MEDICAL PATHOLOGY

STUDENT BOOK
SENIOR 6

ASSOCIATE NURSING PROGRAM

First Edition

FOREWORD

Dear Student

The Rwanda Basic Education Board is pleased to introduce this textbook of Medical Pathology of the Associate Nursing Program. This resource is crafted to support competence-based teaching and learning, ensuring a uniform approach to mastering the Medical Pathology. Our educational philosophy is designed to help you realize your full potential at each level of your education, equipping you to integrate effectively into society and seize career opportunities.

The Rwandan government emphasizes the alignment of educational materials with the syllabus to enhance your learning experience. Instructional materials, activities, and engagement play a crucial role in shaping how well you learn. This textbook focuses on activities that promote idea development and discovery, whether done individually or in groups.

In a competence-based curriculum, learning is an active process where knowledge, skills, and attitude and values are developed through practical activities and real-life scenarios. To fully benefit from this textbook, you should:

- Engage in activities and laboratory experiments to build your skills.
- Share information through presentations, discussions, and collaborative work.
- Take ownership of your learning and draw insights from your activities.

I extend my gratitude to all those who contributed to the creation of this book, including the Ministry of Health, University of Rwanda, and other institutions. Special thanks go to the dedicated faculty members, nurses, midwives, teachers, illustrators, and designers who worked diligently on this project.

Dr. MBARUSHIMANA Nelson

Director General of Rwanda Basic Education Board

ACKNOWLEDGMENT

I would like to express my deep gratitude to everyone who contributed to the development of this student book. The project would not have succeeded without the support of numerous stakeholders. I extend special thanks to the Ministry of Health for leading the development process.My appreciation also goes to the Health Workforce development staff/MoH, REB staff, University of Rwanda, College of Medicine and Health Sciences, Staff from Health Private training institutions, Teaching hospitals, Level Two Teaching hospitals, district hospitals, National Council of Nurses and Midwives (NCNM),) and Secondary schools having Associate Nursing program.Additional thanks are due to the Ministry of Health, the Ministry of Education, and the Clinton Health Access Initiative (CHAI) for their financial support.

Joan MURUNGI

Head of Curriculum, Teaching and Learning Resources Department / REB

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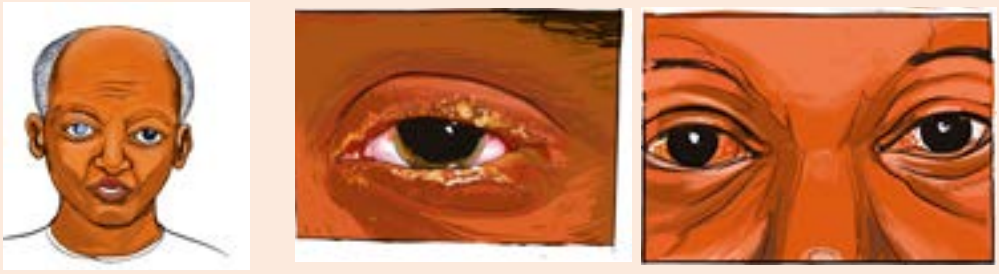
UNIT 1 MEDICAL PATHOLOGIES OF THE EYES

Key unit Competence :

Take appropriate decision on different common medical pathologies of the Eyes.

Introductory activity 1.0

Observe the image below and answer the following questions:



A B C

Figure 1.1 Abnormal conditions of eyes

1. What is the importance of the eyes?
2. Have you ever seen people with such conditions in the community?
3. While observing these eyes, what abnormal findings can you identify?
4. What are some diseases that you know affect the eyes in your community?

1.1 BLEPHARITIS

Learning Activity 1.1

Read carefully the clinical case below and answer the following questions:

N.J 35 year-old man consulted the outpatient department at District hospital with discharges from the right eye that usually occur in the morning. He also had redness of the right eye and swollen right eyelids with burning sensation causing itching of right eye. All the discharges are being fixed at the eyelids causing sensation of an object in the eye. During the history taking, the patient states that his workmate whom they share same bed, same hygiene materials had similar symptoms 2 weeks ago. He went to pharmacy and bought tetracycline ointment application and used it but no success.

Figure 1.2 Inflammation of external parts of eye

1. What are different external parts of the eye structures that have been affected?
2. What are the signs and symptoms the patient was presenting?
3. What could be the possible medical diagnosis that N.J was having?
4. What should be incorporated into the treatment plan of this medical condition?
5. This patient bought the eye medicines from pharmacy and didn't cure his disease; was it good or bad attitude? Justify your response.
6. What will you teach this patient regarding the preventive strategies for cross-contamination?
7. If not treated, what will be the consequences?

The visual system consists of the external tissues and structures surrounding the eye, the external and internal structures of the eye, the refractive media, and the visual pathway. The external structures are the eyebrows, eyelids, eyelashes, lacrimal system, conjunctiva, cornea, sclera, and extraocular muscles. The internal structures are the iris, lens, ciliary body, choroid, and retina.

The entire visual system is important for visual function. At any stage of life, every structure of the eye can be affected that result in changes in visual acuity.

Common pathologies that affect the eyes are: blepharitis, allergic reactions, conjunctivitis, myopia, hypermetropia (hyperopia), cataract as age related disease, etc.

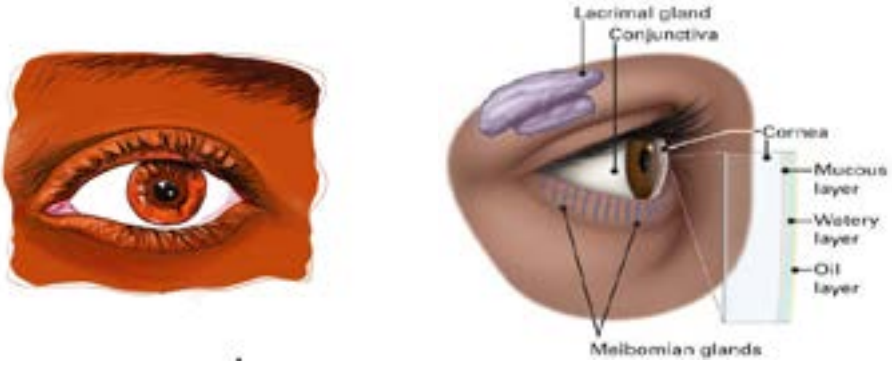


Figure 1.3 External structure of the eye

Blepharitis is a common chronic ophthalmologic condition characterized by inflammation of the eyelid margin associated with eye irritation.

Causes and Risk factors

The causes and pathophysiology of blepharitis differ basing on the type (posterior blepharitis and anterior blepharitis).

The causes of blepharitis include: excess bacteria, a blocked oil gland on the eyelid, hormone problems, allergies (eye medication, contact lens solutions or eye makeup), infection with virus, skin conditions such as seborrheic dermatitis, rosacea (a skin condition characterized by facial redness), eczema and tiny insects called mites. Factors that may provoke or exacerbate blepharitis symptoms include allergic conjunctivitis, cigarette smoking, poor hygiene and retinoid use.

Pathophysiology

Blepharitis comprises two types: posterior and anterior blepharitis. **Posterior blepharitis**: Is more common type of blepharitis. It is characterized by inflammation of the inner portion of the eyelid at the level of the meibomian glands. Hyper keratinization of the meibomian gland ductal epithelium is an early finding in

patients with posterior blepharitis. Altered lipid composition in gland secretions leads to instability of the tear film. The abnormal secretions also have a direct toxic effect on the ocular surface. Additionally, the altered lipid composition provides an environment that promotes bacterial growth, which trigger the meibomian gland abnormalities. Long-term inflammation leads to gland dysfunction and fibrosis as well as damage to the eyelid and ocular surface.

The bacteria that comprise the lid and conjunctival flora in posterior blepharitis are the same as those on normal skin but present in greater numbers and these include coagulase-negative staphylococci, *Corynebacterium* species and *Cutibacterium acnes*. Bacterial lipase produced by colonizing bacteria on the ocular surface may contribute to the differences in lipid composition in the tear film in patients with blepharitis. **Anterior blepharitis**: Anterior blepharitis is less common than posterior blepharitis and characterized by inflammation at the base of the eyelashes. The pathophysiology of anterior blepharitis is not completely understood, although colonizing staphylococcal bacteria appear to play a role.

Anterior blepharitis can be further categorized as staphylococcal or seborrheic type:

Staphylococcal type is characterized by fibrinous scales and crust around the eyelashes caused by colonization of the eyelids by *Staphylococcus aureus* and coagulase-negative staphylococci. Staphylococci may alter meibomian gland secretion and cause blepharitis via various mechanisms including direct infection of the lids, production of staphylococcal exotoxin, and provoking an allergic response or a combination of all these factors.

Seborrheic type is characterized by a red, itchy rash and white scales. It can be on parts of the face as well, including the folds around the nose and behind the ears, the forehead, and the eyebrows and eyelids.

Other possible causes of both anterior and posterior blepharitis include contact (allergic) dermatitis, eczema, and psoriasis. Contact blepharitis is an acute inflammatory reaction of the skin of the eyelids, usually occurring as a reaction to an irritant. Factors that may provoke or exacerbate blepharitis symptoms include allergic conjunctivitis, cigarette smoking, contact lens use, and retinoid use.

Signs and Symptoms

Patients with either anterior or posterior blepharitis generally present with chronic recurrent symptoms, which may vary over time, involving both eyes. These include red, swollen, or itchy eyelids, burning sensation, pink eyes, excessive tearing (which can be a sign of dry eye), crusting or matting of eyelashes in the morning (when discharge from the eye dries on the lids), scaling of the eyelid skin, light sensitivity, blurred vision.

Symptoms of an associated chronic inflammatory skin condition may also be noted like facial redness or flushing suggestive of rosacea; itchy skin involving the scalp, external ear, central face, or trunk suggestive of seborrheic dermatitis.

Figure 1.4 Signs and symptoms of blepharitis

Investigations

The most important aspect in diagnosing the blepharitis is eye examination, and the major findings of blepharitis on physical examination include pink or irritated eyelids, which may be associated with crusting (occur when discharge from the eye dries on the lids). Slit lamp allows for more detailed examination of the Meibomian glands, which can help distinguish between posterior and anterior blepharitis.

Figure1.5 Patient being examined using the slit lamp

Other testing investigations might be helpful: fundus exam: using an ophthalmoscope, swabbing skin for testing (use swab to collect a sample of the oil or crust that forms on eyelid) and culture, microscopic examination of the eyelash, imaging techniques (meibography).

The Snellen eye chart is also used among the other visual screening tests. It is a simple screening tool used for determining visual acuity, the ability to see far images clearly. With the chart away, the examiner asks the client to cover one eye and identify letters of decreasing size (from big to small size).

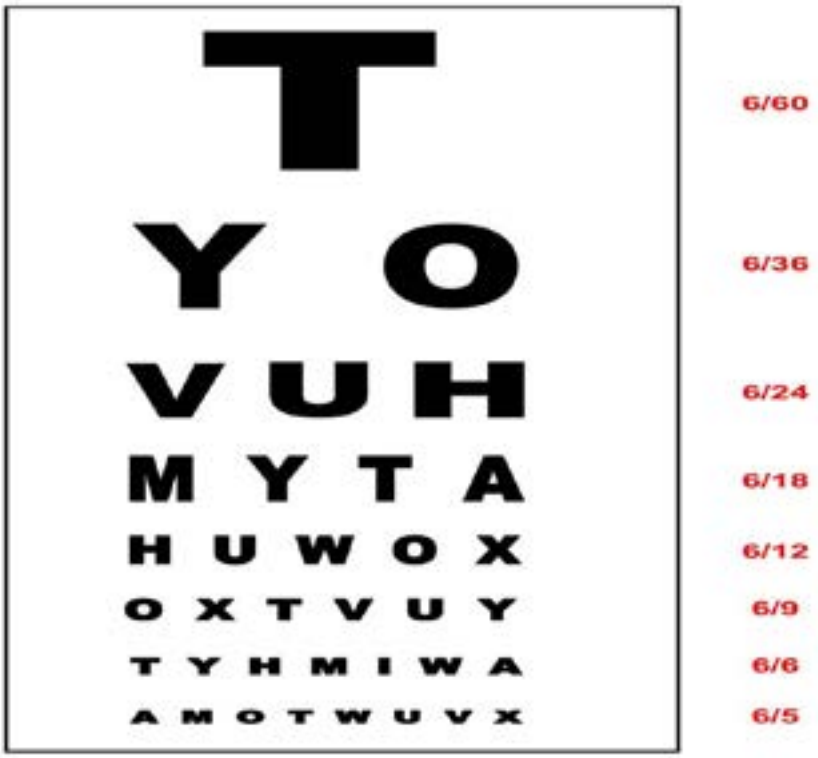


Figure 1.6 The design of Snellen Chart.

Medical Diagnosis

Blepharitis is a clinical diagnosis based on characteristic findings of redness and irritation of the eyelid margin associated with crusting or flakes on the lashes or lid margins. Because these eye pathologies might be associated with other comorbidities, patients must be screened for major organ diseases (baseline complete blood count; blood sugar levels; renal: urea, creatinine; liver: ASAT, ALAT).

Treatment Plan

There is no cure for blepharitis, but when the condition is persistent, the management should include:

a) General approach:

Good lid hygiene is the mainstay of treatment for all forms of blepharitis. The goal is to alleviate symptoms and to develop a maintenance regimen to prevent or minimize future exacerbations.

All patients should be advised to eliminate or limit potential triggers or exacerbating factors (e.g., allergens, cigarette smoking). Contact lenses may continue to be worn if comfortable.

The management of contact (allergic) blepharitis consists of eliminating use of the offending agent (e.g., cosmetics). Patients who use cosmetics should be vigilant about removing their makeup at night, cleaning applicators, and avoiding old or expired products.

b) Mild to moderate symptoms:

Blepharitis is a chronic condition that requires long-term management. The intensity level of treatment varies based on patient symptoms. The lid hygiene measures for symptom relief in patients with chronic posterior or anterior blepharitis has been demonstrated to be effective.

For patients with mild to moderate symptoms, management consists of: Lid hygiene measures using warm compresses (application of heat to the lids and meibomian glands to liquefy the abnormal solidified secretions by heating them. Heat may also promote increased circulation in the meibomian glands and thereby increase the quantity of secretions); lid massage and lid washing (help empty the meibomian glands and improve secretion, especially in patients with posterior blepharitis, and and artificial tears (these eyedrops used to lubricate dry eyes to help maintain moisture on the outer surface of the eyes. Lid massage should be performed immediately following application of a warm compress, a few times a day). The primary care practitioner can generally manage these patients.

Patient with severe or refractory symptoms: for patients who do not respond to the symptomatic measures described above and for those with severe symptoms, there should be initiation of treatment with topical antibiotics (e.g.: erythromycin, azithromycin) or oral antibiotic therapy (e.g.: doxycycline, tetracycline, azithromycin). Because of the potential for systemic side effects with oral drugs, topical therapy is usually tried first. These patients with severe or refractory symptoms should be referred to an ophthalmologist.

Other treatment options include topical glucocorticoids (eg: rimexolone, loteprednol etabonate, and fluorometholone) and topical cyclosporine (only to be prescribed by or in consultation with an ophthalmologist).

Blepharitis associated with *Demodex* species infestation can be treated either with oral ivermectin.

Most patients with blepharitis can be diagnosed and managed by the primary care practitioner. If the diagnosis is not clear based upon clinical manifestations, referral to an ophthalmologist for slit-lamp exam (if not available in primary care site) is advised. Indications for referral are severe eye redness, pain, or light sensitivity; impaired vision; corneal abnormalities (e.g., erosions, ulcers, scarring); uncertain diagnosis or concern for malignancy; severe or refractory symptoms with poor response to standard management.

Blepharitis preventive measures:

Some lifestyle changes that will help in preventing the blepharitis:

- Keep the eyelids clean
- Remove all eye makeups before bed
- Don’t use the eyeliner on the back edges of eyelids, behind the lashes
- In the early stages of treating blepharitis, prevent further irritation by not using makeups
- Once you restart using makeup, consider replacing products used in or near the eyelids, as they may be contaminated

Evolution and complications

Good lid hygiene is the mainstay of treatment for all forms of blepharitis and lead to good outcome. The severe form can lead to many complications: loss of eyelashes, excess tears, dry eyes leading to cornea infection or inflammation, inflamed eyes that can lead to infection or to the formation of chalazion (a red bump on the eyelid. It is sometimes called an eyelid cyst or a meibomian cyst. It slowly forms when an oil or meibomian gland becomes blocked), scarring of the eyelids, conjunctivitis.

Self-assessment 1.1

A. Short answer Questions

1. Describe the anatomy and physiology of the eyes.
2. Identify different approaches that are used for visual screening and explain them.
3. Identify questions to ask during an eye assessment.
4. Describe diagnostic studies for eye function.
5. What should the nurse teach all patients with conjunctival infections secondary to blepharitis?
6. Describe different treatment modalities for a patient with severe symptoms of blepharitis.
7. What is the rationale of lid wash in the management of moderate blepharitis management?
8. Basing on their causes and pathophysiology, differentiate the posterior and anterior blepharitis.
9. List the most common signs and symptoms of blepharitis
10. List all complications related to blepharitis.

B. Case study

Read carefully the scenario below and answer the following questions:

A male patient of 62 years consulted the health center because of swollen left eyelid for the past 5 months accompanied by left eye secretion and excessive tears that have not been previously treated. The patient also presented burning sensation causing itching of left eye. The patient also had red, swollen left eyelids with burning sensation causing itching of left eye. The patient also had many discharges that dried on the lower left lid and had contact with conjunctiva. The patient also had blurred vision mainly when focusing by left eye. The ophthalmologic examination revealed the left lower lid was inflamed and had lashes that were having contact with the conjunctiva, dilation of the holes of Meibomian glands that was hard and painless during palpation.

1. What is the most likely diagnosis the patient was presenting?
2. To conclude on the diagnosis, what additional information would be looking for during the comprehensive physical exam and focused eye assessment?
3. Explain different causes or risk factors related to that medical condition.
4. What will be the management plan for that medical condition?

5. What are the complications related to that medical condition?
6. What are the preventive measures would you advise the patient for better management of that medical condition?

1.2 CONJUNCTIVITIS

Learning Activity 1.2

Read carefully the case scenario below and answer the questions below:

A 34-year-old female presented with complaints of persistent sticky eyelids, watery and green ocular discharge, redness, soreness and slightly blurred vision in both eyes for about 3 weeks. The symptoms started 1 month ago; where the right eye was affected first. She was treated with chloramphenicol (0.5%) initially, but no improvement was reported. She then had ocular swab taken for polymerase chain reaction (PCR) testing and pus sample was sent for culture and was advised not to continue to use antibiotics until the confirmation from results. She reported on the visit that the left eye now felt worse and noticed an increase in green discharge but a decrease in redness since the drop discontinuation. She had flu 1 month but did not take any medications. The Polymerase chain reaction (PCR) testing did not reveal the proper diagnosis and the culture result was still pending.

1. What were the signs and symptoms was the patient presenting?
2. What are medical conditions of eye that patient may present?
3. What were the risk factors that exposed the patient to develop that medical condition?
4. What are the investigations requested to that patient?
5. After seeing all the signs and symptoms above, what are different possible medical diagnosis the patient was having?
6. What are different treatments options to this patients' medical condition?
7. If not treated, what do you think will be the complications?

Conjunctivitis is a common diagnosis in patients who complain of a red eye. It is usually a benign or self-limited condition, or one that is easily treated. It is an inflammation of the conjunctiva. The conjunctiva is the mucous membrane that lines the inside surface of the lids and covers the surface of the globe up to the limbus (the junction of the sclera and the cornea). The portion covering the globe

is the bulbar conjunctiva, and the portion lining the lids is the tarsal or palpebral conjunctiva.

The conjunctiva is generally transparent. When it is inflamed, as in conjunctivitis, it appears pink or red on general inspection. All conjunctivitis is characterized by a red eye, but not all red eyes are conjunctivitis.

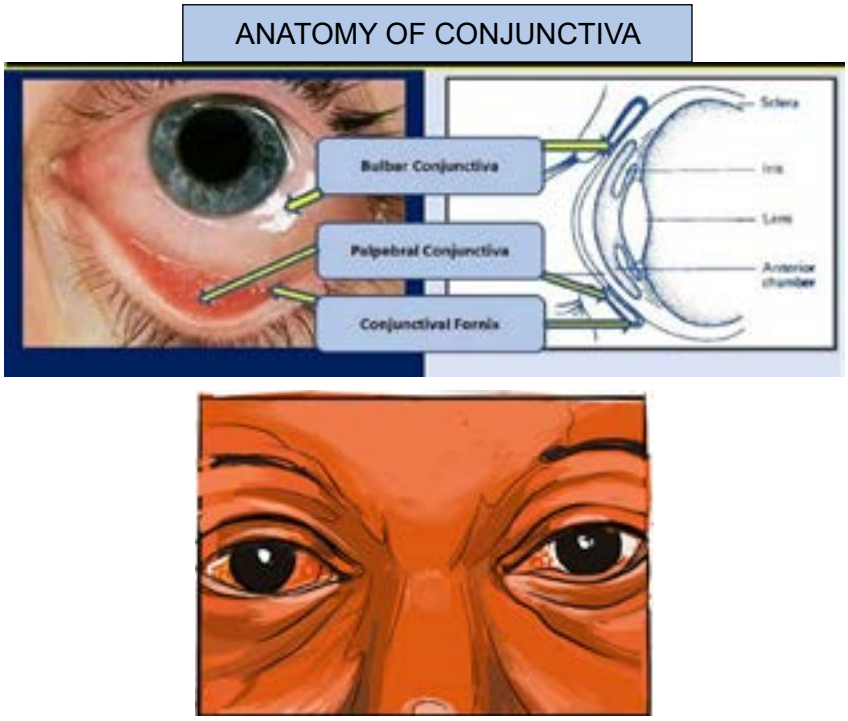


Figure 1.7 Normal eye and eye with conjunctivitis

The conjunctivitis is an infection or inflammation of the transparent membrane that lines the eye and eyeball**.**

Causes and risk factors of conjunctivitis

Conjunctivitis can be classified as infectious (bacterial or viral) or noninfectious (allergic, toxic, or nonspecific). Each type of conjunctivitis has its causes and risk factors. Bacterial conjunctivitis is more common in children than in adults.

Bacterial conjunctivitis: Bacterial conjunctivitis is commonly caused by Staphylococcus aureus, Streptococcuspneumoniae, Haemophilusinfluenzae,and Moraxella catarrhalis. Staphylococcus aureus infection is more common in adults; the other pathogens are more common in children. Bacterial conjunctivitis is highly contagious and is spread by direct contact with the patient and their secretions or with contaminated objects and surfaces. Hyperacute bacterial conjunctivitis can occur due to Neisseria species, particularly Neisseria Gonorrhoeae, can cause a hyperacute bacterial conjunctivitis that is severe and sight-threatening, requiring

immediate ophthalmologic referral. The organism is usually transmitted from the genitalia to the hands and then to the eyes.

Neonatal conjunctivitis may be caused by blocked tear, irritation produced by antimicrobials given at birth, infection by virus or bacterium from the mother to her baby during childbirth. **Viral conjunctivitis: v**iral conjunctivitis is typically caused by adenovirus, with many serotypes implicated. The conjunctivitis may be part of a viral prodrome followed by adenopathy, fever, pharyngitis, and upper respiratory tract infection, or the eye infection may be the only manifestation of the disease. Viral conjunctivitis is highly contagious; it is spread by direct contact with the patient and their secretions or with contaminated objects and surfaces.

Allergic conjunctivitis: Is caused by airborne allergens contacting the eye that trigger a classic type I immunoglobulin E (IgE)-mediated hypersensitivity response specific to that allergen, causing local mast cell degranulation and the release of chemical mediators including histamine, eosinophil chemotactic factors, and platelet-activating factor, among others. **Toxic conjunctivitis**: also called toxic keratoconjunctivitis, is a chronic inflammation of the surface of the eye due to an offending agent, usually a preservative or medication.

Noninfectious, non-inflammatory conjunctivitis: patients can develop a red eye and discharge that is not related to either an infectious or inflammatory process. Usually the cause is a transient mechanical or chemical insult.

Pathophysiology

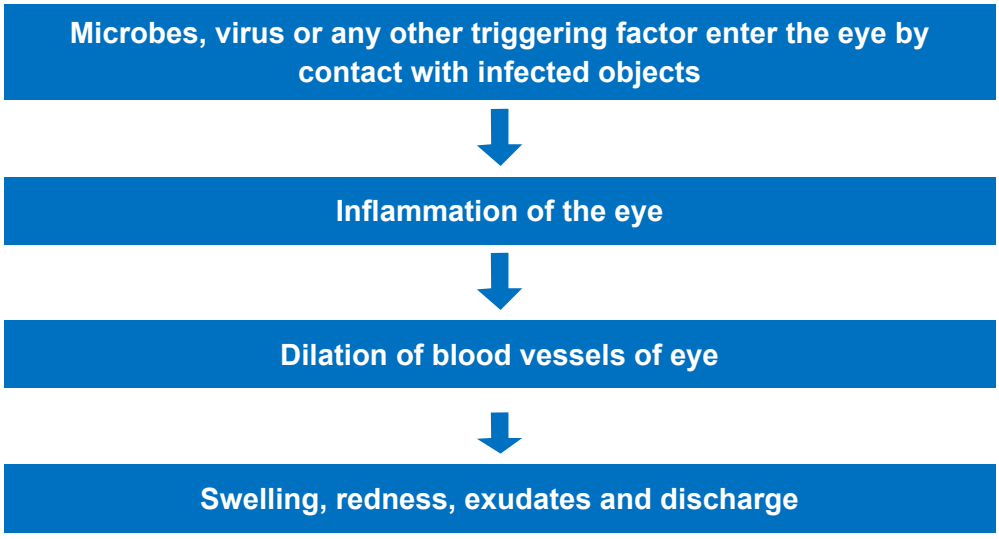


Diagram 1.1: Pathophysiology of conjunctivitis

Signs and symptoms

Red eye, swelling of the conjunctiva and watering of the eyes are symptoms common to all forms of conjunctivitis. The following table summarizes the signs and symptoms of different conjunctivitis.

Symptoms	Bacteria	Viral	Allergic
Systemic symptoms	Usually none	May be part of a viral prodrome followed by adenopathy,fever, pharyngitis, and upperrespiratory tract infection. There may be an enlarged and tender pre-auricular node.	Nasal congestion, sneezing, wheezing.
Itching	Limited to none	Limited to none. Primary complaint is grittiness, burning or irritation.	Primary and major complaint. May also report grittiness, burning, or irritation.
Ocular discharge	Purulent, may be yellow, white, or green. Recurs at lid margins and corners of the eye within minutes of wiping lids.	Watery with strands of mucus.	Watery
Conjunctival appearance	Pink or red	Pink or red. Very rarely hemorrhagic. Palpebral conjunctiva may have a follicular appearance.	Pink. Bulbar conjunctiva may be chemotic (puffy). Palpebral conjunctiva may have a follicular or appearance

Table1.1 Summary of clinical differences of all types of conjunctivitis

Investigations

Conjunctivitis can be diagnosed through a comprehensive eye examination. Testing, with special emphasis on the conjunctiva and surrounding tissues, may include:

- Patient history to determine the symptoms, when the symptoms began, and whether any general health or environmental conditions are contributing to the problem.
- Visual acuity measurements to determine whether vision has been affected.
- Evaluation of the conjunctiva and external eye tissue using bright light.
- Evaluation of the inner structures of the eye to ensure that no other tissues are affected by the condition.
- Supplemental investigations include taking swabs or smears for cultures, stains and polymerase chain reaction (PCR) from the conjunctival tissue. This is particularly important in cases of chronic conjunctivitis, or when the condition is not responding/fail to improve, or to respond to treatment.
- Other basic laboratory investigations: complete blood count, blood sugar levels, renal function tests, liver function tests can also be done to rule out the other existing conditions.

Medical diagnosis

The primary criteria for diagnosing the conjunctivitis should base on the clinical manifestations. Bacterial conjunctivitis is more common in children than in adults. Cultures or stains are not necessary for the initial diagnosis and therapy of conjunctivitis as they are reserved only for atypical or chronic cases that fail to improve or respond to therapy. Persistent signs and symptoms should prompt evaluation by an ophthalmologist.

Treatment plan

Treating conjunctivitis has three main goals: increase patient comfort, reduce or lessen the course of the infection or inflammation, prevent the spread of the infection in contagious forms of conjunctivitis. The appropriate treatment for conjunctivitis depends on its cause:

A. General considerations

Preventing contagion: bacterial and viral conjunctivitis are both highly contagious and spread by direct contact with secretions or contact with contaminated objects. Infected individuals should not share handkerchiefs, tissues, towels, cosmetics, linens, or eating utensils. **Need for examination prior to therapy**: patients are always pressurizing the health care professionals to prescribe antibiotics for conjunctivitis, even when there is nothing to suggest a bacterial process. In principle, only those

diagnosed with bacterial conjunctivitis should receive antibiotics. Otherwise the eye examination must be done carefully and rely on findings to decide the management.

There is no role for corticosteroid use: ophtalmologic corticosteroids (either alone or in combination steroid/antibiotic drops) are not effective and have no role in the management of acute conjunctivitis by primary care clinicians. Corticosteroids can cause sight-threatening complications (e.g., corneal scarring, melting, and perforation) when used inappropriately. Chronic ophthalmic corticosteroid treatments can also cause cataract and glaucoma. Corticosteroids use must be decided by competent healthcare professional..

Specific therapy: Therapy should be directed at the likely etiology of conjunctivitis suggested by the history and physical examination performed carefully.

Bacterial common conjunctivitis: antibiotic treatment is required for acute conjunctivitis in contact lens wearers as well as for cases of adult inclusion conjunctivitis or hyperacute bacterial conjunctivitis. Preferred choices include erythromycin, azithromycin, chloramphenicol ophthalmic ointment or trimethoprim-polymyxin B drops. Common alternative therapies include bacitracin ointment and bacitracin-polymyxin B ointment. Fluoroquinolones are not first-line therapy for routine cases of bacterial conjunctivitis because of concerns regarding emerging resistance and cost.

Viral conjunctivitis: there is no specific topical or systemic antiviral agents for the treatment of viral conjunctivitis. Systemic antibiotic and antiviral therapies play no role. Symptomatic relief may be achieved with: topical antihistamine/decongestants, warm or cool compresses, nonantibiotic lubricating agents such as those used for noninfectious conjunctivitis.

Allergic conjunctivitis: The first step is to remove or avoid the irritant, if possible. Cool compresses and artificial tears sometimes relieve discomfort in mild cases. In more severe cases, nonsteroidal anti-inflammatory medications and antihistamines may be prescribed. People with persistent allergic conjunctivitis may also require topical steroid eye drops. Oral antihistamines may also be prescribed. **Toxic conjunctivitis**: the primary approach to toxic conjunctivitis is recognition and removal of the offending agent. Stopping as many topical agents as feasible is a good first step. **Chemical conjunctivitis:** careful flushing of the eyes with saline is a standard treatment for chemicalconjunctivitis. People with chemical conjunctivitis also may need to use topical steroids.

Evolution and Complications

Early diagnosis and treatment lead to good outcome and will help prevent the condition from becoming worse. Patients with acute bacterial conjunctivitis usually respond to treatment within one to two days by showing a decrease in

discharge, redness, and irritation. Patients who do not respond should be referred to an ophthalmologist. Patients with other forms of acute conjunctivitis (e.g., viral or allergic) usually improve within two weeks, and those who do not should also be referred to an ophthalmologist. Complications of conjunctivitis are the major reasons for urgent ophthalmologic referral:

- Reduction of visual acuity (concerns about infectious keratitis, iritis, angle-closure glaucoma)
- Infectious keratitis, iritis, and angle-closure glaucoma; photophobia (concerns about infectious keratitis, iritis)
- Severe foreign body sensation that prevents the patient from keeping the eye open (concerns about infectious keratitis)
- Corneal opacity (concerns about infectious keratitis)
- Severe headache with nausea (concerns about angle-closure glaucoma)
- Hyperacute bacterial conjunctivitis or epidemic keratoconjunctivitis and dry eye
- Photophobia and severe foreign body sensation are also characteristic of corneal abrasion.

Self-assessment 1.2

A. Short answer questions

1. Basing on their causes, differentiate all types of conjunctivitis.
2. Using a table, differentiate the bacterial, viral, and allergic reaction basing on their symptoms.
3. What is the rationale of taking swabs from discharges among the patients with conjunctivitis?
4. Describe all treatments modalities specific to each type of conjunctivitis.
5. List some effective behavior change activities need to prevent seriousness and complications of conjunctivitis.
6. List the warning signs and symptoms that must prompt urgent referral to ophthalmologist.

B. Case study

Read carefully the scenario below and answer the following questions:

A 34-year-old female presented who lives at around 2km from where the village fetches water from, presented at clinic with complaints of sticky eyelids, watery and pus like ocular discharge, redness, soreness and slightly blurred vision in both eyes. The symptoms started 2 weeks ago; the right eye was affected first. Prior the development of such symptoms, she had history lower abdominal pain and dysuria that were resolved without treatment. She was prescribed with initially erythromycin, but as no improvement was reported, it was replaced by chloramphenicol (0.5%); improvement was only noticeable on the first day.

She then had ocular swab taken for polymerase chain reaction (PCR) and culture testing and was advised not to use chloramphenicol (0.5%); until the confirmation of results. She reported on the visit that the left eye now felt worse and noticed an increase in pus like discharge but a decrease in redness since the drop discontinuation. She also reported photophobia and felt something that prevented her to open the left eye. Prior ocular history included a metal foreign body removal from the right eye 10 years ago. She had flu 3 weeks ago but is in good health now, was not atopic and she was not taking any medications.

1. What is the medical condition is this patient suffering from?
2. From the case described, identify all risk factors that contributed to the development of such medical condition.
3. Why do you think she was advised not to take the chloramphenicol (0.5%) until the laboratory results are available?
4. What are the warning signs that show that the patient had complications? What are different complications was she experiencing?
5. Describe all elements that should constitute the management plan of this patient.
6. List and justify all interventions you would advise her to do in order to minimize the seriousness of complication and avoid cross-transmission to other family members.

1.3 MYOPIA

Learning Activity 1.3

Read Carefully the below scenario and answer the following questions

K is pupil in Primary education, and during taking note he has difficulties to see the letters written on black board, headache, sometimes he goes home without notes, he needs to squint to see clearly the teacher asks himself what are the problems faced by K during classroom. On visual acuity test perform in ophthalmology department using Snellen chart, he shown unable to ready Letters at 6-meter long. In additional K is kind pupil with good behavior without disturbance. The teacher continues to ask himself and parents what are the problems.

At end of day, the teacher changes the places at desk near to black board and child starts writing correctly.

Questions

1. What are the signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What medical investigation might you expect to be ordered to guide the confirmation of the medical problem?
4. What will be included in the treatment plan of this medical condition?
5. What could be the consequences if delayed or not treated adequately?

Myopia (or nearsightedness) affects 20% to 30%of the population but this eye disorder is corrected easily by eyeglasses, and contact lens or surgery. It is the most common cause of impaired vision in people under age 40. Myopia runs in families and usually appears in childhood.

Figure 1.8 Children who have difficulty to see nearest things

In **nearsightedness** (myopia), the point of focus is in front of the retina, making distant objects appear blurry. Nearsightedness (myopia) is a common vision condition in which the patient can see objects near to him/her clearly, but objects farther away are blurry

Myopia occurs when light focuses in front of the retina, the distance objects look blurred.

Signs and Symptoms of myopia

If the patient is nearsighted, he/she will have difficulty reading road signs and seeing distant objects clearly, but will be able to see well for close-up tasks such as reading and computer use. Other signs and symptoms of myopia include squinting, eyestrain and headaches. Feeling fatigued when driving or playing sports also can be a symptom of uncorrected nearsightedness.

The most common symptoms of nearsightedness are trouble seeing things that are far away, needing to squint to see clearly, and eyestrain (when the eyes feel tired or sore).

Causes and risk factors of myopia

Myopia occurs when the eyeball is too long, relative to the focusing power of the cornea and lens of the eye. This causes light rays to focus at a point in front of the retina, rather than directly on its surface.

Nearsightedness can also be caused by the cornea and/or lens being too curved for the length of the eyeball. In some cases, myopia occurs due to a combination of these factors. Myopia typically begins in childhood and carries a higher risk if the parents are nearsighted. In most cases, nearsightedness stabilizes in early adulthood, but sometimes it continues to progress with age.

The factors contributing to the development of myopia include genetic and hereditary factors. Those are associated with the development of myopia, Lack of complete concordance between myopia and monozygotic twins, as well as between generations in families, suggests a polygenic inheritance model with influence of gene-environment effects and **reading**. An association in children between myopia and prolonged reading or reading at close range is well documented. Continuous hyperopic defocusing that occurs during prolonged periods of reading may lead the emmetropization mechanism to increase the axial length of the eye, leading to myopia, medications: Myopia can develop rapidly following use of certain medications. Sulfa-derived medications (e.g., sulfamethoxazole, topiramate and diuretics (e.g. furosemide, acetazolamide) can induce transient.

Diabetes mellitus transient refractive changes in patients with diabetes mellitus are well documented. Alterations in serum osmolality secondary to changes in blood

glucose levels can cause an influx of osmotic fluid into the lens with subsequent lens swelling and a transient increase in refractive power or myopia. As a result, patients with type I or type II diabetes often present with transient blurred vision, particularly those with poorly controlled glucose. Ocular **trauma** can cause forward displacement of the lens with subsequent myopia.

Excessive accommodation, patients with pathologically excessive accommodation may have "accommodative spasm." The symptoms may include double vision and myopia. Anxiety and patient behaviors (forced excessive convergence by focusing on a near object) are common causes, but traumatic brain injury and Para sympathomimetic medications can also lead to excessive accommodation. **Increased intraocular pressure:** Although the rate of myopia progression may be associated with increased intraocular pressure, data from the Correction of Myopia Evaluation Trial have shown no correlation between intraocular pressure and myopic progression. **Maternal** age at birth and maternal smoking during pregnancy revealed to be a risk factor. **Light exposure:** The role of light exposure in the development of myopia is unclear. After adjusting for confounders, children who spend more time in outdoor activities have a lower prevalence of myopia

Pathophysiology overview of myopia

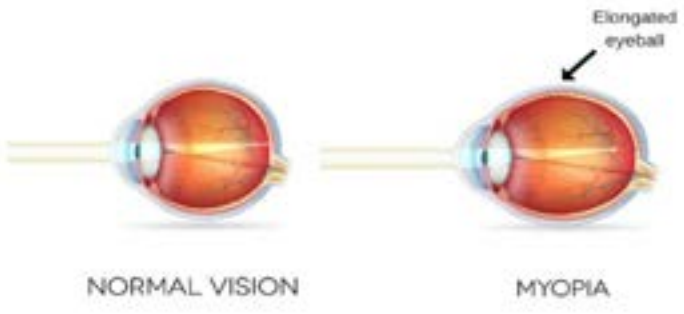


Figure 1.9 Normal vision versa Myopia

In a short- sighted eye, the eyeball is elongated or stretched, creating a longer distance between the cornea and the retina (the "front" and the "back" of the eye) in these eyes the cornea may also have a different shape. This combination causes light to not focus properly.

Refractive error in the eye happens when the shape of the eyeball prevents light from correctly focusing on the retina. If the eyeball is longer than normal (oblong) or shorter than normal, it changes the shape of the cornea and lens, causing an abnormal image to be projected on the retina in the back of the eye.

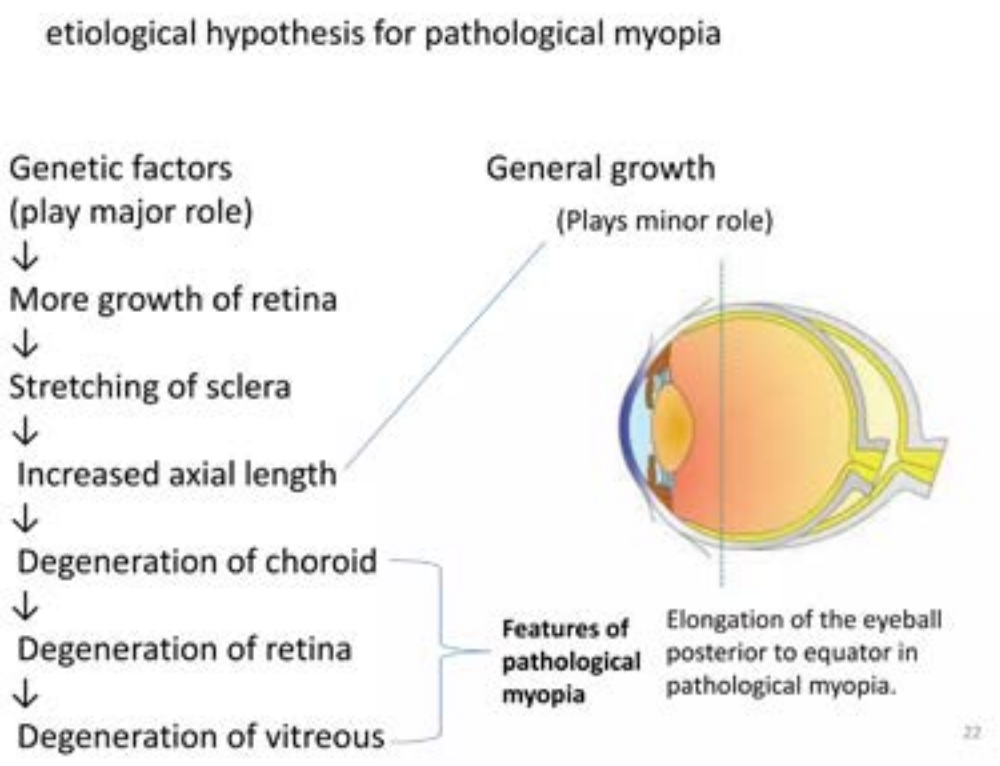


Diagram 1.2 Etiological hypothesis for pathological myopia

Investigations

Myopia is a refractive error that occurs when the eye is longer than normal or has a cornea which is too steep. People with myopia, also known as **short- or near-sightedness**, can see near objects clearly, but objects further away appear blurred and out of focus. Normal vision can be restored by prescribing the correct spectacles or contact lenses.

The following are the steps used for detection of myopia

History, symptoms and signs

Indicators of myopia include:

- Poor distance vision
- Viewing objects from an unusually short distance
- Poor concentration in school
- Squinting or peering through narrowed eyes.

People with myopia may complain of:

- Blurred distance vision
- Frontal headaches

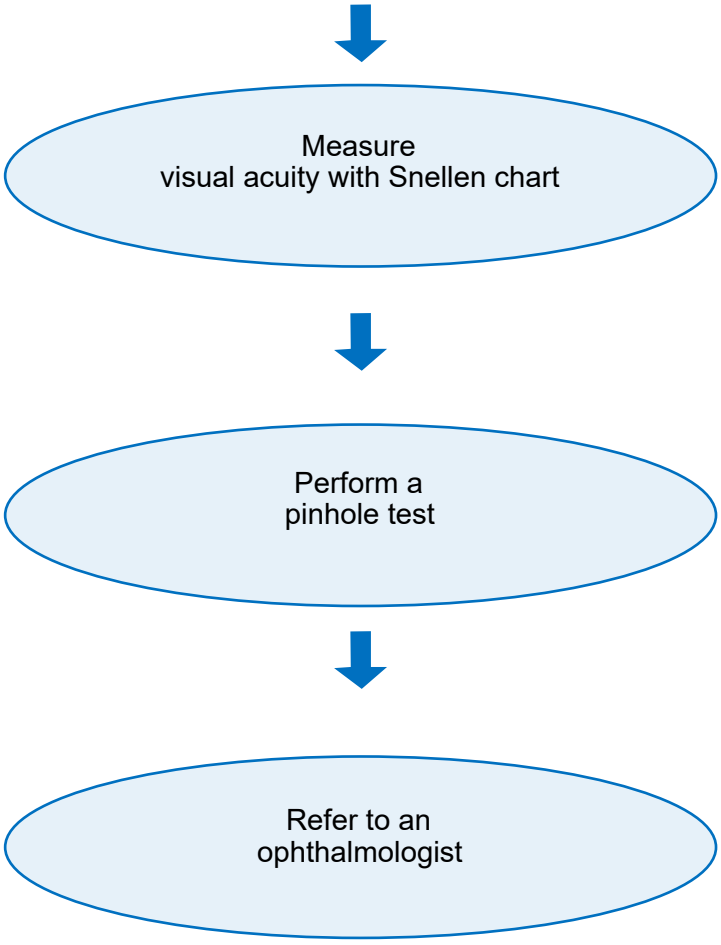


Diagram 1.3 Steps used for myopia detection

Figure 1.10 Testing visual acuity using a tumbling E chart

Adequate medical diagnosis of myopia

Nearsightedness is diagnosed by a basic eye exam, which includes a refraction assessment and an eye health exam. A refraction assessment determines if the patient has vision problems such as nearsightedness or farsightedness, astigmatism, or presbyopia.

Treatment plan of myopia

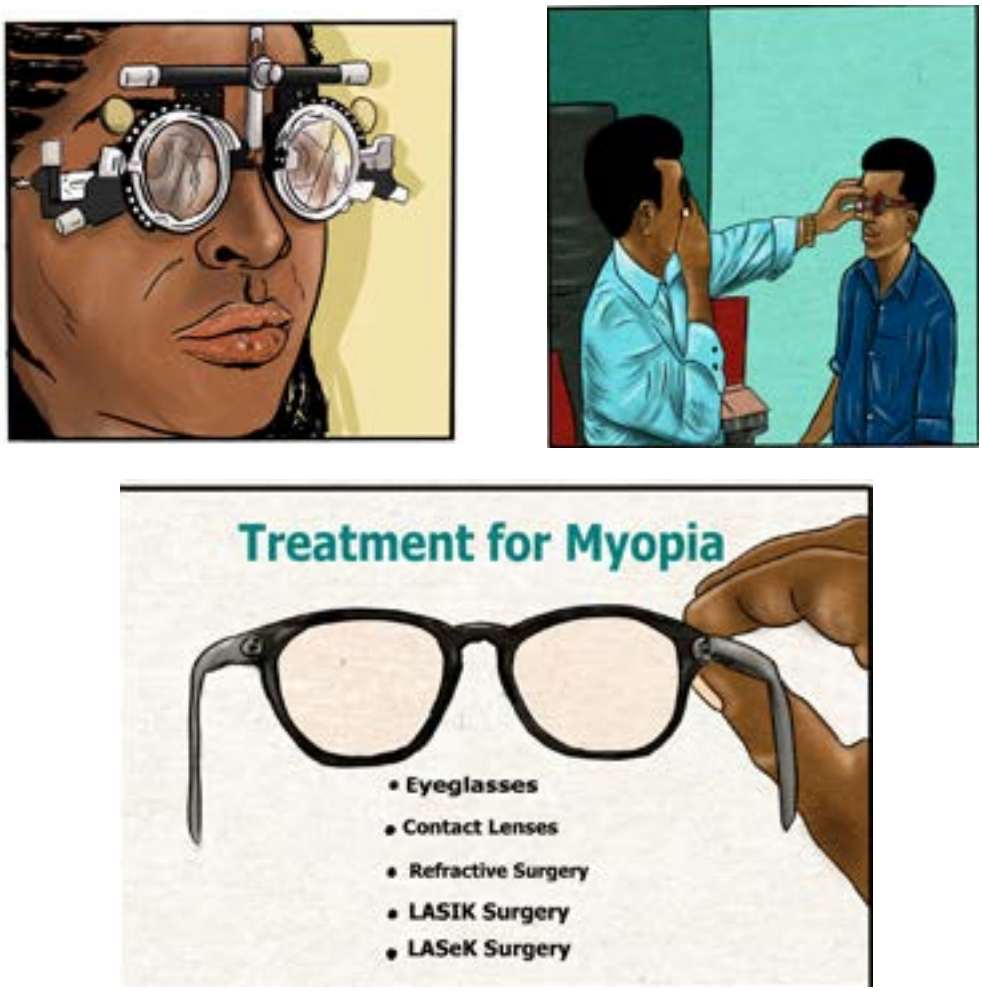


Figure 1.11 Treatment of myopia

The most common treatments for nearsightedness are eyeglasses or contact lenses. The healthcare professional will prescribe the right lenses to help patients see as clearly as possible.

Adults can also get surgery to treat nearsightedness. The surgery changes the shape of the cornea so it can focus light clearly. For children with progressive nearsightedness, there are some effective myopia control methods available, including atropine eye drops, myopia control glasses, myopia control contact lenses and Ortho-k contact lenses. For others, nearsightedness can be corrected with standard prescription eyeglasses, contact lenses or refractive surgery. Depending on the degree of myopia, patients may need to wear glasses or contact lenses all the time or only when they need very clear distance vision, like when driving, seeing a chalkboard or watching a movie.

Pharmacological management of myopia includes atropine, pirenzepine, anti-hypoxia drugs. **Atropine** is a non-selective muscarinic antagonist that has shown the most encouraging results for slowing the progression of myopia in children. **Pirenzepine** has been used as an alternative to atropine treatment for pediatric myopia.It is known to have reduced mydriatic and cycloplegic effects compared to atropine and is prone to fewer side effects in patients. Exhibit anti-hypoxic effects in cardiac myocytes, which may hold great potential to treat scleral hypoxia in myopia, have known Anti-Hypoxia Drugs such as salid and for mononetin.

Surgical Management of myopia is characterized by progressive axial elongation as well as progressive thinning and weakening of the posterior sclera. Surgical intervention to halt the progression of myopic axial elongation and scleral weakening has sparked the interest of many vitreoretinal surgeons. One such surgical management is the macular buckle surgery.

The preventive measures of myopia, numerous interventions to prevent the progression of childhood myopia are being studied. They range from increasing sunlight exposure and limiting near work, to ant muscarinic pharmacological agents, to specialized contact lenses. To prevent myopia from worsening, spend time outside and try to focus on objects that are in the distance. It includes also taking breaks when using computers or cell phones, vision therapy, talking to the healthcare professional on how to prevent myopia. Increased time spent outdoors is a protective factor for myopia progression. Under correction increased myopia progression and optimal correction is mandatory. The use of progressive or bifocal lenses (spectacles or contact lenses) may yield a slowing of myopia by limiting eye accommodation.

Lifestyle and home remedies

1. Have eyes checked regularly, even if seeing well.
2. Control chronic health conditions.
3. Protect the eyes from the sun.
4. Prevent eye injuries.
5. Eat healthy foods.
6. Do not smoke.
7. Use the right corrective lenses.
8. Use good lighting.

The complications of myopia

The complications of myopia include **cataract formation**, retinal detachment from peripheral retinal tears, myopic foveoschisis, macular hole with or without retinal

detachment, peripapillary deformation, dome-shaped macula, choroidal/scleral thinning, myopic choroidal, limitations in instrumental activities of daily living (IADLs) falls, decreased ability to drive or work, and depression.

Self-assessment 1.3

1. List at least five signs and symptoms of myopia
2. State at least any three preventive measures for myopia complications development
3. State any three cause and risk factors of myopia
4. List three main medical treatment options, to correct nearsightedness

1.4 HYPERMETROPIA

Learning Activity 1.4

A 80 years old patient comes to you at the ophthalmology department of Ruhengeri hospital where you are working together with the ophthalmologist technician. He came to the health center presenting with history of headache, blurred vision, eye discomfort, difficult in reading his newspapers as he did before, he states that he can clearly read only the written scripture that are far from him. He is now worried about how he can ready again his newspapers effectively. Eye muscle test and Visual acute test were performed and revealed the weaknesses of eye muscle. In addition, they shown inability to identify different letters of the alphabet printed on a screen positioned at the near distance, bifocal eyeglasses was ordered to this old man .

Questions

1. Basing on those signs and symptoms, what could be the medical problem of this patient?
2. What are signs and symptoms that patient is presenting?
3. What medical investigations might you expect to be ordered to guide the confirmation of the medical problem?
4. What will be included in the medical and nursing management of this case?
5. What could be the consequences if delayed or not treated adequately?

The most common reflective error in childhood is hyperopia, human beings are predominantly hyperopic and as the age progresses, hyperopic eyeballs grow to

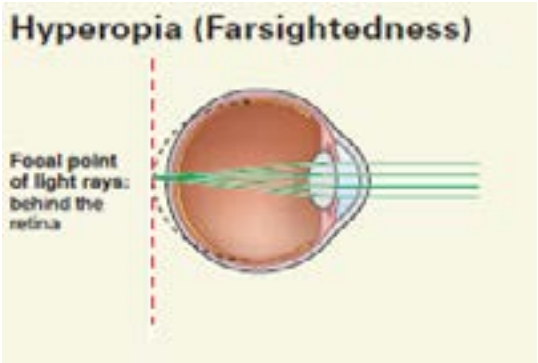
become myopic. Hyperopia occurs when the refracting power of the eye is too weak, most commonly when the eye is too short relative to the refracting power of the cornea and lens. Hyperopia (also termed hypermetropia or farsightedness) is the opposite of myopia.

Hypermetropia also called Hyperopia, Farsightedness or long –sightedness is defined as the reflective condition of the eye where parallel rays coming from the infinity are focused behind the neurosensory retina or inability to accommodate for near objects.

In hyperopia, the focal point of the image is posterior to the retina, and the image is blurred when it reaches the retina.

Images of near objects focus behind, instead of on, the retina from an imperfection in the shape of the eye or lens.

People with it can see distant objects clearly but have difficulty seeing objects up close.



adapt the figure (illustrators)

Figure 1.12 Hyperopia (farsightedness)

Pathophysiology of hypermetropia

The axial shortening of the eyeball or decreased converging potential of the cornea or crystalline lens due to flattening are common responsible factors for simple hyperopia. Congenital or acquired absence of the crystalline lens resulting in loss of converging capacity leads to the pathological hyperopia. Senile changes in cortical lens fibers lead to change in the refractive index causing index hyperopia. Paralysis of accommodation (by cycloplegic drugs) and loss of accommodation due to complete third nerve palsy or internal ophthalmoplegia cause functional hyperopia. It causes the light rays to focus behind the retina and requires the patient to use accommodation to focus the light rays on the retina for near objects. This type of refractive error occurs when the cornea or lens does not have adequate focusing power or when the eyeball is too short.

Causes and risk factors of hypermetropia

The causes of hypemetropia are related to the types of hyperopia and are classified as the following: **Axial hyperopia** (most common - simple hyperopia): It is due to anterior-posterior **axial shortening of the eyeball**. **Genetic predisposition** plays an important role. **Curvature hyperopia**: It is due to **flattening of the cornea** or the lens or both. **Index hyperopia**: It is due to the change in the refractive index of the crystalline lens, which occurs in old age or diabetics. **Positional hyperopia** or **absence of the lens** or **ocular pathologic conditions**: This condition occurs due to malposition or absence of the crystalline lens (congenital or acquired)

Signs and symptoms of hyperopia

The symptoms of hyperopia vary from person to person. The eye care professional can help to understand how the condition affects the client. Hyperopia or farsightedness referred to the presence of nearby objects that may appear blurry, the patient may need to squint to see clearly, eyestrain, including burning eyes and aching in or around the eyes, general eye discomfort or a headache after doing close tasks such as reading, writing, computer work or drawing.

Figure 1.13 A patient with difficulties in reading nearest letters

Medical diagnosis of hyperopia

An eye care professional can diagnose hyperopia and other refractive errors during a comprehensive dilated eye examination. People with this condition often visit their eye care professional with complaints of visual discomfort or blurred vision.

Investigations

In order to make a proper diagnosis of hyperopia, the following test needs to be performed at different levels of health care settings:

a. **Eye muscle test**: This test evaluates the muscles that control eye movement. The healthcare professional watches as patient's eyes eyes follow a moving

object, such as a pen or small light. He or she looks for muscle weakness, poor control or poor coordination.

b. **Visual acute Test:** This test measures how clearly patients see. The healthcare professional asks the patient to identify different letters of the alphabet printed on a chart or a screen positioned some distance away. The lines of type get smaller as you move down the chart. Each eye is tested separately. Patient's near vision also may be tested, using a card with letters held at reading distance. For more details: (see Above Snellen chart).

c. **Refraction assessment**

Light waves are bent as they pass through patient's cornea and lens. If light rays don't focus perfectly on the back of patient's eye, They have a refractive error. It means that patients need some form of correction, such as glasses, contact lenses or refractive surgery, to see as clearly as possible.

d. **Visual field Test (Perimetry)**

The visual field is the full extent of what a person can see to the sides without moving his or her eyes. The visual field test determines whether a client has difficulty in seeing anywhere in his or her overall field of vision.

Figure 1.14 Visual field Test (Perimetry)

e. **Color vision Testing:** distinguishing certain colors, the healthcare professional might screen patient's vision for a color deficiency. To do this, the healthcare professional shows you several multi-colored dot-pattern tests.

f. **Slit-lamp examination:**

A slit lamp is a microscope that magnifies and illuminates the front of eye with an intense line of light. The healthcare professional uses this device to examine the eyelids, lashes, cornea, iris, lens and fluid chamber between cornea and iris.

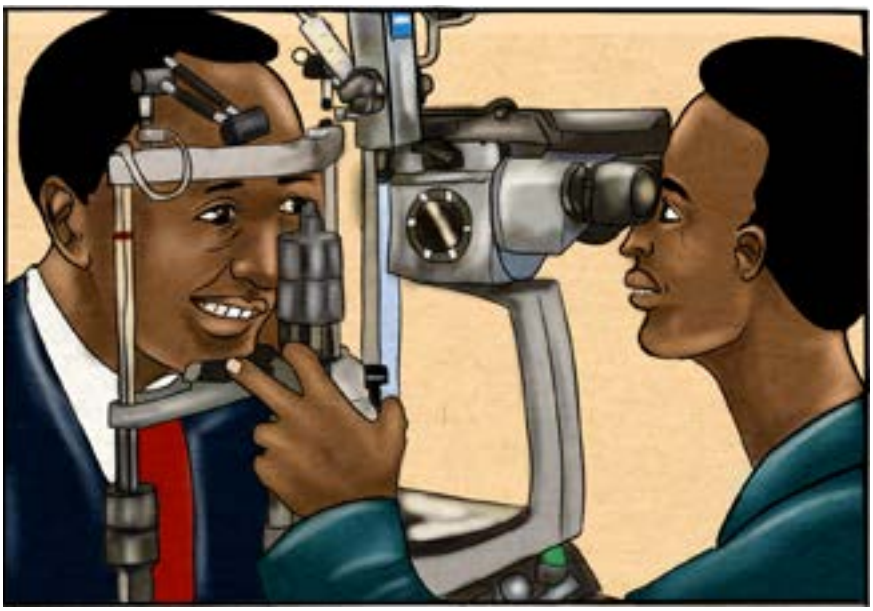


Figure 1.15 Slit-lamp examination

Retinal examination: It is also called **ophthalmoscopy** or **Fundus copy**.

This examination allows the ophthalmologist to evaluate the back of the client's eye including the retina, the optic disk and the retinal blood vessels that nourish the retina. Having the client's pupils dilated with eye drops before the exam keeps the pupils from getting smaller when the ophthalmologist shines light into the eye.

Figure 1.16 Retinal examination called ophthalmoscopy or funduscopy

Treatment plan of hypermetropia

The current treatment of hyperopia evolves and can be corrected with eyeglasses, contact lenses, bifocal Glasses those includes:

a. **Glasses**: This the standard treatment for all children and adult for the majority
b. **Contact lens:** contacts are great option, you can change the color of the patient eyes and this could be tried during a contact lens examination.
c. **Bifocal glasses**: This is an excellent and effective treatment for moderate levels of hyperopia in young people as it enhances a young person's ability to see up and far away. convex lenses for hyperopia act by strengthening the lens system, or increasing its power in diopters

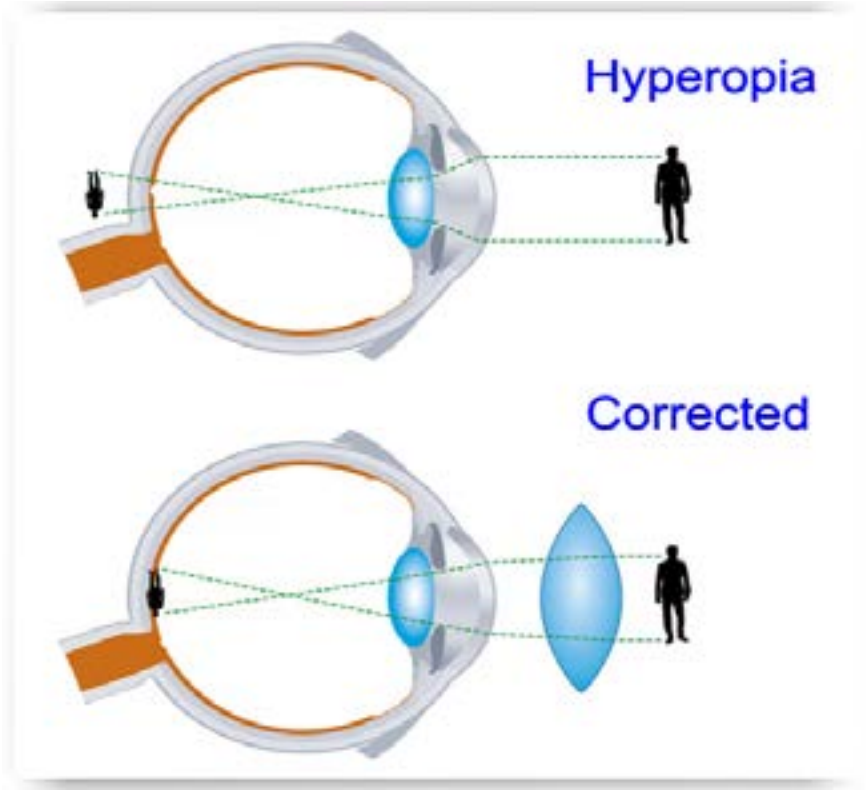


Figure 1.17 Picture showing hypermetropia and after corrected

Farsightedness can be associated with several problems, such as:

- **Crossed eyes:** Some children with farsightedness may develop crossed eyes. Specially designed eyeglasses that correct for part or all of the farsightedness may treat this problem'
- **Reduced quality of life:** With uncorrected farsightedness, patients might not be able to perform a task as well as they wish. In addition the limited vision may detract from enjoyment of day-to-day activities.

- **Eyestrain:** Uncorrected farsightedness may cause patients to squint or strain their eyes to maintain focus. This can lead to eyestrain and headaches.
- **Impaired safety:** Safety of oneself and others may be jeopardized with an uncorrected vision problem. This could be especially serious when driving a car or operating heavy equipment.
- **Financial burden:** The cost of corrective lenses, eye exams and medical treatments can add up, especially with a chronic condition such as farsightedness.

Self-assessment 1.4

1. List at list two signs and symptoms of hypermetropia
2. Enumerate any two causes of hypermetropia
3. List at least two investigations to confirm hypermetropia disease
4. What are the options for treating hypemetropia?
5. State any four complications of hypermetropia

1.5 CATARACT

Learning Activity 1.5

Read Carefully the below pictures and answer the following questions

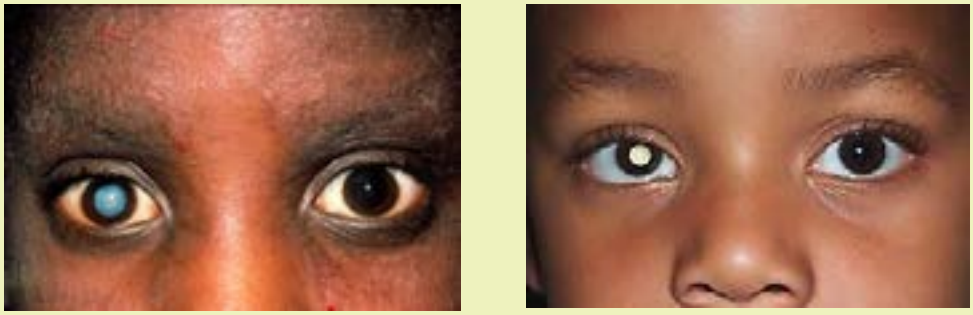


Figure1.18 Normal eye and eye with opacity

1. Differentiate the normal and abnormal eye on the above-observed figure.
2. Which diseases affect the eyes?
3. What is the medical diagnosis for both patients above?

The eye has a high powered natural lens which helps to focus the light rays falling into the eyes onto the retina. Like other tissues of the body, the lens is also made up of multiple cells. When these cells become old due to aging, they tend to opacity and cloud the vision.

Cataracts develop slowly but eventually in everyone. There is no escaping it, just as everyone has to age. Cataract starts affecting one's eyesight and interferes with one's vision. At an early stage, spectacles and stronger lighting may help you deal with the condition. However, when the cataract starts interfering with day-to-day activities, cataract surgery might be only option.

Cataract is opacity in the lens of the eye, which progressively reduces visual functioning. A cataract is a clouding of the normally clear lens of the eye.

There are different types of cataracts including Cataracts affecting the center of the lens (nuclear cataracts), Cataracts that affect the edges of the lens (cortical cataracts), Cataracts that affect the back of the lens (posterior sub capsular cataracts), and Cataracts you're born with (congenital cataracts).

a. **Cataracts affecting the center of the lens (nuclear cataracts).** A nuclear cataract may at first cause more nearsightedness or even a temporary improvement in the reading vision. However, with time, the lens gradually turns more densely yellow and further clouds vision.

   As the cataract slowly progresses, the lens may even turn brown. Advanced yellowing or browning of the lens can lead to difficulty distinguishing between shades of color.

b. **Cataracts that affect the edges of the lens (cortical cataracts).** A cortical cataract begins as whitish, wedge-shaped opacities or streaks on the outer edge of the lens cortex. As it slowly progresses, the streaks extend to the center and interfere with light passing through the center of the lens.

c. **Cataracts that affect the back of the lens (posterior subcapsular cataracts).** A posterior subcapsular cataract starts as a small, opaque area that usually forms near the back of the lens, right in the path of light. A posterior subcapsular cataract often interferes with reading vision, reduces vision in bright light, and causes glare or halos around lights at night. These types of cataracts tend to progress faster than other types do.

d. **Cataracts you are born with (congenital cataracts).** Some people are born with cataracts others develop them during childhood. These cataracts may be genetic, or associated with an intrauterine infection or trauma.

Signs and symptoms of cataract

Cataracts can develop in one or both eyes. They are painless and do not cause any changes in the appearance of eyes. Vision is not usually affected early on when cataracts are small, but they usually worsen over time and can cause a gradual deterioration of sight.

The most common symptoms of cataracts include:

- Clouded, blurred or dim vision
- Increasing difficulty with vision at night
- Sensitivity to light and glare
- Need for brighter light for reading and other activities
- Seeing “halos” around lights
- Frequent changes in eyeglass or contact lens prescription
- Fading or yellowing of colors
- Double vision in a single eye

Pathophysiology of cataract

Opacity of the lens is a direct outcome of oxidative stress. Based on location of opacification within the lens, age-related cataracts are classified into three types: cortical, nuclear, and posterior subcapsular cataracts.

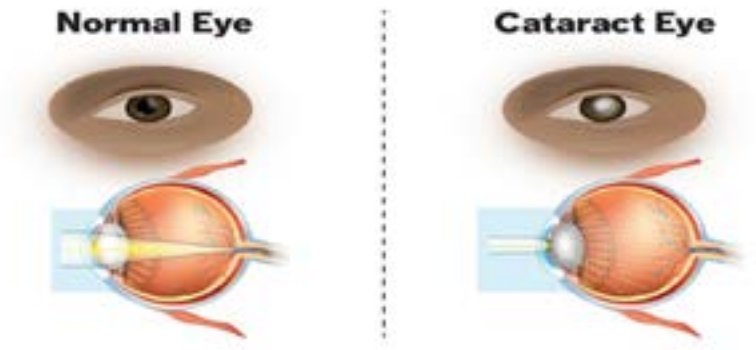


Figure 1.19 Normal versa cataract eye

Altered the metabolic process within lens

↓

Reduction in oxygen uptake

↓

Increas in water content followed by dehydration

↓

Prote in the lens undergoes numerous age related changes

↓

Causes the formation of cataract

Diagram 1.4 Pathophysiology of cataract

Causes and risk factors of cataract

Most cataracts develop when aging or injury changes the tissue that makes up the eye's lens. Proteins and fibers in the lens begin to break down, causing vision to become hazy or cloudy. Some inherited genetic disorders that cause other health problems can increase risk of cataracts. Cataracts can also be caused by other eye conditions, past eye surgery or medical conditions such as diabetes. Long-term use of steroid medications, too, can cause cataracts to develop. In detail, the following are the most risk factors contributing to cataract.

1. **Congenital and Developmental cataracts-**

Exact cause of congenital cataract is not known. Some of the factors, which have been thought to cause the cataract are listed below:

- Genetics- this especially applies to cataracts which are present from birth
- Maternal factors during pregnancy like- malnutrition, infections, certain drugs intake, radiation exposure
- Fetal or infantile factors- Deficient oxygenation, metabolic disorders like galactosemia, associated with congenital anomalies, birth trauma, malnutrition
- Idiopathic

2. **Acquired cataract**

In this form, the opacification of the lens is because of degenerative changes in the lens, but the exact cause of degeneration is not known.

- Hereditary
- UV irradiations
- Dietary factors deficiency (Vitamin E, Vitamin C, Riboflavin)
- Smoking
- Excessive alcohol intake
- Metabolic diseases- Diabetes mellitus, Galactosemia, Hypocalcaemia
- Eye inflammation or injury
- Drugs- Corticosteroids induced, toxic drugs like- Busulphan, allopurinol etc.

Investigations of cataract

To determine that the client has a cataract, the healthcare professional will review the medical history and symptoms, and perform an eye examination. The healthcare professional may conduct several tests, including:

- Visual acuity test. A visual acuity test uses an eye chart to measure how well patients can read a series of letters. ...
- Slit-lamp examination. A slit lamp allows healthcare professional to see the structures at the front of eye under magnification.
- Retinal exam.
- Applanation tonometry.

Adequate medical diagnosis of myopia

Eye cataracts can be diagnosed by an optometrist or an ophthalmologist by performing a series of tests, usually included in a comprehensive eye examination. The following tests help doctors diagnose eye cataracts and determine their severity.

a. Visual Acuity

A visual acuity test measures quality of vision at certain distances.

b. Potential Acuity Test

A potential acuity test or Potential Acuity Meter (PAM) test is a different way to measure how good the eye will see if the cataract did not exist. Surgeons need to know that the cataract surgery will improve the patient's vision. A PAM test projects a visual acuity eye chart with letters into the eye with a laser and bypasses the cataract.

c. Contrast Sensitivity

Contrast sensitivity testing is similar to visual acuity testing but places greater emphasis on how cataracts can decrease image contrast due to light scattering and glare caused by the cataract.

d. Slit Lamp

A slit lamp is a special type of microscope that magnifies the eye so that healthcare professional can examine the lens to determine the presence and severity of a cataract.

e. Pupil Dilation

Pupil dilation is a common test used in diagnosing cataracts. However, when the eye is dilated the pupil increases in size, offering a view of the entire lens.

By thoroughly examining the lens, the healthcare professional can determine whether a cataract is affecting the quality of vision.

Treatment plan

a. Non-Surgical Cataract Treatment

Early cataract treatment aims to improve the quality of vision. When cataract symptoms appear, client may experience cloudy or blurry vision, light sensitivity, poor night vision, double vision, and changes the eyewear prescription. Certain changes can significantly reduce these symptoms.

Cataract symptoms may be improved with new eyeglasses, anti-glare sunglasses, or magnifying lenses. Certain tints and coatings also can be added to lenses to reduce symptoms.

b. Surgical Cataract Treatment

If non-surgical measures do not help, surgery is the only effective treatment. It is considered when a cataract progresses and decreases vision to a point that it interferes with the lifestyle and daily activities.

Prevention

No studies have proved how to prevent cataracts or slow the progression of cataracts. However, doctors think several strategies may be helpful, including:

- **Have regular eye examinations.** Eye examinations can help detect cataracts and other eye problems at their earliest stages. Ask the healthcare professional how often the client should have an eye examination.
- **Quit smoking.** Ask the healthcare professional for suggestions about how to stop smoking. Medications, counseling and other strategies are available.
- **Manage other health problems.** Follow the treatment plan if the patient have diabetes or other medical conditions that can increase the risk of cataracts.
- **Choose a healthy diet that includes plenty of fruits and vegetables.** Fruits and vegetables have many antioxidants, which help maintain the health of the eyes.
- **Wear sunglasses.** Ultraviolet light from the sun may contribute to the development of cataracts. Wear sunglasses that block ultraviolet B (UVB) rays when the client is outdoors.
- **Reduce alcohol use.** Excessive alcohol use can increase the risk of cataracts.

Complications of cataract

Posterior Capsular Opacification (PCO) occurs when a cloudy layer of scar tissue forms behind the lens implant. It is the most common complication of cataract surgery. PCO can begin to form at any point following cataract surgery. Modern cataract surgery creates a capsular bag that contains part of the anterior, the entire posterior capsule, and the implanted, intraocular

Cataract surgery risks include: inflammation, infection, bleeding, swelling, drooping eyelid, dislocation of artificial lens, retinal detachment, **glaucoma**, posterior capsule opacification (PCO),intraocular lens dislocation, light, **Photopsia** (perceived flashes of light),macular edema (swelling of the central retina)**,ptosis** (droopy eyelid),ocular hypertension (elevated eye pressure)

What will happen if cataract is left untreated?

- Over time, cataracts become worse and start to interfere with vision. Important skills can be affected, such as driving, and loss of vision can affect the overall quality of life in many ways including reading, working, hobbies and sports. If left untreated, **cataracts will eventually cause total blindness**.

Self-assessment 1.5

1. What are the signs and symptoms of cataract?
2. What are the causes of cataract?
3. What are the types of cataract?
4. What are the complications of cataract?

End unit assessment 1

SECTION A: Short answers questions

1. All the following criteria: a chronic inflammation of the eyelid margins, formation of scales and granulations on the eyelashes, white eyelashes may result from this condition, Staphylococcus aureus may be a primary infecting organism; are characteristics of medical pathology of eye called: "……."

2. All the following criteria: symptoms include hyperemia and edema of conjunctiva, etiology may be bacterial, fungal, viral, or allergic, lay person's term for condition is "pink-eye"; are characteristics of medical pathology of eye called: "……."

3. All the following criteria: corneal edema is a common sign in this disorder, ulceration and infection are associated with this disorder, cycloplegics and mydriatics may be prescribed, etiology is usually associated with trauma or compromise, systemic or local defense mechanisms; are characteristics of medical pathology of eye called: "……."

4. An opacification of the lens usually associated with the aging process, vision is clouded because light to the retina is blocked, associated with compromised night vision; are characteristics of medical pathology of eye called: "……."

5. Hypermetropic eye is corrected by using _____ lens.

SECTION B: Multiple Choice Questions

1. During a routine eye examination, a patient complains that she is unable to read road signs at a distance when driving her car. The physician knows to check for:
   a. Astigmatism.
   b. Anisometropia.
   c. Myopia.
   d. Presbyopia.

2. A diagnostic clinical manifestation of glaucoma is:
   a. A significant loss of central vision.
   b. Diminished acuity.
   c. Pain associated with a purulent discharge.
   d. The presence of halos around lights.

3. Pharmacotherapy for primary glaucoma that decreases the outflow of aqueous humor would include all of the following *except*:
   a. Alpha-adrenergic agonists.
   b. Carbonic anhydrase inhibitors.
   c. Beta-blockers.
   d. Miotics.

4. Acute bacterial conjunctivitis is characterized by:
   a. Blurred vision.
   b. Elevated intraocular pressure.
   c. A mucopurulent ocular discharge.
   d. Severe pain.

5. The patient is diagnosed with presbyopia. When he asks the nurse what that is, what is the best explanation the nurse can give to the patient?
   a. Abnormally long eyeballs
   b. Absence of crystalline lens
   c. Correctable with cylinder lens
   d. Loss of accommodation associated with age

6. What should the nurse teach all patients with conjunctival infections to use?
   a. Artificial tears to moisten and soothe the eyes
   b. Dark glasses to prevent the discomfort of photophobia
   c. Warm moist compresses to the eyes to promote drainage and healing
   d. Frequent and thorough hand washing to avoid spreading the infection

7. What is an important health promotion nursing intervention related to glaucoma?
   a. Teaching individuals at risk for glaucoma about early signs and symptoms of the disease
   b. Preparing patients with glaucoma for lifestyle changes necessary to adapt to eventual blindness
   c. Promoting regular measurements of intraocular pressure for early detection and treatment of glaucoma
   d. Informing patients that glaucoma is curable if eye medications are administered before visual impairment has occurred

8. The defect of vision in which a person cannot see the distant objects clearly but can see nearby objects clearly is called
   a. Myopia
   b. Hypermetropia
   c. Presbyopia
   d. Bifocal eye

9. The medical condition in which the lens of the eye of a person becomes progressively cloudy resulting in blurred vision is called
   a. Myopia
   b. Hypermetropia
   c. Presbyopia
   d. Cataract

10. The defect of vision in which the image of nearby objects is formed behind the retina, is
   a. Myopia
   b. Short-sightedness
   c. Hypermetropia
   d. Presbyopia

11. The least distance of distinct vision for a normal eye is
    a. Infinity
    b. 2.5 cm
    c. 25 m
    d. 25cm

12. Which part of the eye that is affected by cataract?
    a. Retina
    b. Lens
    c. Cornea
    d. Vitreous

13. Who are more likely to get cataract?
    a. Diabetics
    b. Eye trauma
    c. Long term steroid use
    d. All of the above

14. What are the signs of cataract?
    a. Blurring of vision
    b. Double vision in one eye
    c. Halos around light
    d. All of the above

15. Latest technique of cataract removal utilizes :
    a. Infrared light
    b. Ultraviolet light
    c. Ultrasound
    d. None of the above

16. Myopia and hypermetropia can be corrected by
    a. Concave and plan convex lens
    b. Concave and convex lens
    c. Convex and concave lens
    d. Plano-concave lens for both defects.

UNIT 2 MEDICAL PATHOLOGIES OF EAR

Key unit Competence:

Take appropriate decision on different common medical pathologies of ear.

Introductory activity 2

Carefully observe the picture below and answer the following questions:

Figure 2.1 Abnormal ear conditions

1. What do you think above persons are complaining?
2. What could be the causes of these observed clinical features?

Middle ear infection (**otitis media**) is an acute inflammation or infection in the middle ear. Clients may have acute or chronic forms of either serous otitis media, also known as secretory or non suppurative otitis media, or the purulent or suppurative otitis media.

Although otitis media is more common among young children, adults can and do develop middle ear infections. One of the main consequences of otitis media is conductive hearing loss. **Hearing loss** may result in speech and language disorders as well as a delay in academic development.

'Deaf' people mostly have profound hearing loss, which implies very little or no hearing. They often use sign language for communication.

Earwax, also called cerumen, is made by the body to protect the ears. The earwax has both lubricating and antibacterial properties. Untreated buildup can lead to hearing loss, irritation, pain in the ear, dizziness, ringing in the ears and other problems.

Ear injuries and trauma can cause damage to any part of the outer or inner ear. Accidents, loud noises, changes in air pressure, trauma from contact sports and foreign objects in the ear can cause injuries. Ear injuries can lead to dizziness, balance problems, hearing loss or changes in the ear's appearance. Some ear injuries need surgical repair.

Foreign bodies of the ear, which are relatively common in emergency medicine, are seen most often, but not exclusively, in children.

Various objects may be found in the ear, including toys, beads, stones, folded paper, and biologic materials such as insects or seeds.

2.1. OTITIS MEDIA (ACUTE AND CHRONIC)

Learning Activity 2.1

Carefully read this below situation and answer the following questions:

A 32 years old patient comes to clinical setting with ear pain, fever, drainage from the ear, trouble hearing. The physician examines the insight of ear and finds inflammation of drum and other surrounding membrane with the pus. The physician suspected the ear infection due to the various factors cited during interview, patient said that the cotton swab is always used for removing earwax, and insert some substances from the traditional healers, drinking alcohol and smoking.

The Vital signs were performed. The body temperature was 38.5 degree Celsius, blood pressure 110/70 mmHg; pulse rate was 74beats per minute, respiratory rate was 19 breaths per minutes. The sample of pus taken on laboratory revealed hemophilic influenza; complete blood count (CBC) was performed and revealed white blood cells (WBC) of 130000. Antibiotic drugs were prescribed such as amoxicillin 500mg TDS 7/7, and paracetamol 500mg TDS 3/7 and Ibuprofen 400mg TDS for pain relief. The patients went home take antibiotics two days and stop it for continuing to use traditional medicine, after two weeks' patient complained the hearing loss, tinnitus, and excessive otorrhea.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Acute otitis media (AOM) is an acute, suppurative infectious process marked by the presence of infected middle ear fluid and inflammation of the mucosa lining the middle ear space.

Otitis media: Inflammation of the middle ear characterized by the accumulation of infected fluid in the middle ear, bulging of the eardrum, pain in the ear and, if eardrum is perforated, drainage of purulent material (pus) into the ear canal.

Chronic otitis media (COM) is **a recurrent infection of the middle ear** and/or mastoid air cells in the presence of a tympanic membrane perforation. Symptoms commonly associated with chronic ear disease include hearing loss, otorrhea, aural fullness, otalgia, and occasionally true vertigo.

Chronic suppurative otitis media (CSOM) is the result of an initial episode of acute otitis media and is characterized by a persistent discharge from the middle ear through a tympanic perforation. It is an important cause of preventable hearing loss, particularly in the developing world.

Causes and risk factors

The Eustachian tube is the tube that runs from the middle of the ear to the back of the throat. An AOM occurs when the patient's Eustachian tube becomes swollen or blocked and traps fluid in the middle ear. The trapped fluid can become infected. In young children, the eustachian tube is **shorter** and more **horizontal** than it is in older children and adults. This makes it more likely to become infected.

The risk factors for AOM includes **being between 6 and 36 months old**, using a pacifier, attending daycare, **being bottle fed instead of breastfed** (in infants), and **drinking while laying down** (in infants). In addition, other risk factors such as **exposure to cigarette smoke**, **high levels of air pollution**, experiencing **changes in altitude** and **in climate**, being **in a cold climate**, having had a recent cold, **flu**, **sinus**, or **ear infection can contribute to the development of an AOM.**

Genetics also plays a role in increasing the child's risk of getting AOM.

Pathophysiology

Serous otitis media, a collection of pathogen-free fluid behind the tympanic membrane, results from irritation associated with respiratory allergies and enlarged adenoids. Purulent otitis media usually results from the spread of microorganisms from the eustachian tube to the middle ear during upper respiratory infections such as ***Streptococcus pneumonia*** *(strep)* and ***Haemophilus influenzae*** *(H. flu)*. When fluid or pus collects in the middle ear, pressure increases, which causes the **eardrum to bulge** and spontaneously **rupture** in some cases. Rupture results in a jagged tear of tissue that heals slowly and sometimes incompletely. Scarring

interferes with the vibration of the eardrum, causing **diminished hearing**. Clients with perforated eardrums are prone to **repeated infections**.

Other potentially serious complications can occur. Because the middle ear connects with the mastoid process, a part of the temporal bone, pathogens that are unresponsive to antibiotic therapy can spread, causing **mastoiditis**, or they can travel deeper in the inner ear, causing **labyrinthitis**. Infection also may extend to the meninges, causing **meningitis**, or **brain abscess** may result from its extension to the brain. If septicemia occurs, the infection can spread to the large veins at the base of the brain and cause lateral **sinus thrombosis**. Facial nerve damage and facial paralysis may result from the infection. With prompt and adequate treatment, complications are rare.

Bottle-feeding is a possible risk factor for otitis media as breastfeeding temporarily passes the mother's immunity to the baby, which helps prevent acute otitis media. Children with **cleft palate** or **Down syndrome** are predisposed to ear infections. Children who have acute otitis media before 6 months of age have more frequent later ear infections.

Young children with otitis media may be irritable, fussy, or have problems feeding or sleeping. Older children may complain about pain and fullness in the ear. Fever may be present in a child of any age. These symptoms are often associated with signs of upper respiratory infection such as a runny or stuffy nose or a cough.

Signs and symptoms

The client often describes a history of having had a recent upper respiratory infection or seasonal allergies. Signs and symptoms vary widely depending on the type and severity of the inflammation but may include a **fever**, **tinnitus**, **malaise**, **severe earache**, and hearing loss. **Tenderness** behind the ear indicates mastoiditis. **Redness of the eardrum** and bulging. Pressure in the middle ear or dysfunction of inner ear structures can cause **nausea**, **vomiting**, and **dizziness**. If the tympanic membrane perforates, fluid drains into the external acoustic canal and pain is relieved. Infants and children may have one or more of the following symptoms: Crying, irritability, sleeplessness, pulling on the ears, ear pain, a headache, neck pain, a feeling of fullness in the ear, fluid drainage from the ear, a fever, vomiting, diarrhea, irritability, a lack of balance and hearing loss.

***Figure2.2**: Otitis media (acute and chronic)*

Investigations

Figure 2.3 Investigation for ear infection

A health care provider will diagnose a middle ear infection by doing a physical exam and an ear exam and by asking questions about past health history.

The health care provider uses a tool called a **pneumatic otoscope** to look at the eardrum for signs of an ear infection or fluid buildup. For example, the health care

provider can see if the eardrum moves freely when the otoscope pushes air into the ear.

The white blood cell count shows an elevated number of neutrophils and eosinophils. If the eardrum has ruptured and drainage is present, the cultured drainage reveals a specific infectious microorganism.

Adequate Medical diagnosis

The health care provider may use one or more of the following methods to diagnose AOM: **Otoscopy:** The health care provider uses an instrument called an **otoscope** to look into the patient 's ear and detect the redness**,** swelling**,** blood**,** pus**,** air bubbles, fluid in the middle ear**,** perforation of the eardrum.

Tympanometry: During a tympanometry test, the health care provider uses a small instrument to measure the air pressure in the child's ear and determine if the eardrum is ruptured.

Reflectometry: During a reflectometry test, the child's health care providers uses a small instrument that makes a sound near the child's ear. The healthcare professional can determine if there is fluid in the ear by listening to the sound reflected back from the ear.

Hearing test: The health care provider may perform a hearing test to determine if the child is experiencing hearing loss.

Treatment plan

Management of acute otitis media should begin with adequate analgesia. Antibiotic therapy is given to control the infection.

High-dose amoxicillin (80 to 90 mg per kg per day) is the antibiotic of choice for treating acute otitis media in patients who are not allergic to penicillin. High-dose amoxicillin is recommended as the first-line treatment in most patients, although there are a number of medications that are clinically effective.

After myringotomy, the discharge from the ear is bloody and then purulent. To remove the drainage, the nurse wipes the external ear repeatedly with a dry sterile cotton applicator. An alternative is to insert a loose (not tightly packed) cotton pledget in the external ear to collect drainage.

Evolution and complications

Serious complications of acute otitis media (AOM) include meningitis, brain abscesses, epidural abscesses, mastoiditis, permanent sensorineural hearing loss, and death.

The prognosis of otitis media is usually good with or without treatment, but varies based on the classification. Acute otitis media is self-limited and usually resolves itself within 14 days, and otitis media with effusion will usually resolve itself within 3-6 months.

The complications of AOM are classified by location as the disease spreads beyond the mucosal structures of the middle ear cleft. They may be categorized as follows: Intratemporal - Perforation of the tympanic membrane, acute coalescent mastoiditis, facial nerve palsy, acute labyrinthitis, petrositis, acute necrotic otitis, or development of chronic otitis media.

Self-assessment 2.1

1. What are symptoms of an ear infection?
2. What are the causes of Middle ear infections?
3. Why might hearing loss occur during an ear infection?
4. What are the risk factors for ear infections in infants?
5. What is the purpose ofthe Eustachian tube?

2.2 CERUMEN PLUG (EAR WAX)

Learning Activity 2.2

Carefully read this below situation and answer the following questions:

Mr. L is 81 years old and attends his G. P practice complaining of ear pain and hearing loss. Dr. M examines both ears and notes a build-up of earwax in the auditory canals. She prescribes olive oil eardrops and advises the patient to avoid using ear buds. Mr. L could return to the G. P practice if symptoms do not improve. A week later Mr. L re-attends still suffering hearing loss and pain and “pressure” in both ears. Dr. M finds that there is still significant impacted earwax in both canals. She prescribes sodium bicarbonate eardrops but a month later Mr. M is back at the surgery with the same complaint and on this occasion, Dr. M doubles the dose of eardrops.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Impacted cerumen is accumulated earwax that obstructs the external acoustic meatus. **Eearwax**, also known by the medical term **cerumen**, is a brown, orange, red, yellowish or gray waxy substance secreted in the ear canal of humans and other mammals. It protects the skin of the human ear canal, assists in cleaning and lubrication, and provides protection against bacteria, fungi**,** and water. Earwax consists of dead skin cells, hair, and the secretions of cerumen by the ceruminous and sebaceous glands of the outer ear canal**.** Major components of earwax are long chain fatty acids, both saturated and unsaturated, alcohols, squalene, and cholesterol**.** Excess or compacted cerumen is the buildup of earwax causing a blockage in the ear canal and it can press against the eardrum or block the outside ear canal or hearing aids, potentially causing hearing loss.

Cerumen is produced in the outer third of the cartilaginous portion of the ear canal. It is a mixture of viscous secretions from sebaceous glands and less-viscous ones from modified apocrine sweat glands. The primary components of earwax are shed layers of skin, with, on average, 60% of the earwax consisting of keratin, 12–20% saturated and unsaturated long-chain fatty acids, alcohols, squalene and 6–9% cholesterol.

Causes and risk factors

People who produce a lot of earwax are more likely to have an earwax blockage and impaction, which is where the wax gets pushed deep inside the ear canal. Swimming can cause some people to produce excess earwax.

Hearing aids and earplugs prevent wax from falling out of the ear naturally, which leads to its accumulation inside the ear. The use of items to remove earwax or relieve itching can make the buildup worse. Such items include cotton swabs, or Q-tips, bobby pins, keys, napkin corners. These items can push the wax deeper into the ear canal and harming the sensitive tissues of the ear, possibly leading to permanent damage.

Some people are more likely than others to have earwax problems. People who tend to collect more earwax in their ears include individuals whose ear canals are narrow or not fully formed, people with very hairy ear canals, people with osteomata, or benign bony growths, in the outer part of the ear canal, those with certain skin conditions, such as eczema, older people, because earwax tends to become drier and harder with age, which increases the risk of impaction ,people with recurring ear infections and impacted earwax, individuals with lupus or Sjogren's syndrome.

One way to remove excess earwax at home is to wipe around the outside of the ear with a washcloth. Alternatively, a pharmacist can offer advice about suitable over-the-counter (OTC) treatments. People can also use the following solutions, which are usually also available from a pharmacy, as eardrops: hydrogen peroxide,

a mild antiseptic that is useful for cleaning wounds, baby oil, almond oil, or olive oil, glycerin, mineral oil

To use the eardrops, people should tilt their head so that the affected ear faces upward, place one or two drops in it, and wait for 1–2 minutes in this position. They should then tilt their head so that the ear faces down and allow any liquid to drain out.

If people do this twice a day, the earwax will usually come out within 2 weeks. It often tends to do this at night while a person is asleep.

People should never use a cotton swab or another item to try to extract earwax. Inserting objects into the ear canal can damage sensitive tissues in the ear and make the impaction worse.

Pathophysiology

Impacted cerumen is more common among people who have **excessive thick** or **dry cerumen**. Both qualities interfere with drainage toward the proximal end of the meatus, where cerumen normally leaves the ear during regular shampooing and showering. The trapped cerumen interferes with the transmission of sounds carried on airwaves.

Signs and Symptoms

The client with impacted earwax may experience a sense of fullness or pain in the ears, referred to as otalgia, and diminished hearing. The client asks that words be repeated, misinterprets questions, or raises the volume on the television or radio. Visual inspection with an otoscope shows an orange-brown accumulation of cerumen in the distal end of the external acoustic meatus. Audiometric, Rinne, and Weber tests reveal conductive hearing loss. **Some symptoms of impacted earwax** include Hearing loss, earache, sense of ear fullness, itching in the ear, dizziness, ringing in the ears, cough, tinnitus, which is a ringing in the ear, an ear infection, vertigo, or a sense of being unbalanced that can lead to dizziness and nausea

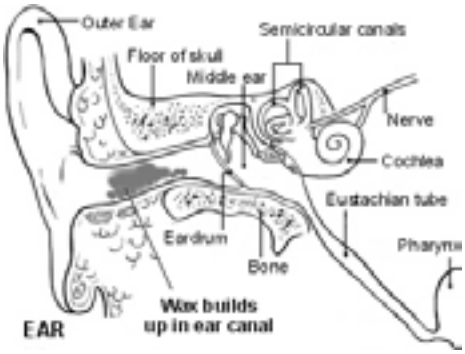


Figure 2.4 Cerumen plug (Earwax)

Investigations

Inspection: Begin with Inspection and palpation of the pinna (auricle) and structures surrounding the ear.

Figure 2.5 Structures surrounding the ear.

Otoscopy is a clinical procedure used to examine structures of the ear, particularly the external auditory canal, tympanic membrane, and middle ear. Clinicians use the process during routine wellness physical exams and the evaluation of specific ear complaints. During the **otoscopic examination**, the provider utilizes an otoscope, also known as an auriscope, to visualize the ear anatomy. While performing the otoscopic examination, the provider holds the handle of the otoscope and inserts the cone of the otoscope into the patient's external auditory canal**.** The otoscope contains a light and magnifying lens to illuminate and enlarge ear structures to help the provider accurately visualize and evaluate the health of the visible anatomical structures.

Otoscopy plays a significant role in diagnosing several ear conditions and is a key step for the diagnosis of some conditions such as acute otitis media.

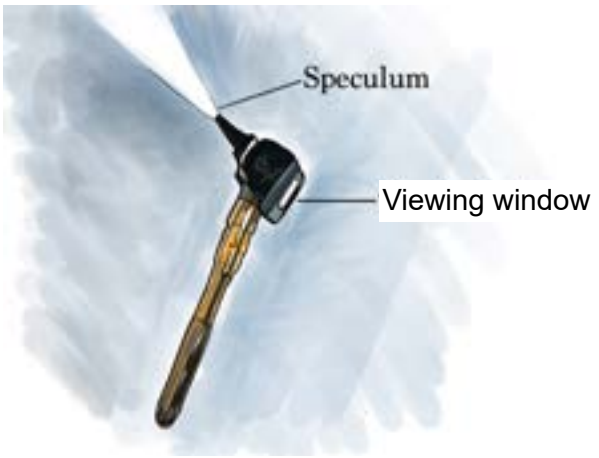


Figure2.6 *Otoscope.*

Figure 2.7 Ear examination with otoscope.

Figure2.8 Pneumatic otoscopy

Pneumatic otoscopy “allows the examiner to observe movement of the tympanic membrane directly” “If the tympanic membrane does not move perceptibly with applications of slight positive or negative pressure, a middle ear effusion is highly likely”.

Figure 2.9 Tuning fork test

WEBER TEST

Technique: Tuning fork placed at midline forehead

Normal: Sound radiates to both ears equally

Abnormal: sound lateralizes to one ear

- Ipsilateral conductive Hearing Loss or
- Contralateral sensorineural Hearing Loss

RINNE TEST

Figure 2.10 Use of Tuning fork test

Technique

First: Bone conduction

Vibrating tuning fork held on Mastoid

Patient covers opposite ear with hand

Patient signals when sound ceases

Move the vibrating tuning fork over the ear canal (Near, but not touching the ear)

Next: Air conduction. Patient indicates when the sound ceases

Normal: Air conduction is better than bone conduction

Air conduction usually persists twice as long as tone

Referred to as “positive test”

Abnormal: Bone conduction better than air conduction

Suggests Conductive hearing loss

Referred to as “negative test”

Test for Eustachian Tube Function

1. **Valsalva Maneuver:**

Figure 2.11 Valsalva Maneuver

Method: After taking a deep breath, the patient pinches his nose and closes his mouth in an attempt to blow air in his ears. Otoscopy shows movement of the drum.

Note: Failure of this test does not prove pathologic occlusion of the tube

This maneuver in the presence of nasal and nasopharyngeal infection carries the danger of transmission of infection to the ear

2. **Toynbee's test:**

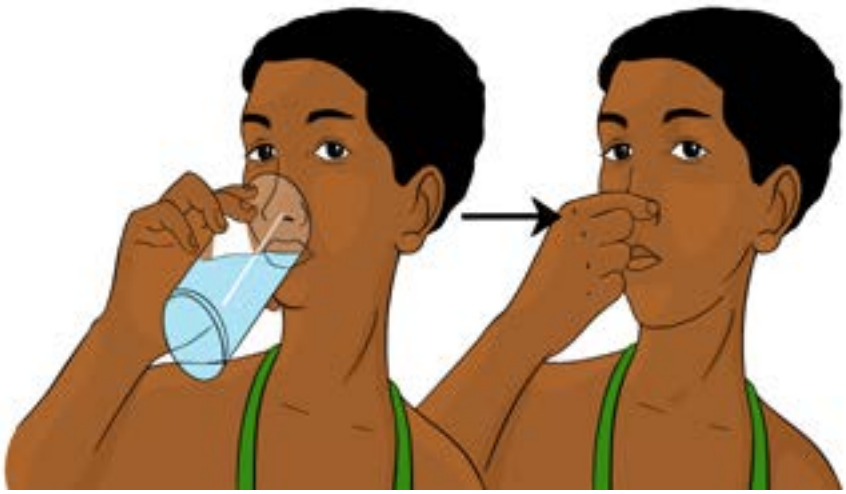


Figure 2.12 Toynbee's test

It is safer and confirms normal tubal function.

Method: The nose is closed and the patient swallows. There is in drawing of the tympanic membrane, confirmed by otoscopy.

Adequate medical diagnosis

The diagnosis of cerumen impaction is made by direct visualization with an otoscope. Common symptoms include hearing loss, feeling of fullness in the ear, itching, otalgia, tinnitus, cough, and, rarely, a sensation of imbalance. Hearing loss from cerumen impaction can cause reversible cognitive impairment in older persons. Some patients are unable to accurately convey symptoms, such as those with dementia or developmental delay; nonverbal patients with behavioral changes; and young children with fever, speech delay, or parental concerns. In these patients, cerumen should be removed when it limits examination.

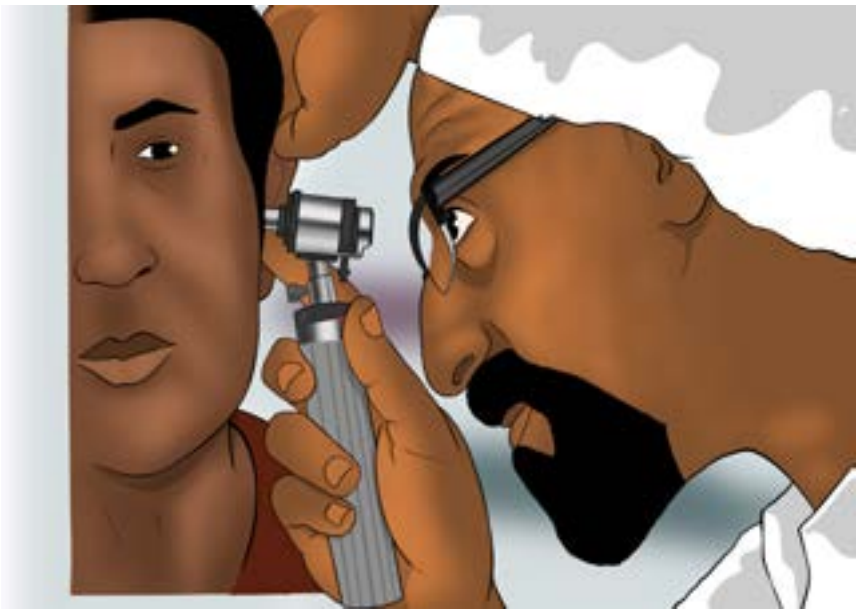


Figure 2.13 ***The diagnosis of cerumen impaction***

Treatment Plan

Dried cerumen is hydrated by instilling 1 or 2 drops of half strength peroxide, warm glycerine, or mineral oil, or it is softened with commercial agents, such as carbamide peroxide (Debrox) and triethanolamine (Cerumenex). Cerumen is removed mechanically by irrigating the ear if the eardrum is intact or using an instrument called a cerumen spoon.

A number of **softeners** are effective; however, if this is not sufficient, the most common method of cerumen removal is syringing (ear irrigation) with warm water. A curette method is more likely to be used by audiologists and otolaryngologists when the ear canal is partially occluded and the material is not adhering to the skin of the ear canal. Cotton swabs, on the other hand, push most of the earwax farther into the ear canal and remove only a small portion of the top layer of wax that happens to adhere to the fibers of the swab.

Softener is referred to as cerumenolysis, topical preparations for the removal of earwax may be better than no treatment, and there may not be much difference between types, including water and olive oil. Commercially or commonly available cerumenolytics includes any of a number of types of oil, urea hydrogen peroxide (6.5%) and glycerine.

Eardrops, health care professional will prescribe eardrops to soften the wax and make it easier to remove. People should use eardrops at room temperature. The wax will typically soften within a few days and gradually come out on its own. A person with a perforated eardrum or an active ear infection should not use eardrops.

Ear irrigation

Once the cerumen has been softened, it may be removed from the ear canal by irrigation, Ear syringing techniques consists of pulling the external ear up and back, and aiming the nozzle of the syringe slightly upwards and backwards so that the water flows as a cascade along the roof of the canal. The irrigation solution flows out of the canal along its floor, taking wax and debris with it. The solution used to irrigate the ear canal is usually warm water, normal saline, sodium bicarbonate solution, or a solution of water and vinegar to help prevent secondary infection.

Affected people generally prefer the irrigation solution to be warmed to body temperature, as dizziness is a common side effect of ear washing or syringing with fluids that are colder or warmer than body temperature.

Figure2:14 Ear irrigation procedure

When is irrigation not suitable (Contra-indications)?

Ear irrigation is not suitable for everyone in all circumstances. The procedure may be unsuitable if any of the following factors apply:

- The person has had ear surgery in the last 12 months.
- A child has a tympanostomy tube, also called a grommet, which is a small tube that doctors insert to allow ventilation of the middle ear.
- Another foreign body is blocking the ear canal.
- The person was born with a cleft palate.
- The individual has a perforated eardrum or has had one in the last 12 months.
- The person has or has recently had **otitis media,** which is an infection of the middle ear.

- There is a mucous discharge from the ear, which could indicate an undiagnosed perforation.

Anyone who has had any problems, such as severe vertigo or pain, following previous irrigation should not undergo this procedure again.

Curette and cotton swabs

Figure 2.15 Curette and cotton swabs

Earwax can be removed with an ear pick/curette, which physically dislodges the earwax and scoops it out of the ear canal.

It is generally advised not to use cotton swabs (Q-Tips or cotton buds), as doing so will likely push the wax farther down the ear canal, and if used carelessly, perforate the **eardrum**. Abrasion of the ear canal, particularly after water has entered from swimming or bathing, can lead to ear infection. In addition, the cotton head may fall off and become lodged in the ear canal. Therefore, cotton swabs should be used only to clean the external ear.

Manual removal

If irrigation is not an option or is unsuccessful, the health care professional may recommend either micro suction or manual removal to clear the ear canal. Micro-suction uses a small instrument to suck earwax out of the ear. Manual removal may involve using a thin instrument with a small hoop at the end to clean the ear and scrape out any earwax.

Other instruments that doctors may use for this procedure include curettes, spoons, and hooks. If the individual still has hearing problems or tinnitus after earwax removal, they may require a hearing loss test to check for other issues.

Evolution and Complications

Impacted earwax can lead to ear infections if a person does not get treatment. Very

rarely, the infection may spread to the base of the skull and cause **meningitis** or cranial paralysis.

Vertigo is also possible if the earwax pushes against the eardrum, or tympanic membrane. This symptom can cause nausea and a sensation of moving even when a person is staying still.

Self-assessment 2.2

1. What are the signs and symptoms for patient with cerumen plug?
2. What are the causes of cerumen plug?
3. Explain how cerumenplug is diagnosed for adult and children
4. Explain the procedure of ear irrigation
5. Outline the common cerumen-softening agents for Cerumen Removal
6. What are the most complications if Cerumenplug is remained untreated?

2.3 DEAFNESS, HEARING LOSS, AND HEARING IMPAIRMENT

Learning Activity 2.3

Carefully read this below situation and answer the following questions:

A 64 years old patient comes to clinical setting with difficulty understanding words, especially against background noise or in a crowd, trouble hearing consonants, He frequently asking others to speak more slowly, clearly and loudly, He needs to turn up the volume of the television or radio while listening to the radio and television. The physician examines the insight of ear and finds an accumulation of wax in the ear canal. Vital signs were performed. The body temperature was 36.5 degree Celsius, blood pressure 110/70 mmHg; pulse rate was 74beats per minute, respiratory rate was 19 breaths per minutes. Complete blood count (CBC) was performed and revealed white blood cells (WBC) of 100000.The patient was prescribed with hearing aids.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Hearing impairment is the most frequent sensory deficit in human populations, affecting more than 250 million people in the world. Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatization. It may be worsened by some medical conditions such as hypothyroidism, diabetes, and possibly hyperlipidemia, among others.

A person is said to have hearing loss if they are not able to hear as well as someone with normal hearing, **meaning hearing thresholds of 20 dB** or better in both ears. It can be mild, moderate, moderately severe or profound, and can affect one or both ears.

Hearing impairment or deafness covers are terms we use to refer to someone who has some level of hearing loss – but this level can vary greatly. Conductive hearing loss is when sounds cannot pass freely to the inner ear caused by a blocked outer or middle ear, a ruptured eardrum or an abnormally formed ear structure.

Hearing impairment is the inability of an individual to hear sounds adequately. This may be due to improper development, damage or disease to any part of the hearing mechanism. Hearing is a prerequisite for the development of normal speech & language. A child learns to speak by hearing the speech of others in the family and surroundings.

Deafness is an invisible impairment. Keen observation is necessary in order to identify a deaf child/individual. Deafness at birth or in early childhood has disastrous effects on the child's overall development. These effects vary depending upon the age of onset, nature and degree of hearing impairment.

It is important to distinguish between the different levels of hearing loss.

Hearing loss: This is a reduced ability to hear sounds in the same way as other people.

Deafness: This occurs when a person cannot understand speech through hearing, even when sound is amplified.

Profound deafness: This refers to a total lack of hearing. An individual with profound deafness is unable to detect sound at all.

The severity of hearing impairment is categorized by how much louder volumes need to be set at before they can detect a sound. Some people define profoundly deaf and very deaf in the same way, while others say that a diagnosis of profound deafness is the end of the hearing spectrum.

Causes, risk factors and pathophysiology

There are many causes of hearing loss in adults. Audiologists can help but it depends on the types of hearing loss.

Conductive Hearing Loss

Conductive hearing loss results from defects in the outer or middle ear. The sound is not conducted efficiently to the inner ear. All sounds heard thus become weak and/or muffled. Usually such individuals speak softly irrespective of the surrounding environmental noise.

Conditions that cause conductive hearing loss includes wax in the ear canal, diseases of the outer and middle ear associated with symptoms like ear ache and ear discharge, congenital defects in the outer or middle ear – defect and damage to the outer or middle ear, upper respiratory tract infections, neglect of care of ears and oral cavity (mouth).

Sensorineural Hearing Loss

Sensorineural hearing loss is caused due to **damage** or **disease of the inner ear** or **auditory nerve**. It could also result as an after effect of infectious diseases like **measles**, **mumps**, **meningitis** and **Tuberculosis**.

Some conditions that may cause congenital sensorineural hearing loss includes hereditary childhood deafness, Rh incompatibility, premature birth (birth before due time), and birth Asphyxia (lack of oxygen supply to the newborn due to inability to breathe. Other causes of sensorineural hearing loss are Viral infections in pregnancy, exposure to X–rays in the first trimester of pregnancy (taking X–ray within the first three months), harmful drugs of variety e.g. **streptomycin**, and acoustic neuroma (Tumor of the auditory nerve).

Mixed Hearing Loss

Mixed hearing loss is the combination of conductive and sensorineural hearing loss. One of the main causes of this type of loss is the long standing ear infection known as Chronic Supportive Otitis Media (CSOM). In CSOM, ear discharge in the form of pus, blood or clear water is seen. This starts with conductive loss yielding to sensorineural impairment, if not treated immediately and regularly.

Central Hearing Loss

Central hearing loss is due to a damage, malformation or infections of the neural pathways and the hearing centers in the brain. The child may hear but has difficulty in understanding what he hears. Some of the children classified as learning disabled or slow learners may have this type of hearing loss.

Functional Hearing Loss

Functional hearing loss is due to some psychogenic condition or maybe due to deliberate exaggeration of hearing thresholds for personal gains.

The Four Levels of Hearing Loss:

- Mild Hearing Loss.
- Moderate Hearing Loss.
- Severe Hearing Loss.
- Profound Hearing Loss

The inner ear is home to some of the most delicate bones in the body, and damage to the eardrum or middle ear can cause hearing loss and deafness in a range of ways.

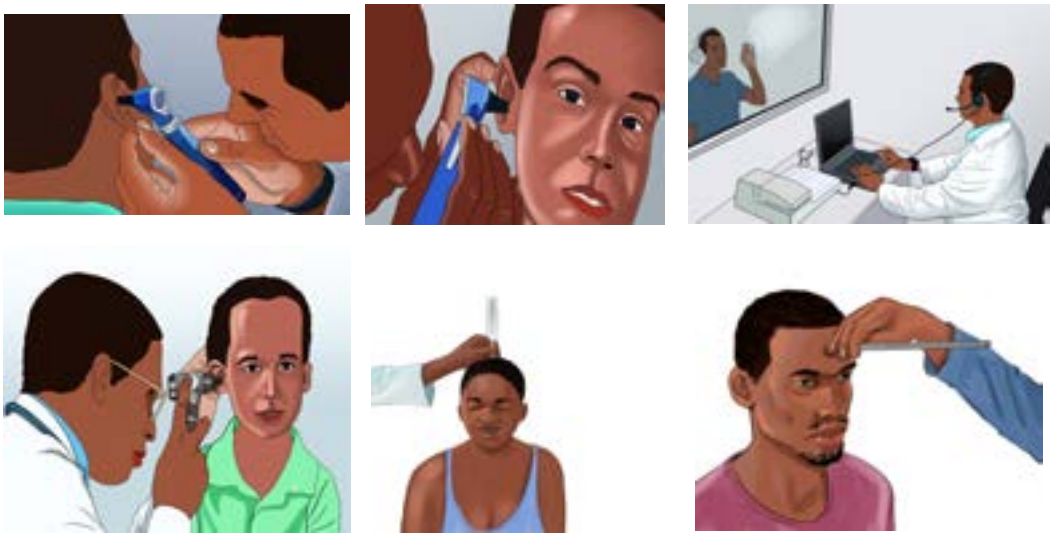
Signs and symptoms

The signs and symptoms of hearing loss may include muffling of speech and other sounds, difficulty understanding words, especially against background noise or in a crowd, trouble-hearing consonants, frequently asking others to speak more slowly, clearly and loudly, and needing to turn up the volume of the television or radio. The symptoms of hearing impairment depend on its cause. Some people are born without being able to hear, while others suddenly become deaf due to an accident or illness. For most people, symptoms of deafness progress gradually over time.

Some conditions may have hearing loss as a symptom, such as tinnitus or stroke.

Figure 2.16 Careful and attention while hearing

Adequate medical diagnosis



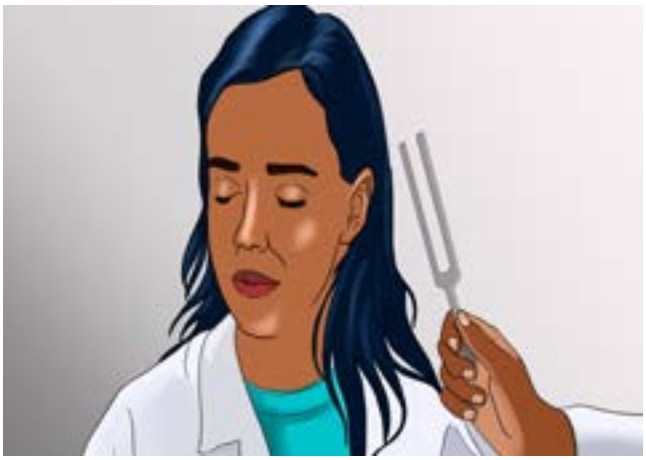


Figure 2.17 Different ways of assessing hearing capacity

Patients who suspect something is wrong with their hearing will initially go and seek the advice of a healthcare professional.

The healthcare professional will talk to the patient and ask several questions regarding the symptoms, including when they started, whether or not they have gotten worse, and whether the individual is feeling pain alongside the hearing loss.

A physical examination

The healthcare professional will look into the ear using an otoscope. This is an instrument with a light at the end. The following may be detected during the examination:

- A blockage caused by a foreign object
- A collapsed eardrum
- An accumulation of earwax
- An infection in the ear canal
- An infection in the middle ear if a bulge is present in the eardrum.
- Cholesteatoma, a skin growth behind the eardrum in the middle ear.
- Fluid in the ear canal
- A hole in the eardrum

The healthcare professional will ask questions about the person's experiences with hearing, including:

- Do you often find yourself asking people to repeat what they said?
- Do you find it hard to understand people on the telephone?
- Do you miss the doorbell when it rings? If so, does this happen frequently?
- When you chat with people face-to-face, do you have to focus carefully?

- Has anybody ever mentioned to you that you might have a problem with your hearing?
- Do you find more people mumble today than they used to?
- Internal you hear a sound; do you often find it hard to determine where it is coming from?
- When several people are talking, do you find it hard to understand what one of them is telling you?
- Are you often told that the television, radio, or any sound-producing device is too loud?
- Do you find male voices easier to understand than female voices?
- Do you spend most of each day in a noisy environment?
- Have you often found yourself misunderstanding what other people say to you?
- Do you hear rushing, hissing, or ringing sounds?
- Do you avoid group conversations?

If the patient answered “yes” to most of the above questions, see a healthcare professional for hearing loss checking.

General screening test

A health care provider may ask the patient to cover one ear and describe how well they hear words spoken at different volumes, as well as checking sensitivity to other sounds.

If the healthcare professional suspects a hearing problem, they will probably be referred to either an ear, nose, and throat (ENT) specialist or an audiologist.

Further tests will be carried out, including:

A tuning fork test: This is also known as the Rinne test. A tuning fork is a metal instrument with two prongs that produces a sound when it is struck. Simple tuning fork tests may help the healthcare professional detect whether there is any hearing loss, and where the problem is.

A tuning fork is vibrated and placed against the mastoid bone behind the ear. The patient is asked to indicate when they no longer hear any sound. The fork, which is still vibrating, is then placed 1 to 2 centimeters (cm) from the auditory canal. The patient is asked again whether they can hear the fork.

As air conduction is greater than bone conduction, the patient should be able to hear the vibration. If they cannot hear it at this point, it means that their bone conduction is superior to their air conduction.

This suggests a problem with sound waves getting to the cochlea through the ear canal.

Audiometer test: The patient wears earphones, and sounds are directed into one ear at a time. A range of sounds is presented to the patient at various tones. The patient has to signal each time a sound is heard.

Each tone is presented at various volumes, so that the audiologist can determine at which point the sound at that tone is no longer detected. The same test is carried out with words. The audiologist presents words at various tones and decibel levels to determine where the ability to hear stops.

Bone oscillator test: This is used to find out how well vibrations pass through the ossicles. A bone oscillator is placed against the mastoid. The aim is to gauge the function of the nerve that carries these signals to the brain.

Investigations:

Laboratory,Full blood accounts (FBC); Imageries: Chest x- ray, otoscopic examination and audiometric tests complement each other for the diagnosis of hearing loss. Objective tests measure the hearing loss at some specific frequencies. Endo- or retro cochlear origin of the deafness is identified thanks to these tests, leading to selection of the most appropriate therapeutic option. In children, behavioral assessment techniques are to be adapted to the patient's age. Information from tympanometry, optoacoustic emissions and possibly auditory brainstem responses, is used to complete the diagnosis. Language skills are also assessed in order to adapt the child's deafness management to his/her actual communication ability.

Treatment Plan

Help is available for people with all types of hearing loss. Treatment depends on both the cause and severity of the deafness. Sensorineural hearing loss is incurable. When the hair cells in the cochlea are damaged, they cannot be repaired. However, various treatments and strategies can help improve quality of life.

Hearing aids

These are wearable devices that assist hearing.

There are several types of hearing aid. They come in a range of sizes, circuitries, and levels of power. Hearing aids do not cure deafness but amplify the sound that enters the ear so that the listener can hear more clearly.

Hearing aids consist of a battery, loudspeaker, amplifier, and microphone. Today, they are very small, discreet, and can fit inside the ear. Many modern versions can distinguish background noise from foreground sounds, such as speech.

A hearing aid is not suitable for a person with profound deafness.

The audiologist takes an impression of the ear to make sure the device fits well. It will be adjusted to suit auditory requirements.

Examples of hearing aids include:

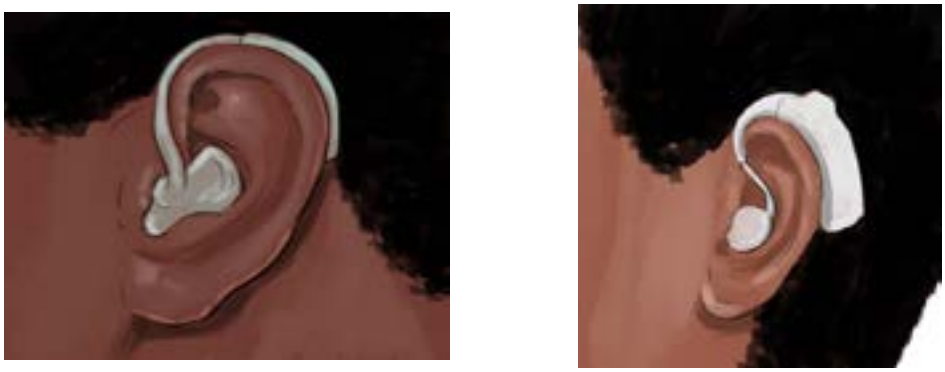


Figure 2.18 Hearing aids (BTE)

Behind-the-ear (BTE) hearing aids: These consist of a dome called an earmold and a case, with a connection linking one to the other. The case sits behind the outer ear, with the connection to the dome coming down the front of the ear. The sound from the device is either electrically or acoustically routed to the ear.

BTE hearing aids tend to last longer than other devices, as the electrical components are located outside the ear, meaning that there is less moisture and earwax damage These devices are more popular with children who need a sturdy and easy-to-use device.

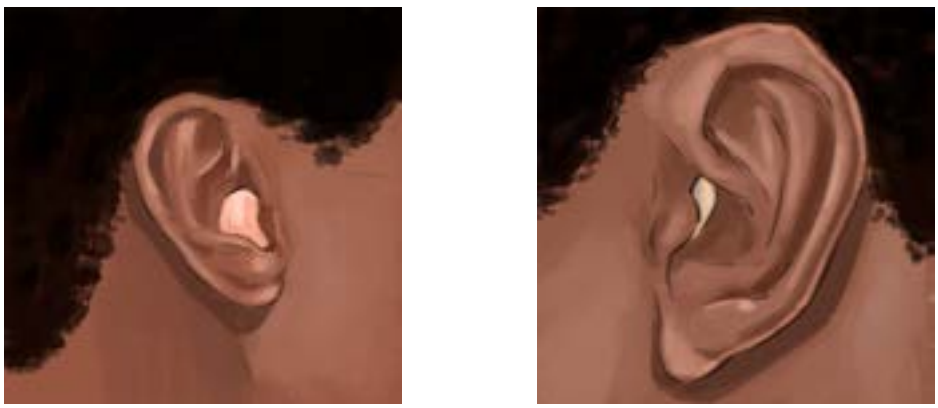


Figure 2.19 Hearing aids (ITC)

In-the-canal (ITC) hearing aids: These fill the outer part of the ear canal and can be seen. Soft ear inserts, usually made of silicone, are used to position the loudspeaker inside the ear. These devices fit most patients straight away and have better sound quality.

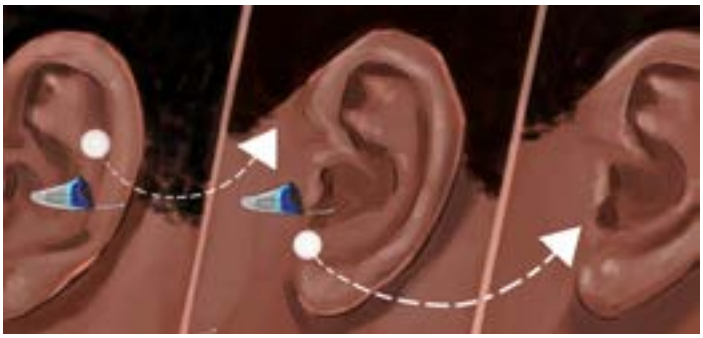


Figure 2.20 Hearing aids (CIC)

Completely in the canal (CIC) hearing aids: These are tiny, discreet devices but not recommended for people with severe hearing loss.

Figure 2.21 Hearing aids (Bone conduction)

Bone conduction hearing aids: These assist people with conductive hearing loss, as well as those unable to wear conventional type hearing aids. The vibrating part of the device is held against the mastoid with a headband. The vibrations go through the mastoid bone, to the cochlea. These devices can be painful or uncomfortable if worn for too long.

Cochlear implants

If the eardrum and middle ear are functioning correctly, a person may benefit from a cochlear implant. This thin electrode is inserted into the cochlea. It stimulates electricity through a tiny microprocessor placed under the skin behind the ear.

A cochlear implant is inserted to help patients whose hearing impairment is caused by hair cell damage in the cochlea. The implants usually improve speech comprehension. The latest cochlear implants have new technology that helps patients enjoy music, understand speech better even with background noise, and use their processors while they are swimming.

On the outside, a cochlear implant consists of A **microphone**: This gathers sound from the environment, A **speech processor**: This prioritizes the sounds that matter more to the patient, such as speech. The electrical sound signals are split into channels and sent through a very thin wire to the transmitter. A **transmitter**: This is a coil secured with a magnet. It is located behind the outer ear and transmits the processed sound signals to the internally implanted device.

On the inside:

- A surgeon secures a receiver and stimulator in the bone beneath the skin. The signals are converted into electrical impulses and sent through internal wires to the electrodes.
- Up to 22 electrodes are wound through the cochlea. The impulses are sent to the nerves in the lower passages of the cochlea and then directly to the brain. The number of electrodes depends on manufacturers of the implant.

Children will usually have cochlear implants in both ears, while adults tend to have just one

Evolution and complications

Hearing loss can have a significant effect on quality of life. Older adults with hearing loss may report feelings of depression. Because hearing loss can make conversation difficult, some people experience feelings of isolation. Hearing loss is also associated with cognitive impairment and decline.

In only the last dozen years, many important studies have surfaced linking hearing loss to disabling conditions, such as cognitive decline and Alzheimer's disease, clinical depression, diabetes, falls among the elderly, heart disease, and many more.

Self-assessment 2.3

1. Explain the causes of hearing loss in adult
2. How hearing loss is diagnosed in adult
3. What are the treatment plans of hearing loss?
4. What are the most complications of untreated hearing loss?

2.4 EAR INJURY OR TRAUMA

Learning Activity 2.4

Carefully read this below situation and answer the following questions:

N, E is a 25 years old male patient comes to clinical setting with left sever Ear pain, dizziness, headache, hearing loss, bleeding from the same ear, tinnitus sensation after falling down from motorcycle after road traffic accident.

The health care provider examines the insight and outside of ear and finds, a well colored conjunctiva. Vital signs were performed. The body temperature was 36.5 degree Celsius, blood pressure 120/60 mmHg; pulse rate was 68beats per minute, respiratory rate was 18 breaths per minutes. Complete blood count (CBC) was performed and revealed white blood cells (WBC) of 100000 and Hemoglobin level 10g/dl. An otoscope exam and tympanometry were performed and show normal tympanic membrane and no pressure change was observed. A sterile dry wound dressing was applied and Paracetamol 500mg TDS 3/7 as well as cloxacillin 500mg TDS were prescribed for N.E.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Ear injuries include external damage to the soft tissue of the outer ear or internal damage to the eardrum or ear canal of the inner ear. For the outer ear, injuries can include scratches, bruises, blood clotting, cuts, or swelling of the fleshy ear tissue.

Injuries can also rupture the eardrum. Any trauma to the ear or side of the head can cause a rupture. The following have been known to cause eardrum ruptures:

- Getting hit in the ear
- Sustaining an injury during sports
- Falling on the ear
- Car accidents

Inserting any kind of object, such as a cotton swab, fingernail, or pen, too far into the ear can harm the eardrum as well.

Acoustic trauma, or damage to the ear from extremely loud noises, can rupture the eardrum. However, these cases are not as common.

Causes

Accidents, loud noises, changes in air pressure, trauma from contact sports and foreign objects in the ear can cause injuries. Ear injuries can lead to dizziness, balance problems, hearing loss or changes in the ear's appearance.

Signs and symptoms of ear injury and trauma

- Ear pain (earache), which can be severe.
- Dizziness and balance problems.
- Headache.
- Hearing loss.
- Pus or bleeding from the ear.
- Tinnitus (buzzing or ringing in the ear).

Pain is the main symptom of eardrum rupture. For some, the pain may be severe. It can remain steady throughout the day, or it can increase or decrease in intensity.

Usually the ear begins to drain once pain goes away. At this point, the eardrum is ruptured. Watery, bloody, or pus-filled fluids may drain from the affected ear. A rupture that results from a middle ear infection usually causes bleeding. These ear infections are more likely to happen in young children, people with colds or the flu, or in areas with poor air quality. The client may have some temporary hearing loss or a reduction in hearing in the affected ear or he/she can also experience tinnitus, a constant ringing or buzzing in the ears, or dizziness.

Figure 2.22 Signs and symptoms of an injury to the ears

Adequate medical diagnosis

The healthcare professional can use several ways to determine if patients have a ruptured eardrum:

- A fluid sample, in which the healthcare professional tests fluids that may be leaking from the ear for infection (infection may have caused the eardrum to rupture)
- An otoscope exam, in which the healthcare professional uses a specialized device with a light to look into the ear canal
- An audiology exam, in which the healthcare professional tests patient's hearing range and eardrum capacity
- Tympanometry, in which healthcare professional inserts a tympanometer into the ear to test eardrum's response to pressure changes

The healthcare professional may refer the patient to an ear, nose, and throat specialist, or ENT, needs more specialized examinations or treatment for a ruptured eardrum.

Treatment plan

Eardrum repair is a surgical procedure used to fix a hole or tear in the eardrum, also known as the tympanic membrane. This surgery can also be used to repair or replace the three tiny bones behind the eardrum.

The eardrum is a thin membrane between the outer ear and the middle ear that vibrates when sound waves hit it. Repeated ear infections, surgery, or trauma may cause damage to the eardrum or middle ear bones that must be corrected with surgery. Damage to the eardrum or middle ear bones can result in hearing loss and an increased risk of ear infections.

Cover the injury with a sterile dressing shaped to the contour of the ear, and tape it loosely in place. Apply cold compresses over the dressing to reduce pain and swelling. If part of the ear has been cut off, keep the part.

Types of eardrum repair procedures

Myringoplasty

If the hole or tear in the eardrum is small, the healthcare professional may first try to patch the hole with gel or a paper-like tissue. This procedure takes 15 to 30 minutes and can often be done in the doctor's office with only local anesthesia.

Tympanoplasty

A tympanoplasty is performed if the hole of the eardrum is large or if there is a chronic ear infection that cannot be cured with antibiotics. This surgery will be performed in the hospital setting under general anesthesia. The patient will be unconscious during this procedure.

Most traumatic eardrum injuries eventually heal on their own. However, an otolaryngologist (ear, nose, and throat specialist, or ENT) should check all. Sometimes, eardrum injuries do not heal with time and need to be **patched surgically** (tympanoplasty). Vestibular therapy can help kids who have balance problems.

Treatment for eardrum rupture

Treatments for eardrum rupture are mainly designed to relieve pain and eliminate or prevent infection.

Patching

If the ear does not heal on its own, the healthcare professional may patch the eardrum. Patching involves placing a medicated paper patch over the tear in the membrane. The patch encourages the membrane to grow back together.

Antibiotics

Antibiotics can clear up infections that might have led to the eardrum rupture. They also protect from developing new infections from the perforation. The doctor may prescribe oral antibiotics or medicated eardrops. Client may also be told to use both forms of medication.

Surgery

In rare cases, surgery may be required to patch the hole in the eardrum. A surgical repair of a perforated eardrum is called tympanoplasty. During tympanoplasty, the surgeon takes tissue from another area of the body and grafts it onto the hole in the eardrum.

Home remedies

At home, client can ease the pain of a ruptured eardrum with heat and pain relievers. Placing a warm, dry compress on the ear several times daily can help.

Promote healing by not blowing the nose any more than absolutely necessary. Blowing the nose creates pressure in the ears. Trying to clear the ears by holding the breath, blocking the nose and blowing also creates high pressure in patient's ears. The increased pressure can be painful and slow the eardrum's healing.

Evolution and Complications

There are risks involved with any type of surgery. Risks can include bleeding, infection at the surgery site and allergic reactions to medications and anesthesia given during the procedure.

- Complications from eardrum repair surgery are rare but can include:
- Damage to the facial nerve or the nerve controlling the sense of taste
- Damage to the bones of the middle ear causing hearing loss
- Dizziness
- Incomplete healing of the hole in the eardrum
- Moderate or severe hearing loss
- cholesteatoma, which is an abnormal skin growth behind the eardrum

Self-assessment 2.4

1. What are all possible causes or risk factors to the ear injury?
2. What are the signs and symptoms of an ear injury?
3. What are the investigations that should be performed to confirm the diagnosis of ear injury?
4. What must be included into the management plan of the ear injury?
5. If not treated, what could be the possible complications of ear injury?

End of unit assessment 2

1. Which of the following conditions causes the maximum hearing loss?
   a) Ossicular disruption with intact tympanic membrane
   b) Disruption of malleus and incus as well tympanic membrane
   c) Partial fixation of the stapes footplate
   d) Otitis media with effusion

2. A 7-year-old child developed acute otitis media. He was treated antibiotics for 10 days. His pain and fever subsided completely but still had conductive hearing loss. You next line of treatment is:
   a) Give another course of a different antibiotic
   b) Do a myringotomy and culture the middle ear fluid
   c) Do a myringotomy and insert a grommet
   d) Wait and watch for 3 months for fluid to drain spontaneously

3. A 5-year-old male child had acute otitis being treated with eardrops, oral antibiotics and analgesics. Two weeks after he presented with a swelling over the mastoid pain in the ear with pulsatile ear discharge and fever. Now treatment of this child would include:
   a) IV antibiotics
   b) Cortical mastoidectomy
   c) Modified radical mastoidectomy
   d) Analgesics
   e) Antihistamines

4. A 55-year old female present with tinnitus, dizziness and history of progressive deafness. Diffential diagnosis includes all Except:
   a) Acoustic neuroma
   b) Endotymphatic hydrops
   c) Meningioma
   d) Histiocytosis

5. A child aged 3 years presented with fever sensorineural deafness; he was prescribed hearing aids but showed no improvement. What is the next line of management?
   a) Fenestration surgery
   b) Stapes mobilization
   c) Cochlear implant
   d) Conservative

6. With the turning fork of 512 Hz, weber test is lateralized to the right ear. It denotes:

a) Conducive hearing loss on the right and normal left ear.
b) Normal right ear but sensorineural hearing loss on the left.
c) Conductive hearing loss on the with normal right
d) Both (a) and (b)

7. Adenoidectomy is indicated in all of the following conditions except:

a) Otitis media with effusion
b) Nasal obstruction due to adenoidal hyperplasia
c) Recurrent otitis media in children
d) Allergic rhinitis in children

8. The incision used in endomeatal approach to the ear is?

a) Lempert I incision
b) Rosen's incision
c) Lempert II incision
d) Wilde's incision

9. Hitzelberger's sign is?

a) Reduced corneal sensitivity
b) Hypoesthesia of the posterior meatal wall
c) Paraesthesia of face
d) Delayed blink reflex

10. All are true regarding mucocele of frontal sinus except?

a) Cystic tender swelling
b) Egg shell crackling can be elicited
c) Displaces the eyeball downward and laterally
d) Treatment is frontoethmoidectomy

11. Prussak's space is bounded below by?

a) Fibers of lateral malleolar fold
b) Shrapnell's membrane
c) Short process of malleus
d) Neck of malleus

12. The following is true for Gradenigo's syndrome?

a) Mastoid tenderness

b) Retroorbital pain

c) Hearing loss

d) Sagging of posterosuperior meatal wall

13. All are true regarding the use of sodium fluoride in otosclerosis except?

a) It inhibits proteolytic enzymes in the cochlea

b) It's use is contraindicated in patients with chronic nephritis

c) It acts by inhibition of osteoblastic activity

d) It is used in patients with positive Schwartz sign

14. Secondary haemorrhage after tonsillectomy is most commonly seen?

a) 6 hours after surgery

b) 24 hours after surgery

c) 6 days after surgery

d) 14 days after surgery

15. Most common site of origin of vestibular schwannoma is?

a) Cochlear nerve

b) Superior vestibular nerve

c) Inferior vestibular nerve

d) Facial nerve

16. Endolymphatic hydrops is characteristic of(ear)

e) Cholesteatoma

f) Meniere's disease

g) Otosclerosis

h) Gradenigo's syndrome

17. Otoacoustic emissions arise from?(ear)

a) Inner hair cells

b) Outer hair cells

c) Organ or Corti

d) None of the above

18. Gold standard test for laryngopharyngeal reflux is

a) Esophageal motility study

b) Barium swallow

c) 24 hour double probe pH monitoring

d) Esophageal biopsy

19. Use of seigel's speculum during examination of the ear provides all except:

a) Magnification

b) Assessment of movement of the tympanic membrane

c) Removal of foreign body from the ear

d) As applicator for the powdered antibiotic of ear

20. Sensorineural deafness may be feature of all, except:

a) Nail patella syndrome

b) Distal renal tubular acidosis

c) Bartter syndrome

d) Alport syndrome

21. Which of the following conditions causes the maximum hearing loss?

a) Ossicular disruption with intact tympanic membrane

b) Disruption of malleus and incus as well tympanic membrane

c) Partial fixation of the stapes footplate

d) Ottitis media with effusion

22. Which is the investigation of choice in assessing hearing loss in neonates?

a) Impedance audiometry

b) Brainstem Evoked Response Audiometry (BERA)

c) Free field audiometry

d) Behavioral audiometry

23. A 30 year old male is having Attic cholesteatoma of left ear with lateral sinus thrombophlebitis. Which of the following will be the operation of choice?

a) Intact canal wall mastoidectomy

b) Simple mastoidectomy with Tympanoplasty

c) Canal wall down mastoidectomy

d) Mastoidectomy with cavity obliteration

24. Which of the following is not a typical feature of malignant otitis externa?

a) Caused by Pseudomonas aeruginosa

b) Patients are usually old

c) Mitotic figures are high

d) Patient is immune compromised

25. Which of the following is not a typical feature of Ménière's disease?

a) Sensorineural deafness

b) Pulsatile tinnitus

c) Vertigo

d) Fluctuating deafness

26. Treatment of choice in a 6 year old child with recurrent URTI with mouth breathing and failure to grow with high arched palate and impaired hearing is

a) Tonsillectomy

b) Grommet insertion

c) Myringotomy with grommet insertion

d) Adenoidectomy with grommet insertion

e) Treatment of choice for glue ear is:

f) Myringotomy with cold knife

g) Myringotomy with diode laser

h) Myringotomy with ventilation tube insertion

i) Conservative treatment with analgesics & antibiotics

Section B: Short answer questions

1. A 3 year old has a bug lodged in his ear. He is screaming and combative. What can you do to help?
2. Following a fight, a 25yo male declines transport. He has a large swelling of the outer ear from a direct blow. What can you advise him about the need for treatment, and why? His other ear has a 2cm laceration that communicates with the other side. Why is this more dangerous than on other part of the body?
3. What is the purpose of the Eustachian tube?
4. What is a risk factor for ear infections in infants?
5. What are the symptoms of an ear infection?
6. What are the causes of hearing loss as the result of an ear infection?

Section C: Questions to answer by True or False

1. Ear infection or acute otitis media is an infection of the middle ear. True or False?
2. Ear infections are highly contagious. True or False?
3. Untreated ear infections can lead to complications such as meningitis. True or False?
4. There is no way to prevent ear infections in children and adults. True or False?

UNIT 3 MEDICAL PATHOLOGIES OF NOSE AND THROAT

Key unit Competence:

Take appropriate decision on different common medical pathologies of nose and throat.

Introductory activity 3.0

Carefully observe the pictures below and answer the following questions:

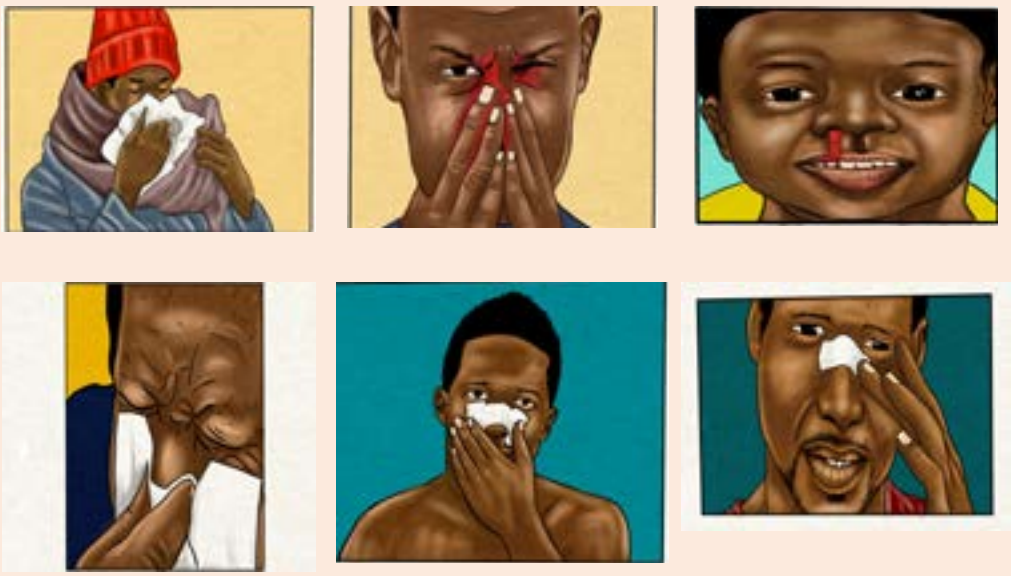


Figure 3.1 Abnormal Nose conditions

1. What do you think above persons are complaining?
2. What are different medical conditions might they be experiencing?

3.1 RHINITIS

Learning Activity 3.1

Carefully read this below situation and answer the following questions:

M.P is a 42 years old female patient comes to the health facility with complaints of nasal block (obstruction), rhinorrhea, sneezing and pruritus of nasal mucosa for 2 days. Vital signs were taken and revealed body temperature: 37.8 Celsius degree, blood pressure 100/60 mmHg, pulse rate was 83 beats per minute, respiratory rate was 20 breaths per minutes, SOPo2 of 98%. Chlorphenilamine 4mg TDS 3/7, Paracetamol tab 500mg TDS 3/7 Normal saline nasal spray 2 drops BID were prescribed to assist M. P's medical condition. He has been encouraged to take hot drinks and take enough bed rest for 3 days.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What was included in the management of this case?
4. What could be included in the teaching topics for M.P?
5. If not treated, what will be the consequences?

Rhinitis is an entity that includes many different subtypes and is mainly used to describe a pattern of nasal symptoms such as nasal congestion/obstruction, rhinorrhea, sneezing and pruritus that appear as a result of inflammation and/or dysfunction of the nasal mucosa.

There are three distinct rhinitis subgroups that are widely accepted: allergic rhinitis (AR), infectious rhinitis, and non-allergic, non-infectious rhinitis

Rhinitis, also known as coryza, is irritation and inflammation of the mucous membrane inside the nose. Common symptoms are a stuffy nose, runny nose, sneezing, and post-nasal drip. The inflammation is caused by viruses, bacteria, irritants or allergens.

Causes

Rhinitis is commonly caused by a viral or bacterial infection, including the common cold, which is caused by Rhinoviruses, Coronaviruses, and influenza viruses, others caused by adenoviruses, human parainfluenza viruses\, human respiratory syncytial virus, enteroviruses other than rhinoviruses, metapneumovirus, and measles virus, or bacterial sinusitis, which is commonly caused by Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis.

Symptoms of the common cold include rhinorrhea, sneezing, sore throat (pharyngitis), cough, congestion, and slight headache. In this medical condition there is an inflammation caused by viruses, bacteria, irritants or allergens. The most common kind of rhinitis is allergic rhinitis, which is usually triggered by airborne allergens such as pollen and dander.

The causes of allergic rhinitis

When the body comes into contact with an allergen, it releases histamine, which is a natural chemical that defends the body from the allergen. This chemical can cause allergic rhinitis and its symptoms, including a runny nose, sneezing, and itchy eyes.

In addition to tree pollen, other common allergens include grass pollen; dust mites; animal dander, which is old skin; cat saliva; mold.

During certain times of the year, pollen can be especially problematic. Tree and flower pollens are more common in the spring. Grasses and weeds produce more pollen in the summer and fall.

The types of allergic rhinitis

The two types of allergic rhinitis are **seasonal** and **perennial**. Seasonal allergies usually occur during the spring and fall season and are typically in response to outdoor allergens like pollen. Perennial allergies can occur year round, or at any time during the year in response to indoor substances, like dust mites and pet dander.

Risk factors for allergic rhinitis

Allergies can affect anyone, but a higher likelihood of developing allergic rhinitis exists if there is a history of allergies in the family. Having asthma or atopic eczema can also increase the risk of allergic rhinitis. Some external factors can trigger or worsen this condition, includes Cigarette smoke; chemicals; cold temperatures; humidity; wind; air pollution; hairspray perfumes; colognes; wood smoke; fumes.

Pathophysiology

Most prominent pathological changes observed are nasal airway **epithelial metaplasia** in which goblet cells replace ciliated columnar epithelial cells in the nasal mucous membrane. This results in mucin hypersecretion by goblet cells and decreased mucociliary activity. Nasal secretion is not adequately cleared with clinical manifestation of nasal congestion, sinus pressure, post-nasal dripping, and headache. Over-expression of transient receptor potential (TRP) ion channels, such as TRPA1 and TRPV1, may be involved in the pathogenesis of non-allergic rhinitis.

Signs and symptoms

The signs and symptoms for rhinitis includes sneezing, a runny nose, a stuffy nose, an itchy nose, coughing. a sore or scratchy throat, itchy, eyes, dark circles under the eyes, frequent headaches, eczema-type symptoms, such as having extremely dry, itchy skin that can blister and weep, hives, excessive fatigue.

Allergic rhinitis may cause additional symptoms, such as sneezing and nasal itching, nasal congestion, coughing, headache, fatigue, malaise, and cognitive impairment. The allergens may also affect the eyes, causing watery, reddened, or itchy eyes and puffiness around the eyes.

The person feels one or more of these symptoms immediately after coming into contact with an allergen. Some symptoms, such as recurrent headaches and fatigue, may only happen after long-term exposure to allergens. Fever is not a symptom of hay fever.

Some people experience symptoms only rarely. This likely occurs when the person is exposed to allergens in large quantities. Other people experience symptoms all year long. Talk to the clinician about possible allergies if the symptoms last for more than a few weeks and do not seem to be improving.

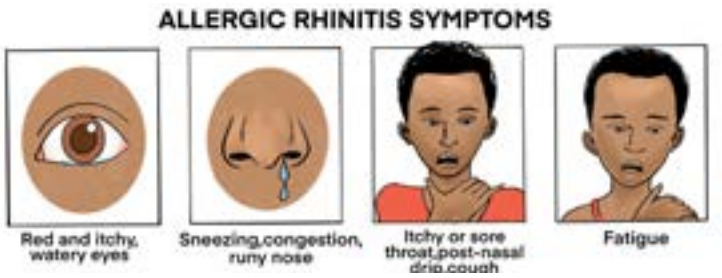


Figure 3.2 Signs and symptoms of rhinitis

Investigations

The clinician will diagnose non-allergic rhinitis based on symptoms and by ruling out other causes, especially allergies. The healthcare professional will perform a physical exam and ask questions about the symptoms. He or she might recommend certain tests, although there are no definite tests for no allergic rhinitis. The clinician is likely to decide that there is no allergic rhinitis if the nasal congestion, a runny nose or postnasal drip and tests for other conditions do not reveal an underlying cause such as allergies or a sinus problem. In some cases, the clinician might prescribe the medication and see whether the symptoms improve.

Ruling out an allergic cause: in many cases, rhinitis is caused by an allergic reaction. The only way to be sure rhinitis is not t caused by allergies is through allergy testing, which may involve skin or blood tests.

Skin test: To find out whether the symptoms might be caused by a certain allergen, the skin is pricked and exposed to small amounts of common airborne allergens, such as dust mites, mold, pollen, and cat and dog dander. If the patient is allergic to a particular allergen, he/she will likely to develop a raised bump (hive) at the test location on the skin. If the patient is not allergic to any of the substances, the skin will look normal.

Blood test: A blood test can measure the immune system's response to common allergens by measuring the amount of certain antibodies in the bloodstream, known as immunoglobulin E (IgE) antibodies. A blood sample is sent to a medical lab, where it can be tested for evidence of sensitivity to specific allergens.

Figure 3.3 Signs and symptoms of allergic rhinitis

Adequate medical diagnosis

The different forms of rhinitis are essentially diagnosed clinically. Vasomotor rhinitis is differentiated from viral and bacterial infections by the lack of purulent exudate and crusting. It can be differentiated from allergic rhinitis because of the absence of an identifiable allergen.

The medical diagnosis of rhinitis is based mainly on history taking, past medical history and physical exam. However, the clinician may perform certain tests to figure out the best treatment and prevention plan.

A skin prick test is one of the most common. The clinician places several substances onto the skin to see how the body reacts to each one. Usually, a small red bump appears if the patient is allergic to a substance.

Treatment Plan

Treatment of non- allergic rhinitis depends on allergens for mild cases, home treatment and avoiding triggers might be enough. For more-bothersome symptoms, certain medications may provide relief, including **Saline nasal sprays.** Use an over-the-counter nasal saline spray or homemade saltwater solution to flush the nose of irritants and help thin the mucus and soothe the membranes in the nose. **Corticosteroid nasal sprays.** If decongestants or antihistamines do not easily control the symptoms, the healthcare professional might suggest a nonprescription corticosteroid nasal spray, such as fluticasone (Flonase Allergy Relief) or triamcinolone (Nasacort Allergy 24 Hour). Prescription nasal sprays also are available. Corticosteroid medications help prevent and treat inflammation associated with some types of non-allergic rhinitis. Possible side effects include nasal dryness, nosebleeds, headaches and throat dryness.

Antihistamine nasal sprays: azelastine (Astelin, Astepro) or olopatadine hydrochloride (Patanase). While oral antihistamines do not seem to help nonallergic rhinitis, nasal sprays containing an antihistamine might reduce symptoms.

Anti-drip anticholinergic nasal sprays: The prescription drug ipratropium is often used as an asthma inhaler medication. However, it is now available as a nasal spray and can be helpful if a runny, drippy nose is the main complaint. Side effects can include nosebleeds and drying of the inside of the nose.

Decongestants: Available over-the-counter or by prescription, examples include pseudoephedrine-containing drugs (Sudafed 12 Hour) and phenylephrine (Neo-Synephrine, others). These medications help narrow the blood vessels, reducing congestion in the nose. Possible side effects include high blood pressure, heart pounding (palpitations) and restlessness.

Home remedies: Home remedies will depend on the allergens. If patient has seasonal or pollen allergies, Patient can try using an air conditioner instead of opening the windows. If possible, add a filter designed for allergies.

Using a dehumidifier or a high-efficiency particulate air) filter can help the patient control the allergies while indoors. If patient is allergic to dust mites, wash the sheets and blankets in hot water that is above 130°F (54.4°C). Adding a filter to the vacuum and vacuuming weekly may also help. Limiting carpet in home can also be useful.

Alternative and complementary medicine

Due to concerns over possible side effects, more people with allergies are looking at ways to address hay fever symptoms "naturally." However, it is important to remember that any medication can have side effects, even if it is considered natural. Aside from home remedies, options can also include alternative and complementary medicine. The downside to these treatments can be that there is little supporting evidence to prove that they are safe or effective. The correct dosing may also be difficult to determine or achieve.

Evolution and Complications

Unfortunately, allergic rhinitis itself cannot be prevented. Treatment and management are keys to achieving a good quality of life with allergies. Some complications that can arise from hay fever includes inability to sleep from symptoms keeping during night; development or worsening of asthma symptoms ,frequent ear infections; sinusitis or frequent sinus infections; absences from school or work because of reduced productivity; frequent headaches.

Complications can also arise from antihistamine side effects. Most commonly, drowsiness (feeling of being sleepy and lethargic) can occur. Other side effects include headache, anxiety, and insomnia. In rare cases, antihistamines can cause gastrointestinal, urinary, and circulatory effects.

Self-assessment 3.1

1. What are the most common signs and symptoms of patient with allergic rhinitis?
2. List at least three risk factors or causes of allergic rhinitis
3. What are the remedies that should be advised to the patient with allergic rhinitis?
4. What is the treatment plan of allergic rhinitis?
5. If this person is not treated well, what are the possible medical conditions?

3.2 SINUSITIS

Learning Activity 3.2

Carefully read this below situation and answer the following questions:

S.J is a 36 years old young adult male patient comes to the ENT (Ear, Nose and Throat) Department with the following complaints: Facial pain, pressure sensation, congestion or fullness; Nasal obstruction or blockage; Discolored nasal discharge; Loss of smell; Headache and Fatigue. Vital signs were taken and revealed body temperature: 36.8 Celsius degree, blood pressure 100/60 mmHg, pulse rate was 83 beats per minute, respiratory rate was 20 breaths per minutes, SOPo2 of 97%. Blood test, culture which revealed the presence of bacterial infection type staphylococcal, x-ray of sinusitis, CT Scan were performed to rule out medical diagnosis. While waiting for results from investigations, he was given amoxycilline 500mg TDS for 5 days, and cetirizine 10mg OD for 5 days preferably during the night. He was also advised to use normal saline nose drops followed by suction or nose blowing to wash dried mucus or pus out of the nose.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What was included in the management of this case?
4. What could be included in the teaching topics for M.P?
5. If not treated, what will be the consequences?

Sinusitis is an inflammation of the sinus lining caused by bacterial, viral and / or microbial infections; as well as structural issues like blockages of the sinus opening (ostium). If the sinus opening (ostium) is closed, normal mucus drainage may not occur this condition may lead to infection and inflammation of the sinuses.

The different types of sinusitis

There are two main categories of sinusitis: **acute** and **chronic**. Sinusitis is usually preceded by a cold, allergy attack or irritation from environmental pollutants. Often, the resulting symptoms, such as nasal pressure, nasal congestion, a “runny nose,” and fever, run their course in a few days. However, if symptoms persist, a bacterial infection or acute sinusitis may develop. If sinusitis occurs frequently or lasts three months or longer, it may be chronic sinusitis.

Causes and Risk Factors

Sinusitis can be caused by a virus, bacteria, or fungus that swells and blocks the sinuses. A few specific causes include **common cold**, nasal and **seasonal allergies**, including allergies to mold, polyps (growths), and a deviated septum. A deviated septum means that it is not straight, so that it is closer to the nasal passage on one side of the nose, causing a blockage.
Older persons have more compromised immune systems and a greater prevalence of serious upper respiratory tract infections, both of which increase their risk for the complication of acute sinusitis. They also tend to have weakened cartilage and dryness in the nasal passages that can promote infection. Because young children have more colds and smaller nasal and sinus passages, they face an increased risk for sinusitis as well. Smoke and other air pollutants Cigarette and cigar smoke and other forms of air pollution, such as industrial chemicals, increase the risk for sinusitis. Air pollution can damage the cilia responsible for moving mucus out of the sinuses.

Air travel as well as other situations that involve changes in atmospheric pressure, such as deep sea diving or climbing to high altitude increase the risk for sinus blockage and sinusitis. Asthma and respiratory allergies increase sinus inflammation, which can increase the risk for infection. Dental disease infections from dental disease, such as dental abscesses and periodontal infection, or procedures, such as sinus perforations during tooth extraction, can precipitate sinusitis. Patients with dental pain may indeed have sinusitis, especially involving the upper teeth and commonly the wisdom teeth. Intervention is needed to stop the disease progression and to avoid excess antibiotic treatment.

Other medical conditions

Medical conditions that cause inflammation in the airways or create persistent thickened stagnant mucus can increase the risk for recurrent acute or chronic sinusitis, such as diabetes and other disorders of the immune system. AIDS and poorly controlled diabetes particularly increase the risk for acute invasive fungal sinusitis, which is called mucormycosis, zygomycosis, or fulminant invasive sinusitis. Pregnancy can also cause temporary congestion and symptoms of sinusitis.

An autoimmune disease, Wegener granulomatosis, causes long term swelling and tumor-like masses in air passages and predisposes to acute as well as chronic sinusitis.

Pathophysiology

Sinuses are moist air spaces within the bones of the face that normally drain into the nose. The sinuses are four sets of hollow spaces that are located in the cheekbones (maxillary sinus), the forehead (frontal sinus), behind the nasal passages (ethmoid sinus), and deep in the brain behind the nasal passages (sphenoid sinus). Sinuses are lined with the same mucous membranes that line the nose and mouth. When someone has a cold or allergies and the nasal passages become swollen and make more mucus, so do the sinus tissues. The drainage system for the sinuses can be blocked, and mucus can become trapped in the sinuses. Bacteria, viruses, and fungi can grow there and lead to sinusitis. Sinus congestion can occur without an infection if one of the sinus openings become blocked from a cold or allergies. As germs multiply within the sinuses, pain and pressure can occur around the eyes, above the eyebrows, or over the cheekbones. When the sinuses become infected and swell or become irritated, this is called **sinusitis** (or sinus infection). These infections usually follow colds but can also occur with allergies. Sinusitis is common and easily treated.

The signs and symptoms of sinusitis

Common symptoms may include facial pain, pressure, congestion or fullness; nasal obstruction or blockage; discolored nasal discharge; discolored post-nasal discharge; Loss of smell; Headache; Fatigue. Patient might also present post nasal drip (mucus drips down the throat), nasal discharge (thick yellow or green discharge from nose) or stuffy nose, facial pressure (particularly around the nose, eyes, and forehead), headache and or pain in the teeth or ears, halitosis (bad breath), cough, tiredness and fever.

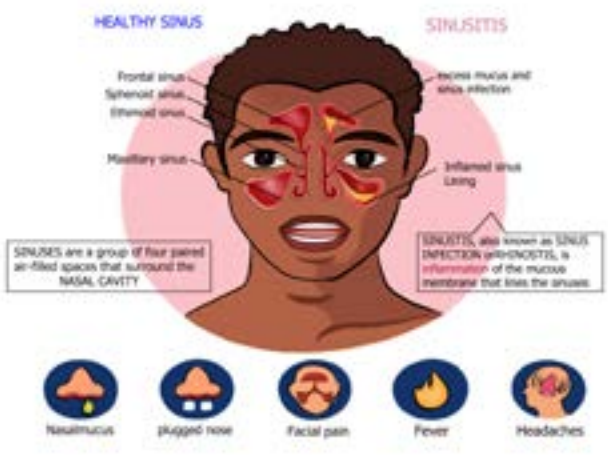


Figure 3.4 Signs and symptoms of sinusitis

Investigations

Blood tests: may be ordered to identify underlying conditions such as cystic fibrosis, allergies or viral/bacterial infections. Mucus samples may also be obtained to identify underlying conditions. Other tests that may be done in certain situation include:

Trans illumination: This simple procedure involves shining a bright light (as from a flashlight) over the cheek in a dark room. If no light illuminates certain areas of the face, it is likely that a sinus infection is present. This test is not very reliable and is not commonly performed.

Nasal Culture: the clinician might send a sample of the patient nasal discharge to a laboratory, where it can be tested for the presence of bacteria. Accurate evaluation of a nasal culture usually requires that the culture be obtained during nasal endoscopy. If patient is healthy and has acute sinusitis, a nasal culture is usually not done.

Sinus X-ray: X-rays of the sinuses are of limited use for diagnosing the presence of acute sinusitis.

CT scan: this type of imaging study can be useful for diagnosing sinusitis, including in those areas not well visualized by sinus x-rays. CT **(Computed Tomography) Scan** scans are particularly effective for diagnosing chronic sinusitis.

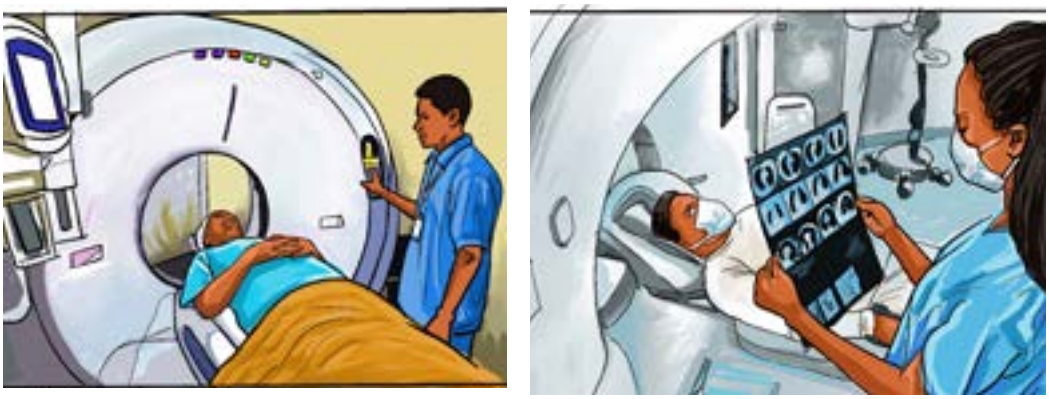


Figure 3.5 Patient under CT scan

MRI scan: The healthcare professional may order an MRI scan (Magnetic resonance imaging) if complications of sinusitis are suspected.

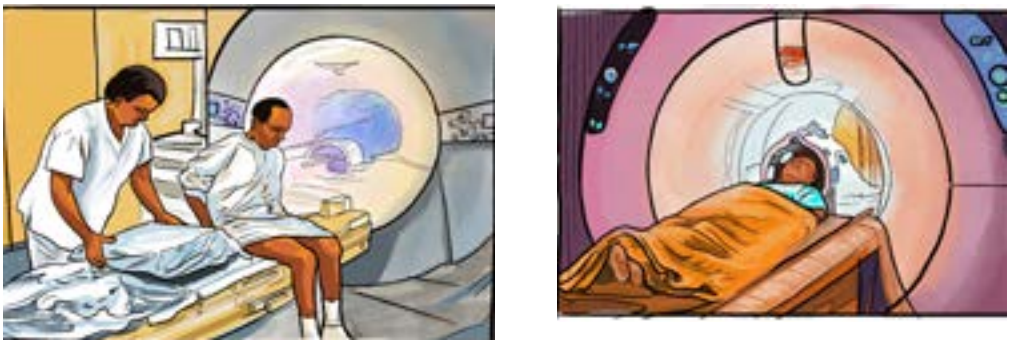


Figure 3.6 Patient under MRI

Sweat Chloride Test

This is a test for cystic fibrosis in children who also have polyps and/or chronic sinus infections.

Blood Tests for Immune Function

The healthcare professional may request these tests if patients have recurrent or chronic sinusitis.

Sinus Puncture

If there is some confusion about the diagnosis, the healthcare professional may choose to send the patient to a specialist to have a sinus puncture performed. This involves using a needle to remove a bit of fluid from within the sinuses. This fluid will then be sent to a lab to identify the infecting bacteria and to determine the most effective type of antibiotic for treatment.

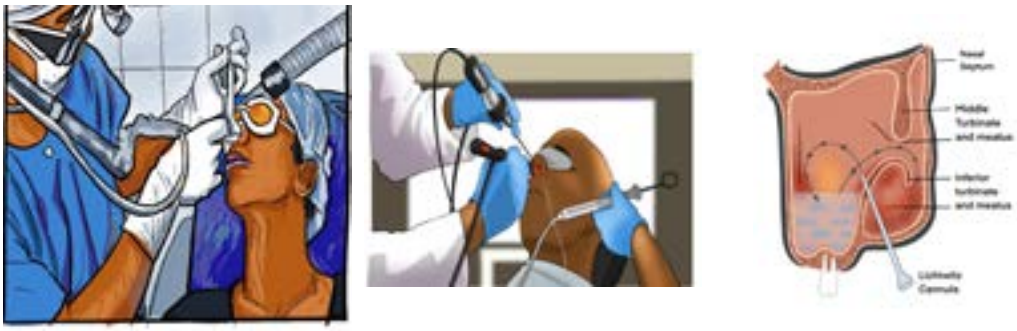


Figure 3.7 Patient undergoing sinus puncture

Nasal Endoscopy

This procedure uses a slim, flexible tube with a fiberoptic light at the end (endoscope). It is inserted into the nose. The healthcare professional can inspect the mucosa of the nose and the openings of the sinuses. If indicated, he can also take samples or biopsies through the endoscope for lab examination to look for fungus, tumor, or other uncommon causes of sinusitis.

Figure 3.8 Images on nasal endoscopy

Adequate medical Diagnosis

In most cases, acute sinusitis is diagnosed on the basis of the history and physical examination, because there is no accepted office-based test for acute bacterial sinusitis. The gold standard test for the diagnosis of acute bacterial sinusitis is culture of the aspirate from an antral puncture, but this should not be done routinely because it is painful, risks complications, and requires expertise.

The history needs to focus on the duration of symptoms, because persons who have had less than seven to ten days of symptoms are unlikely to have a bacterial infection. The history should also include questions about allergic rhinitis, systemic diseases, trauma, airplane travel, tobacco use, exposure to environmental toxins, and anatomical abnormalities. According to a multidisciplinary expert panel, the diagnosis of acute sinusitis should be based on two primary symptoms: purulent rhinitis and facial pain. Separately, these symptoms and physical findings for the diagnosis of acute sinusitis only have fair performance characteristics, but the combination is better in making the diagnosis.

Patients should also be asked about allergies and previous episodes of similar symptoms and seasonal patterns. The physical examination should focus on checking for swollen turbinates', purulent rhinorrhea, nasal polyps, and local sinus pain when bending over. Pain induced with sinus percussion is a less reliable finding than focal pain when bending over.

Treatment plan

Home treatment

Nasal Washes: Use warm water or saline nose drops followed by suction or nose blowing to wash dried mucus or pus out of the nose. Saline can be purchased as commercially available products or it can be made at home by mixing ¼ tsp. salt in one-cup warm water and adding a pinch of baking soda. Using a nasal aspirator to irrigate the nose. It allowed to do nasal washes at least two times a day or whenever the child cannot breathe through the nose.

A simple sinusitis infection is treated with:

- Decongestants.
- Cold and allergy medications.
- Nasal saline irrigation.
- Drinking fluids (sinusitis is a viral infection and fluids will help).

If symptoms of sinusitis do not improve after 10 days, there is need of

- Antibiotics (for seven days in adults and 10 days in children).
- Oral or topical decongestants.
- Prescription intranasal steroid sprays. (Do not use non-prescription sprays or drops for longer than three to five days — they may actually increase congestion).

Long-term (chronic) sinusitis may be treated by focusing on the underlying condition (typically allergies). This is usually treated with:

- Intranasal steroid sprays.
- Topical antihistamine sprays or oral pills.
- Leukotriene antagonists to reduce swelling and allergy symptoms.
- Rinsing the nose with saline solutions that might also contain other types of medication.

Evolution and Complications

Acute sinusitis complications are uncommon, and serious complications are rare. If they occur, complications might include:

- **Chronic sinusitis.** Acute sinusitis may be a flare-up of a long-term problem known as chronic sinusitis. Chronic sinusitis lasts longer than 12 weeks.
- **Meningitis.** This infection causes inflammation of the membranes and fluid surrounding brain and spinal cord.
- **Other infections.** Uncommonly, an infection can spread to the bones (osteomyelitis) or skin (cellulitis).

- **Vision problems.** If the infection spreads to the eye socket, it can cause reduced vision or even blindness that can be permanent.

Other complications include: Orbital cellulitis, Subperiosteal abscess, Orbital abscess, Mastoiditis, Frontal or maxillary osteomyelitis, Subdural abscess, Cavernous sinus thrombosis, Brain abscess.

Long-term chronic sinusitis can also cause other serious complications, including:

- Permanent loss of the ability to smell due to damage to the olfactory nerve, which is responsible for the sense of smell.
- Loss of vision if an infection spreads to the eyes.
- Inflammation of the brain and spinal cord membranes (known as meningitis)

Prevention

These steps help to reduce the risk of getting acute sinusitis:

- Avoid upper respiratory infections. Try to stay away from people who have colds or who are sick with other infections. Wash the hands frequently with soap and water, especially before taking meals.
- Manage the allergies. Work with the doctor to keep symptoms under control.
- Avoid cigarette smoke and polluted air. Tobacco smoke and other pollutants can irritate and inflame the lungs and nasal passages.
- Use a humidifier. If the air in home is dry, adding moisture to the air may help prevent sinusitis. Be sure the humidifier stays clean and free of mold with regular, thorough cleaning.
- Drink plenty of fluids to keep mucus thin
- Sleep with the head propped up, or with the pain-free side of the face on the pillow
- Inhale steam three or four times a day (for example, sit in the bathroom with a hot shower running).
- Use a salt-water nasal spray or a nasal cup to loosen mucus
- Adhere properly to the prescribed medications to help with pain and headaches and avoid the infections. In addition, adhere to the prescribed decongestant to help the sinuses drain. However, antihistamines should be the last options as they make mucus thick.
- Put a warm, wet towel against the face to help with pain.

Self-assessment 3.2

1. What are all possible causes or risk factors to develop Sinusitis?
2. What are the signs and symptoms of Sinusitis?
3. What are the investigations that should be requested to make the diagnosis?
4. What must be included into the management plan of that medical condition?
5. If not treated, what will be the complications for Sinusitis?

3.3 EPISTAXIS OR NOSEBLEEDS

Learning Activity 3.3

Carefully read this below situation and answer the following questions:

A 34 female patient presents to ED (Emergency Department) at 2 am, post waking up with all over her pillow and a continuous ooze of blood from her right nostril. On physical examination, the patient is alert and oriented, Conjunctiva was well colored BP 110/60, Pulse 95, respiratory rate 22, SPO2 98% on room air and has no past medical history. The patient reports having a sinus infection of late, which she has been using an antihistamine nasal spray to treat. A full blood count was performed to check the hemoglobin level and revealed 9 g/dl, a blood group type was done and revealed type B, Rh+. The patient U. Z was put on in a quiet area, pressure by pinching the anterior aspect of the nose was applied for 20 minutes.

1. What are the abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

A nosebleed, also known as epistaxis, is bleeding from the nose. Blood can also flow down into the stomach and cause nausea and vomiting. In more severe cases, blood may come out of both nostrils. Rarely, bleeding may be so significant that low blood pressure occurs. Blood may also come up the nasolacrimal duct and out from the eye.

Figure 3.9 Two children boxing, the one on the right having a nosebleed due to a punch to the face.

Causes

The most common cause of nosebleeds is dry air. Dry air can be caused by hot, low-humidity climates or heated indoor air. Both environments cause the nasal membrane (the delicate tissue inside the nose) to dry out and become crusty or cracked and more likely to bleed when rubbed or picked or when blowing the nose.

Risk factors include trauma, including putting the finger in the nose, blood thinners, high blood pressure, alcoholism, seasonal allergies, dry weather, and inhaled corticosteroids. There are two types: anterior, which is more common; and posterior, which is less common but more serious. Anterior nosebleeds generally occur from Kiesselbach's plexus while posterior bleeds generally occur from the sphenopalatine artery. The diagnosis is by direct observation.

An **anterior nosebleed** starts in the front of the nose on the lower part of the wall that separates the two sides of the nose (called the septum). Capillaries and small blood vessels in this front area of the nose are fragile and can easily break and bleed. This is the most common type of nosebleed and is usually not serious. These nosebleeds are more common in children and are usually able to be treated at home.

A **posterior nosebleed** occurs deep inside the nose. This nosebleed is caused by a bleed in larger blood vessels in the back part of the nose near the throat. This can be a more serious nosebleed than an anterior nosebleed. It can result in heavy bleeding, which may flow down the back of the throat. Patients may need medical attention right away for this type of nosebleed. This type of nosebleed is more common in adults.

Nosebleeds can occur due to a variety of reasons. Some of the most common causes include trauma from nose picking, blunt trauma (such as a motor vehicle accident), or insertion of a foreign object (more likely in children). Relative humidity

(including centrally heated buildings), respiratory tract infections, chronic sinusitis, rhinitis or environmental irritants can cause inflammation and thinning of the tissue in the nose, leading to a greater likelihood of bleeding from the nose.

Most causes of nose bleeding are self-limiting and do not require medical attention. However, if nosebleeds are recurrent or do not respond to home therapies, an underlying cause may need to be investigated. Some rarer causes are listed below:

Coagulopathy

- Thrombocytopenia (thrombotic thrombocytopenic purpura, idiopathic thrombocytopenic purpura)
- Von Willebrand's disease
- Hemophilia
- Leukemia
- HIV
- Chronic liver disease cirrhosis causes deficiency of factor II, VII, IX,& X

Dietary

- Sulfur dioxide (sulphur dioxide) E220 (as a food preservative used particularly in wines, dried fruits, etc.)
- Sulphites as food preservatives
- Salicylates naturally occurring in some fruits and vegetables

Inflammatory

- Granulomatosis with polyangiitis
- Systemic lupus erythematosus

Medications/Drugs

- Anticoagulation (warfarin, heparin, aspirin, etc.)
- Insufflated drugs (particularly cocaine)
- Nasal sprays (particularly prolonged or improper use of nasal steroids)

Neoplastic

- Squamous cell carcinoma
- Adenoid Cystic Carcinoma
- Melanoma
- Nasopharyngeal carcinoma
- Nasopharyngeal angiofibroma

- Nosebleeds can be a sign of cancer in the sinus area, which is rare, or tumors starting at the base of the brain, such as meningioma. Due to the sensitive location, nosebleeds caused by tumors are typically associated with other symptoms, such as hearing or vision problems.

Traumatic

- Anatomical deformities (*e.g.* septal spurs)
- Blunt trauma (usually a sharp blow to the face such as a punch, sometimes accompanying a nasal fracture)
- Foreign bodies (such as fingers during nose-picking)
- Digital trauma
- Middle ear barotrauma (such as from descent in aircraft or ascent in scuba diving)
- Nasal bone fracture
- Septal fracture/perforation
- Surgery (*e.g.* septoplasty and functional endoscopic sinus surgery)
- Nasal bleeds may be due to fracture of facial bones namely maxilla and zygoma.

Vascular

- Hereditary hemorrhagic telangiectasia (Osler–Weber–Rendu disease)
- Angioma
- Aneurysm of the carotid artery

Pathophysiology

The arteries that supply Kiesselbach's plexus are the ones responsible for anterior nosebleeds. The nasal mucosa contains a rich blood supply that can be easily ruptured and cause bleeding. Rupture may be spontaneous or initiated by trauma. Nosebleeds are reported in up to 60% of the population with peak incidences in those under the age of ten and over the age of 50 and appear to occur in males more than females. An increase in blood pressure (e.g. due to general hypertension) tends to increase the duration of spontaneous epistaxis. Anticoagulant medication and disorders of blood clotting can promote and prolong bleeding. Spontaneous epistaxis is more common in the elderly as the nasal mucosa (lining) becomes dry and thin and blood pressure tends to be higher. The elderly is also more prone to prolonged nosebleeds as their blood vessels are less able to constrict and control the bleeding.

The vast majority of nosebleeds occur in the front anterior (front) part of the nose from the nasal septum. This area is richly endowed with blood vessels (Kiesselbach's plexus). This region is also known as Little's area. Bleeding farther back in the nose is known as a posterior bleed and is usually due to bleeding from Woodruff's plexus, a venous plexus situated in the posterior part of inferior meatus. Posterior bleeds are often prolonged and difficult to control. They can be associated with bleeding from both nostrils and with a greater flow of blood into the mouth.

Sometimes blood flowing from other sources of bleeding passes through the nasal cavity and exits the nostrils. It is thus blood coming from the nose but is not a true nosebleed, that is, not truly originating from the nasal cavity. Such bleeding is called "pseudo epistaxis" (pseudo + epistaxis). Examples include blood coughed up through the airway and ending up in the nasal cavity, then dripping out.

Signs and Symptoms

The signs and symptoms of a nosebleed include:

- Bleeding from either or both nostrils.
- A sensation of flowing liquid at the back of the throat.
- The urge to swallow frequently.

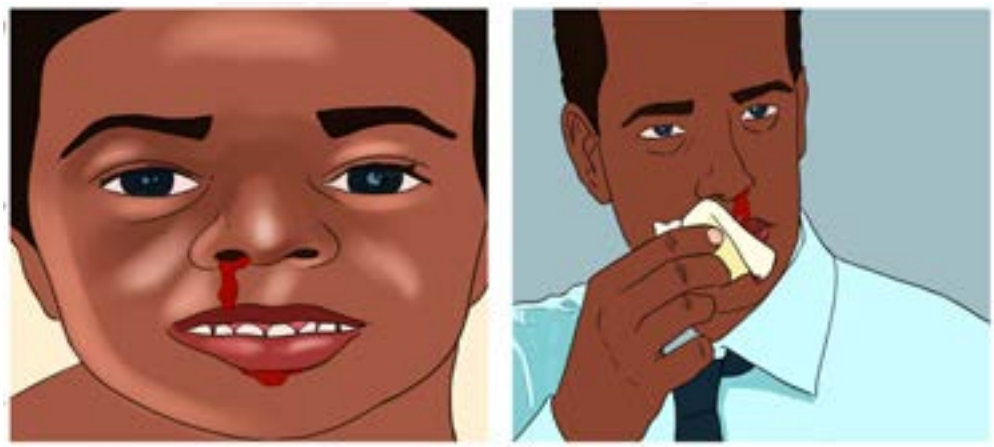


Figure 3.10 People with nasal bleeding

Investigations

Laboratory tests to evaluate the patient's condition and underlying medical problems may be ordered depending on the clinical picture at the time of presentation. If the bleeding is minor and not recurrent, then a laboratory evaluation may not be needed.

If a history of persistent heavy bleeding is present, obtain a hematocrit count and type and cross match. If a history of recurrent epistaxis, a platelet disorder, or neoplasia is present, obtain a complete blood count (CBC) with differential.

For a patient with nasal bleeding, the diagnosis must focus on:

- Clinical diagnosis/ complete history taking and full physical exam
- Complete blood count(CBC)
- Coagulation studies (international normalization rate/INR, prothrombin time/ PT, activated partial thromboplastin time, platelet function tests)
- Blood urea nitrogen (BUN), serum creatinine
- Liver function tests(LFTs)

Direct visualization with a good directed light source, a nasal speculum, and nasal suction should be sufficient in most patients. However, computed tomography (CT) scanning, magnetic resonance imaging (MRI), or both may be indicated to evaluate the surgical anatomy and to determine the presence and extent of rhinosinusitis, foreign bodies, and neoplasms. Nasopharyngoscopy may also be performed if a tumor is the suspected cause of bleeding. Sinus films are rarely indicated for a nosebleed. Angiography is rarely indicated

The diagnosis of posterior epistaxis is diagnosed by focusing on:

- Complete Blood Count (CBC), which is a blood test to check for blood disorders.
- Partial Thromboplastin Time (PTT) or INR, which is a blood test that checks how long it takes for the blood to clot.
- Nasal endoscopy.
- CT scan of the nose.
- X-ray of the face and nose.

Figure 3.11 Different ways of examining the nose when there is nose bleeding

Adequate medical diagnosis

To diagnose epistaxis, **routine laboratory testing is not required**. Patients with symptoms or signs of a bleeding disorder and those with severe or recurrent epistaxis should have complete blood count (CBC), prothrombin time (PT), and partial thromboplastin time (PTT).

Treatment plan

Figure 3.12 Demonstration of how to apply pressure to stop a nosebleed

The first treatment is direct pressure. Grasp the nose firmly between the thumb and forefinger and squeeze it for 10 to 30 minutes without stopping. Putting an ice pack on the neck or bridge of the nose may help slow blood flow. Leaning forward to spit out blood instead of letting it run down the throat and be swallowed may help prevent vomiting. Using salt water nasal sprays and humidifying the air may help dryness.

Most anterior nosebleeds can be stopped by applying direct pressure, which helps by promoting blood clots. Those who suffer a nosebleed should first attempt to blow out any blood clots and then apply pressure for at least five minutes and up to 20 minutes. Pressure should be firm and tilting the head forward helps decrease the chance of nausea and airway obstruction as seen in the picture on the right. When attempting to stop a nosebleed at home, the head should not be tilted back. Swallowing excess blood can irritate the stomach and cause vomiting. Vasoconstrictive medications such as oxymetazoline (Afrin) or phenylephrine are widely available over the counter for treatment of allergic rhinitis and may also be used to control benign cases of epistaxis. Those with nosebleeds that last longer than 20 minutes (in the setting of direct pressure as seen in the image to the right) should seek medical attention. Patient will be advised to breathe through the mouth, use a tissue or damp washcloth to catch the blood, use the thumb and index finger to pinch together the soft part of the nose. Make sure to pinch the soft part of the nose against the hard bony ridge that forms the bridge of the nose. Squeezing at or above the bony part of the nose will not put pressure where it can help stop the bleeding.

Figure 3.13 Different options of nasal bleeding management

Nasal packing

If pressure and chemical cauterization cannot stop bleeding, nasal packing is the mainstay of treatment. There are several forms of nasal packing that can be contrasted by anterior nasal packing and posterior nasal packing. Traditionally, nasal packing was accomplished by packing gauze into the nose, thereby placing pressure on the vessels in the nose and stopping the bleeding. Traditional gauze packing has been replaced with products such as Merocel and the Rapid Rhino. The Merocel nasal tampon is similar to gauze packing except

it is a synthetic foam polymer (made of polyvinyl alcohol and expands in the nose after application of water) that provides a less hospitable medium for bacteria. The Rapid Rhino stops nosebleeds using a balloon catheter, made of carboxymethylcellulose, which has a cuff that is inflated by air to stop bleeding through extra pressure in the nasal cavity. Systematic review articles have demonstrated that the efficacy in stopping nosebleeds is similar between the Rapid Rhino and Merocel packs; however, the Rapid Rhino has been shown to have greater ease of insertion and reduced discomfort. People who receive nasal packing need to return to a medical professional in 24–72 hours in order to have packing removed.

In addition, several dissolvable packing materials can stop bleeding. Those are the thrombotic agents to promote blood clots, such as surgicel and vitamin K. The thrombogenic foams and gels do not require removal and dissolve after a few days. Posterior nasal packing can be achieved by using a Foley catheter, blowing up the balloon when it is in the back of the throat, and applying traction. Complications of nasal packing include abscesses, septal hematomas, sinusitis, and pressure necrosis. In rare cases, toxic shock syndrome can occur with prolonged nasal packing. As a result, many forms of nasal packing involve use of topical antistaphylococcal antibiotic ointment.

Medications:

Tranexamic acid helps promote blood clotting. For nosebleeds it can be applied to the site of bleeding, taken by mouth, or injected into a vein. Oral and topical antibiotics to prevent rhinosinusitis and possibly toxic shock syndrome. Avoidance of aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs). Medications to control underlying medical problems (e.g., hypertension, vitamin K deficiency) in consultation with other specialists.

Cauterization

This method involves applying a chemical such as silver nitrate to the nasal mucosa, which burns and seals off the bleeding. Eventually the nasal tissue to which the chemical is applied will undergo necrosis. This form of treatment is best for mild bleeds, especially in children, that are clearly visible. A topical anesthetic (such as lidocaine) is usually applied prior to cauterization. Silver nitrate can cause blackening of the skin due to silver sulfide deposit, though this will fade with time.

Surgery

Ongoing bleeding despite good nasal packing is a surgical emergency and can be treated by endoscopic evaluation of the nasal cavity under general anesthesia to identify an elusive bleeding point or to directly ligate (tie off) the blood vessels supplying the nose.

Other

The utility of local cooling of the head and neck is controversial. Some state that applying ice to the nose or forehead is not useful. Others feel that it may promote vasoconstriction of the nasal blood vessels and thus be useful.

Evolution and Complications

The Prognosis is generally good, and mortality is very low. If severe form, the complications are: Hemorrhagic shock, Septic shock, Pneumocephalus, Sinusitis, Septal pressure necrosis, Neurogenic syncope during packing, Epiphora (from blockage of the lacrimal duct), Hypoxia (from impaired nasal air movement), Aspiration, Hypovolemia in heavy bleeding, Cerebral abscess is very uncommon.

Self-assessment 3.3

1. What are all possible causes or risk factors to develop epistaxis?
2. What are the signs and symptoms of epistaxis?
3. What are the investigations that should be requested to make the diagnosis?
4. What must be included into the management plan of that medical condition?
5. If not treated, what will be the complications for epistaxis?

3.4 NASAL INJURY (TRAUMA)

Learning Activity 3.4

Carefully read the case below and answer the following questions:

32 years old Patient comes to clinical setting with nasal injury, nasal bleeds, nasal pain. The physician examines the inside of nose and finds inflammation of mucosa and other surrounding membrane with the tears. Pain in and around the nose, blood coming from the nose, clear fluid coming from the nose, bruising around the eyes, swelling of the face, particularly around the nasal area, trouble breathing through the nose, distortion of the shape of the nose, loss of sense of smell. The physician suspected the nose trauma due to the various factors cited during interview, the physician uses with nasal speculum and patient feels a severe pain. Nasal fracture bone is suspected, x-ray is recommended and other test laboratory. The patients went home take antibiotics two days and stop it for continuing to use traditional medicine, after two weeks patient complained the bad smell and fever.

1. What is body organ do you think is most affected than others?
2. What are the signs and symptoms of patient with nasal trauma?
3. Describe the causes, which could be in basis of nasal trauma?
4. How can you treat this kind of nasal injury and trauma?
5. If is not treated, what are the possible complications.

A **nasal fracture**, commonly referred to as a broken nose, is a fracture of one of the bones and nose. Symptoms may include bleeding, swelling, bruising, and an inability to breathe through the nose. They may be complicated by other facial fractures or a septal hematoma.

Signs and symptoms

Figure 3.14 Images of patients with nasal injury

Symptoms of nasal trauma can range from mild to severe, depending on the type and extent of the injury. For example, symptoms of nasal trauma can include pain in and around the nose, pain or tenderness, especially when touching the nose. In this case, blood comes from the nose, clear fluid from the nose, bruising around the nose or eyes, swelling of the face, particularly around the nasal area. In addition, trouble breathing through the nose, distortion of the shape of the nose, loss of sense of smell, discharge of mucus from the nose, misshapen nose are present. Moreover, the patient is feeling that one or both nasal passages are blocked.

Causes

External nasal trauma can occur when force is exerted on the nose. Common causes of external nasal trauma include falls, sports injuries, road traffic accidents, physical assault or abuse

Internal nasal trauma can occur when the cartilage or the blood vessels inside the nose are damaged. Common causes of internal nasal trauma include infections from nasal piercings, irritation caused by inhaling certain substances, sniffing cocaine or other illegal drugs, picking or scratching the inside of the nose, getting a foreign object lodged in the nose.

Investigations

Nasal fractures are identified visually and through physical examination. Medical imaging is generally not recommended. A priority is to distinguish simple fractures limited to the nasal bones (Type 1) from fractures that also involve other facial bones and/or the nasal septum (Types 2 and 3). In simple Type 1 fractures X-Rays supply surprisingly little information beynd clinical examination. However, diagnosis may be confirmed with X-rays or CT scans, and these are required if other facial injuries are suspected. Full bloods account (FBC) might also be helpful.

A fracture that runs horizontally across the septum is sometimes called a “Jarjavay fracture”, and a vertical one, a “Chevallet fracture”.

Adequate medical diagnosis

The Health Care Provider may use a variety of methods to diagnose nasal trauma. For example, they may ask about the symptoms and when they started, gently touch the bridge of the nose to feel for irregular alignment or movement, examine the inside of the nose to look for obstructions or chemical damage, use an X-ray or CT scan to assess the internal structures of the nose.

Although treatment of an uncomplicated fracture of nasal bones is not urgent. A referral for specific treatment in five to seven days usually suffices. An associated injury, nasal septal hematoma, occurs in about 5% of cases, and does require urgent treatment and should be looked for during the assessment of nasal injuries.

Treatment Plan

In many cases, minor cases of nasal trauma are treated at home, using basic first aid and home care strategies. In other cases, client may need professional treatment. The recommended treatment plan will vary, depending on the type and severity of nasal trauma that. For example, they may recommend cauterization or packing, medications, surgery. Nasal injuries can result in damage to the skin, bone, cartilage or any combination.

If the skin is cut this requires cleaning and then closing using either sutures or self-adhesive strips. An injection to prevent tetanus is advisable if vaccination is not up to date (every 10 years).

Bony fractures of the nose account for nearly 50% of all facial fractures. Fractures to the nasal bones cause a lot of swelling and it may take about five days for the swelling to settle down enough for the bones to be checked.

First aid and home care

To treat minor nosebleeds:

Sit upright and lean forward to reduce blood pressure in the nose. Pinch both of the nostrils shut at the soft portion of the nose for five to 15 minutes. While completing these steps, breathe through the mouth and keep the head higher than the heart. Refrain from picking or blowing the nose for several hours afterward.

To treat blunt-force trauma of the nose:

Apply ice for 10 to 20 minutes at a time throughout the day, for the first few days after the injury. Wrap the ice in a thin cloth or towel to protect the skin from frostbite.

Take over-the-counter anti-inflammatory pain relievers, such as ibuprofen. Sleep with the head raised to reduce pain and swelling. If the nose broke is suspected, contact the healthcare professional.

To remove a foreign object from the nose: gently blow the object out of the nose by pinching shut the unaffected nostril. If the object is visible and can be easily grasped, try to gently remove it with tweezers. If the first two steps fail, contact the doctor. Do not pick at the object or use a cotton swab or other tool to probe at it.

Cauterization or packing

If patient develops a nosebleed that lasts longer than 20 minutes or recurs frequently, contact the doctor. Blood tests or imaging of the nose is required to diagnose the cause. Patient may also require professional treatment.

Two common treatments of nosebleeds are nasal packing and cauterization. With packing, the healthcare professional will place gauze or an inflatable balloon inside one or both nostrils to exert pressure on the broken blood vessels in order to stop the bleeding. In other cases, they may use cauterization to stop nosebleeds. In this procedure, they either apply a topical medication to the broken blood vessels or use a heating device to seal them closed.

Medications

Health Care Provider may recommend over-the-counter or prescription medications to help treat certain types of nasal trauma. For example, they may recommend painkillers to ease discomfort, antibiotics to treat infections, nasal sprays to reduce irritation.

Surgeries

The reduction of nose fracture might require manual realignment (if the break has displaced the bones and cartilage in the nose, the manual realignment needs to be done within 14 days from when the fracture occurred. During this procedure, administer medication by injection or nasal spray to ease discomfort, open the nostrils with a nasal speculum and uses special instruments to help realign the broken bones and cartilage of the nose). If this fails, it will require surgeries.

If the patient experiences a severe nasal fracture, the doctor may recommend surgery to repair it.

In other cases, the patient may need more intensive reconstructive surgery to repair a nasal fracture. If the nasal fracture is accompanied by clear fluid coming from the nose, the patient will be admitted to the hospital. This is cerebrospinal fluid the and the qualified healthcare professional may insert a drain in the lower back to help change the course of the spinal fluid away from the injured area.

Evolution and complications

Bone stability after a fracture occurs between 3 and 5 weeks. Full bone fusion occurs between 4 and 8 weeks. Some complications related to nasal injury are hypovolemia, infections, deformity of the nose and face, and all these others might occur from some serious and severe nose fractures:

Septal haematoma: Blood collecting (haematoma) under the lining (mucosa) of the central partition wall of the nose (septum) is stripped off either side causing a purple swelling inside the nose. If this occurs, it will lead to nasal obstruction, pain, and need treating by draining the blood away soon after it happened. If the blood is left and not drained it can become infected or cause damage to the underlying support destroying cartilage and then leave a 'saddle nose' deformity. Treatment is by surgical drainage and a course of antibiotics.

Nasal obstruction: Nasal blockage usually occurs after the injury due to swelling inside the nose and this may take a few days to settle. If the nose is still blocked after three weeks it may be due to the septum being deviated and buckled which blocks the nasal passage. Septal deviation may require surgical correction if the blockage is significant.

Nosebleeds (epistaxis): Nosebleeds are common and usually settle on their own with simple first aid by gently pinching the lower half of the nose for 15 minutes. Nasal packing or cautery in hospital is reserved for nosebleeds that do not stop of their own accord.

Cerebrospinal fluid leak: Severe nasal trauma can push the nasal bones into the face, giving the face a pug-like appearance. The thin cribriform plate at the roof of the nose may fracture causing the cerebrospinal fluid that bathes the brain to leak out. Small fractures seal spontaneously with conservative management (95% within two weeks). Antibiotics are not given unless infection is proven to be present. If fluid leak continues, more treatment may be required.

Loss of sense of smell (anosmia): The smell organ in the roof of the nose can also be damaged. Loss of sense of smell very rarely returns.

Self-assessment 3.4

1. What are the causes of nasal fractures?
2. What are different signs and symptoms of nasal fracture?
3. What are the complications of nasal injury?

3.5 PHARYNGITIS

Learning Activity 3.5

Carefully read this below situation and answer the following questions:

L.L is a 12-year-old female presenting to her pediatrician, complaining of sore throat and cough. She has had some hoarseness in her voice over the past few days and subjective sweats but no documented fever. She has a history of seasonal allergies in the fall, and takes loratidine tablets only during that season. Upon review of systems, she complains of isolated throat pain, without any rhinorrhea, sinus pressure, or headache. Her mother has been taking her temperature at home, and they have fluctuated from 35 - 37.20 c. Upon arrival to the Pediatrician, she had heart rate of 115 beats per minute, blood pressure of 110/76 mmHg, respiratory rate of 18 cycles per minute, and oxygen saturation of 100% on room air.

During the physical examination, she had severe unilateral sore throat, bulging of pharyngeal wall, neck pain and swelling and dysphagia with pharyngeal wall that had whitish plaques. The Pediatrician ordered blood sample for complete blood count, erythrocyte sedimentation rate and throat swab for culture. L.L was given a prescription for ibuprofen, to help with the inflammation and subjective fevers. She was not given a prescription for antibiotics, but the pediatrician advised the patient and her mother that he would call in a prescription for antibiotics if the culture returned positive. She was encouraged to drink plenty of fluids and rest.

1. What were the abnormal signs and symptoms was the patient presenting?
2. What do you think is the medical diagnosis the child was presenting?
3. What were the investigations requested to diagnose that medical condition?
4. What was involved into the treatment plan of that patient?
5. What might be some complications if is poorly managed?

Pharyngitis is inflammation of the pharynx, which is in the back of the throat. Its most often referred to simply as “sore throat.” Pharyngitis can also cause scratchiness in the throat and difficulty swallowing.

Pharyngitis-induced sore throat is one of the most common reasons for doctor visits. More cases of pharyngitis occur during the colder months of the year. It’s also one of the most common reasons why people stay home from work. In order to properly treat a sore throat, it’s important to identify its cause. Pharyngitis may be caused by bacterial or viral infections

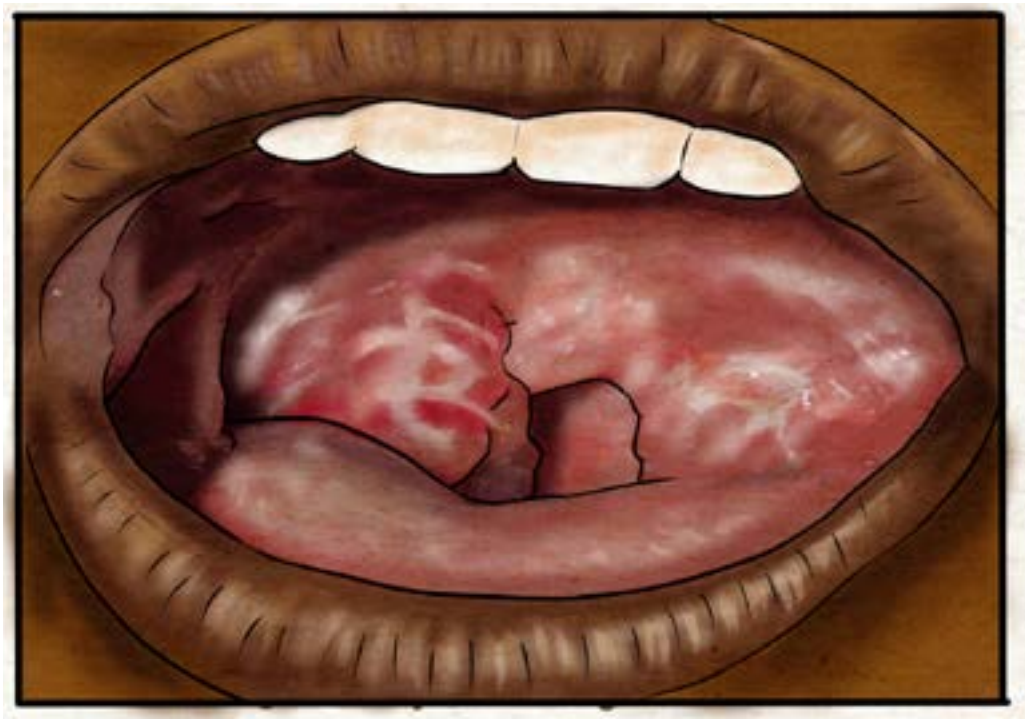


Figure 3.15 Images of Pharyngitis

Causes and risk factors

Pharyngitis is the inflammation of the mucous membranes of the oropharynx. In most cases, it is caused by an infection, either bacterial or viral. Other less common causes of pharyngitis are non-infectious that include allergies, trauma, cancer, reflux, and certain toxins.

There are numerous viral and bacterial agents that can cause pharyngitis like measles, adenovirus (which is one of the causes of the common cold), chickenpox, croup (which is a childhood illness distinguished by a barking cough), group A streptococcus.Viruses are the most common cause of sore throats. Pharyngitis is most commonly caused by viral infections such as the common cold, influenza, or mononucleosis.

Respiratory viruses, including SARS-CoV-2 are the most common causes of acute pharyngitis. Adenovirus, rhinovirus, and coronaviruses (including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Other respiratory viruses that cause pharyngitis include enteroviruses, influenza A and B, parainfluenza viruses, and respiratory syncytial virus.

Less commonly, pharyngitis is caused by a bacterial infection. The most common bacterial infection of the throat is streptococcus throat, which is caused by group A streptococcus. Group A Streptococcus (GAS) is the most common bacterial cause

of acute pharyngitis. Other bacteria that can cause pharyngitis include: Group C and G Streptococcus (are generally considered to be less common causes of pharyngitis than GAS), Arcanobacterium haemolyticum (formerly Corynebacterium haemolyticum, a facultative anaerobic gram-positive bacillus is an uncommon cause of acute pharyngitis.

Pharyngitis caused by A. haemolyticum is similar to streptococcal pharyngitis and is most common in adolescents and young adults. Fusobacterium necrophorum (an anaerobe that often colonizes the oropharynx, is a putative cause of pharyngitis), Mycoplasma and Chlamydia species (both Mycoplasma pneumoniae and Chlamydia pneumoniae have been reported to cause pharyngitis, most commonly in children and young adults), Corynebacterium diphtheria (is the causative agent of diphtheria. Francisella tularens. Rare causes of bacterial pharyngitis include also gonorrhea.

The most **common noninfectious causes** of pharyngitis include allergic rhinitis or sinusitis, gastroesophageal reflux disease, smoking or exposure to second-hand smoke, and exposure to dry air (particularly in the winter). Trauma (eg, caused by tracheal intubation) or vocal strain have also been reported to cause sore throat. Other risks include the use of angiotensin-converting enzyme (ACE) inhibitors and some chemotherapeutics, autoimmune disorders like Kawasaki disease, periodic fever. Frequent exposure to colds and flus can increase the risk for pharyngitis. Allergy, frequent sinus infections and exposure to second hand smoke may also raise the risk.

Pathophysiology

Bacteria and viruses can cause direct invasion of the pharyngeal mucosa. Certain viruses like rhinovirus can cause irritation secondary to nasal secretions. In almost all cases, there is a local invasion of the pharyngeal mucosa which also results in excess secretion and edema. This will also leads to fever, vasodilation, and tissue damage.

Signs and symptoms

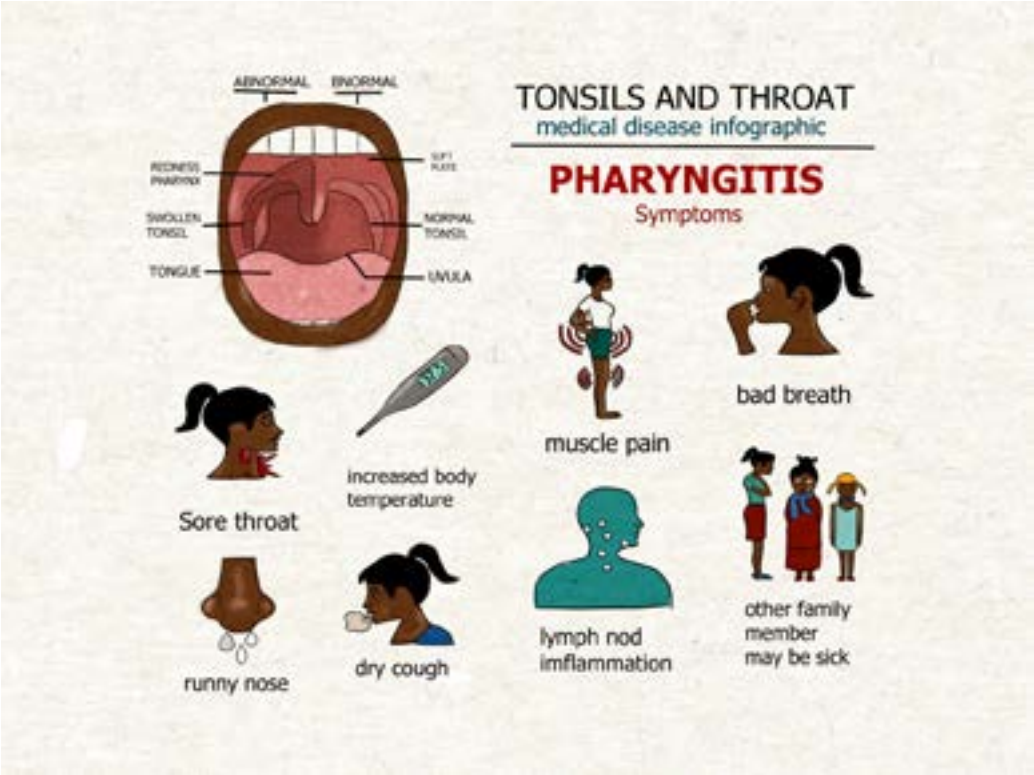


Figure 3.16 Pharyngitis Signs and symptoms

Most patients with pharyngitis of any cause present with a sore throat that worsens when swallowing. Neck pain or swelling due to regional/cervical lymphadenopathy commonly accompany sore throat. Fever, headache, fatigue, and malaise are variably present. The patient also presents the white or gray patches, swelling, and redness of the throat.

Patients with pharyngitis caused by respiratory viruses usually have other signs and symptoms of upper respiratory tract infection, such as fatigue, nasal congestion, and cough. Coryza, conjunctivitis, sneezing, hoarseness, ear pain, sinus discomfort, oral ulcers, and a viral exanthem are additional features that support the diagnosis of viral pharyngitis. Fever associated with viral upper respiratory tract infection is typically low grade except in patients with influenza and COVID-19.

Classic signs and symptoms of GAS pharyngitis include acute-onset sore throat, fever, pharyngeal edema, patchy tonsillar exudates, and prominent, tender, anterior cervical lymphadenopathy. Other features that support the diagnosis include palatal petechiae, a scarlatiniform rash and a strawberry tongue.

Signs of upper airway obstruction include muffled or “hot potato” voice, hoarseness, drooling or pooling of saliva, stridor, respiratory distress (tachypnea, dyspnea, retractions), “sniffing” or “tripod” positions, which help maintain airway patency. Patients with signs of airway obstruction generally require urgent airway management and/or hospitalization for additional care. In addition to the signs of upper airway obstruction, features that may indicate deep neck space infections include severe unilateral sore throat, bulging of pharyngeal wall, soft palate, or floor of the oropharynx, neck pain or swelling, crepitus, trismus (irritation and reflex spasm of the internal pterygoid muscle), stiff neck, toxic appearance, fever.

Investigations

Investigating the pharyngitis should focus on:

- The complete history taking and physical exam that will mainly focus on ear, nose, throat and neck.
- Throat swab culture: this involves using a cotton swab to take a sample of the secretions from the throat for the rapid strep test in the consultation room for Group A beta-hemolytic streptococcal rapid antigen detection test (preferred diagnostic method in emergency settings), or the swab is sent to a lab for further testing and results. This is criterion standard for diagnosis of GAS infection (90-99% sensitive).
- Testing for coronavirus 2 (SARS-CoV-2) by rapid test after taking nasal swabs or polymerase chain reaction (PCR) with oro-pharyngeal swab.
- Blood tests: mainly to determine whether the patient has mononucleosis. A complete blood count (CBC) may be done to look for any other type of infection. Other laboratory studies that may be helpful include Peripheral blood smear, gonococcal culture if indicated by the history.
- Imaging studies generally are not indicated for uncomplicated viral or streptococcal pharyngitis. However, the following may be considered: lateral neck x-ray in patients with suspected epiglottitis or airway compromise, soft-tissue neck CT if concern for abscess or deep-space infection exists.

Adequate medical diagnosis

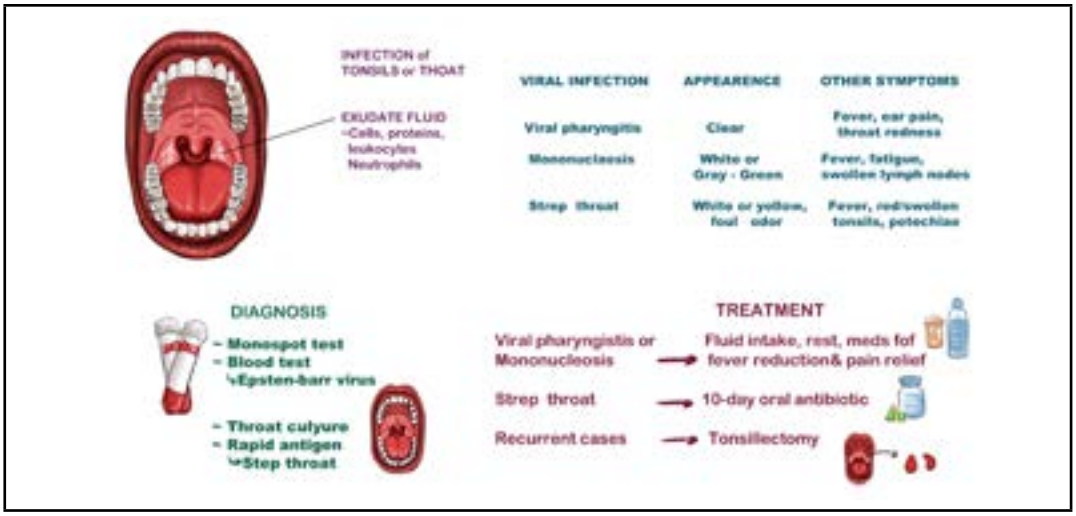


Figure 3.17 Images of medical diagnosis

Acute pharyngitis is one of the most common conditions encountered in outpatient clinical practice. The most common causes of acute pharyngitis are respiratory viruses and group A *Streptococcus* (GAS). Most patients with pharyngitis present with nonspecific symptoms such as a sore throat that worsens with swallowing and cervical lymphadenopathy. The diagnosis of viral pharyngitis can be made clinically after ruling out severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Testing for GAS is indicated for patients who have a clinical syndrome compatible with GAS pharyngitis (e.g., fever, tonsillar exudates, and cervical lymphadenopathy) and lack features of a viral upper respiratory tract infection. The majority of patients presenting with acute pharyngitis can be clinically diagnosed with respiratory viral syndrome after being ruled out for SARS-CoV-2 and/or will test negative for GAS.

Treatment plan

The main goals in evaluation of adults with pharyngitis are the exclusion of serious or potentially life-threatening conditions and the identification of treatable causes. Viral infections do not need to be treated with antibiotics, and treatment is symptomatic as it is only necessary to help relieve symptoms. For the viral pharyngitis, home care that can help in relieving symptoms includes drinking plenty of fluids to prevent dehydration, eating warm broth, gargling with warm salt water (1 teaspoon of salt per 8 ounces of water), using a humidifier, resting until the person feels better.

Bacterial infections (Group A beta-hemolytic streptococcal pharyngitis) require antibiotics. Antibiotics may shorten the duration of symptoms by 16 to 24 hours and prevent rheumatic fever. A 7 to 10 days course of oral penicillin is recommended to ensure the eradication of bacterial carriage and the prevention of rheumatic fever. Treatment options for Group A beta-hemolytic streptococcal pharyngitis include

oral treatment with penicillin V or oral amoxicillin. Cephalosporins and clindamycin may also be used. Intramuscular penicillin is also a treatment option. Macrolides (azithromycin and clarithromycin) have been shown to create the resistance and are not considered a first-line antibiotic for pharyngitis. In patients with a mild penicillin allergy, cephalosporins can be used. In patients with a history of anaphylaxis to penicillin, azithromycin or clindamycin can be used. The disease is no longer infectious after 24 hours of antibiotics.

Single dose corticosteroids like dexamethasone may be given to reduce the severity of symptoms. Symptomatic treatment with gargles (wash one's mouth and throat with a liquid that is kept in motion by breathing through it with a gurgling sound) and acetaminophen/paracetamol or ibuprofen as nonsteroidal anti-inflammatory drugs should be recommended. Use caution in the setting of severe dehydration. For patients with infectious mononucleosis, contact sports should be avoided for 6 to 8 weeks due to the risk of splenic rupture.

Prevention

Maintaining proper hygiene can prevent many cases of pharyngitis. Some preventive measures include avoid sharing food, drinks and eating utensils, avoid individuals who are sick (isolation or quarantine if possible), wash hands often especially before eating and after coughing or sneezing, use alcohol-based hand sanitizers when soap and water aren't available, avoid smoking and inhaling secondhand smoke.

Evolution and complications

In general, the prognosis for pharyngitis is good as both viral and bacterial infections are typically self-limited to 5 to 7 days. Patients with GAS pharyngitis usually recover soon, often within 24 to 72 hours of starting antibiotics. Failure to improve within these time periods should raise suspicion for alternative diagnoses or complications. Treatment failures are usually due to antibiotic resistance, poor compliance, and untreated close contacts. Mortality from pharyngitis is rare but does occur if the airway is compromised. Severe infections of the pharynx and surrounding soft tissue can be life-threatening. Recognizing signs and symptoms of these conditions is critical to management. Upper airway obstruction can result from severe pharyngeal inflammation of any etiology but is more commonly associated with infectious mononucleosis and invasive infections involving the deep tissue of the neck.

Bacterial invasion of the deep tissue of the neck can lead to infection and/or abscess formation in the peritonsillar, submandibular, parapharyngeal, or retropharyngeal space Suppurative thrombophlebitis (Lemierre syndrome) can arise from bacterial invasion and clot formation of the jugular vein.

GAS infection can lead to suppurative and nonsuppurative complications. Suppurative complications of GAS pharyngitis are due to invasion of the organism beyond the pharynx and include otitis media, peritonsillar cellulitis or abscess, sinusitis, meningitis, bacteremia, and necrotizing fasciitis. Non-suppurative complications of GAS pharyngitis are immune mediated and include acute rheumatic fever, post-streptococcal glomerulonephritis, and reactive arthritis. Prevention of these complications is a key reason for treating GAS pharyngitis with antibiotic.

Self-assessment 3.5

1. What are different causes and risk factors of pharyngitis?
2. What are different investigations that must be requested to diagnose the pharyngitis?
3. What must be included into the treatment plan of pharyngitis?
4. What are the complications of pharyngitis?

3.6 TONSILLITIS

Learning Activity 3.6

Carefully read this below situation and answer the following questions:

A patient N.E, aged 27, was brought to the emergency department of CHUK stating that her throat is so sore that she has difficulty swallowing even liquids. The Registered nurse, completes an assessment of Ms. N.E. The physical examination performed revealed the following findings results: To 102°F (38.8°C), Blood pressure 110/70 mmHg, pulse rate was 74beats per minute, respiratory rate was 19 breaths per minutes. An acutely swollen and reddened area of the soft palate is noted in her mouth, half occluding the orifice from the mouth into the pharynx. Yellow exudate is present. CBC reveals an elevated WBC of 16,000/mm3. Antibiotic drugs were prescribed such as amoxicillin 500mg TDS 7/7, and paracetamol 500mg TDS 3/7 and Ibuprofen 400mg TDS for pain relief. The patient was also advised to drink warm or very cold fluids to help with throat pain and gargle with warm salt water

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Tonsillitis is inflammation of the tonsils, and adenoiditis is inflammation of the adenoids. These conditions generally occur together; the common diagnosis is tonsillitis. Although both disorders are more common in children, they also may be seen in adults.

Causes and risk factors

Common viruses most often cause tonsillitis, but bacterial infections also can be the cause. The most common bacterium causing tonsillitis is **Streptococcus** pyogenes (group A streptococcus), the bacteria that causes strep throat. Other strains of strep and other common causes of tonsillitis includes adenoviruses, influenza virus, Epstein-Barr virus, Parainfluenza viruses, Enteroviruses, Herpes simplex virus.

Risk factors of getting tonsillitis are the following:

- **Age:** Children tend to get tonsillitis more than adults do. Kids who are between the ages of 5 and 15 are more likely to get tonsillitis caused by bacterial infections. Tonsillitis from viral infections are more common in very young children. Elderly adults are at higher risk for tonsillitis too.
- **Germ exposure:** Children also spend more time with other kids their age in school or camp, so they can easily spread infections that lead to tonsillitis. Adults who spend a lot of time around young children, such as teachers, may also be more likely to pick up infections and get tonsillitis.

Pathophysiology overview

The tonsils and adenoids are lymphatic tissues and common sites of infection. Primary infection may occur in the tonsils and adenoids, or the infection can be secondary to other URIs. Chronic tonsillar infection leads to enlargement and partial upper airway obstruction. Chronic adenoidal infection can result in acute or chronic infection in the middle ear (otitis media).

Signs and Symptoms

The main symptoms of tonsillitis are inflamed and swollen tonsils sometimes are severe enough to make it hard to breathe via the mouth. Sore throat, throat pain or tenderness difficulty or pain on swallowing, fever, chills red tonsils, a white or yellow coating on the tonsils, painful blisters or ulcers on the throat, headache, loss of appetite, ear pain, swollen glands in the neck or jaw, bad breath and malaise are the most common symptoms. Enlarged adenoids may produce nasal obstruction, noisy breathing, snoring, and a nasal quality to the voice (A scratchy or muffled voice), stiff neck. Visual examination reveals enlarged and reddened tonsils. White patches may appear on, the tonsils if group A streptococci are the cause.

Figure3.18 The appearance of the oral pharynx and tonsils in, acute pharyngitis and tonsillitis.

Figure 3.19 Images of tonsillitis

Investigations

A throat culture and sensitivity test determines the causative microorganism and appropriate antibiotic therapy.

A blood test: A complete blood cell count (CBC) may be ordered. It looks for high and low numbers of blood cells to show whether a virus or bacteria caused the tonsillitis.

Rash: The healthcare professional will check for scarlatina, a rash linked to strep throat infection.

Adequate medical diagnosis

The health care provider performs a physical exam by looking at the tonsils to see if it is red or swollen or have pus on them. They will also check for a fever. They may look in the ears, nose for signs of infection, and feel the sides of the neck for swelling and pain.

There is a need to perform tests to find the cause of tonsillitis like **a throat swab.** The healthcare professional will test saliva and cells from the throat for strep bacteria. They will run a cotton swab along the back of the throat. This might be uncomfortable but will not hurt. Results are usually ready in 10 or 15 minutes. Sometimes, the healthcare professional will also want a lab test that takes a couple of days. If these tests are negative, a virus is what caused the tonsillitis.

Treatment Plan

The treatment will depend in part, on what caused tonsillitis.

Medication

If the tests find bacteria, client will get antibiotics: one-time injection or in pills for several days. Client will start to feel better within 2 or 3 days, but it is important to take all of the medication. The antibiotics usually used are Penicillins for tonsillitis due to group A streptococcus. Other antibiotics might also be used if patient is allergic to penicillin.

Home remedies

If client has a virus, antibiotics will not help, and the body will fight the infection on its own. In the meantime, client can try some home remedies:

- Get lots of rest
- Drink warm or very cold fluids to help with throat pain
- Eat smooth foods, such as flavored gelatins, ice cream, and applesauce
- Use a cool-mist vaporizer or humidifier in the room
- Gargle with warm salt water
- Suck on lozenges with benzocaine or other medications to numb the throat
- Take over-the-counter pain relievers such as acetaminophen or ibuprofen

If the causative organism is group A streptococcus. The nurse ensures that the client and family members can manage self-care at home by communicating the following points:

– Report any signs of bleeding to the physician is particularly important in the first 12 to 24 hours, and then 7 to 10 days after surgery as the throat heals.
– Gently gargle with warm saline or an alkaline mouthwash to assist in removing thick mucus.
– Maintain a liquid and very soft diet for several days after surgery, avoid spicy foods and rough-textured foods.
– Also, avoid milk and milk products if the client does not tolerate them well. Streptococcus, prompt treatment is needed to prevent potential cardiac and renal complications.

Tonsillectomy surgery

Tonsils are an important part of the immune system, so the doctor will try to help to keep them. However, if the tonsillitis keeps coming back or will not go away, or if swollen tonsils make it hard to breathe or eat, client might need to have the tonsils taken out. This surgery is called tonsillectomy.

Tonsillectomy used to be a very common treatment. Now, doctors only recommend it if tonsillitis keeps coming back.

Usually, the doctor uses a sharp tool called a scalpel to take out the tonsils. However, other options are available, including lasers, radio waves, ultrasonic energy, or electrocautery to remove enlarged tonsils.

Discuss the best options with the healthcare professional to decide the best treatment for the condition.

Tonsillectomy recovery

Tonsillectomy is an outpatient procedure, meaning client will not need to stay in the hospital. It usually lasts less than an hour. Client can probably go home a few hours after surgery.

Recovery usually takes 7 to 10 days. Client may have some pain in the throat, ears, jaw, or neck after the surgery. Get plenty of rest and drink many fluids while recovering, but do not eat or drink any dairy products for the first 24 hours.

Client might have a low fever and see a little blood in the nose or mouth for several days after the surgery. If the fever increases or client has bright red blood in the nose or mouth, it is necessary to contact a doctor immediately.

Tonsillitis Prevention

The best way to prevent tonsillitis is through good hygiene, including:

- Washing hands often
- Not sharing food, drink, utensils, or personal items like toothbrushes with anyone

- Staying away from someone who has a sore throat or tonsillitis

Antibiotic therapy, analgesics such as acetaminophen, and saline gargles may be used to treat the infection and associated discomfort. Chronic tonsillitis and adenoiditis may require tonsillectomy, operative removal of the tonsils, and adenoidectomy, operative removal of the adenoids. The criteria for performing these procedures are repeated episodes of tonsillitis, hypertrophy of the tonsils, enlarged obstructive adenoids, repeated purulent otitis media, hearing loss related to serous otitis media associated with enlarged tonsils and adenoids, and other conditions (e.g., asthma, rheumatic fever) exacerbated by tonsillitis. Tonsillectomy and adenoidectomy are generally done as outpatient procedures.

Evolution and Complications

Complications usually happen only if bacteria caused the infection. They include:

- A collection of pus around the tonsil (peritonsillar abcess)
- Middle ear infection
- Breathing problems or breathing that stops and starts while sleeping (obstructive sleep apnea)
- Tonsillar cellulitis, or infection that spreads and deeply penetrates nearby tissues

If the patient has strep bacteria and does not get treatment, the illness could lead to a more serious problem, including rheumatic fever, scarlet fever, sinusitis, a kidney infection called glomerulonephritis.

Self-assessment 3.6

1. What are all possible causes or risk factors to develop tonsillitis?
2. What are the signs and symptoms of tonsillitis?
3. What are the investigations that should be requested to make the diagnosis?
4. What must be included into the management plan of that medical condition?
5. If not treated, what will be the complications for tonsillitis?

3.7 LARYNGITIS

Learning Activity 3.7

Read the following scenario and answer the related questions

A 29-year-old woman presented with an acute episode of hoarseness progressing to aphonia, which she had experienced 3 days before her appointment. She also reported a sore throat, odynophagia, and cough for 5 days. She had been taking a cough suppressant (Dextromethorphan15mg 2x/day/5days), antihistamine (azatadinex3/day/3days), decongestant (Sudafed take 1 tablet every 4 hours), and acetaminophen (Paracetamol 500mg three times a day for 4 days) to relieve her symptoms, and she was advised the oral hydration. Test revealed increased Reinke edema and new bilateral mid membranous vocal fold masses .The amplitude and wave form of the vocal folds were decreased. She was diagnosed with acute laryngitis and treated with amoxicillin-clavulanate 500mg three times a day for 10 days and a methylprednisolone 1 tablet per day in 7days.

1. What are the abnormal signs and symptoms that the patient was presenting
2. What is a medical diagnosis of this patient?
3. What are the possible causes of this above medical condition?
4. What is the treatment plan of this patient?
5. What are the possible complications if the patient is untreated?

Laryngitis is **an inflammation of the voice box (larynx) from overuse, irritation or infection**. Inside the larynx are vocal cords two folds of mucous membrane covering muscle and cartilage. Normally, the vocal cords open and close smoothly, forming sounds through their movement and vibration.

Laryngitis refers to inflammation of the larynx. This is often due to an acute viral infection, which is typically a mild and self-limiting condition that lasts for a period of 3 to 7 days. There are non-infectious causes and more serious conditions that can present with acute laryngeal symptoms. The practitioners must be familiar with the differential diagnosis and workup. This activity reviews the evaluation and treatment of acute laryngitis and highlights the role of the inter-professional team in caring for patients with this condition.

Causes

Acute laryngitis

Most cases of laryngitis are temporary and improve after the underlying cause gets better. Causes of acute laryngitis include:

Viral infections similar to those that cause a cold

Vocal strain, caused by yelling or overusing the voice

Bacterial infections, although these are less common

Chronic laryngitis

Laryngitis that lasts longer than three weeks is known as chronic laryngitis. This type of laryngitis is generally caused by exposure to irritants over time. Chronic laryngitis can cause vocal cord strain and injuries or growths on the vocal cords (polyps or nodules). Chronic laryngitis can be caused by:

Inhaled irritants, such as chemical fumes, allergens or smoke

Acid reflux, also called gastroesophageal reflux disease (GERD)

Chronic sinusitis

Excessive alcohol use

Habitual overuse of the voice (such as in singers or cheerleaders)

Smoking

Less common causes of chronic laryngitis include bacterial or fungal infections, Infections with certain parasites

Other causes of chronic hoarseness include Cancer, Vocal cord paralysis, which can result from nerve injury due to surgery, injury to the chest or neck, cancer, nerve disorders, or other health conditions, bowing of the vocal cords.

Risk factors

Risk factors for laryngitis include: **Having a respiratory infection,** such as a cold, bronchitis or sinusitis, **Exposure to irritating substances,** such as cigarette smoke, excessive alcohol intake, stomach acid or workplace chemicals, **Overusing the voice,** by speaking too much, speaking too loudly, shouting or singing.

Pathophysiology

Acute laryngitis is an inflammation of the vocal fold mucosa and larynx that lasts less than 3 weeks. When the etiology of acute laryngitis is infectious, white blood cells remove microorganisms during the healing process. The vocal folds then become more edematous, and vibration is adversely affected. The phonation

threshold pressure may increase to a degree that generating adequate phonation pressures in a normal fashion becomes difficult, thus eliciting hoarseness. Frank aphonia results when a patient cannot overcome the phonation threshold pressure required to set the vocal folds in motion.

The membranous covering of the vocal folds is usually red and swollen. The lowered pitch in laryngitic patients is a result of this irregular thickening along the entire length of the vocal fold.

Signs and symptoms

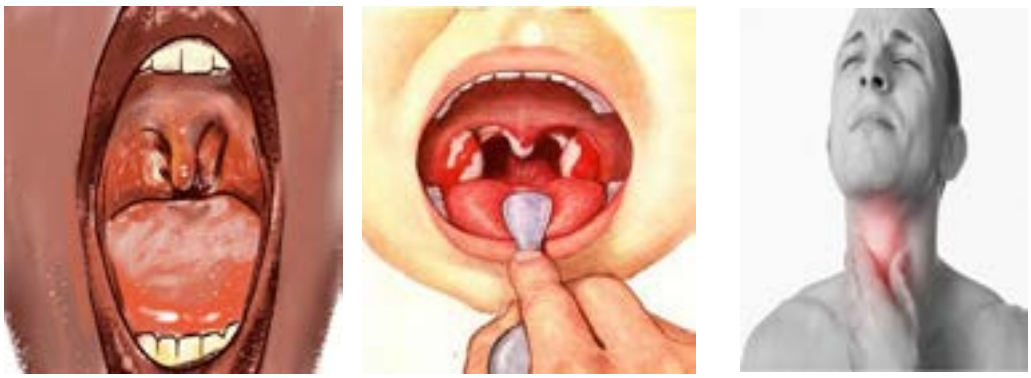


Figure 3.20 Signs and symptoms of laryngitis

In most cases, laryngitis symptoms last less than a couple of weeks and are caused by something minor, such as a virus. Less often, laryngitis symptoms are caused by something more serious or long lasting. Laryngitis signs and symptoms can include:

- Hoarseness
- Weak voice or voice loss
- Tickling sensation and rawness in the throat
- Sore throat
- Dry throat
- Dry cough

Investigations

The most common sign of laryngitis is hoarseness. Changes in the voice can vary with the degree of infection or irritation, ranging from mild hoarseness to almost total loss of the voice. If the patient has chronic hoarseness, the healthcare professional may review patient's medical history and symptoms. He or she may want to listen to patient's voice and examine patient's vocal cords, and he or she may refer the patient to an ear, nose and throat specialist.

These techniques sometimes are used to help diagnose laryngitis:

Figure 3.21 **Examining the larynx using laryngoscope**

Laryngoscopy: In a procedure called laryngoscopy, the healthcare professional can visually examine the vocal cords by using a light and a tiny mirror to look into the back of the throat. The healthcare professional may use fiber-optic laryngoscopy. This involves inserting a thin, flexible tube (endoscope) with a tiny camera and light through the nose or mouth and into the back of the throat. Then the healthcare professional can watch the motion of the vocal cords as client speaks.

Figure 3.22 Taking the oro-pharyngeal swab

Biopsy: If the doctor sees a suspicious area, he or she may do a biopsy — taking a sample of tissue for examination under a microscope.

Adequate medical diagnosis

The diagnosis of laryngitis is based on symptoms, medical history, and a physical examination. Laryngitis is usually diagnosed and treated by a general practitioner or registered nurse practitioner. However, a speech-language pathologist may also be involved in diagnosis and treatment.

Symptoms of laryngitis most commonly include voice changes (hoarseness, raspiness, or voice loss), early vocal fatigue, throat pain or “tickling”, frequent throat clearing, dry cough

Other symptoms might include difficulty breathing, shortness of breath, wheezing, drooling, or difficulty swallowing. However, these often indicate a more serious condition, such as epiglottitis, a swelling of the epiglottis, and the flap of tissue that covers the larynx to prevent food from going down the trachea (windpipe).

The history of the symptoms will help the healthcare professional nail down a cause. Risk factors of laryngitis that may point to a cause include: Recent illness or exposure to sick people, Acid reflux ,Allergies, Asthma, Immune status, Travel, Medications, Smoking, Alcohol use ,Recent injuries or neck surgery, Activities or occupations that involve overuse of the voice (teachers, coaches, call center employees, singers, etc.)

Treatment Plan

Laryngitis typically resolves in a few days even without treatment, so treatment is largely conservative and supportive. Voice rest, steam inhalation, over-the-counter pain relievers, irritant avoidance, and treatment of the underlying cause are the pillars of laryngitis treatment.

Supportive care

No matter what the cause, laryngitis is best treated by giving the voice a rest by reducing vocal activity as much as possible. Steam inhalation and drinking fluids also help to soothe irritated tissue, moderate symptoms, and speed healing.

Medications

Pain, sore throat, and dry cough are most effectively relieved with over-the-counter pain relievers. In severe cases, or for voice professionals, a healthcare professional may use oral or inhaled corticosteroids to rapidly reduce swelling. Other medications will be used only to treat the underlying cause, not the laryngitis itself. Because laryngitis is not usually caused by a bacterial infection, doctors rarely use antibiotics.

Treating the underlying cause

When identified, the underlying condition must be managed. If laryngitis is caused by acid reflux, dietary changes and medications that reduce stomach acid may be prescribed.

Laryngitis caused by medications or irritants will be treated by discontinuing the medication or avoiding the irritant. In particular, tobacco users will be advised to quit smoking to relieve chronic laryngitis due to smoking. Allergies will be treated with allergy medications and lifestyle changes. Laryngitis due to an upper respiratory infection caused by a bacteria or fungus will be treated with the appropriate antimicrobial medications, either antibiotics or antifungals.

Voice therapy

In cases of chronic laryngitis, voice therapy trains patients in vocal behaviors and lifestyle changes that help preserve the voice. Sessions are directed by speech-language therapists and usually last for four to eight weeks.

Laryngitis medications

Most cases of laryngitis resolve in a few days with adequate voice rest and supportive care. Outside of pain relievers, medications are usually not used.

Pain relievers

Sore throat pain, throat irritation, and dry cough are best handled with over-the-counter analgesics such as **acetaminophen**, **ibuprofen**, **naproxen**, or **aspirin**. Topical medications or remedies such as saltwater, over-the-counter throat lozenges, sore throat syrups, hard candy, herbal teas, herbal sprays, or herbal lozenges only work by coming in contact with inflamed or irritated tissues and so will help only with irritation in the throat itself. The larynx, however, is the doorway to the lungs. If topical medications like saltwater, lozenges, or cough syrup could enter the larynx, the result would be choking or drowning.

Corticosteroids

For severe laryngitis cases or voice professionals, a physician may prescribe an oral or inhaled corticosteroid, such as **prednisone**, to rapidly reduce swelling. Because of the side effects, which include laryngitis, corticosteroids are only rarely used.

The best medication for laryngitis

Figure 3.23: Steam inhalation

There is no “best” medication for laryngitis. In most cases, the best treatment for laryngitis is vocal rest, steam inhalation, and proper hydration. Medications are used to treat a possible underlying cause or to provide symptom relief.

Prevention

- To prevent dryness or irritation to vocal cords:
- **Avoid smoking and stay away from secondhand smoke.** Smoke dries throat. It can also cause the vocal cords to become irritated.
- **Limit alcohol and caffeine.** These cause you to lose total body water.
- **Drink plenty of water.** Fluids help keep the mucus in the throat thin and easy to clear.
- **Keep spicy foods out of your diet.** Spicy foods can cause stomach acid to go into the throat or esophagus. This can lead to heartburn or gastroesophageal reflux disease (GERD).
- **Include a variety of healthy foods in your diet.** Eat fruits, vegetables and whole grains. These have several vitamins, such as vitamins A, E and C, that are important for overall health. These foods can also help keep the mucous membranes in the throat healthy.
- **Avoid clearing your throat.** This does more harm than good, because it causes an abnormal vibration of the vocal cords and can increase swelling. Clearing the throat also causes it to secrete more mucus and feel more irritated, making the person want to clear the throat again.
- **Avoid upper respiratory infections.** Wash the hands often, and avoid contact with people who have upper respiratory infections such as colds.

Evolution and complications

As this is often a self-limiting condition, it carries a good prognosis. If the patient completes the recommended therapy, the prognosis for recovery to a premorbid level of phonation is excellent. If vocal maladaptations have occurred, a course of speech therapy can resolve these problems.

Acute laryngitis: - complications are rare, as the disease is usually self-limiting. Damage to the vocal cords is possible in patients who try to overcompensate for the dysphonia.

Chronic laryngitis: - the main complications are voice loss, obstruction of the airways and chronic cough. Laryngeal stenosis may develop occasionally. Rarely, in severe infections such as those with herpes viruses, laryngeal erosion and necrosis may occurIn some cases of laryngitis caused by infection, the infection may spread to other parts of the respiratory tract

Self-assessment 3.7

1. What are the signs and symptoms of patient with acute laryngitis
2. What are the causes and risk factors of acute laryngitis and chronic laryngitis?
3. Propose the treatment plan for someone who has signs and symptoms of laryngitis
4. How the laryngitis is diagnosed?
5. What are the complications if the laryngitis is not treated?

End unit assessment 3

Section A: Multiple Choice Questions

1. Which of the following is not a feature of allergic rhinitis?
   a) Sneezing.
   b) Rhinorrhoea.
   c) Itching of the nose.
   d) Nasal blockage.
   e) Facial pain or pressure.
2. In allergic rhinitis, ipratropium bromide is effective in controlling:
   a) Nasal blockage.
   b) Sneezing.
   c) Itching of the nose.
   d) Rhinorrhoea.
   e) None of the above
3. Which of the following is the best way to prevent allergic rhinitis?
   a) Diabetic medications
   b) Nasal sprays
   c) Allergy shots
   d) Stay away from known allergens

4. What is the medical term for a nosebleed?
    a) Psoriasis
    b) Ptosis
    c) Epistaxis
    d) Pronation
5. Which of the following is a common cause of nosebleeds?
    a) Dry air
    b) Use of certain medications
    c) An injury to the face
    d) All of the answers are correct
6. Which of the following should you NOT do if you have a nosebleed?
    a) Relax
    b) Sit down
    c) Lean slightly forward
    d) Put your head back
7. Pathology of allergic rhinitis
    a) Oedematous swelling of the mucosa occurs.
    b) There is infiltration with giant epithelioid cells.
    c) Seromucinous glands atrophy.
    d) Venous stasis results in a dusky swelling of the inferior turbinates.
    e) Polyp formation is a rare complication
8. What is the definition of pharyngitis?
    a) Strep throat
    b) Mononucleosis
    c) Sore throat
    d) Croup
9. Treatment for a sore throat caused by a bacteria includes:
    a) Antibiotics
    b) Surgery
    c) Hospitalization
    d) Gargling with mouthwash

10. The term for inflammation of the flap covering the windpipe is:
    a) Epiglottitis
    b) Tracheitis
    c) Inflammation of the windpipe
    d) Pharyngitis

11. Rhinophyma is associated with
    a) Hypertrophy of the sebaceous glands
    b) Hypertrophy of sweat glands
    c) Hypertrophy of endothelial cells
    d) Hypertrophy of epithelial cells

12. Rhinolalia clausa is associated with all of the following except?
    a) Allergic rhinitis
    b) Palatal paralysis
    c) Adenoids
    d) Nasal polyps

13. A case of carcinoma larynx with the involvement of anterior commissure and right vocal cord, developed perichondritis of thyroid cartilage. Which of the following statements is true for the managements of this case?
    a) He should be given radical radiotherapy as this can cure early tumours
    b) He should be treated with combination of chemotherapy and radiotherapy
    c) He should first receive radiotherapy and if residual tumour is present then should undergo laryngectomy
    d) He should first undergo laryngectomy and then post—operative radiotherapy.

14. Hyperacusis in Bell's palsy is due to the the paralysis of the following muscle
    a) Tensor tympani
    b) Levator veli palatine
    c) Tensor veli palatine
    d) Stapedius

15. Which of the following is the most common etiological agent in paranasal sinus mycoses?
    a) Aspergillus spp
    b) Histoplasma
    c) Conidiobolus coronatus
    d) Candida albicans

16. A 5 year old patient is scheduled for tonsillectomy. On the day of surgery he had running nose, temperature 37.5°C and dry cough. Which of the following should be the most appropriate decision for surgery?

a) Surgery should be cancelled
b) Can proceed for surgery if chest is clear and there is no history of asthma
c) Should get Xray chest before proceeding for surgery
d) Cancel surgery for 3 weeks and patient to be put on antibiotics

17. Androphonia can be corrected by doing:

a) Type I Thyroplasty
b) Type 2 Thyroplasty
c) Type 3 Thyroplasty
d) Type 4 Thyroplasty

18. The most common site of leak in CSF rhinorrhoea is

a) Sphenoid sinus
b) Frontal sinus
c) Cribriform plate
d) Tegmen tympani

19. The most common and earliest manifestation of carcinoma of the glottis is:

a) Hoarseness
b) Haemoptysis
c) Cervical lymph nodes
d) Stridor

20. Most common laser used in laryngeal surgery is

a) Argon laser
b) Nd YAG laser
c) CO2 laser
d) KTP laser

21. Pain pathway from ethmoid sinus is via?

a) Nasociliary nerve
b) Lacrimal nerve
c) Lateral pterygoid nerve
d) Frontal nerve

22. All are true regarding Reinke's oedema except?
    a) Usually caused by vocal abuse
    b) There is collection of oedema fluid in the subepithelial space
    c) There is asymmetrical swelling of vocal cords
    d) Vocal cord stripping is the treatment
23. Pain in tonsillar fossa and upper neck is characteristic of
    a) Eagle's syndrome
    b) Apert's syndrome
    c) Sickler's syndrome
    d) Usher's syndrome
24. Ipsilateral immobility of soft palate is seen in
    a) Lermoyez syndrome
    b) Ortner's syndrome
    c) Costen's syndrome
    d) Trotter's syndrome

Section B: Short Answer Questions

1) A nurse is called for a 37yo male with a severe nosebleed. He recalls no trauma to the nose. What is the most common cause of nosebleeds?
2) What is the most effective way to stop a nosebleed?
3) What medicated spray can be used to help stop a bleed?
4) The patient's blood pressure is 180/105. Is hypertension a cause of nosebleeds?
5) What is the difference between a posterior and an anterior nosebleed, and why is this important?
6) What is sinusitis?
7) What are the signs and symptoms of acute sinusitis?
8) How is acute sinusitis treated?
9) What are the signs and symptoms of chronic sinusitis?
10) What is nasal endoscopy?

UNIT 4 MEDICAL PATHOLOGIES OF THE MOUTH AND OESOPHAGUS

Key unit Competence:

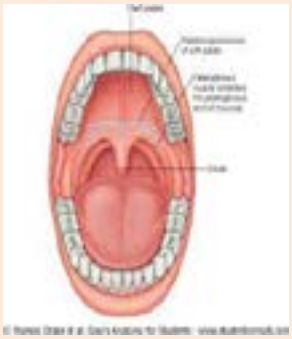
Take appropriate decision on different common medical pathologies of Oral and oesophagus.

Introductory activity 4

The following pictures indicate different problems affecting oral and esophagus structure.

Observe carefully the pictures A, B, C, D and E below and answer the questions that follow:

A



B

C

D

E

Figure 4.1 oral and esophagus health problems (adapt to the context)

1. From the images above, which one represents the normal structure?
2. What are the types of oral health problems illustrated by other pictures?
3. What do you observe on the picture B and C?
4. What do you observe on the picture D and E?

Dental caries that is also known as tooth decay or cavities is a disease that is caused by the breakdown of tooth enamel. It is a chemical dissolution of a tooth surface that brought about by metabolic activity in a microbial deposit covering a tooth surface at any given time.

Though dental caries is more common among young children and elderly people, all people are susceptible to get it at any age following the exposure. Injuries and trauma can cause damage to any part of the oral cavity soft structure. Accidents, trauma from contact sports and foreign objects in the oral cavity can cause injuries. Oral cavity injuries can lead to dental tissues damage, fall, and loss. Some oral cavity injuries need surgical repair.

Foreign bodies of the ear, which are relatively common in emergency medicine, are seen most often, but not exclusively, in children.

Various objects may be found in the ear, including toys, beads, stones, folded paper, and biologic materials such as insects or seeds.

4.1 DENTAL CARIES

Learning Activity 4.1

Carefully read this below situation and answer the following questions:

A patient H.J aged 67, was brought to the Out Patient Department complaining with tooth sensitivity to hot meal, constant tooth pain, dark spots on the teeth, bad breath. The physical exam reveals cavities in teeth and tenderness on palpation (pain), facial swelling and fever with body temperature of 38.8°C, Blood pressure 110/70 mmHg, and pulse rate: 74beats per minute, respiratory rate was 19 breaths per minutes . FBC reveals an elevated WBC of 16,000/mm3. X-ray of teeth was performed and revealed the presence of holes in the 34 tooth tissues. An acutely swollen and reddened area of the soft gingiva is noted in her mouth due to delayed treatment. She was prescribed Antibiotic drugs such as amoxicillin 500mg TDS 7/7, and Ibuprofen 400mg TDS 4/7 for pain relief.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?

Our teeth have such an important role to play in our lives. They help us chew and digest food, they help us to talk and speak clearly and they give our face its shape. A smile also has other day-to-day benefits. It can give us greater confidence, as well as influence our social lives, careers and relationship.

Dental caries that is also known as tooth decay or cavities is a disease that is caused by the breakdown of tooth enamel. It is a chemical dissolution of a tooth surface, which brought about by metabolic activity in a microbial deposit covering a tooth surface at any given time.

Causes and risk factors

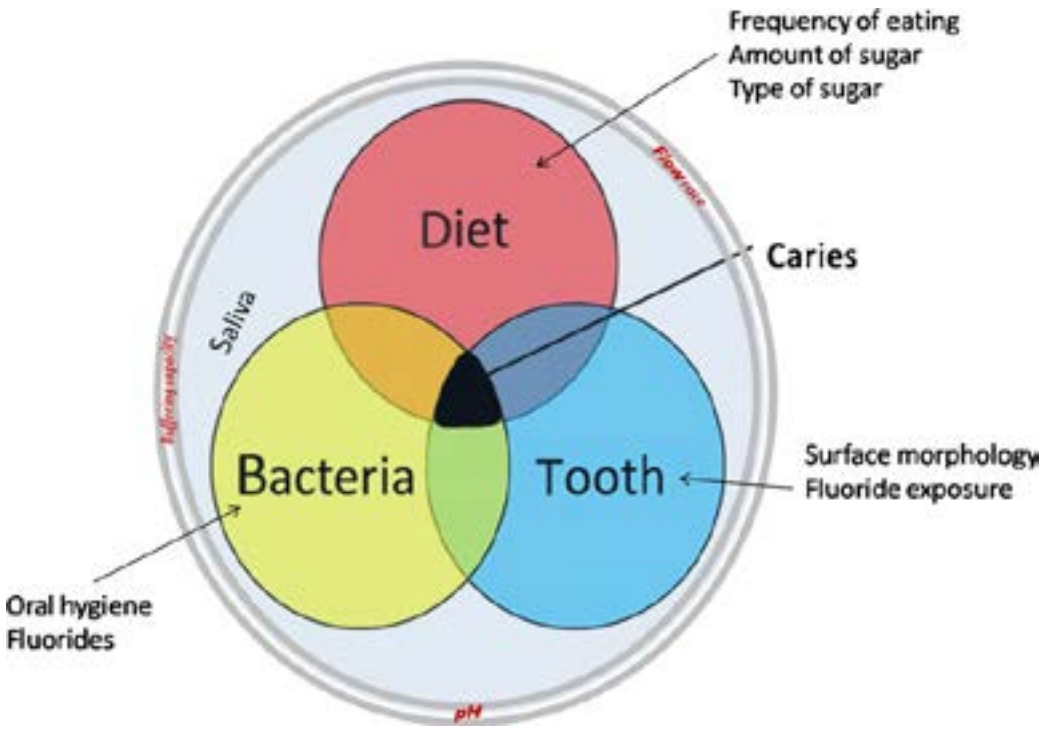


Diagram 4.1: Summary of causes and risk factors of dental caries development

Various factors are around to raise the risk of developing dental caries including A diet of sweets. Sugary snacks and drinks provide the bacteria lurking in the mouth with loads of fuel for their destructive activities. Likewise, foods and drinks that cling to the teeth can also spur plaque formation. Poor oral hygiene, tooth placement or Tooth location, Teeth that are harder to clean are more susceptible to decay. That means teeth that are misaligned or located in the back of the mouth are at higher risk (molars and premolars). Inadequate fluoride, it is a mineral that is widely recognized for its ability to fight off dental decay and support oral health. Certain health conditions, People battling dry mouth have less saliva to rinse bacteria and plaque from tooth surfaces, Heartburn and eating disorders often introduce stomach acids into the mouth. These acids damage the enamel, weakening it and making

it easy for decay. Worn dental fixes. Fillings, crowns and other dental fixes restore the appearance and function of damaged teeth. Over time, they can weaken and wear out, creating places for plaque and bacteria to hide. Many of these fillings and crowns are not meant to last a lifetime. Younger and older age are some of the risk factors among others. a dry mouth, weak enamel due to genetics or illness, do not brush their teeth twice a day with fluoride tooth paste, having an eating disorder, such as anorexia or bulimia, experience gastroesophageal reflux, also known as acid reflex or GERD are risk factors for developing dental decay.

Pathophysiology overview

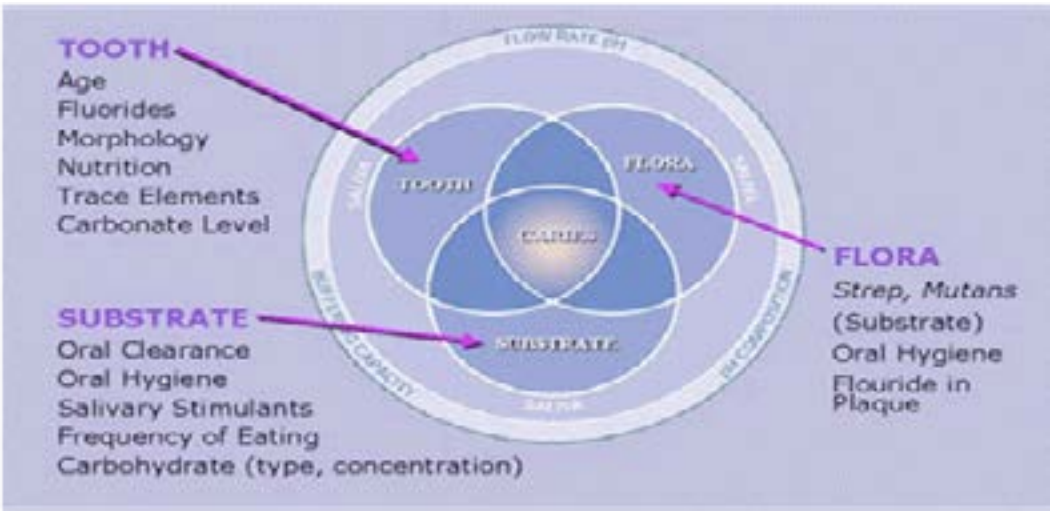


***Diagram 4.2**: summary of caries development complexity*

Many variables can contribute to the caries process. Caries develops when there is a susceptible tooth exposed to pathogenic flora (bacteria) in the presence of substrate (the surface on which an organism grows). Under these conditions, the bacteria metabolize substrate to form acid, which decalcifies teeth. In early stages, the acids dissolve the enamel in the crown of the tooth, moderate tooth decay, the dentine is attacked by acids and bacteria invade the cavity. the advanced tooth decay leads to the inflammation of the pulp then necrosis (death) of the pulp tissue.

Signs and Symptoms

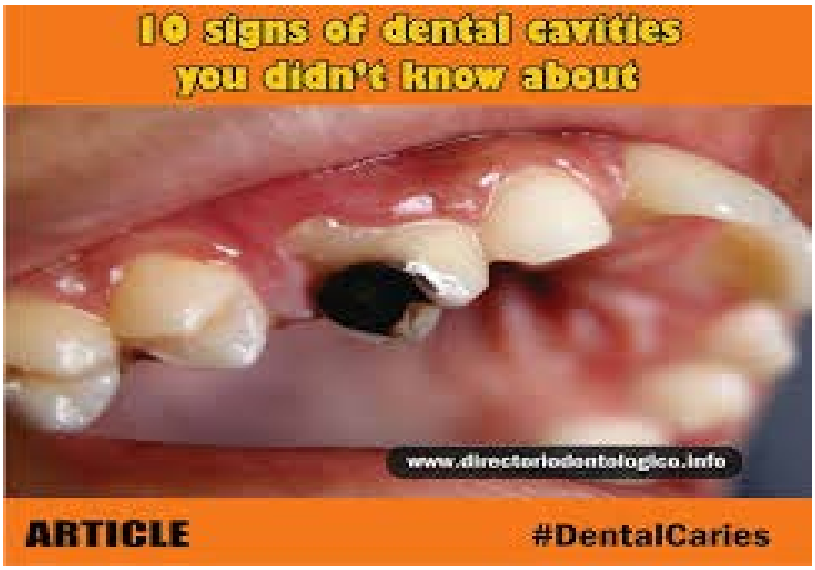


Fig 4.2: The appearance of the oral cavity, dental caries pharyngitis and tonsillitis

Symptoms of tooth decay can vary depending on the severity of the damage caused. The main symptoms of dental caries are tooth sensitivity to sugary, hot, or cold food, constant tooth pain, white or dark spots on the teeth, bad breath, loose filling, cavities in teeth, food frequently trapped teeth, difficulty biting certain foods, abscesses on teeth that cause pain, facial swelling or fever.

Investigations

Most cavities are discovered in the early stages during routine dental check-ups. A dental exam may show that the surface of the tooth is soft. Dental x-rays may show some cavities before they are visible via inspection.

Adequate medical diagnosis

The health care provider takes diagnosis based on physical exam by looking at the teeth structure to see if the surface of the tooth is soft and presenting abnormal changes such as signs of infection. There is a need to perform the dental x-rays to detect cavities.

Treatment Plan

A treatment will be recommended for a person with tooth decay, depending on its severity. Treatment for tooth decay can include early-stage fluoride treatments**,** fluoride can be used in various forms to help stop and even repair the damage that has occurred due to tooth decay. A dentist can apply professional fluoride treatments directly to the teeth. These fluoride treatments are generally quick, taking only a few minutes. The fluoride comes in the form of a gel, varnish, foam, or solution.

Fillings, when cavities occur from tooth decay, a filling can be a treatment option. After drilling the tooth to remove any decay, the dentist shapes the cavity to fit the filling. The dentist then fills the cavity, using materials such as dental amalgam or composite.

Crowns, Larger cavities that occur due to tooth decay may require a crown instead of a filling. To place a crown, the dentist first removes the outer portion of the tooth, as well as any decay. The dentist will take an impression of the tooth and fit a temporary crown until the permanent one is ready for fitting, usually 1–2 weeks later.

Root canals, A dentist can perform a root canal to help prevent the need for extraction when the pulp of the tooth is damaged. The dentist first numbs the tooth before removing the pulp. They will then clean and shape the root canal inside of the tooth. The dentist may also apply medicine in the tooth to get rid of any bacteria. The dentist will then fill the root canals with a rubber-like substance and place a crown or filling on the tooth to restore and strengthen it.

Tooth extraction, a dentist may recommend a person has a tooth extraction if the tooth decay has caused severe damage. The dentist will first numb the damaged tooth. Once they have removed the tooth, the dentist will recommend a post – extraction treatment regime. A person may notice swelling or pain after a tooth extraction, which is normal. However, if a person notices any of the following symptoms, they should call a dentist or seek medical attention immediately: fever, nausea, vomiting, severe pain, swelling, or bleeding, pain that increases over time.

Medication

There is a number of different drugs used during dental caries depending on the condition, the purpose of some medication prescription is to fight certain oral diseases, to prevent or treat infections or to control pain and relieve anxiety.

Drugs to control pain and anxiety includes local anesthesia, general anesthesia, nitrous oxide, intravenous sedation may be prescribing to help control pain and anxiety. Other pain relievers include prescription or nonprescription anti-inflammatory drugs, acetaminophen, anesthetics and topical analgesics.

Anti-inflammatory drugs include corticosteroids are anti-inflammatory drugs that are used to relieve the discomfort and redness of mouth and gum problems. A recommendation of a nonprescription anti-inflammatory drug such as ibuprofen, diclofenac to relieve mild pain and/or swelling caused by dental appliances, toothaches, and fever.

Dental caries Prevention

Examinations by a dentist should begin when patients are one year of age. A six-month interval for dental checkups. Removing dental plaque helps the patient maintain good

oral health. Fluoride is a drug used to prevent tooth decay. It is available on a non -prescription basis in many toothpastes. It is absorbed by teeth and helps strengthen teeth to resist acid and block the cavity-forming action of bacteria. As a varnish or a mouth rinse, fluoride helps reduce tooth sensitivity. Brushing with fluoride toothpaste after eating or drinking, rinsing the mouth, regularly dentist visit, considering dental sealants, drinking some tap water, avoiding frequent snacking and sipping, eating tooth-healthy foods and considering fluoride treatments are some of the preventive measures among others.

Finally, the health care provider could recommend dietary changes, such as decreasing the amount and frequency of consumption of foods with a high sugar content.

Evolution and Complications

Tooth decay can lead to several complications. The bacteria present inside dental plaque can damage not only the teeth, but also the surrounding gums and the dental bones. In severe cases, painful dental abscesses may develop in the teeth and gums.

Some of the complications of tooth decay include damage to and even breakage of the tooth. Teeth may also loosen and fall out. **Gum disease** or **gingivitis**, characterized by pain and inflammation of the gums may develop. Gums then appear red and swollen and may bleed when handled or brushed. A more severe form of gum disease called **periodontitis** may also eventually manifest.

With this condition, the tissues connecting the tooth to the tooth socket (called the periodontal ligament) are affected as well as the jawbone or alveolar bone where the tooth sockets are located. In advanced cases of tooth decay, **dental abscesses** may occur, where the dental, plaque forms **pus-filled swellings**. This can cause severe pain, fever and other symptoms of infection. Individuals with tooth decay may develop **dental sepsis**, where sinuses associated with an affected tooth may become infected and swollen.

The toothache associated with tooth decay may lead children or adults to take time off from school or work. In addition, **fractured tooth**, **inability to bite** down on tooth, **tooth sensitivity**. The decay can inhibit functions such as eating and even interfere with growth and development. Since, tooth decay is more common among children, its potential impact on a child's attendance at school and ability to function normally should be understood.

Self-assessment 4.1

1. Describe the causes or risk factors of dental caries development
2. List at least four signs and symptoms of dental caries
3. Discuss any investigation to rule out dental caries
4. Describe any four treatment options in the management of dental caries
5. Describe the complications of dental caries development
6. Discuss about the preventive measure for dental caries development

4.2. ORAL PHARYNGEAL CANDIDA

Learning Activity 4.2

Carefully read this below situation and answer the following questions:

A patient H.J aged 67, was brought to the Out Patient Department complaining with soreness, cotton-like feeling in the mouth, loss of taste, dysphagia, cracking and redness at the corners of the mouth. The physical exam reveals cavities in teeth and tenderness on palpation (pain), fever with body temperature of 39.8°C, Blood pressure 110/70 mmHg, and pulse rate: 82beats per minute, respiratory rate was 16 breaths per minutes the x-ray was performed and revealed the presence of holes in the 34 tooth tissues. An acutely swollen and reddened area of the soft gingiva is noted in her mouth. CBC reveals an elevated WBC of 112,000/mm3. Antifungal drugs were prescribed such as Fluconazole 800 mg OD 14/7 or oral Nystatin 500000UI QID7/7 and Oral paracetamol 500mg TDS 3/7 for pain relief.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Candidiasis is an infection caused by a yeast (a type of fungus) called candida which normally lives on the skin and inside the body in area such as the mouth, throat, gut and vagina, without causing any problem problems. Sometimes, candida can multiply and an infection if the environment inside the mount, throat or oesophagus changes in a way that encourages fungal growth.

Candidiasis in the mouth and throat is also called thrush or oropharyngeal candidiasis. Candidiasis in the oesophagus is called oesophageal candidiasis or Candida esophagitis. Oesophageal candidiasis is one of the most common infections in people living with HIV/AIDS.

Causes and risk factors

There are several factors around candida infection including microenvironment factors, local factors, nutritional and illness. **Micro environmental factors:** lower pH, increased carbohydrate concentration, increased temperature, nitrogen or carbon starvation, products of inflammation and tissue breakdown, suppressed commensal bacterial population. **Local factors:** micro trauma, poor oral plaque control and generalized neglected oral self-care, poorly fitting dentures, reduced salivary flow, radiotherapy to the head and neck, oral cancer; oral immunopathogenic diseases (i.e. lichen planus, mucosal pemphigoid). **Systemic factors: Physiological:** old age, infancy, pregnancy. Nutritional**:** malnutrition, avitaminosis, iron deficiency. **Medications**: glucocorticosteroids, other immunosuppressive drugs, cytotoxic chemotherapy, broad-spectrum antibiotics. **Illnesses:** cell-mediated immunodeficiencies, malignancies, diabetes mellitus, hypothyroidism, hypoparathyroidism, prolonged hospitalisation, having an HIV infection, undergoing high-dose chemotherapy or radiotherapy treatment for cancer, having a central venous catheter (CVC) for medication, being on dialysis.

Pathophysiology overview

The genus *Candida* comprises about 200 yeast species, with C. albicans accounting for most of candida infections. However, in recent times, the prevalence of other candidal

Species in the mouth such as C. glabrata, C. tropicalis, C. krusei, C. dubliniensis and *C. parapsilosis* appear to have been on the increase as pathogens. It has been reported that candida species occur as commensals on the normal oral and oro-pharyngeal epithelium of up to 60% of immunocompetent, non-hospitalized subjects who are free of clinically detectable oral candidiasis. *C.albicans* exists in the mouth in three different morphological forms: the yeast cell, also termed blastopore or blastoconidium, the septate filamentous form termed the pseudo hypha, and the non-septate filamentous form, the hypha.

Signs and symptoms

Candidiasis in the mouth and throat can have many different symptoms, including: White patches on the inner cheeks, tongue, roof of the mouth, and throat (photo showing candidiasis in the mouth), redness or soreness, cotton-like feeling in the mouth, loss of taste, pain while eating or swallowing, cracking and redness at the corners of the mouth.

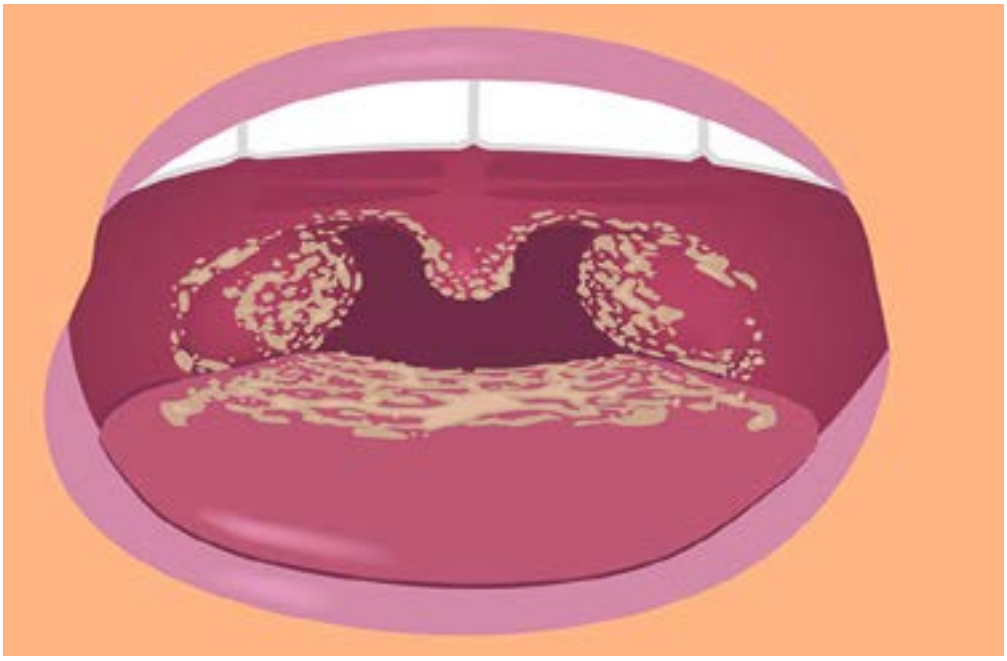


Figure 4.3 Signs and symptoms of candidiasis

The symptoms are sometimes presented according to the types of candidiasis such as **Pseudomembranous candidiasis (thrush) which is characterized** discrete white pseudomembranous patches that may become, confluent, comprising candida elements, desquamated, epithelial cells, fibrin, inflammatory cells and debris, affecting any, oral mucosal site. The friable pseudo membrane can be rubbed off, revealing an underlying erythematous or bleeding surface. Nonspecific soreness or a burning sensation are variable.

Figure 4. 4 Acute pseudomembranous candidiasis.

Erythematous candidiasis, which is characterized by widespread erythema usually of the dorsal surface of the tongue or of the palate. Palatal erythematous candidiasis is most frequently denture related. There may be some burning sensation. **Angular cheilitis** which is manifested as erythematous fissures or macerations affecting both mucosa and skin at the corner of the mouth. Reduced interpapillary dimension with associated maceration of the angular skin, and nutritional deficiencies are predisposing factors. *Staphylococci* and *streptococci* are etiological co-factors.

Hyperplastic candidiasis: A white patch that cannot be rubbed off that can affect any oral mucosal site, but most frequently the retro-commissural labial mucosa.

Adequate medical diagnosis

Diagnosis of oral candidiasis is based on the clinical features of the lesion and on microscopic identification of filamentous fungal elements either in a smear preparation or in a biopsy specimen from the suspected lesion. Although simple and convenient, the sensitivity of the cytological smear tests for erythematous candidiasis is low, in contrast to its high sensitivity for pseudomembranous candidiasis.

Although a biopsy is by no means essential for routine diagnosis of oral candidiasis, a definitive diagnosis can be made by demonstration of filamentous fungal elements invading the epithelium, with inflammation of the underlying lamina propria. *Candida* can be seen when stained with periodic Acid-Schiff (PAS) or with Gram and Gomori methenamine silver, but not with haematoxylin and eosin. The various species of *candida* can be differentiated by the macroscopic characteristics of cultured colonies, by the microscopic morphology of the fungus, by immunohistochemically techniques and by the polymerase chain reaction technique.

Treatment Plan

Candidiasis in the mouth, throat, or oesophagus is usually treated with antifungal medicine. The treatment for mild to moderate infections in the mouth or throat is usually an antifungal medicine applied to the inside of the mouth for 7 to 14 days. These medications include clotrimazole, miconazole, or nystatin. For severe infections, the most common treatment is fluconazole (an antifungal medication) taken by mouth or through a vein. If patient does not get better after taking fluconazole, healthcare providers may prescribe a different antifungal. The treatment for candidiasis in the oesophagus is usually fluconazole. Other types of prescription antifungal medicines can also be used for people who can't take fluconazole or who don't get better after taking fluconazole.

Preventives measures

There are some measures can be taken to decrease the risk for oral thrush including practice good oral hygiene by brushing teeth twice daily, flossing regularly, and keeping up with dental appointments. In addition, clean gums and dentures regularly, avoid smoking, rinse the mouth and brush teeth after taking medications or using a corticosteroid inhaler, practice good denture hygiene, avoid wearing dentures at night are other measures to prevent candidiasis.

Make sure that the wearing dentures fit properly; Moreover, sterilize pacifiers and bottles for infants, babies, and children, use of antibiotics when necessary, speak with a healthcare professional about using a chlorhexidine mouthwash during chemotherapy treatments may contribute to decrease the risk of thrush.

Speak with a child's pediatrician if he or she is immunocompromised about using preventative antifungals, having routine check-ups, especially if a person has a chronic health condition like diabetes that can increase the risk of infection. Control diabetes by controlling blood sugar levels, treat other yeast infections like those of the vagina, avoid and treat dry mouth if possible, rinse mouth with salt water.

Nursing mothers should consider cleaning nipples, wearing nursing pads, wearing a clean bra each day and appropriately cleaning breast pump parts. After nursing, letting the skin around the nipples dry completely before putting a bra back on can help minimize risk.

Self-assessment 4.2

1. Describe the causes or risk factors of oral pharyngeal development
2. List at least four signs and symptoms of oral pharyngeal candidiasis
3. Discuss any investigation to rule out oral pharyngeal candidiasis diagnosis
4. Describe any four treatment options in the management of oral pharyngeal candidiasis
5. Describe the complications of oral pharyngeal candidiasis development

4.3 ORAL INJURIES

Learning Activity 4.3

Carefully read this below situation and answer the following questions:

A patient N.A aged 37 was brought to the Emergency department with complains of oral mucous lesions involving multiple oral cavity structure, high sensitivity on palpation following accidental tooth bite after patient. The presence of whitish, linear, filament like plicae formation were observed via inspection. Body temperature was 36.8°C, Blood pressure 100/60 mmHg, pulse rate was 64beats per minute, respiratory rate was 16 breaths per minutes; the x-ray was performed and revealed the presence of slight tooth fracture. An acutely swollen and reddened area of the soft gingiva is noted in his mouth. Antibiotic drugs were prescribed such as amoxicillin 500mg TDS 7/7 for bacterial infection prevention and saline water to be used to wash out, Diclofenac tablet 100mg TDS 3/7 for pain relief.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?

Trauma-related oral lesions are common in clinical practice of dentistry and they can impair patients' normal oral function and cause pain in patients' eating, chewing, and talking. An injury to the oral mucosa can result from physical, chemical, or thermal trauma. Such injuries can result from accidental tooth bite, hard food, sharp

edges of the teeth, hot food, or excessive tooth brushing. Some injuries can also be caused by iatrogenic damage during dental treatment or other procedures related to oral cavity. In this chapter, oral mucosal trauma and injuries will be examined in four subclasses: physical and mechanical traumas of oral mucosa; chemical injuries of the oral mucosa; radiation injuries; and electrical, thermal burns.

Causes and risk factors

Lesions are apparent as shallow whitish wrinkles, which are diffuse and present irregularly on the buccal, labial mucosa and tongue. Epithelial desquamation occurs on the surface. It is often related to chronic biting of the oral mucosa seen in psychologically tense patients. Parafunctional bite of the buccal mucosa, lips, and tongue until wear of superficial epithelium and wound formation are consciously made by those patients.

Some causes of oral injuries are mechanical irritation from C. albicans dentures or a tissue response to microorganisms living beneath the dentures, accidental mucosal biting, and sharp edges of prosthesis. In addition, sharp or pointed foodstuff, during orthodontic treatment, lip biting after injection of local anaesthetic solutions, neonatal teeth, or faulty tooth brushing, Caustic chemical and drug materials when they meet the oral mucosa are often very irritating and cause direct mucosal trauma. Chemotherapy, radiotherapy, or their combinations can lead oral mucositis, Long-term exposure to sunlight also risk factors associated with oral injuries.

Pathophysiology overview

Traumatic mucosal injuries are the most common type of oral injury in infants and young children and may be caused by burns, either chemical (e.g., alkali) or thermal (e.g., hot drinks); by sucking on a pacifier or finger; by sharp objects inserted into the mouth, resulting in abrasions or lacerations; or by blunt trauma (accidental or non-accidental).

Thermal or chemical burns may result in areas of mucosal erythema or sloughing, and adherent white material appears as healing proceeds. The distribution may include the palate, the lips, or the peripheral areas of the tongue.

Signs and Symptoms of dental cavity

Linea alba (white line)

*Figure 4.5**: Linea alba seen on the buccal mucosa***

Lesions are mostly asymptomatic. The common visual symptom of linea alba is the presence of whitish, linear, filament-like plicae formations, horizontally parallel to the occlusal level of bicuspids and molar teeth in both left and right sides of buccal mucosa. Palpation should give a tactile sensation of normal mucosa texture. It is more prominent in individuals with reduced overjet of the posterior teeth.

Figure 4.6 Diffuse irregular white area of lower mandibular

It is characterized by diffuse erythema, edema, sometimes petechial and white spots that represent accumulations or Candida hyphae. Denture stomatitis is usually asymptomatic.

Denture stomatitis

Figure 4.7: Denture stomatitis located on the denture-bearing area of maxilla.

Traumatic ulcers

Traumatic ulcer due to lip biting after inferior dental nerve block is seen on the lower lip. During orthodontic treatment, traumatic ulcers can occur especially on the buccal mucosa due to the irritation of braces or appliance wires.

Figure 4.8*: Traumatic *ulcer after accidental mucosal biting.

Figure 4.9: Traumatic ulcer caused by sharp edges of prosthesis.

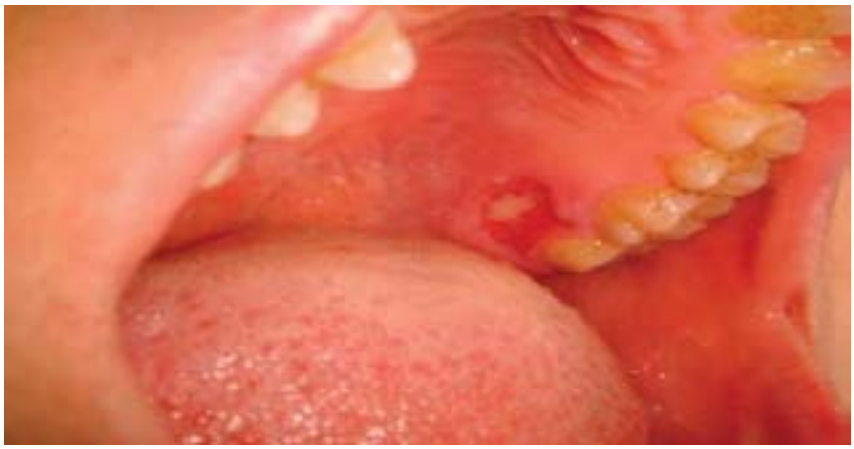


Figure 4.10: Traumatic ulcer caused by sharp or puncturing foodstuff.

Figure 4.11: *Traumatic ulcers during orthodontic treatment.*

Figure 4.12 Lip biting after injection of local anesthetic solutions.

Figure 4.13 Traumatic ulcer caused by neonatal teeth.

Erythematous lesions involve perioral skin and lips. Lesions may be associated with skin peeling, crusting, and fissuring to different degrees.

4.14 Traumatic fibroma

Lesions are shown as broad-based, with light color in respect to neighboring normal tissue, superficially whitish as the secondary trauma causes formation of hyperkeratotic ulcerative surface.

Figure 4.15: Traumatic fibroma of the buccal mucosa.

Chemical burn

The wounds have irregular shape and white color, are overlaid by a pseudomembrane, and are very painful. Lesions can cover an extended area. If the lesions are contacted shortly, a shallow whitish and wrinkled appearance occurs. Brief contacts cannot cause necrosis

Figure 4.16 Acid/arsenic injury

Investigations

The investigation of oral cavity injuries may include chest x-ray if suspicious tooth has been aspirated, orthopantogram (OPG) if considering fractured mandible, TMJ injury or concern for fully intruded tooth, Occlusal (bite-down) views can only be done in the dental department.

Figure 4.17 Subluxation & extrusion

Figure 4.18 Avulsion &subluxation

Figure 4.19: Full intrusion

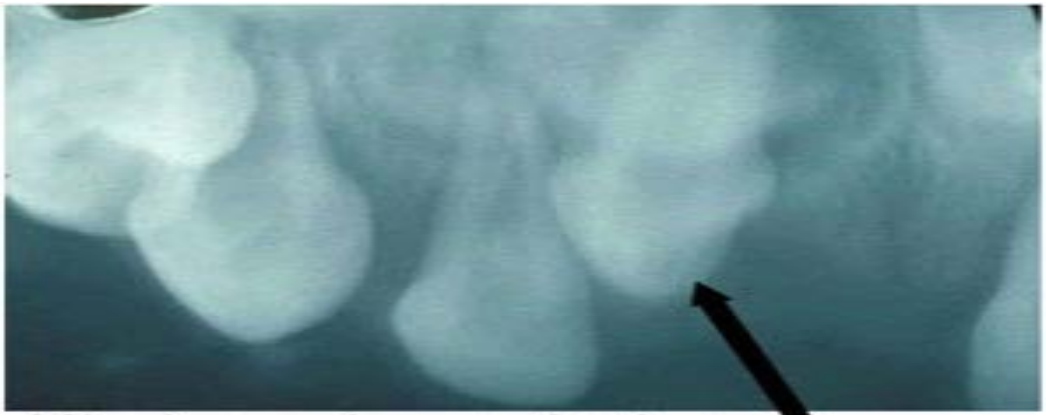


Figure 4.20 Missing primary incisor assumed avulsed. Radiograph shows it to be fully intruded.

Adequate medical diagnosis

Diagnosis of oral cavity injuries is mainly based on the appropriate history taking and physical examination of the victim as well as the findings from radiograph examination if required.

Treatment Plan

The basic treatment strategy involves pain relief, infection control, and acceleration of wound repair Application of antibiotic ointments to the burn area has been recommended by some authors Systemic antibiotics are recommended by most clinicians to prevent wound infections. Sometimes splints and plastic surgery are needed to be applied. Prophylactic antibiotics are not recommended if operative management is not required, the provision of the tetanus booster if required.

In thermal burn, no treatment is required for simple lesions. Care should be taken in deep lesions to avoid contamination during healing period. Saline would be prescribed to accelerate wound healing and avoid bacterial ingrowth. In severe damages, prophylactic antibiotic coverage is recommended. In hard tissue damages related to thermal burn, surgical removal of necrotic tissue should be performed to surrounding vital tissues and obtain blood supply for repair and subsequent regeneration.

In radiation injuries, Supportive care, cessation of radiation treatment, B-complex vitamins, and sometimes low doses of corticosteroids are suggested.

Evolution and Complications

Complications of injuries involving teeth and their supporting structures include pulp necrosis, ankylotic root resorption (Avulsed teeth), inflammatory root resorption, and pulp canal obliteration, complicated crown fracture. For severe trauma, i.e., alveolar fracture and luxation injuries.

Self-assessment 4.3

1. What are all possible causes or risk factors to develop oral cavity injuries?
2. What are the signs and symptoms of oral cavity injuries?
3. What are the investigations that should be performed to make the diagnosis?
4. What must be included into the management plan of that medical condition?
5. If not treated, what will be the complications for oral cavity injuries?

4.4 OESOPHIGITIS

Learning Activity 4.4

Carefully read this below situation and answer the following questions:

A patient N.E aged 37, was brought to the Out Patient Department complaining with difficult swallowing, painful swallowing, chest pain, particularly behind the breastbone, that occurs with eating, swallowed food becoming stuck in the oesophagus, heartburn, acid regurgitation. The physical exam reveals the fever with body temperature of 39.8°C, blood pressure of 100/60 mmHg, pulse rate: 78 beats per minute, respiratory rate was 18 breaths per minutes, the endoscopy examination was performed and revealed the oesophageal mucosa change (the redness, swelling). In addition, full Blood Count reveals an elevated WBC of 1200000/mm3, barium x-ray was performed, and revealed narrowed oesophagus lumen. The physician confirmed the medical diagnosis of infectious esophagitis and decide to put the patient on Oral paracetamol 500mg TDS 3/7 for pain relief orally and oral Penicillin v 500mg TDS 7/7.

1. What are abnormal signs and symptoms that patient was presenting?
2. What was the medical problem for this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?

Esophagitis is inflammation that may damage tissues of the esophagus, the muscular tube that delivers food from the mouth to the stomach.

Signs and symptoms

Common signs and symptoms of esophagitis include difficult swallowing, painful swallowing, chest pain, particularly behind the breastbone, that occurs with eating, swallowed food becoming stuck in the oesophagus (food impaction), heartburn, acid regurgitation. Signs of esophagitis may include also feeding difficulties, failure to thrive.

Causes and risk factors

Esophagitis is generally categorized by the conditions that cause it. In some cases, more than one factor may be causing esophagitis. The common forms of esophagitis include reflux esophagitis, infectious esophagitis, pill esophagitis,

eosinophilic esophagitis, drug-induced esophagitis, lymphocytic esophagitis and radiation and chemo radiation esophagitis.

Eosinophilic esophagitis: Eosinophils are white blood cells that play a key role in allergic reactions. Eosinophilic esophagitis occurs with a high concentration of these white blood cells in the esophagus, most likely in response to an allergy-causing agent (allergen) or acid reflux or both. In many cases, this type of esophagitis may be triggered by foods such as milk, eggs, wheat, soy, peanuts, beans, rye and beef. However, conventional allergy testing does not reliably identify these culprit foods. People with eosinophilic esophagitis may have other nonfood allergies. For example, sometimes inhaled allergens, such as pollen, may be the cause.

Lymphocytic esophagitis: Lymphocytic esophagitis (LE) is an uncommon esophageal condition in which there are an increased number of lymphocytes in the lining of the esophagus. LE may be related to eosinophilic esophagitis or to GERD.

Drug-induced esophagitis: Several oral medications may cause tissue damage if they remain in contact with the lining of the esophagus for too long. For example, if a patient swallows a pill with little or no water, the pill itself or residue from the pill may remain in the esophagus. Drugs that have been linked to esophagitis including pain-relieving medications, such as aspirin; ibuprofen; Antibiotics; such as tetracycline and doxycycline; Potassium chloride, which is used to treat potassium deficiency, bisphosphonates; a treatment for weak and brittle bones (osteoporosis);Quinidine which is used to treat heart problems.

Infectious esophagitis: A bacterial, viral or fungal infection in tissues of the esophagus may cause esophagitis. Infectious esophagitis is relatively rare and occurs most often in people with poor immune system function, such as people with HIV/AIDS or cancer. A fungus normally present in the mouth called Candida albicans is a common cause of infectious esophagitis. Such infections are often associated with poor immune system function, diabetes, cancer, or the use of steroid or antibiotic medications, risk factors for esophagitis vary depending on the different causes of the disorder.

Reflux esophagitis: Factors that increase the risk of gastroesophageal reflux disease (GERD) and therefore are factors in reflux esophagitis include the following: Eating immediately before going to bed, dietary factors such as excess alcohol, caffeine, chocolate and mint-flavored foods, excessively large and fatty meals, smoking, extra weight, including from pregnancy. A number of foods may worsen symptoms of GERD or reflux esophagitis such as tomato-based foods, citrus fruits, caffeine, alcohol, spicy foods, Garlic and onions, chocolate.

Drug-induced esophagitis: factors that may increase the risk of drug-induced esophagitis are generally related to issues that prevent quick and complete passage of a pill into the stomach. These factors include swallowing a pill with little or no

water, taking drugs while lying down, taking drugs right before sleep, probably due in part to the production of less saliva and swallowing less during sleep, older age, possibly because of age-related changes to the muscles of the esophagus or a decreased production of saliva, large or oddly shaped pills.

Adequate medical diagnosis

The diagnosis will be based on the answers to questions, a physical exam, and one or more tests. These tests may include: **Barium X-ray,** for this test, the client drinks a solution containing a compound called barium or take a pill coated with barium. Barium coats the lining of the esophagus and stomach and makes the organs visible. These images can help identify narrowing of the esophagus, other structural changes, a hiatal hernia, tumors or other abnormalities that could be causing symptoms.

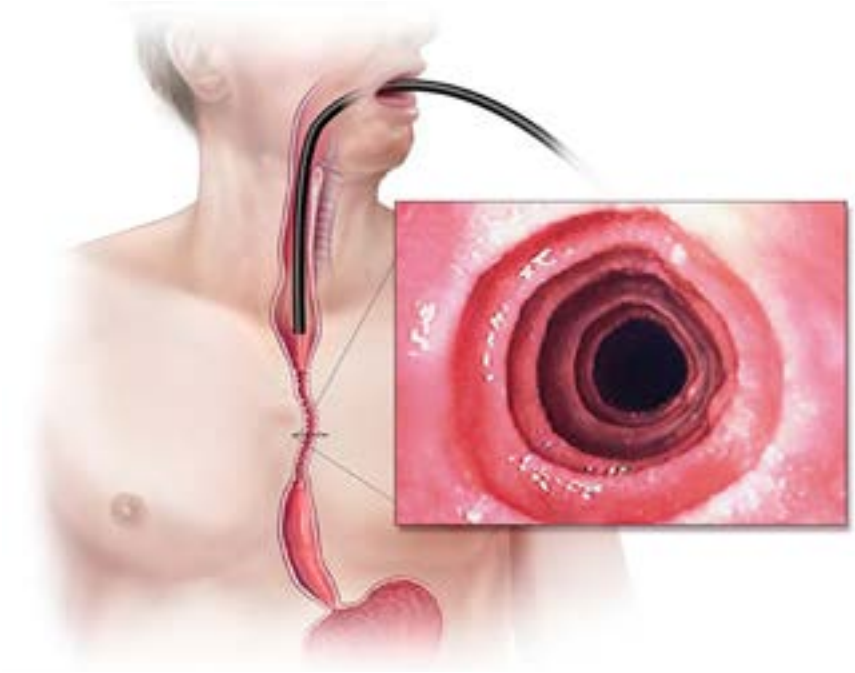


Figure 4.21: Medical diagnosis with endoscopy

Endoscopy may be performed to highlight the change within esophageal mucosa such as unusual appearance of the esophagus and remove small tissue samples for testing. The esophagus may look different depending on the cause of the inflammation, such as drug-induced or reflux esophagitis.

Laboratory tests such as biopsy (small tissue samples removed (biopsy) during an endoscopic exam are sent to the lab for testing. Depending on the suspected cause of the disorder, tests may be used to diagnose a bacterial, viral or fungal infection, determine the concentration of allergy-related white blood cells (eosinophils), to

identify abnormal cells that would indicate esophageal cancer or precancerous changes.

Treatment plan Treatments for esophagitis are intended to lessen symptoms, manage complications and treat underlying causes of the disorder.

Treatment strategies vary primarily based on the cause of the disorder. Reflux esophagitis, Treatment for **reflux esophagitis** may include **over-the-counter treatments.** These include antacids (Maalox, Mylanta, others); medications that reduce acid production, called H-2-receptor blockers, such as cimetidine (Tagamet HB); and medications that block acid production and heal the esophagus, called proton pump inhibitors, such as lansoprazole (Prevacid) and omeprazole (Prilosec). **Prescription-strength medications.**

These include H-2-receptor blockers as well as proton pump inhibitors, such as esomeprazole (Nexium), lansoprazole (Prevacid), omeprazole (Prilosec) and pantoprazole (Protonix). The physician also may be prescribed prokinetics such as bethanechol and metoclopramide (Reglan), which help the client to quickly empty the stomach.

Eosinophilic esophagitis: Treatment for eosinophilic esophagitis is primarily avoiding the allergen and reducing the allergic reaction with medications. Medications may include **Proton pump inhibitors** such as esomeprazole (Nexium), lansoprazole (Prevacid), omeprazole (Prilosec) or pantoprazole (Protonix). The same steroid medications that are inhaled to manage asthma are swallowed to treat eosinophilic esophagitis.

Infectious esophagitis: The prescription maybe prescribed such as a medication to treat a bacterial, viral, fungal or parasitic infection causing infectious esophagitis. The treatment of common complications may include a procedure to expand (dilate) the esophagus. This treatment is generally used only when the narrowing is very severe or food has become lodged in the esophagus. Lifestyle modification to lessen the symptoms or avoid recurring problem by **avoiding foods that may increase reflux, a** voiding eating excessive amounts of foods that may worsen the symptoms of gastroesophageal reflux. These may include alcohol, caffeine, chocolate and mint-flavored foods, **using good pill-taking habits thus encourage** taking a pill with plenty of water. The patient needs to be warned to not lying down for at least 30 minutes after taking a pill.

Always talk to the health care provider about an appropriate diet and exercise routine to help the client losing weight and maintain a healthy weight, ending a smoking habit in case the patient is smoker, a**voiding stooping or bending,** especially soon after eating, a**voiding lying down after eating. Raising the head of the bed. Place wooden blocks under the bed to elevate the head up to 15 to 20 centimeters.**

Evolution and complication

The prognosis of esophagitis is good with rapid diagnosis and appropriate treatment initiation; ultimately, it depends on the severity of the underlying disease. Esophagitis is commonly seen in adults and is uncommon in childhood. This treatment is generally used only when the narrowing is very severe or food has become lodged in the esophagus. However, if left untreated, esophagitis can lead to changes in the structure of the esophagus. Possible complications include scarring or narrowing (stricture) of the esophagus, tearing of the esophagus lining tissue from retching (if food gets stuck) or during endoscopy (due to inflammation), Barrett's esophagus, characterized by changes to the cells lining the esophagus, increasing the risk of esophageal cancer.

Self-assessment 4.4

A 45-year-old female presents to GISENYI District Hospital with a 2-week history of odynophagia, dysphagia, dry mouth, and retrosternal pain. She reports limited intake of solid food due to the pain, as well as an unintentional weight loss of 10 Kgs during the past month. The patient has been HIV positive for over 10 years. She is not taking her antiretroviral therapy and has not seen a physician regularly. Her most recent CD4 count was 150 over 1 year ago. The physical examination is notable for a cachectic female, with white lesions on the tongue and buccal mucosa. These lesions are easily scraped off with a tongue depressor

Short answer questions

1. List any five causes and risk factors to develop esophagitis
2. List at list five signs and symptoms of esophagitis development
3. Indicate at least three types of medical investigations to rule out the esophagitis diagnosis
4. Discuss the management plan of the patient suffering from reflex esophagitis
5. List the three major complications of esophagitis

End of unit 4 assessment

1. List at least three signs and symptoms of dental caries development
2. What is the treatment options of dental caries?
3. Discuss any five preventive measures for dental caries development
4. What are three signs and symptoms of oral pharyngeal candidiasis?
5. What is the oral medication of a patient with oral candidiasis?
6. List any four types of oral cavity injuries
7. Discuss any three risk factors of esophagitis development
8. State any 3 management option of esophagitis
9. What are the two complications of esophagitis?
10. List any 5 lifestyles for better prevent esophagitis in your community

UNIT 5 MEDICAL PATHOLOGIES OF THE SKIN

Key unit Competence:

Take appropriate decision on different common medical pathologies of the skin

Introductory activity 5.0

Carefully observe the pictures below and answer the following questions:

Figure 5.1: Pathologies of the skin

Source: https://www.google.rw/search?q=skin+diseases&sxsrf=ALiCzsbX6BvNKKC-jvTUOXXYnSwIUxi6gA:1653116337232&source=lnms&tbm=isch&sa=X&ved=2ahUKEwji87WggvD3AhVn7rsIHSTmAFkQ_AUoAXoECAEQA

1. What do you think above persons are complaining?
2. What could be different medical conditions might these patients be presenting?

Skin diseases are conditions that affect human skin. These diseases may cause rashes, inflammation, itchiness or other skin changes. Some skin conditions may be genetic, while lifestyle factors may cause others.

Skin diseases are a broad range of conditions affecting the skin, and include diseases caused by bacterial infections, viral infections, fungal infections, allergic reactions, skin cancers, and parasites. Skin disease treatment may include medications, creams or ointments, or lifestyle changes.

There are many different kinds of skin disease, most of which are completely unrelated save for the fact that they affect the skin. Skin diseases can be categorized as either being caused by infection (bacterial, viral, or fungal), allergies, autoimmune reactions, parasites, or cancers.

5.1. ERYTHEMA

Learning Activity 5.1

Carefully read this below situation and answer the following questions:

A 27-year-old male patient, non-smoker, presented to the Rheumatology Department with a 3-week history of painful erythematous lesions on both shins. He also mentioned low-grade fever (up to 37.5°C), fatigue and arthralgia. Physical examination revealed multiple rounded purplish nodules located bilaterally on the extensor surface of the lower extremities, and red bumps on the soles, palms, arms, face and legs that grow into circles that may look like targets, itchiness.

Laboratory investigations revealed an elevated C-reactive protein – CRP (119.82 mg/l, normal 5.0 mg/l) and erythrocyte sedimentation rate – ESR (74 mm/h; normal 0–10 mm/h). Urine and blood culture results were negative. Throat swab revealed growth of normal flora. The diagnostic test for Yersinia was negative.

His chest X-ray revealed bihilar lymphadenopathy. Further evaluation with high resolution chest computed tomography confirmed the lymphadenopathy and also demonstrated thickened bronchial walls of both lungs and nodular lesions, which suggested an alveolar sarcoidosis. The foot ultrasound showed a small amount of fluid in the right ankle joint and effusion in all sheaths of the flexor, extensor digitorum and the big toe tibial and peroneal tendons. Sonography also showed massive bilateral swelling of the subcutaneous tissue up to 1/2 shank.

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?

3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Erythema (from the Greek *erythros*, meaning red) is redness of the skin or mucous membranes, caused by hyperemia (increased blood flow) in superficial capillaries. It occurs with any skin injury, infection, or inflammation. Examples of erythema not associated with pathology include nervous blushes.

Causes

The causes of erythema vary in different conditions. Common causes include an allergic reaction to medications such as penicillin, antibiotics, sulfonamides, barbiturates and phenytoin, and Infections such as herpes simplex virus (HSV), or mycoplasma. Other causes of erythema include exposure to heat, radiation, insect bites, and hormonal problems.

Signs and Symptoms

The symptoms associated with erythema vary from one type to another. The most common symptoms of erythema multiforme include Itchy skin, Joint pain, Vision problems with dry and itchy eyes, Mouth sores, Fatigue, Photosensitivity (sensitivity to light or sun), Flu-like symptoms in severe cases, Fever.

The skin sores or lesions may be raised, discolored and have a central sore surrounded by pale red rings that look like a bulls-eye, earning them the name *Target lesions*. Some lesions are liquid-filled blisters while others look like hives. They can appear on face, lips, legs, feet, hands, arms or palms.

Pathophysiology

Erythema is **caused by dilation and irritation of the superficial capillaries**; the augmented flow of blood through them imparts a reddish hue to the skin. Erythema may arise from a great variety of causes and disease conditions. Blushing is a transient form of erythema.

Types of erythema

There are various types of erythema, of which erythema multiforme is the most common. Each type of erythema has a different cause, and therefore needs different treatments. Some forms of erythema include:

- Erythema multiforme (EM), which occurs due to an allergic reaction to medications or infection

- Erythema nodosum (EN), which is characterized by nodular eruptions on the lower legs
- Erythema Ab Igne, which is caused by continued exposure to heat
- Erythema chronicum migrans, which is noted in in the early stages of Lyme disease
- Erythema induratum, which is associated with tuberculosis
- Erythema infectiosum (also called the Fifth disease), which is commonly caused during childhood
- Erythema marginatum, which is characterized by pink rings on the limbs
- Erythema toxicum (ET), which affects neonates
- Erythema gyratum repens, which is a component of a paraneoplastic process
- Palmar erythema, which is characterized by reddening on the palms of hands
- **Erythema annulare centrifugum**, presents with erythema (redness) in a ring (annulare) form that spreads from a center (centrifugam). This condition was first described by Darier in 1916.
- **Erythema nodosum (EN)**, which is characterized by nodular eruptions on the lower legs. Specific symptoms include weight loss, uneasiness, low-grade fever, cough and pain in joint (arthralgia) with or without arthritis.

There are two serious forms of erythema multiforme – Stevens Johnson syndrome (SJS) and Toxic epidermal necrolysis (TENS).

Investigation

A biopsy (removal of tissue for exam under a microscope) of a bump can usually confirm the diagnosis. The biopsy is done along with complete lab work. However, the exact cause cannot always be identified. Erythema nodosum caused by medicine can usually be diagnosed by elimination of the medicine causing the reaction.

Medical Diagnosis

Different types of erythema manifest differently, and the diagnosis may depend on the physical appearance of the skin. Healthcare professional normally recognize erythema multiforme just by examining the skin. The healthcare professional may also ask a series of questions such as a history of recent infections and medications to pinpoint out the cause. In some cases, a skin biopsy may be done.

Treatment

In most cases, erythema is self-limiting and does not require treatment. In case where treatment is needed, the healthcare professional treats the symptoms depending on the type and cause of rash. If a bacterial infection is suspected, then the healthcare professional may prescribe antibiotics. If a medication allergy is suspected, then the healthcare professional will stop the medication and may replace it with another one as needed.

Supportive care for erythema includes:

- Cool compresses on the affected areas
- Pain killers(Paracetamol) or antihistamines(Polaramine), for itching
- Steroid(hydrocortisone, dexamethasone)) or IV medications in severe cases
- Soothing creams for itchy or sore skin

These medications and supportive care do not shorten the duration of the condition, but provide comfort to the patient. The treatment of erythema depends on the severity and type of erythema.

For mild rashes: These may be treated with only moisturizers and topical corticosteroid creams to reduce itching and burning of the skin. A Burrow's compress, which has antibacterial and antifungal properties, is an effective way to treated erythema.

For severe rashes: These can be life threatening and must be treated as soon as possible. Patients with severe rashes may need to stay in a burns unit. Severe pain due to blisters and nodules may require pain medications such as **acetaminophen, hydrocodone** or others as recommended by the healthcare professional. The blisters can be infected and leak large amounts of pus, which needs to be monitored and treated. Intravenous immunoglobulins such as **immunoglobulin G** (IgG) may be needed. Antivirals may be administered if the cause of the erythema is suspected to be herpex simplex virus (HSV). Other specialists may be consulted if different organs such as the eyes are affected. Photomodulation therapy, which is a red light therapy for the skin is another effective way to treat severe cases.

For recurrent rashes: Recurrent rashes due to HSV infection may require a daily dose of the anti-viral medication **acyclovir** orally to suppress the virus for several months.

Self-assessment 5.1

1. What is Erythema?
2. What are the Types of Erythema?
3. What are the Causes of Erythema?
4. What are the Symptoms of Erythema?
5. How do you Diagnose Erythema?
6. How do you Treat Erythema?

5.2. ALBINISM

Learning Activity 5.2

Figure 5.2 Albinism

Source: wikepedia (2022), Albinism in Humans, retrieved from on https://en.wikipedia.org/wiki/Albinism_in_humans

1. What are abnormal signs and symptoms that patient was presenting?
2. What are the investigations that have been ordered to guide the confirmation of the medical problem?
3. What was included in the management of this case?
4. If not treated, what will be the consequences?

Albinism is a congenital condition characterized in humans by the partial or complete absence of pigment in the skin, hair and eyes. Albinism is associated with a number of vision defects, such as photophobia, nystagmus, and amblyopia. Lack of skin pigmentation makes for more susceptibility to sunburn and skin cancers.

Signs and symptoms

Signs and symptoms of albinism involve skin, hair, and eye color and vision.

Skin

The most recognizable form of albinism results in white hair and very light-colored skin compared with siblings. Skin coloring (pigmentation) and hair color can range from white to brown, and may be nearly the same as that of parents or siblings without albinism.

With exposure to the sun, some people may develop:

- Freckles
- Moles, with or without pigment — moles without pigment are generally pink-colored
- Large freckle-like spots (lentigines)
- Sunburn and the inability to tan

For some people with albinism, skin pigmentation never changes. For others, melanin production may begin or increase during childhood and the teen years, resulting in slight changes in pigmentation.

Hair

Hair color can range from very white to brown. People of African or Asian descent who have albinism may have hair color that is yellow, reddish or brown. Hair color may also darken by early adulthood or stain from exposure to normal minerals in water and the environment, and appear darker with age.

Eye color

Eyelashes and eyebrows are often pale. Eye color can range from very light blue to brown and may change with age. The lack of pigment in the colored part of the eyes (irises) makes the irises somewhat translucent. This means that the irises cannot completely block light from entering the eye. Because of this, very light-colored eyes may appear red in some lighting.

Vision

Vision impairment is a key feature of all types of albinism. Eye problems and issues may include:

- Rapid, involuntary back-and-forth movement of the eyes (nystagmus)
- Head movements, such as bobbing or tilting the head, to try to reduce the involuntary eye movements and see better
- Inability of both eyes to stay directed at the same point or to move in unison (strabismus)
- Extreme nearsightedness or farsightedness
- Sensitivity to light (photophobia)
- Abnormal curvature of the front surface of the eye or the lens inside the eye (astigmatism), which causes blurred vision
- Abnormal development of the retina, resulting in reduced vision
- Nerve signals from the retina to the brain that don't follow the usual nerve pathways (misrouting of the optic nerve)
- Poor depth perception
- Legal blindness (vision less than 20/200) or complete blindness

Causes

Several genes provide instructions for making one of several proteins involved in the production of melanin. Melanin is produced by cells called melanocytes, which are found in the skin, hair and eyes. Albinism is caused by a mutation in one of these genes. Different types of albinism can occur, based mainly on which gene mutation caused the disorder. The mutation may result in no melanin at all or a significantly reduced amount of melanin

Types of albinism

Types of albinism are classified based on how they are inherited and on the gene that is affected.

- **Oculocutaneous albinism (OCA),** the most common type, means a person inherited two copies of a mutated gene — one from each parent (autosomal recessive inheritance). It is the result of a mutation in one of seven genes, labeled from OCA1 to OCA7. OCA causes decreased pigment in the skin, hair and eyes, as well as vision problems. The amount of pigment varies by type, and the resulting color of skin, hair and eyes varies by and within types.
- **Ocular albinism** is mainly limited to the eyes, causing vision problems. The most common form is type 1, inherited by a gene mutation on the X chromosome. X-linked ocular albinism can be passed on by a mother who carries one mutated X gene to her son (X-linked recessive inheritance).

Ocular albinism occurs almost exclusively in males and is much less common than OCA.

- **Albinism related to rare hereditary syndromes** can occur. For example, Hermansky-Pudlak syndrome includes a form of OCA as well as bleeding and bruising problems and lung and bowel diseases. Chediak-Higashi syndrome includes a form of OCA as well as immune problems with recurrent infections, neurologic abnormalities and other serious issues.

Medical Diagnosis

- The process of diagnosing albinism may involve Trusted Source:
- A physical exam
- A discussion about skin and hair pigmentation changes
- The examination of the eyes by an ophthalmologist (a specialist eye doctor).
- A comparison of the individual's coloration with that of biological family members

Other diseases can also cause changes in pigmentation, but they do not cause vision changes. If pigment and vision changes are both present, doctors consider albinism a likely diagnosis. Genetic testing is the most reliable way to diagnose albinism. However, it is expensive, and doctors do not consider it necessary in families with a history of albinism.

Treatment

Albinism is a lifelong genetic condition with no cure. Therefore, treatment focuses on minimizing the symptoms and watching for skin changes. People with albinism must receive appropriate eye care including prescription glasses, dark glasses to protect the eyes from the sun, and regular eye exams.

Surgery on the optical muscles can sometimes minimize the "shaking" that occurs in nystagmus. Procedures to minimize strabismus can make it less noticeable, but surgery does not improve the vision. The level of success in reducing symptoms varies among individuals. People should watch their skin carefully for any changes and use sunscreen for protection.

Self-assessment 5.2

1. What is Albinism?
2. What are the Types of albinism?
3. What are the Causes of albinism?
4. What are the Symptoms of albinism?
5. How do you Diagnose albinism?
6. How do you Treat albinism?

5.3. VITILIGO

Learning Activity 5.3

Figure 5.3: Vitiligo

Source: Wikepedia (2022) skin condition: Vitiligo retrieved from https://en.wikipedia.org/wiki/Vitiligo

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Vitiligo is a skin disorder in which smooth white areas (called macules or patches) appear on a person's skin. It generally starts on the hands, forearms, feet and face. Globally, about 1% or so of the population has vitiligo.

Vitiligo usually begins with a few small white patches that may gradually spread over the body over the course of several months. Vitiligo typically begins on the hands, forearms, feet, and face but can develop on any part of the body, including the mucous membranes (moist lining of the mouth, nose, genital, and rectal areas), the eyes, and inner ears.

Sometimes the larger patches continue to widen and spread, but usually they stay in the same place for years. The location of smaller macules shifts and changes over time, as certain areas of skin lose and regain their pigments. Vitiligo varies in the amount of skin affected, with some patients experiencing few depigmented areas and others with widespread loss of skin color.

The types of vitiligo

Vitiligo can be:

- **Generalized,** which is the most common type, when macules appear in various places on the body.
- **Segmental**, which is restricted to one side of the body or one area, such as the hands or face.
- **Mucosal,** which affects mucous membranes of the mouth and/or the genitals.
- **Focal,** which is a rare type in which the macules are in a small area and do not spread in a certain pattern within one to two years.
- **Trichome,** which means that there is a white or colorless center, then an area of lighter pigmentation, and then an area of normally colored skin.
- **Universal**, another rare type of vitiligo, and one in which more than 80% of the skin of the body lacks pigment.

Causes of vitiligo

Although the causes of vitiligo are not completely understood, there are a number of different theories:

- **Autoimmune disorder:** The affected person's immune system may develop antibodies that destroy melanocytes.
- **Genetic factors:** Certain factors that may increase the chance of getting vitiligo can be inherited. About 30% of vitiligo cases run in families.
- **Neurogenic factors:** A substance that is toxic to melanocytes may be released at nerve endings in the skin.
- **Self-destruction:** A defect in the melanocytes causes them to destroy themselves.

The signs and symptoms of vitiligo

Signs and symptoms of vitiligo include the following:

- Patches of skin lose color. This can include the eyes and/or the mucous membranes in the mouth or nose.
- Patches of hair on the head or face turn prematurely gray or white.

Although vitiligo is mainly a cosmetic condition, people with vitiligo may experience a variety of problems:

- Because they lack melanocytes, macules are more sensitive to sunlight than the rest of the skin, so they will burn rather than tan.
- People with vitiligo may have some abnormalities in their retinas (the inner layer of the eye that contains light-sensitive cells) and some variation of color in their irises (the colored part of the eye).
- In some cases, there is some inflammation of the retina or iris, but vision is usually not affected.
- People with vitiligo may be more likely to get other autoimmune diseases (in which the body's immune system causes it to attack itself), such as hypothyroidism, diabetes, pernicious anemia, Addison's disease, and alopecia areata. In addition, people with autoimmune diseases are more at risk for developing vitiligo.
- People with vitiligo may feel embarrassed or anxious about their skin. Sometimes people are rude – they may stare or say unkind things. This could cause a person with vitiligo to develop low self-esteem. This in turn could create anxiety or depression issues and make someone want to isolate. If this happens, the patient should talk to the healthcare provider or family and friends to help him/her find a solution.

Medical Diagnosis

The health care provider asks about risk factors such as:

- Whether a close relative has been diagnosed with vitiligo
- Whether the has been diagnosed with an autoimmune disorder
- If the patient has experienced recent stress (such as a major life change) or other potentially triggering events (such as a severe sunburn).

Most of the time, doctors diagnose vitiligo by visually examining white patches on the skin and considering the medical history, the physician may use a Wood's lamp, which uses ultraviolet light to identify pigment loss. This lamp is especially useful for people with fairer skin where the difference in color is subtler.

Other conditions make the skin change or lose pigmentation. These include:

- **Chemical leukoderma:** Exposure to some industrial chemicals cause damage to the skin cells, resulting in linear or splotchy white areas of skin
- **Tinea versicolor:** This yeast infection can create dark spots that show on light skin, or light spots that show on darker skin.
- **Albinism:** This genetic condition means that the person has lower levels of melanin in the skin, hair and/or eyes.
- **Pityriasis alba:** This condition starts off with red and scaly areas of skin, which fade into scaly lighter patches of skin.

Treatment

There is no cure for vitiligo. The goal of medical treatment is to create a uniform skin tone by either restoring color (repigmentation) or eliminating the remaining color (depigmentation). Common treatments include camouflage therapy, repigmentation therapy, light therapy and surgery. Counseling may also be recommended.

Camouflage therapy:

Using sunscreen with a Sun Protection Factor of 30 or higher. In addition, the sunscreen should shield ultraviolet B light and ultraviolet A light (UVB and UVA). Use of sunscreens minimizes tanning, thereby limiting the contrast between affected and normal skin.

- Makeups help camouflage depigmented areas. One well-known brand is Dermablend®.
- Hair dyes if vitiligo affects the hair.
- Depigmentation therapy with the drug monobenzone can be used if the disease is extensive. This medication is applied to pigmented patches of skin and will turn them white to match the areas of vitiligo.

Repigmentation therapy:

- Corticosteroids can be taken orally (as a pill) or topically (as a cream put on the skin). Results may take up to 3 months. The healthcare professional will monitor the patient for any side effects, which can include skin thinning or striae (stretch marks) if used for a prolonged period.
- Topical vitamin D analogs.
- Topical immunomodulators such as calcineurin inhibitors.

Light therapy:

- Narrow band ultraviolet B (NB-UVB) requires two to three treatment sessions per week for several months.
- Excimer lasers emits a wavelength of ultraviolet light close to that of narrow

band UVB. This is better for patients who do not have widespread or large lesions since it is delivered to small, targeted areas.

- Combining oral psoralen and UVA (PUVA) is used to treat large areas of skin with vitiligo. This treatment is said to be very effective for people with vitiligo in the areas of the head, neck, trunk, upper arms and legs.

Surgery:

Autologous (from the patient) skin grafts: Skin is taken from one part of the patient and used to cover another part. Possible complications include scarring, infection or a failure to repigment. This might also be called mini grafting.

Micropigmentation: A type of tattooing that is usually applied to the lips of people affected by vitiligo.

Self-assessment 5.3

1. What is vitiligo?
2. What are the types of vitiligo?
3. What are the causes of vitiligo?
4. What are the symptoms of vitiligo?
5. How do you diagnose vitiligo?
6. How do you treat vitiligo?

5.4. PSORIASIS

Learning Activity 5.4

Figure 5.4: Psoriasis

Source: Wikipedia (2022), psoriasis in humans retrieved from https://en.wikipedia.org/wiki/Psoriasis

1. What are the abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Psoriasis is a skin disorder that causes skin cells to multiply up to 10 times faster than normal. This makes the skin build up into bumpy red patches covered with white scales. They can grow anywhere, but most appear on the scalp, elbows, knees, and lower back. Psoriasis cannot be passed from person to person. It does sometimes happen in members of the same family.

Psoriasis usually appears in early adulthood. For most people, it affects just a few areas. In severe cases, psoriasis can cover large parts of the body. The patches can heal and then come back throughout a person's life.

Signs and Symptoms

Plaques of red skin often covered with silver-colored scales. These plaques may be itchy and painful, and they sometimes crack and bleed. In severe cases, the plaques will grow and merge, covering large areas.

Disorders of the fingernails and toenails, including discoloration and pitting of the nails. The nails may also crumble or detach from the nail bed.

Plaques of scales or crust on the scalp.

People with psoriasis can also get a type of arthritis called psoriatic arthritis. It causes pain and swelling in the joints. The National Psoriasis Foundation estimates that between 10% to 30% of people with psoriasis also have psoriatic arthritis.

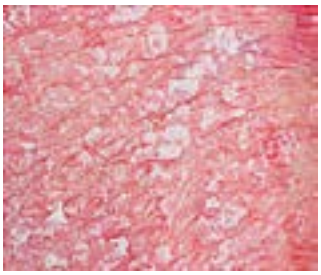


Figure 5.5: Type of Psoriasis

Types

Other types of psoriasis include:

- **Pustular psoriasis**, which causes red and scaly skin with tiny pustules on the palms of the hands and soles of the feet.
- **Guttate psoriasis**, which often starts in childhood or young adulthood, causes small, red spots, mainly on the torso and limbs. Triggers may be respiratory infections, strep throat, tonsillitis, stress, injury to the skin, and taking antimalarial and beta-blocker medications.
- **Inverse psoriasis**, which makes bright red, shiny lesions that appear in skin folds, such as the armpits, groin, and under the breasts.
- **Erythrodermic psoriasis**, which causes fiery redness of the skin and shedding of scales in sheets. It is triggered by severe sunburn, infections, certain medications, and stopping some kinds of psoriasis treatment. It needs to be treated immediately because it can lead to severe illness.

The Causes of Psoriasis

No one knows the exact cause of psoriasis, but experts believe that it is a combination of things. Something wrong with the immune system causes inflammation, triggering new skin cells to form too quickly. Normally, skin cells are replaced every 10 to 30

days. With psoriasis, new cells grow every 3 to 4 days. The buildup of old cells being replaced by new ones creates those silver scales.

Things that can trigger an outbreak of psoriasis include:

- Cuts, scrapes, or surgery
- Emotional stress
- Strep infections
- Medications, including blood pressure medications, anti-malarial drugs, lithium and other mood stabilizers, antibiotics, and NSAIDs.

Medical Diagnosis

Physical exam. It is usually easy for the healthcare professional to diagnose psoriasis, especially if the patient has some plaques on areas such as on the Scalp, Ears, Elbows, Knees, Belly button, and Nails. The health care provider performs full physical exam and ask if people in the family have psoriasis.

Lab tests. The healthcare professional might do a biopsy -- remove a small piece of skin and test it to make sure you do not have a skin infection. There is no other test to confirm or rule out psoriasis.

Treatment

Luckily, there are many treatments. Some slow the growth of new skin cells, and others relieve itching and dry skin. The healthcare professional will select a treatment plan that is right for patient based on the size of the rash, where it is on the body image, the patient age, the overall health, and other things. Common treatments include:

- Steroid creams
- Moisturizers for dry skin
- Coal tar (a common treatment for scalp psoriasis available in lotions, creams, foams, shampoos, and bath solutions)
- Vitamin D-based cream or ointment (a strong kind ordered by healthcare professional. Vitamin D in foods and pills has no effect.)
- Retinoid creams

Treatments for moderate to severe psoriasis include:

- **Light therapy.** A healthcare professional shines ultraviolet light on the skin to slow the growth of skin cells. PUVA is a treatment that combines a medicine called psoralen with a special form of ultraviolet light.
- **Methotrexate.** This drug can cause bone marrow and liver disease as well as lung problems, so it is only for serious cases. Doctors closely watch patients.

They will have to get lab tests, perhaps a chest X-ray, and possibly a liver biopsy.

- **Retinoids.** These pills, creams, foams, lotions, and gels are a class of drugs related to vitamin A. Retinoids can cause serious side effects, including birth defects, so they are not recommended for women who are pregnant or planning to have children.
- **Cyclosporine.**This drug, made to suppress the immune system, may be taken for serious cases that do not respond to other treatments. It can damage the kidneys and raise blood pressure, so the healthcare professional will closely watch patient's health.
- **Biologic treatments**. These work by blocking the part of the body's immune system that is overactive in psoriasis. Biologic medications such as **adalimumab (Humira), brodalumab (Siliq), certolizumab pegol (Cimzia), etanercept (Enbrel), guselkumab (Tremfya)** can help.
- **An enzyme inhibitor.** The medication apremilast (Otezla) is a new kind of drug for long-term inflammatory diseases like psoriasis and psoriatic arthritis.

Self-assessment 5.4

1. What is psoriasis?
2. What are the Types of psoriasis?
3. What are the Causes of psoriasis?
4. What are the Symptoms of psoriasis?
5. How do you Diagnose psoriasis?
6. How do you Treat psoriasis?

5.5 ECZEMA

Learning Activity 5.5

Figure 5.6 Patient with eczema

Source: Wikidia (2022),eczema in humans retreived from https://www.google.rw/search?q=eczema&sxsrf=ALiCzsa-Jkdqg7I0JA4FAy_BEMzmRwW2FQ:1653120064202&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiXi8qRkPD3AhUKhP0HHdAbBOAQ_AUoAXoECAEQAw&biw=1056&bih=491&dpr=1.82

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. If not treated, what will be the consequences?

Eczema is a group of conditions that make the skin inflamed or irritated. The most common type is atopic dermatitis or atopic eczema. “Atopic” refers to a person’s tendency to get allergic conditions such as asthma and hay fever.

Signs and Symptoms

Eczema looks different for everyone. In addition, the flare-ups will not always happen in the same area.

No matter which part of the skin is affected, eczema is usually itchy. The itching sometimes starts before the rash. The skin may also be red, dry, cracked, and leathery. In infants, the itchy rash can lead to an oozing, crusting condition, mainly on the face and scalp. It can also happen on their arms, legs, back, and chest. Children and teens usually have a rash in the bends of their elbows, behind their knees, on their neck, or on their wrists or ankles. The rash turns scaly and dry.

The rash usually happens on the face, backs of the knees, wrists, hands, or feet. The skin will probably be very dry, thick, or scaly. In fair-skinned people, these areas may start out reddish and then turn brown. In darker-skinned people, eczema can affect skin pigments, making the affected area lighter or darker.

Types of Eczema

Eczema includes conditions such as:

Atopic dermatitis it is also linked to other allergic disorders, like asthma and hay fever, and often starts in childhood.

Contact dermatitis. Nearly everyone gets this at some point in his or her lives. It happens when the skin is exposed to something that causes a rash. The trigger can cause irritation or an allergic reaction.

Triggers are unique to each person and vary by the two types of contact dermatitis:

- Irritant dermatitis is the more common kind and is more closely linked to people with atopic dermatitis. Triggers may include skin care products, soaps and detergents, jewelry made with nickel, and industrial chemicals like solvents and cement.
- Allergic dermatitis flares when the skin is exposed to something, which the patient is allergic to. Common allergens include poison ivy, nickel and other metals, fragrances and beauty products with fragrances, rubber, latex, and the preservative thimerosal. For some people, it takes sunlight to provoke a reaction.
- **Dyshidrotic eczema.** This is a less common but more challenging form of eczema. It causes outbreaks of tiny blisters on the palms of the hands, soles of the feet, and sides of the fingers. It may be triggered by sweating or irritants like metals.
- **Neurodermatitis.** This type of eczema tends to cause just one or two intensely itchy patches, often on the nape of the neck, an arm, or a leg. Risk factors include having another form of eczema, like atopic or contact dermatitis, or just very dry skin. However, it is also linked to some mental health issues like anxiety disorder and obsessive-compulsive disorder (OCD). Women between the ages of 30 and 50 have a higher chance of getting it than other people.

- **Nummular eczema.** This coin-shaped eczema often appears after a skin injury like a burn or insect bite. The patient more likely to get nummular eczema if the family members have atopic dermatitis, allergies, or asthma.
- **Seborrheic dermatitis.** This happens in areas of the body with lots of oil glands. When it is on the scalp, it is called dandruff. Seborrheic dermatitis probably results from a severe reaction to a high amount of Malassezia yeast, a common organism, on the skin. It is also linked to other skin conditions, like psoriasis, acne, and rosacea, as well as a variety of other diseases.
- **Stasis dermatitis.** This type happens in people who have poor blood flow, usually in the lower legs. Unlike some other types of eczema, these plaques are not linked to faulty genes. Some lifestyle habits raise the risk too, like being overweight and not getting enough activity.

Causes and Risk Factors

Experts are not sure what exactly causes eczema. Things that may make it more likely include:

- An immune system response to something irritating
- Problems in the skin's barrier that let moisture out and germs in
- A family history of other allergies or asthma

Eczema Triggers

Some people have flare-ups of the itchy rash in response to things like:

- Rough or coarse fabric
- Feeling too hot or cold
- Household products like soap or detergent
- Animal dander
- Respiratory infections or colds
- Stress
- Sweat

Medical Diagnosis

No one test can spot eczema. The healthcare professional will probably diagnose it by looking at the skin and by asking a few questions. Because many people with eczema also have allergies, the healthcare professional may order some allergy tests to look for irritants or triggers. Children with eczema are especially likely to have allergy tests.

Treatment

Moisturizers. Because the skin is dry and itchy, the healthcare professional will recommend lotions and creams to keep it moist. Creams and ointments ease inflammation and put water back in the skin to help it heal. Put them on several times a day, including right after the bathe or shower. Petroleum jelly and mineral oil work well because they form a thick barrier over the skin. Products with glycerin, lactic acid, and urea may also help because they help pull water into the skin.

Hydrocortisone creams and antihistamines. Over-the-counter products like hydrocortisone cream and antihistamines can also help. Hydrocortisone is a steroid that helps keep redness, itching, and swelling at bay. The patient can buy low-strength creams and lotions at the store. If those do not help, the healthcare professional may prescribe something stronger. It is safe to put hydrocortisone on most body parts as many as four times a day for up to 7 days, as long as the patient is not pregnant or breastfeeding. Keep it away from the eyes, rectum, and genitals.

Over-the-counter allergy meds may not work well for itchy skin caused by eczema. However, antihistamines that are known to cause drowsiness can help to sleep if the patient takes them before bed.

Colloidal oatmeal. Add this finely ground oatmeal to a lukewarm bath.

Wet wraps. When the eczema is flaring, soak some gauze, bandages, or pieces of soft clothing in cool water and put them on the skin. The coolness will relieve itching, and the moisture will help creams or lotions work even better. Carefully cover the area with a dry layer (such as pajamas) and leave in place for several hours or overnight.

Coal tar. The healthcare professional may suggest a product with coal tar. Coal tar has treated eczema and other skin problems for more than 2,000 years. Although it is messy and many people do not like the strong smell, it may help soothe the skin.

Calamine lotion can be put in the refrigerator and helps relieve itching quickly.

Relaxation techniques. There is a strong link between stress and the skin. Self-hypnosis, meditation, and biofeedback therapy have all been shown to ease eczema symptoms.

Medications

The healthcare professional may also prescribe creams and ointments with corticosteroids to ease inflammation. If the area becomes infected, the antibiotics will help.

Other options include tar treatments (chemicals that reduce itching), phototherapy (using ultraviolet light), and the drug cyclosporine.

Self-assessment 5.5

1. What is eczema?
2. What are the Types of eczema?
3. What are the Causes of eczema?
4. What are the Symptoms of eczema?
5. How do you Diagnose eczema?
6. How do you Treat eczema?

5.6. FURUNCLE

Learning Activity 5.6

Figure 5.7 Images of furuncle

Source: wikipedia (2022), Furuncle retreived

1. Basing on those signs and symptoms, what could be the medical problem of this patient?
2. What are different causes of the conditions in the images above?
3. What can be included in the management of this case?
4. What are the possible complications related to this medical condition?

A skin abscess happens when pus collects in hair follicles, skin tissues, or under the skin. A furuncle, also known as a boil, is a painful infection that forms around a hair follicle and contains pus.

Signs and symptoms of furuncle

The patient with furuncle presents the following signs and symptoms:

Localized pain, fever, headache, localized inflammation and pus

Pathophysiology of Furuncle

The affecting organism enters the body, usually at a break in the skin barrier such as a wound site. The organism then causes an inflammatory reaction within the hair follicle.

Staphylococcal infection commonly causes the abscess, which consists of a fibrin wall with surrounding inflamed tissues. This encloses a core of pus containing organisms and leukocytes.

Hematologic spread of infection is possible even from the smallest abscess and is enhanced by proteolytic enzymes produced by the staphylococcal organisms. This spread can result in pneumonia and infection of the heart valves, bones, and joints. Immunocompromised patients may develop fatal sepsis.

Medical diagnosis

The health care provider can diagnose tinea versicolor by physical exam (inspection and palpation), the health care provider should take pus as sample to identify germs

Treatment

The health care provider can generally treat small boils at home by applying warm compresses to relieve pain and promote natural drainage.

For larger boils and carbuncles, treatment may include:

- **Incision and drainage.** The health care provider may drain a large boil or carbuncle by making an incision in it. Deep infections that cannot be completely drained may be packed with sterile gauze to help soak up and remove additional pus.
- **Antibiotics.** Sometimes the health care provider may prescribe antibiotics to help heal severe or recurrent infections.

Self-assessment 5.6

1. What is furuncle?
2. What are the Types of furuncle?
3. What are the Causes of furuncle?
4. What are the Symptoms of furuncle ?
5. How do you Diagnose furuncle?
6. How do you Treat furuncle?

5.7. ACNE

Learning Activity 5.7

Figure 5.8 Images of Acne

1. What are abnormal signs and symptoms that patient was presenting?
2. Basing on those signs and symptoms, what could be the medical problem of this patient?
3. What are the investigations that have been ordered to guide the confirmation of the medical problem?
4. What was included in the management of this case?
5. What are the possible complications related to this medical condition?

Acne is an inflammatory disorder of the skin, which has sebaceous (oil) glands that connects to the hair follicle, which contains a fine hair. In healthy skin, the sebaceous glands make sebum that empties onto the skin surface through the pore, which is an opening in the follicle. Keratinocytes, a type of skin cell, line the follicle.

Acne is a common skin condition where the pores of the skin become blocked by hair, sebum (an oily substance), bacteria and dead skin cells. Those blockages

produce blackheads, whiteheads, nodules and other types of pimples. If you have acne, know you're not alone. It's the most common skin condition that people experience. It's estimated that 80% of people ages 11 to 30 will have at least a mild form of acne, and most people are affected by it at some point in their lives.

Acne can take several forms. They include:

- **Blackheads:** Open bumps on the skin that fill with excess oil and dead skin. They look as if dirt has deposited in the bump, but the dark spots are actually caused by an irregular light reflection off the clogged follicle.
- **Whiteheads:** Bumps that remain closed by oil and dead skin.
- **Papules:** Small red or pink bumps that become inflamed.
- **Pustules:** Pimples containing pus. They look like whiteheads surrounded by red rings. They can cause scarring if picked or scratched.
- **Fungal acne (pityrosporum folliculitis):** This type occurs when an excess of yeast develops in the hair follicles. They can become itchy and inflamed.
- **Nodules:** Solid pimples that are deep in the skin. They are large and painful.
- **Cysts:** Pus-filled pimples. These can cause scars.

The causes of acne

Acne is largely a hormonal condition that is driven by androgen hormones, which typically become active during the teenage and young adult years. Sensitivity to these hormones combined with surface bacteria on the skin and fatty acids within oil glands can result in acne. Certain things can cause acne and/or make it worse:

- Fluctuating hormone levels around the time of a woman's period.
- Picking at acne sores.
- Clothing and headgear, like hats and sports helmets.
- Air pollution and certain weather conditions, especially high humidity.
- Using oily or greasy personal care products (like heavy lotions, creams or hair pomades and waxes) or working in an area where you routinely come in contact with grease (such as working at a restaurant where there are greasy food surfaces and frying oil).
- Stress, which increases the hormone cortisol, can also cause acne to flare.
- Some medications.
- Genetics.

Treatment plan of acne

Various medications and therapies have proven to be effective. They target the underlying factors that contribute to acne.

Medications applied topically:

- **Benzoyl peroxide** is available as an over-the-counter product (such as Clearasil®, Stridex®, PanOxyl ®)
- **Salicylic acid** is available over-the-counter for acne, as a cleanser or lotion. **Azelaic acid** is a natural acid found in various grains such as barley, wheat and rye.
- **Retinoids (vitamin A derivatives)** such as Retin-A®, Tazorac®, and Differin® (which is now available without a prescription) break up blackheads and whiteheads and help to prevent clogged pores, the first signs of acne.
- **Antibiotics** (topical types include clindamycin and erythromycin) control surface bacteria that aggravate and often encourage the swelling of acne.
- **Dapzone** (Aczone®) is a topical gel, which also has antibacterial properties.

Medications taken orally (by mouth):

- **Antibiotics,** especially tetracycline and doxycycline.
- **Oral contraceptives** include Estrostep®, Beyaz®, Ortho Tri-Cyclen® and Yaz ®.
- **Isotretinoin** (Amnesteem®, Claravis®, Sotret®).
- **Steroids.** Rarely, steroids can be used to treat severe acne or injected into large nodules to reduce inflammation.
- **Lasers.** Currently, lasers are primarily used to treat acne scars.
- **Chemical Peels**. This treatment uses special chemicals to remove the top layer of old skin.

Self-assessment 5.7

1. What is acne?
2. What are the types of acne?
3. What are the causes of acne?
4. What are the symptoms of acne?
5. How do you diagnose acne?
6. How do you treat acne?

End unit assessment 5

A. Multiple Choice Questions

- Circle the most appropriate answer

1. **An absence of pigment in the skin is called:**
   a. Acanthosis nigrans
   b. Albinism
   c. Melanism
   d. Xanthoderm

2. **An acute eruption of intensely itchy papules or wheals is called:**
   a. Acne vulgaris
   b. Pityriasis rosea
   c. Psoriasis
   d. Urticarial (hives)

3. **Excessive hair on the face or body, especially in women, is called:**
   a. Albinism
   b. Atrichia
   c. Alopecia
   d. Hirsutism

4. **Yellowing of the skin is indicative of**
   a. Hyperbillirubinemia
   b. Hyperuricemia
   c. Hyperkalemia
   d. Hyporeninemia

5. **A chronic dermatitis of unknown etiology in patient with a history of allergy**
   a. Actinic dermatitis
   b. Atopic dermatitis
   c. Stasis dermatitis
   d. Seborrheic dermatitis

6. **The outer most layer of skin is the**
   a. Dermis
   b. Endodermis
   c. Epidermis
   d. Hypodermis

7. **Which of the following infective also known as ring worm?**
   a. Folliculitis
   b. Herpes simplex
   c. Impetigo
   d. Tinea corporis

8. **Another term for iching is**
   a. Dermatitis
   b. Keratosis
   c. Petechiae
   d. Pruritis

9. **Clotrimazole and nystatin are both:**
   a. Topical antifungal
   b. Anti-itch creams
   c. Topical antibiotic
   d. Used to treat eczema

10. **Which of the following is a fungal infection**
    a. Lichen planus
    b. Keratosis
    c. Seborrhea
    d. Tinea capitis

11. **A skin disorder most often caused by the herpes virus and consistence of red lesions that look like target is:**
    a. Candidiasis
    b. Erythema multiforme
    c. Hirsutism
    d. Keratosis

12. Where are scabies mites found?

a. Hair follicles
b. Stratum corneum
c. Sub-epidermal
d. Throughout the skin layers

13. Small elevation of skin containing purulent material

a. Papule
b. Pustule
c. Vesicle
d. Cyst

14. An ulcer is

a. Shallow epidermal defect
b. Break in epidermis with exposure of dermis
c. Not good for coffee drinkers
d. A primary problem

15. Alopecia is

a. Full or partial hair loss
b. Difficult for men with
c. Only full hair loss
d. Never where you want it to be

16. Inflammation secondary to rupture of a hair follicle

a. Furunculosis
b. Pustule
c. Vesicle
d. Plaque

17. Erythema is

a. Blood condition
b. Red
c. Lack of pigmentation
d. Excessive sweating

18. Urticarial means

a. Allergic reaction of the skin

b. Thickened skin

c. Dead tissue

Hemorrhagic

SECTION B: Questions to answer by true and false

1. Eczema is an inflammatory condition of the skin

a. True

b. False

2. Impetigo is a contagious bacterial skin infection with pustules that rupture

a. True

b. False

REFERENCES

1. Centers for diseases control and Prevention (2021), sinus infection (Sinusitis), retrieved from https://www.cdc.gov/antibiotic-use/sinus-infection.html
2. Cleveland Clinic (2021), Pathophysiology of sinusitis, retrieved from https://victoriaent.com/wp-content/uploads/2019/08/Sinusitis_Fact_Sheet.pdf
3. *Ferri, Fred F. (2020).* Ferri's Clinical Advisor 2014 E-Book: 5 Books in 1. *Elsevier Health.*
4. Harvard Medical School (2021), Chronic Sinusitis in adult retrieved from https://www.health.harvard.edu/a_to_z/chronic-sinusitis-in-adults-a-to-z
5. Healthline (2021) Otoscopy with different diseases retrieved from https://www.ncbi.nlm.nih.gov/books/NBK556090/
6. Healthline (2021) treatment of rhinitis allergic reactions retrieved from https://www.healthline.com/health/allergic-rhinitis#Home%20remedies
7. https://my.clevelandclinic.org/health/diseases/17701-sinusitis
8. https://www.medicinenet.com/otoscope/definition.htm
9. *Krulewitz, NA; Fix, ML (2019). "Epistaxis". Emergency Medicine Clinics of North America*
10. *Kucik, Corry J.; Clenney, Timothy (2020). "Management of epistaxis". American Family*
11. Mayo clinic (2021) Diagnostic procedures of nonallergic rhinitis retrieved from https://www.mayoclinic.org/diseases-conditions/nonallergic-rhinitis/diagnosis-treatment/drc-20351235
12. Mayo Clinic (2021). Risk factors of sinusitis, signs and symptoms of sinusitis.
13. MedecineNet (2021) Medical Definition of Ear infection
14. Medical surgical nursing critical thinking in patient care 5th edition
15. *Morgan, Daniel J.; Kellerman, Rick (March 2014). "Epistaxis". Primary Care: Clinics in* National Library of Medecine (2021) Investigations and diagnosis of deafness retrieved from https://pubmed.ncbi.nlm.nih.gov/10737084/
16. Samuel R. Falkson; Prasanna Tadi diseases of ear retrieved from https://www.aafp.org/afp/2018/1015/p525.html
17. *Tabassom, A; Cho, JJ (January 2020). "Epistaxis (Nose Bleed)". StatPearls.* PMID

18. *Wackym, James B. Snow,... P. Ashley (2009).* Ballenger's otorhinolaryngology : head and neck surgery *(17th ed.). Shelton, Conn.: People's Medical Pub. House/B C Decker*

19. *Wilson, I. Dodd (1990).* Clinical Methods: The History, Physical, and Laboratory *Examinations 3rd ed.).*

20. World Health Organization (2020), Cerumen plug treatment

21. World Health Organization (2021) hearing loss in adult retrieved fromhttps://vikaspedia.in/health/child-health/information-on-hearing-impairment-and-rehabilitation/hearing-impairment-and-rehabilitation/hearing-impairment

22. Sharon L. Lewis, Shannon Ruff Dirken, Margaret McLean Heitkemper, Linda Bucher (2014). Medical-surgical nursing. Assessment and management of clinical conditions.

23. Barbara K. Timby; Nancy E. Smith (2010). Introductory medical-surgical nursing 10th Edition.

24. Roni M Shtein (2021). Blepharitis. Retrieved from: https://www.uptodate.com/contents/blepharitis?search=blepharitis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H1784841514, on 13th September 2021.

25. https://www.webmd.com/eye-health/blepharitis

26. Deborah S Jacobs (2020). Conjunctivitis. Retrieved from: https://www.uptodate.com/contents/conjunctivitis?search=CONJUNCTIVITIS&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1 on 13th September 2021.

27. https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/conjunctivitis?sso=y

28. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7092688/

29. https://www.allaboutvision.com/conditions/myopia.htm

30. https://parkslopeeye.com/what-are-the-causes-of-blepharitis/, https://www.aao.org/eye-health/anatomy/meibomian-glands

31. Source:https://www.uptodate.com/contents/search?search=nursing%20management%20of%20myopia&sp=0&searchType=PLAIN_TEXT&source=USER_INPUT&searchControl=TOP_PULLDOWN&searchOffset=1&autoCom visited on 20/09/2021

32. Medisync:https://medisync.org/blog/surgery_guides/introduction-to-cataract-surgery-what-are-the-symptoms-and-causes-for-cataract/

33. WebMD: https://www.webmd.com/eye-health/cataracts/what-are-cataracts

34. Verwell healthhttps://www.verywellhealth.com/cataract-treatment-3421561 by

35. By Troy Bedinghaus, OD Medically reviewed by Johnstone M. Kim, MD retrieved on April 19, 2020

36. American Academic of Ophthalmology (2021), eye medical condition,introduction to cataract Retrieved from https://www.aao.org/preferred-practice- pattern/conjunctivitis-ppp-2018

37. Australian Society of Ophthalmologists (2021),Treatment and prevention of eye diseases Retrieved from https://au.linkedin.com/company/australian-society-of-ophthalmologists-aso-

38. Barbara K. Timby; Nancy E. Smith (2010). Introductory medical-surgical nursing 10th Edition.

39. Canadian Ophthalmological Society (2021),Canadian Ophthalmological Society Public Relations Toolkit Retrieved from https://www.cos-sco.ca/wpcontent/uploads/2020/06/COS_Physician_Toolkit_en.pdf

40. Centers for Disease Control and Prevention (2021), vision health initiative, Common Eye Disorders and Diseases retrieved from https://www.cdc.gov/visionhealth/basics/ced/index.html

41. Deborah S Jacobs (2020). Conjunctivitis. Retrieved from: https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/conjunctivitis?sso=y https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7092688/ https://www.allaboutvision.com/conditions/myopia.htm

42. Jan Basile, Michael J Bloch (2021). Overview of hypertension in adults. Retrieved from https://www.uptodate.com/contents/overview-of-hypertension-in adults?search=hypertension&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1,on 11th September 2021.

43. Jose-Alberto Palma, Horacio Kaufmann (2021). Mechanisms, causes, and evaluation of orthostatic hypotension. Retrieved from.

44. Jamary Oliveira-Filho, Michael T. Mullen, (2021). Initial assessment and management of acut stroke Retrieved from https://www.uptodate.com/contents/initial-assessment and-management-of-acute stroke?search=stroke&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1, on 09th September 2021

45. Louis R. Caplan (2021). Overview of the evaluation of stroke retrieved from https://www.uptodate.com/contents/overview-of-the-evaluation-of stroke?search=stroke&source=search_result&selectedTitle=2~150&usage_ type=default&display_rank=2, accessed on 9th September 2021

46. Louis R Caplan (2020). Etiology, classification, and epidemiology of stroke retrieved from https://www.uptodate.com/contents/etiology-classification-and-epidemiology ofstroke?search=stroke&source=search_ result&selectedTitle=3~150&usage_type=default&display_rank=3, on 09th September 2021

47. Louis R Caplan (2021). Clinical diagnosis of stroke subtypes Retrived from https://www.uptodate.com/contents/clinical-diagnosis-of-stroke-subt ypes?search=stroke&source=search_result&selectedTitle=5~150&usage_ type=default&display_rank=5, on 09th September 2021

48. Sharon L. Lewis, Shannon Ruff Dirken, Margaret McLean Heitkemper, Linda Bucher (2014). Medical-surgical nursing. Assessment and management of clinical conditions.

49. Richard H. Sterns (2020). Etiology, clinical manifestations, and diagnosis of volume

50. depletion in adults.Retrieved from https://www.uptodate.com/contents/ etiology-clinical- manifestations-and-diagnosis-of-volume-depletion-inadults?search=hypotension%20in%20adults&source=search_ result&selectedTitle=5~150&usage_type=default&display_rank=5, on 10th September 2021.

51. Sharon L. Lewis, Shannon Ruff Dirken, Margaret McLean Heitkemper, Linda Bucher (2014). Medical-surgical nursing. Assessment and management of clinical conditions.

52. Roni M Shtein (2021). Blepharitis. Retrieved from: https://www.webmd.com/ eye-health/blepharitis

53. World Health Organisation (2021) Blindness and vision impairment retrieved from https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment

54. W. Bruce Jackson (2018), Blepharitis: current strategies for diagnosis and management Retrieved from https://ophed.net/system/files/2011/06/ blepharitis-2934-2934.pdf

55. World Health Organization (2021), the impact of myopia and high myopia, retrieved from https://www.who.int/blindness/causes/MyopiaReportforWeb.pdf

56. https://www.news-medical.net/health/Complications-of-Tooth-Decay.aspx(Accessed on 16th May,2022)

57. https://www.txhealthsteps.com/static/warehouse/1076-2011-May-4-06vdu11301voz18o4925/section_6.html#:~:text=Caries%20Development,-Figure%201%20shows&text=Cari(Accessed on 17th May,2022)

58. https://www.intechopen.com/chapters/65714 accessible on 20th May,2022

59. https://www.mayoclinic.org/diseases-conditions/esophagitis/diagnosis-treatment/drc-20361264 Accessed on 21st May,2022

60. https://www.mayoclinic.org/diseases-conditions/esophagitis/diagnosis-treatment/drc-20361264 Accessed on 21st May,2022

61. https://emedicine.medscape.com/article/174223-overview accessed on 22nd May,2022

62. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5045691/#:~:text=Complications%20of%20injuries%20involving%20teeth,a%20few%20years%20(4).Accessedon 22nd May,2022

63. Erythema Multiforme. Medline Plus. Medical Encyclopedia. Web June 16th 2016. - (https://www.nlm.nih.gov/medlineplus/ency/article/000851.htm)

64. Erythema Multiforme. KidsHealth. For Parents. Web June 17th 2016. - (http://kidshealth.org/en/parents/erythema-multiforme.html)

65. Erythema. International Atomic Energy Agency. Radiation Protection of Patients (RPOP). Web June 17th 2016. - (https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/5_InterventionalCardiology/erythema.htm)

66. Skin care: 5 tips for healthy skin. Adult Health. Mayo Clinic. Web June 18th 2016. - (http://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/skin-care/art-20048237?pg=1)