

1. SURGERY OF HEAD AND NECK

INTRODUCTION

1.1. THE INTEGUMENTARY SYSTEM

The **integument** is the outer covering of the body, a protective wrapping that includes the skin, and all structures derived from or associated with skin, such as hair, claws, hooves, horns, tail and various skin related glands including mammary gland. The integument is one of the largest and most extensive organ systems in the body. In humans, skin is the heaviest single organ of the body, accounting for about 16% of the total body weight in adults.

Functions of the skin

- It covers and protects underlying structures
- It acts as a first line of defense against microorganisms
- It has remarkable ability to regenerate and heal
- It carries out the protective and regulatory duties
- It is an important sensory organ
- It is also engaged in the synthesis of Vitamin-D and in the storage of the nutrients
- It provides a cushion against, mechanical trauma as well as insulation against heat and cold, in combination with subcutaneous fat

Histologically, skin forms two distinct layers, the **epidermis** and the underlying **dermis** and a third layer, **hypodermis** is found below the dermis.

Epidermis is the outer most portion of the skin formed of epithelial tissue that rests on the dermis; resists abrasion and forms a permeability barrier.

Layers of Epidermis

- Stratum basale (Basal layer)
- Stratum spinosum (Spiny layer)
- Stratum Granulosum (Granular layer)
- Stratum Lucidum (Clear layer)
- Stratum Corneum (Horney layer).

Dermis: Makes up the greatest portion of the integument, has dense connective tissue that forms the deeper layer of the skin; responsible for most of structural strength of the skin.

Hypodermis: (Subcutaneous layer) loose connective tissue under the dermis; attaches the skin to muscle and bone. This layer permits the skin to move freely over the underlying bone and muscle without putting tension on the skin that would result in tearing.

Related structures of the integument

- **Hair-** A thread like outgrowth of the skin consisting of columns of dead epithelial cells filled with keratin.
- **Arrector Pili muscle-** Small smooth muscle, attached to the hair follicle, can make the hair stand up.
- **Sebaceous glands** are located in the dermis, usually associated with the hair follicle; secretes white semi liquid mixture called sebum.
- **The Horns** – are epidermal in origin and are structurally similar to hair; emerge from the horn process of the frontal bone. In adults the horn is generally hollow and communicates directly with the frontal sinus.
- **Mammary Glands** are specialized skin glands produce colostrum and milk. Their number varies from two (in Horses) to 14 (in swines). The number of openings from which milk emerges also varies- one per teat in Cattle, sheep and goats; 20 in Dogs and up to 20 openings per nipple in Humans.
- **The Hoof** also known as **ungula** and the hoofed animals are called **ungulates**. The weight bearing hooves represent the 3rd and 4th digits.
- **Tail** is a long movable appendage with long hairs at the tip and seen at the back of the animal.

1.2. SURGICAL INTERVENTIONS OF HORN

Surgical anatomy of horn

The horn encloses the cornual process of the frontal bone, except in polled breeds of exotic cattle. The corium of the horn completely envelops the horn core and fuses with its periosteum. The irregular spaces of the horn core are continuous with the frontal sinus. At the base, the horn is thin and is continuous with the epidermis. The horn substance becomes thicker and solid towards the apex.

Until 2 months of age, the horn bud is not attached to the skull. To prevent the scurf of the horn from growing back after dehorning, a ring of skin tissue 1 to 1.5 cm around the base of the horn needs to be removed, because this is the origin of the germinal epithelium, where horn growth occurs. If this area of skin is removed, the surrounding haired skin will replace the defect without producing horn.

Blood Supply: Cornual artery.

Nerve Supply: Cornual nerve (CLOT).

Surgical affections of horn

i) Fracture Horn

The horn usually gets fractured as a result of trauma due to fighting or accidents. Fracture of horn causes hemorrhage into the frontal sinus and bleeding from the nostrils. Accumulation of blood in the frontal sinus may cause purulent sinusitis.

Treatment comprises amputation of the horn, distal to the fracture site. Incomplete fracture of horn involving base or frontal bone without open wound will heal, if properly immobilized using iron rods.

ii) Avulsion Horn

Avulsion of horn is separation of horny covering of the horn core, due to traumatic injury. Diffuse hemorrhage seen is usually arrested spontaneously.

After cleaning the wound, moist antiseptic pad is applied and bandaged. Horny tissue develops completely within a few months. If not contaminated, the horny portion may be replaced immediately and bandaged and antibiotic coverage given.

iii) Horn cancer

This is a squamous cell carcinoma of the cells lining the core at the base of the horn. It generally affects adult cattle between 5 to 10 years of age. It is malignant in nature.

Amputation of horn is the treatment.

iv) Cutaneous Horn

Cutaneous Horn occurring in cattle, sheep and goats are growths, single or multiple, consists of firm horn like projections around the base of the horn. Histologically, it is compacted, laminated keratin. Treatment is surgical excision.

Surgical interventions

I. Dehorning (Amputation of Horn)

As a surgical procedure, dehorning is one of the oldest and most common procedures done on cattle. Dehorning is primarily an elective procedure, except for in cattle with fractured horns.

Indications

- To enhance the appearance of animal.
- To make the animal less dangerous for the handler and other cattle.

- To manage horn diseases like horn cancer and fractured horn.
- To lessen the carcass loss due to bruising of the skin.
- To reduce the incidence of infected lacerations.
- To remove misdirected or over grown horns, causing cutaneous injurious due to pressure.

Restraint and Anesthesia

Adequate restraint of the unwilling patient is crucial for rapid and efficient dehorning. Nose leads and halter on cattle are useful. With practice one learns to improvise and cope to control the animal satisfactorily.

Anesthesia is a must for dehorning as per law and no “**brief – grief**” technique is to be practiced.

- ✓ Sedation (Xylazine 0.1mg/kg i/m) and control the animal in lateral recumbency
- ✓ The cornual nerve block is very useful
- ✓ Ring block at the base of the horn can also be given.

Surgical techniques

The procedure to remove the horn bud in young calves is debudding or disbudding. In large animals the horn is amputated, either by flap method or direct amputation method.

I. Debudding / Disbudding - Calves

The various methods of debudding of calves are;

a) Thermocautery b) Direct cutting c) Genetic debudding.

a) Thermocautery: For this purpose, various types of equipments like, Electric dehorner, Propane dehorner, Small/large Barnes or Improvised electrocautery are available. Clip the hairs around the horn bud. After restraint and anesthesia, the dehorner is applied and moved back and forth to remove horn bud completely, along with 1- 1.5cm of skin surrounding it. It requires no hemostasis, since the cautery seals vessels.

II. Amputation of Horn / Dehorning / Cornuectomy - Adults

a) Flap Method or Cosmetic Dehorning

Skin incision is made encircling the base of the horn immediately below the coronary band and reflected to form a flap. The cornual vessels are ligated and small vessel bleeding controlled by point firing. Reflecting the skin by blunt dissection exposes the periosteum of the frontal bone. The horn is removed from the base, using horn amputation saw or embryotomy wire, leaving the skin flap. Then cutting the extra bone using chistle and hammer brings the two edges of the skin flaps together in close apposition. The entire skin flaps are apposed

with mattress or interrupted sutures using non-absorbable suture materials. A protective bandage is applied after covering the wound with medicated gauze.

This cosmetic dehorning allows primary closure of the skin over the defect created by removing the horn. It is done to create a more predictably desirable looking head with less scarring and short healing time. The cosmetic dehorning is done mainly in young animals, less than two years.

Infection is a serious complication; although it is rare with proper technique. Systemic antibiotic may be used, if needed. Surgery should not be done in rainy, dusty conditions or during fly seasons. The other possible postoperative complications include secondary hemorrhage; wound dehiscence, sinusitis and maggot infestation.

b. Direct Cutting Method

In this, the entire horn is amputated with the help of **embryotomy wire**, immediately below the coronary band. Hemorrhage is controlled by ligating vessels or by thermocautery using hot iron.

1.3. SURGICAL INTERVENTIONS OF ORAL CAVITY

Affections of Molars- Ruminants

1. Irregular Molars

Sharp molars are a common clinical condition in cattle, buffaloes and camels. In the upper molars, the outer edges and in the lower molars, the inner edges become sharp. The sharp edges can easily be inspected visually or felt by passing fingers over the masticating surface of the molars after applying the mouth gag. Irregular molars hamper mastication and cause simple indigestion.

Symptoms

- Injury to the tongue during mastication
- Holding the head on one side during chewing
- Accumulation and impaction and of feed materials between cheek and molars.
- **Quidding** - Dropping the partially chewed food materials with saliva during mastication.
- Foaming saliva at the borders of the mouth
- Ulcers in the inner aspect of cheek and tongue
- Loss of general condition of the animal due to improper feeding.

Treatment: Rasping

2. Over - Grown Molars or Dental Hook

Part of table surface of particular molar, projects more due to lack of wear. It is commonly seen in the first upper molar or last lower molar in ruminants. The last molars are more predisposed.

Treatment

Cutting: If the molar is over grown, a tooth cutter is first employed to cut the long projection and then the sharp edges are rasped after cutting. An emollient e.g. Glycerin may be applied to the oral cavity to treat the minor injuries of the cheek and gums.

Great care has to be taken while cutting the tooth because uneven force may split, loosen or extract the tooth. Such incidents happen in camels, as it is not that easy to cut the tooth in this species.

1.4. SURGICAL INTERVENTIONS OF EAR

Surgical Anatomy

The ear, organ of hearing can be divided into three physical and functional areas: **the external ear, the middle ear and the inner ear.**

External Ear: The main parts of are the **pinna, the external auditory canal and the tympanic membrane (eardrum).** The external ear collects sound waves and transmits to the middle ear. **Middle Ear:** This contains 3 small bone **ossicles** called **malleus (hammer), the incus (anvil) and the stapes (stirrup)** and the opening of the eustachian tube. The ossicles act as a system of levers that transmit the sound wave vibrations from the tympanic membrane to the cochlea. **Inner Ear:** This contains the **cochlea**, a snail shaped spiral cavity, the **vestibule** located between the cochlea and the **semicircular canal.** The inner ear structures contribute to both **hearing and equilibrium.**

1.4.1. AURAL HEMATOMA

Auricular or aural hematoma is an accumulation of blood within the cartilage of the pinna, usually caused by violent head shaking or scratching.

The blood collection is usually confined to the concave surface of the pinna. The condition is seen more often in pendulous eared dogs and less frequently in cats and sporadically in goats.

Pathophysiology: Self inflicted by scratching and head shaking are the main causes.

The underlying causes are; a) Inflammation and irritation associated with otitis externa b) Allergy. The head shaking may result in rupture of the cartilage. The hematoma originates from branches of great auricular artery, within the fractured auricular cartilage. It is not between the skin and the cartilage.

Hematomas are treated immediately after diagnosis, because delay may allow the hematoma to enlarge.

Further delay results in thickening due to fibrosis and develops a “cauliflower” appearance.

The objectives of the surgical procedures are;

- a) To treat the source of irritation
- b) To drain the hematoma
- c) To maintain apposition of the cartilage surface to prevent recurrence.

A. Incision, Drainage and Bandage

- Clip both sides of pinna and prepare the ear for aseptic surgery
- Plug the ear canal with sterile sponges to prevent entry of blood from hematoma
- Incise the hematoma in a linear or “S” shaped fashion on the concave side along the long axis
- Drain and explore the hematoma and remove the fibrin tags and blood clots
- Place 1cm wide mattress sutures with 2-0 to 3-0 monofilament non-absorbable materials, parallel to and no closer than 0.5 cm from the incision.
- Keep the incision edges 2-3 mm apart while placing the first row of sutures. The sutures need not penetrate the external skin surface, since it creates another source of entryway for contamination
- Pass the needle carefully from the concave surface of the pinna, catching both cartilage planes
- Place the remaining mattress sutures in staggered fashion 1 cm apart to obliterate the entire dead space and
- Tie the sutures with optimum tension to oppose the cartilage surfaces.

B. Drainage only

- After aseptic preparation, make a small (0.5 to 1cm) incision into the hematoma at its most proximal and distal extent on the pinna
- Remove all the fluid and fibrin tags with mosquito hemostats and digital expression
- Place a fenestrated drain (sterilized I/V tubing) through the dead space and exiting both stab wounds.
- Fix the drain to the skin at both ends with non-absorbable sutures.

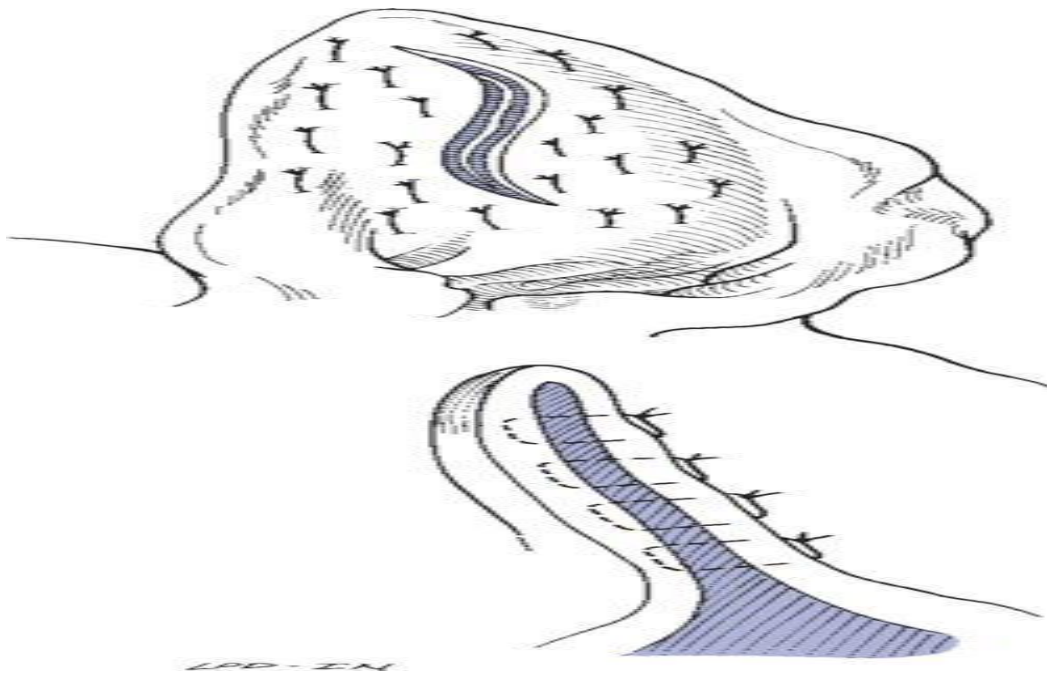


Fig. 1: Sutures should be placed vertically rather than horizontally for aural hematoma repair. They may be placed through the cartilage without incorporating the skin on the convex surface of the ear, or they may be full thickness.

Post operative care

- Bandage over the top of the head or in an upright fashion.
- Leave the ear canal exposed for cleaning and medication
- Use Elizabethan collar to reduce self-trauma
- Remove sutures within 2 to 3 weeks.

1.4.2. OTITIS EXTERNA

Otitis externa is the inflammation of the soft tissue components of the external auditory meatus.

This condition is one of the most common and frustrating problem encountered in small animal practice and rare in cattle and camels.

Etiology

1. Primary factors: Conditions that initiate the inflammatory process

- ✓ Trauma
- ✓ Parasites- *Otodectes cynotis*
- ✓ Foreign bodies- grass awn, foxtails, etc
- ✓ Allergy - Food, atopy, contact, etc
- ✓ Autoimmune diseases, zinc responsive dermatoses, etc.

Predisposing Factors: Permitting an environment conducive to facilitate inflammation

- Conformation of the ear canal
- Obstructive diseases - hyperplasia, polyps, and tumors.
- Iatrogenic ear trauma - cleaning, hair removal, etc
- Moisture in the canal, hair in the ears e.g. Poodles and Terriers
- Breed disposition e.g. Chinese shar Pei, with stenotic canals
- Immune-deficiency syndromes.

Clinical signs

- ✓ Malodor
- ✓ Head shaking
- ✓ Scaling and crusting
- ✓ Licking of the ear by other pets
- ✓ Scratching and rubbing of the ears
- ✓ Pets become irritable and aggressive, pain around the ear- manifested as crying & whining.

Diagnosis

- History
- Physical examination
- Culture and sensitivity test
- Biopsy- for identification of abnormal growth
- Radiography - To detect otitis media, otitis interna and patency of ear canal.
- Otoscopic examination to find out: Erythema, exudation, hyperplasia and ulceration

Treatment

I. Cleaning the External Ear Canal

The cleaning and drying the ear canal makes the environment less favorable for the growth of the microbes and reduces the inflammation.

Cleaning and Flushing solution - (Otic clens)

Drying solution- (Panodry)

1.4.3. Surgical Procedure- Zepp's Procedure or Lateral Ear Canal Resection

The objective is to expose the ear canal to favor drainage and there by enhance the local environment by decreasing the moisture, humidity and temperature in the ear canal.

Surgical Technique

- Place the animal in lateral recumbency and position the head
- Aseptically prepare the ear region and drape it and identify the anatomical relationships.
- Make two parallel incisions in the skin, lateral to the vertical canal from the tragus to site.
- The incision should be 1 ½ times the length of the vertical canal.
- Connect the incisions ventrally, reflect skin flap and resect it without damaging the facial nerve and parotid salivary gland
- Cut the lateral wall of the vertical ear canal to the level of the horizontal ear canal
- Reflect the cartilage flap distally, exposing the horizontal ear canal and resect the distal half of the flap to make the drain board
- Place sutures from the flap to the skin, starting from the horizontal canal first and complete suturing till the distal portion.
- Healing of the surgical wound is routine, wound dehiscence may occur if there is any infection. In that case it is treated as open wound.

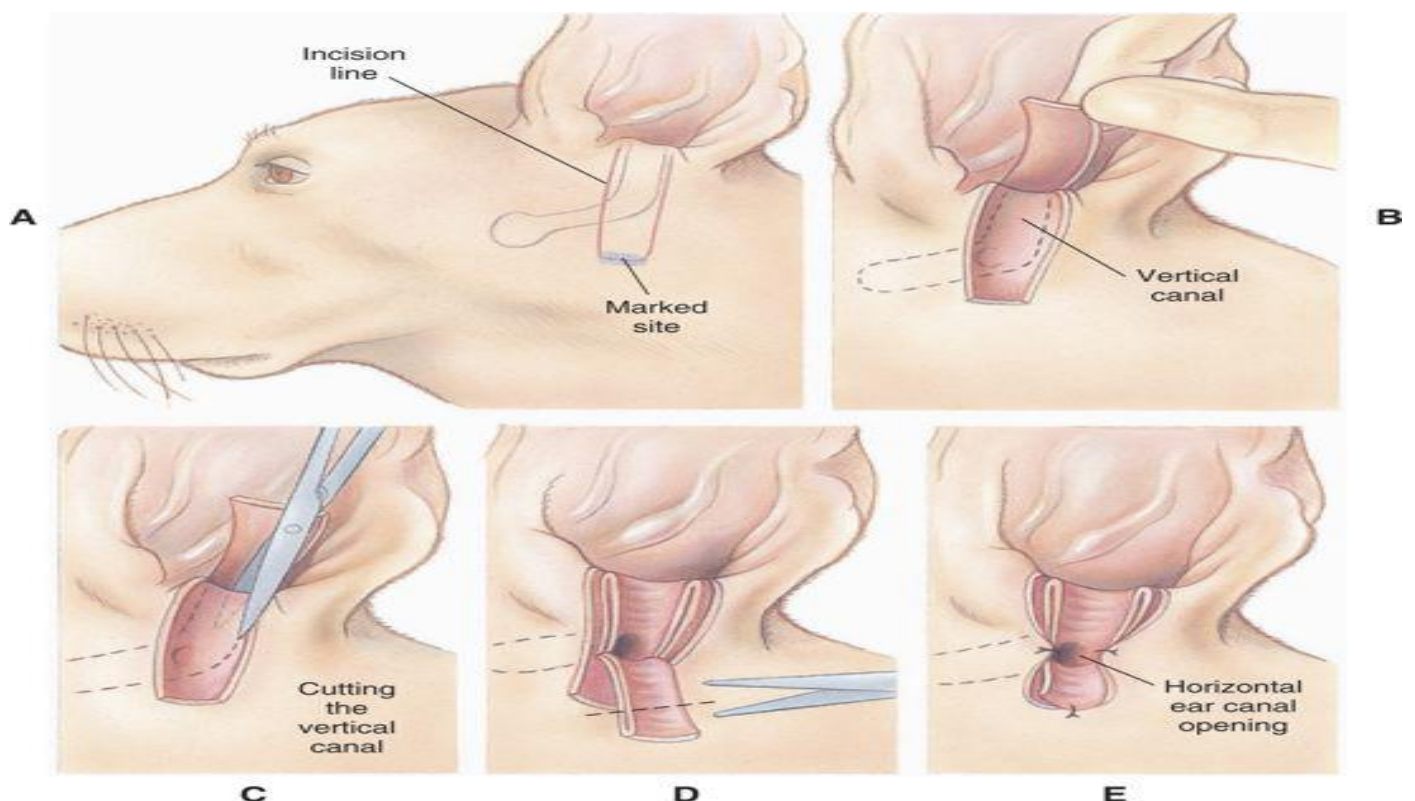


Fig.2: Lateral ear canal resection. A, Mark a site one half the length of the vertical ear canal below the

horizontal ear canal. **B**, Lateral to the vertical ear canal, make two parallel incisions that extend from the tragus ventrally to the marked site. **C**, Connect the skin incisions ventrally, and reflect the skin flap dorsally, exposing the lateral cartilaginous wall of the vertical ear canal. Use Mayo scissors to cut the vertical canal. **D**, Reflect the cartilage flap distally, and inspect the opening of the horizontal canal. Resect the distal half of the cartilage flap to make the drainboard, and remove the skin flap. **E**, Place sutures from the epithelial tissue to the skin. Begin suturing at the opening of the horizontal canal, then suture the drainboard.

Postoperative care

- Post operative analgesics and tranquilizers are given if the animal is dysphoric or anxious
- A bandage is applied over the ear and an Elizabethan collar to prevent bandage removal or self mutilation
- Antibiotics administered based on culture results and continued for 2 to 3 weeks.

Complications

- In dogs with underlying dermatologic diseases, it has to be treated concurrently
- The concurrent middle ear infection should be treated
- Facial nerve palsy is a rare complication.

In young dairy calves of 3 to 6 weeks of age, otitis media occur commonly. Facial nerve paralysis and vestibular signs are the clinical signs. The treatment is antimicrobial therapy and supportive care in most cases.

1.5.SURGICAL INTERVENTIONS OF EYE

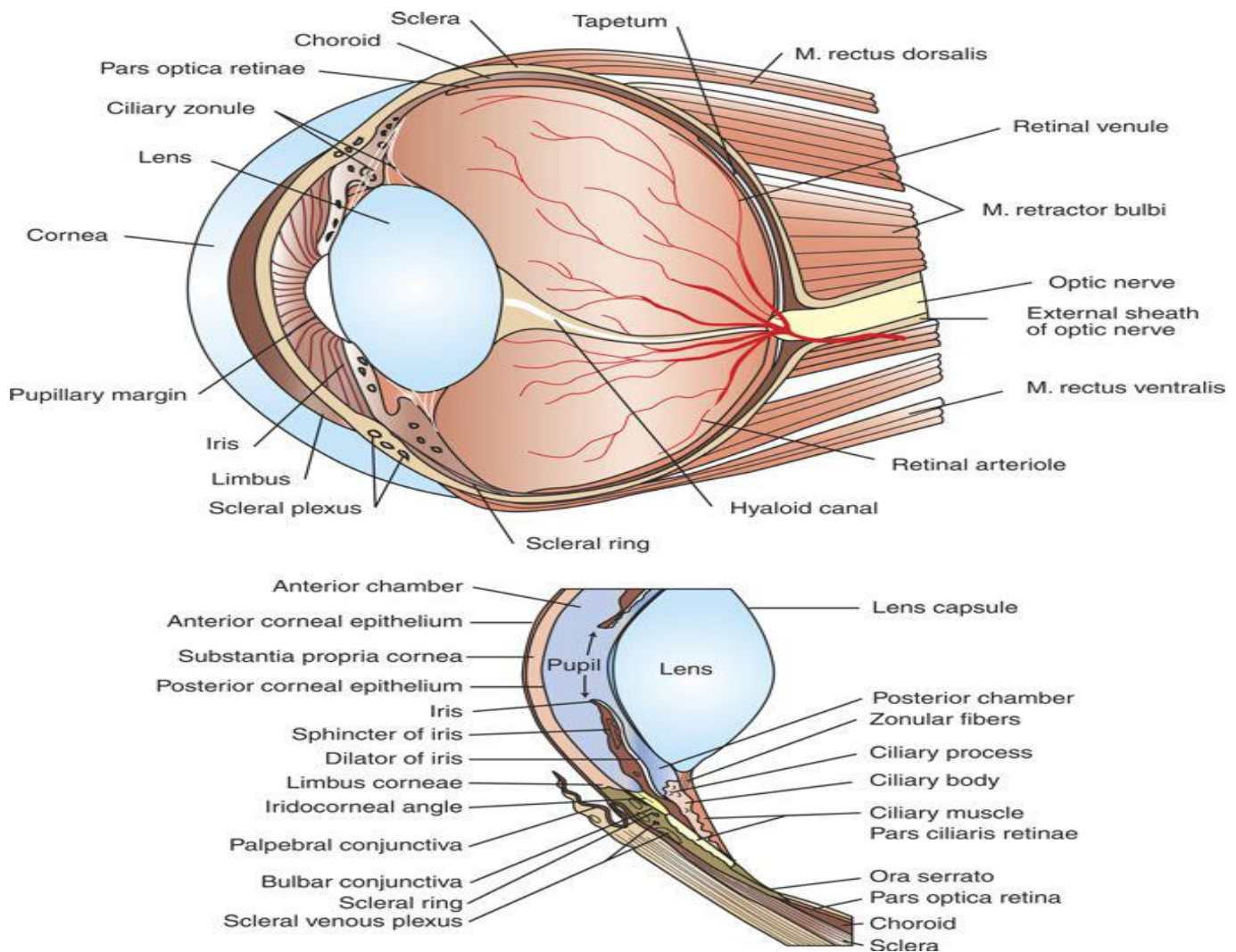


Fig.3: Ocular and periorcular anatomy

Surgical conditions of the eye

A. EYE LIDS

I. Trauma

Trauma: Lacerations of the eyelids usually occur as a result of direct trauma. In camels mostly lower eyelid are involved. Minor laceration may be treated on general principles and allowed to heal as open wounds.

- Major laceration requires thorough cleaning and should be closed in two layers.
- First layer sutures includes trans-conjunctival layer, the knots are buried in the subconjunctiva.
- Skin and muscles are then apposed in second layer.

- The first suture should be through the grey line of the eye lid. Accurate apposition will avoid scar formation and chances of development of ectropion or entropion.
- The knots of suture should not come in contact with the cornea or conjunctive to avoid continuous irritation.

II. Entropion

Entropion is inversion or inward turning of the edges of the eyelids causing local irritation which can lead to keratoconjunctivitis or corneal ulcers, scarring or corneal ulcer perforation, leading to blindness.

Correction procedures

- ✓ Mild cases respond to frequent manual eversion (every 2 to 3 hours) with heavy topical lubrication to prevent eyelid spasm. If entropion is not corrected within 48 hours corneal disease develops
- ✓ Short term option is to inject saline or long acting antibiotics in the affected eyelids to swell tense and evert the eyelid out.
- ✓ By one or two horizontal mattress "tacking" sutures by split thickness bites parallel to the eyelid margins to evert the eyelid margins. If large number of animals are to be treated staples or wound clips may be used

III. Ectropion

Ectropion is eversion of eyelids.

Signs of ectropion include; Exposed conjunctiva, epiphora, conjunctivitis, keratitis, corneal neovascularisation and pigmentation and exfoliative blepharitis due epiphora.

Surgical Technique

V-Y correction: The V-Y correction is commonly used for cicatricial ectropion from wounds, tumor excision or over correction of entropion.

IV. Tarsorrhaphy

Tarsorrhaphy is a technique of closing the eyelids to protect the cornea from exposure and injury following surgery. Complete temporary tarsorrhaphy is done while treating corneal ulcers or following corneal or intraocular surgery. Following partial temporary tarsorrhaphy, prolonged subpalpebral medication is facilitated. Complete permanent tarsorrhaphy usually follows enucleation and exenteration.

B. EYE BALL OR GLOBE

1. Neoplasia of the Eye

Some of the common growths observed on the cornea include, squamous cell carcinoma, inflammatory growths may affect the membrana nictitans and eyelids. The squamous cell carcinoma is usually pink or red in color and protrudes over the cornea. The growths are foul smelling, fragile and bleed easily.

Treatment: Enucleation of the eye.

2. Glaucoma

Glaucoma is characterized by increased intraocular pressure. It is a group of diseases

- The aqueous humor produced at a faster rate than being drained from the eye
- Glaucoma is most often diagnosed in dog
- In animals the success rate for treatment is less
- In many cases the affected eye is surgically removed.

3. Entropion

Indications

- Extensive trauma to the eye and adnexa.
- Intractable infection
- Painful intractable glaucoma.
- Extensive ocular tumors
- Congenital defects that results in exposure and damage
- Uncontrollable endophthalmitis or panophthalmitis.

Surgical Procedures

- A. **Enucleation** is the removal of the globe, the nictitating membrane and the eyelid margins.
- B. **Exenteration** is removal of the globe, nictitating membrane, orbital contents and eyelid margins.
- C. **Evisceration** of the eyeball is the removal of the contents of the eye ball or the globe, with preservation of sclera or cornea.

A. Enucleation – Surgical Technique

- Aseptically prepare and close the eyelids with simple continuous suture
- Incise the skin 0.5 cm away from the eyelid margin, around the closed eyelids
- Dissection continued subcutaneously towards the orbital rim without perforating the conjunctiva
- The extra ocular muscles are severed close to the globe, using curved Metzenbam scissors
- After transecting the rectus and oblique muscles, the globe is grasped and gentle traction is applied, so that the retractor muscle forms a cone around the optic nerve
- A curved hemostat applied on the optic nerve and blood vessels and transected and then the globe and the third eyelid are removed
- Hemorrhage controlled by ligation or by digital pressure over the packed sterile sponges which are removed after some time.
- The pressure of the suture, sponges and bandage is adequate to stop the hemorrhage
- Skin closed using non-absorbable sutures and a pressure bandage applied for 24 hours
- Antibiotics given for 5 to 7 days after surgery.

B. Exenteration

Exenteration is removal of the globe, nictitating membrane, orbital contents and eyelid margins.

- In exenterating the globe and as much of the orbital contents as possible are removed
- The dissection is done outside the extraocular eye muscles and conjunctiva and all of which are removed with the globe.
- In this procedure the postoperative defect is greater because more orbital contents are removed than with enucleation. The other procedures are similar to enucleation.

C. Evisceration of the Eyeball

Evisceration of the eyeball is the removal of the contents of the eye ball or the globe, with preservation of sclera or cornea.

- ✓ This is done before placing silicon cosmetic prosthesis into the corneoscleral shell.
- ✓ Evisceration and intrascleral prosthesis provide a fair cosmetic alternative to enucleation in the treatment of advanced glaucoma in dogs.
- ✓ This procedure must not be used when intraocular neoplasia or infection is suspected. It should not also be employed in cats because of implant extrusion.

1.6. YOKE GALL, YOKE ABSCESS AND YOKE TUMOR

- **Gall:** is c/zed by a swelling due to accumulation of inflammatory exudates collected subcutaneously or between the layers of the skin.
- **Yoke gall:** is a localized acute inflammation of the skin and subcutis in the neck of cattle due to constant friction caused by the yoke.
- **Yoke abscess:** it may result if pyogenic membrane is formed due to suppuration.
- **Yoke tumor:** if the swelling persists fibrous tissue develops in the course of time and appears as a fibrous tumor.

Treatment:

- In the initial stage_____ Iodine ointment
- Yoke abscess_____ Opening it surgically
- Yoke tumor_____ Extirpation or surgical removal by making a slightly oblique elliptical skin incision after sedation and local infiltrate anesthesia.

Complications:

- **Delayed wound healing:**
 - ▶ Infection,
 - ▶ Improper apposition of cut wounds,
 - ▶ Failure of arrest of hemorrhage,
 - ▶ Excessive trauma during operation,
 - ▶ Interference by the animal after operation
- **Abnormally large scar formations may interfere with the usefulness of the animal for work.**