

Surgery

Surgery : Are one of the medical sciences deal with the treating of the disease (injuries , congenital or acquired deformities)by manual appliances or instrument.

Surgery: Comes from Latin word called **chirurgie**

Chirurgia: Consist from two phrase **chir** = mean **hand** , **urgie** = mean **work** ,that mean surgery = hand work

Surgeon= The man who was doing surgery .

History of surgery : It is one of the oldest practical science. Surgery was developed during the last 150 years ago .

***Long and Morton 1842**-use ether in anesthesia

***Holmis 1846**- use the anesthesia.

***Wood in 1853**- use needle and syringe.

***Pasteur 1864**- he say the fermentation caused by living organisms and caused infection. When there is no infection there is good surgery.

***Lister 1867**- he use carbolic acid to kill the living organisms(introduce the antiseptic surgery).

***Peaen 1867**- use the artery forceps .

***Lister 1876**- use the chromic catgut in suture material

***Bergman 1886**- introduce the sterilization by boiling if boil the things there is no infection.

***Halstead 1894**- introduce the use of gloves in surgery (he use the gloves)

Classification of surgery : surgery can be classify as :

A-Techniques involved(classification deepened on techniques are used)-

1-**Extripative surgery** e.g. Amputation when cut or remove the organ or part of the organ.

2-**Cosmetic surgery** e.g. Docking surgery , horn amputation, ear terming (in this conditions the animal is not sick).

3-**Reconstruction surgery (plastic surgery)**)

4-**Replacement surgery (transplantation)** skin , organ transplantation .

5-**Conservative surgery** to save the life of the animal.

B-System involved

1. Neurosurgery
2. Cardiac surgery
3. Thoracic surgery
4. Urogenital surgery
5. Orthopedic surgery
6. Ophthalmic surgery

C-Equipment involved

- 1-Cryurgery by used cold -196 C°
- 2-Microsurgery
- 3-Electrosurgery
- 4-Laser surgery
- 5-Laprosopic surgery

Qualities of surgeon :

1-Ladies finger 2-Lions heart 3-Eagles eye 4-Solimans judgment

Essential of surgery: (tenets of Halasted) (Halstedeans essential).

1-Gentle handing of the tissue.

2-Aseptic precaution and technique.

3-Sharp anatomical dissection of tissue.

4-using of haemostasis.

5-Obliteration of dead space.

6-Avoid of tension.

7- Importance of rest of tissue .

Diagnostic aids or tools used in surgery :

Further to the ordinary diagnostic examinations used in surgery like (palpation , percussion, auscultation , complete blood picture(RBC, WBC,TLC, DLC, Hb) , abdominocentesis , metal detector etc.). The following tools are used also .

- 1-Using of X-ray (Radiography) for diagnosis of fractures , F.B, diaphragmatic hernia etc.
- 2-Ultrasonography 3-Magnetic Resonance Image MRI 4-Computed Tomography (CT Scan)
- 5-Intensifying Image System (I I S) .

Indications of surgery :

- 1-To save the life of animal, or to prolong its age such as caesarean section in case of dystocia, intestinal obstruction, removal of malignant cancer, urethral calculi , etc. .
- 2-For acceleration of healing process e.g. suturing of wound , immobilization of fracture.
- 3-For removal of an pathological condition such as; tooth extraction of diseased tooth , removal of benign tumor.
- 4-For cosmetic purposes like docking in dog, trimming of ear .
- 5-Reconstruction of affected parts, like -repair of (contracted tendons, atresia ani, palatine fissure) .
- 6-For economic purposes or social acceptance of animal .e.g. castration, or spaying , dehorning .
- 7-As an diagnostic technique like –exploratory laparotomy , thoracocentesis and abdominocentesis .

Sterilization

***Sterilization** : is process by which the article become free from all microorganisms (pathogenic and nonpathogenic) either in vegetative or spore form.

***Disinfected** : substances which are used for destruction of pathogenic bacteria on non-living surfaces e.g. detole, phenol, Hibitane, etc.

***Antiseptics**: substance used ether to kill or inhibit pathogenic microorganisms on body surfaces without damage the tissue or destroy leukocyte. It means prevention of infection y inhibiting growth of bacteria e.g. Iodine, Alcohol, Permanganate , Acriflavin.

***Asepsis or Aseptic**: A state of being sterile.

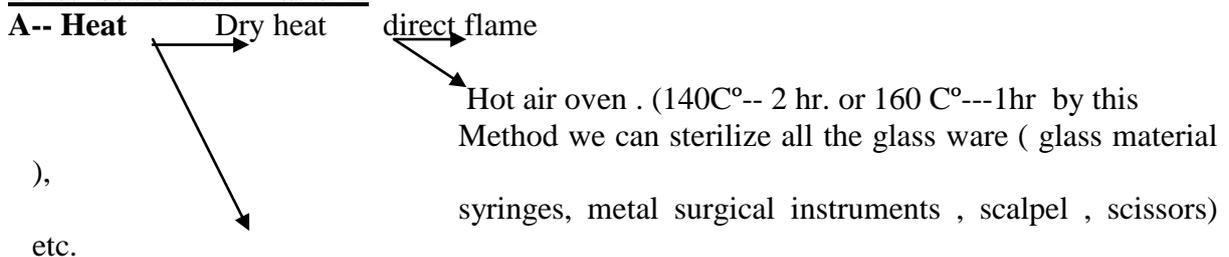
*the application of sterilization in surgery are for maintenance of asepsis (when there is no pathogenic bacteria are present)

***Detergent**: are chemical substance which remove the organisms by physical action.

In surgery the sterilization of all articles are divided into 3 parts :

- 1) **Critical items** : are the items coming in close__contact with the site of operation e.g. instrument.
- 2) **Semicritical** :are_the items not coming in direct contact with the site of operation e.g. operation table .
- 3) **Non- critical items**: are the items not coming in contact with site of operation (directly or indirectly _e.g. environment of the surgical theater.

*Methods of sterilization :



Moist heat --- Boiling –for 10-30 minute can sterilize , needles, syringes or other metal surgical instrument. In boiling can kill the vegetative from of increasing the powerful of sterilization of boiling water can add little of acid or alkaline or washing soda. Such as 2% sodium carbonate or 1% NaoH . (can kill the vegetative and spore from)

---Autoclave (stem under pressure).

Autoclave : is the best method of sterilization in which the vegetative and spore from of bacteria are killed by using 121C° for 15-20 minute at 15 Ib. Autoclave is used for sterilization of surgical instrument, glass ware , syringes, rubber goods. Such as gloves with paraffin for lubrication, gowns, surgical towels. etc.

*The sterilization contoole by- autoclave tapes, bacillus stearothermophilus , brown tube .

Factors affecting the sterilization by heat:

- 1-Nature of heat a-dry or b- moist –more effect than dry
- 2-Temperature and time –more tem .less time.
- 3-Absence or presence of spore- (vegetative from more susceptible to the heat)
- 4-number of organism present
- 5-Reaction of the medium (PH)spore are resistance to the neutral pH.

6-Composition of the protect bacteria from heat .Fat , oil, they protect bacteria from heat.

B-Radiation--- Ultraviolet radiation –for operating theater and operation table .

--- Gamma radiation X- ray -for plastic surges, disposable gloves, suture material e.g. catgut (They useful for the sterilization of).

3-Chemical agent (methods)

1-Acid :Cause increase in the pH of the medium and increase the rate of death e.g. carbonic acid , citric acid as preservative , Boric acid as antiseptic.

2-Alkalies- e.g. sodium hydroxide (NaOH), potassium hydroxide KOH 0.5 %.

3-Salts of heavy metals e.g. Silver nitrate , mercuric chloride, mercurochrome, metaphen and merthiolate , Aresenic compound, copper salts , zinc oxide 0.5.

4-Halogens –like chlorine , iodine (2.5% aqua solution good for skin before)
Fluorine (halogens act by oxidation)

5-Oxidising agents –e.g. potassium permanganate (1/500).

6-Formaldehyde- e.g. Formalin (Formaldehyde gas good for surgical table and theatre)

7-Reducing agents-e.g. hydrogen peroxide (H_2O_2), Zing peroxide (ZnO_2)

8-Phenols and related compound eg. Phenol, cresole, Detol, chlorhexidine (Hibitane), Hexochlorophane, savelon.

9-soap-mechanical or physical removal of bacteria

10- Dyes- e.g. aniline dyes e.g. crystal violet malachite green , acridine dyes- e.g. proflavin and acriflavin

11-Aerosal –e.g. ethylene oxide (cold sterilization) use for sterilization of suture material plastic syringes , tubes, plastic catheters. Etc

12- Alcohol –ethyl alcohol 70 % isopropyl alcohol 70%.

Inflammation

it is a processes (structural , biochemical and morphological)change occur in the vital tissue as a response to sub lethal injury (not serious to cause death) , with begins following the injury and end with complete healing.

Cause of inflammation : these are many cause of inflammation

- 1-**Physical factors** e.g. mechanical trauma (trauma, wound , blows , sprains) , heat cold , radiation(ultraviolet or ionized radiation) electricity.
- 2-**Chemical factors** , such as acid, alkaline, caustics, chemical irritants, bacterial toxins , poisons (except cyanide and strychnine does not causing inflammation or necrosis).
- 3-**Pathogenic organism** e.g. bacteria , viruses , fungi, protozoa, parasite .
- 4-**Immune reaction** ---antigen antibody reaction or lymphocyte antigen reaction e.g. allergy anaphylaxis , serum-sickness, autoimmune disease , delayed hypersensitivity reaction----ect)

Sequences of inflammation (the scientific description of inflammation) : the inflammation occur due to 1- circulatory changes 2-chemical mediators.

***The circulatory changes include:**

- 1- **Active hyperemia** --- firstly transient vasoconstriction occur following by vasodilatation and vascular congestion , and this was the cause of redness nd hotness.
- 2-**Exudation**—exudation of the surrounding tissue , due to the increase in the permeability of B.V. due to vasodilatation.
- 3-**Reduce the blood flow** ---due to vasodilatation.
- 4-**Emigration of leukocytes-** firstly **Margination** of leukocytes (pavementation) was occur as a result to the increase of blood viscosity due to reduce of blood flow (axial streaming changed to abaxial streaming). Then emigration of leukocytes (specially neutrophile). Under the effect of chemotaxis due to (plasma cascade system, tissue damage , the microorganism , polymorphonuclear cell and partially denaturated proteins). Followed by diapedesis of erythrocytes and pervascular cuffing of lymphocyte.

***The chemical mediators include:**

- Mediators derived from the plasma e.g. kinin, complement system.
- Mediators released by cell e.g. Histamine, 5-HT, Prostaglandin(PGE₂ and PGI₂).

The chemical mediator responsible for:

- 1-Active hyperemia 2-increase the permeability of B.V
- Inflammation a general have two reaction.

- 1- **Local reaction** ---make the cardinal signs of inflammation which are hotness, redness, swelling painful and loss of function.
- 2-**General reaction (system)**—fever , plus and respiratory rate and excitement, depression , coma and death.

***Classification of the inflammation** : according to

1. Exudates –serous , catarrhal , mucosa, fibrinous, purulent, hemorrhagic, membranous---ect.
2. Duration acute, subacute , chronic .
3. Tissue charges –adhesive, obliterative , hyperplastic, atrophic, granulomatous, necrotic.
4. Extent and tissue involvement –diffuse, focal, disseminated, interstitial, paranchymatous—ect.
5. Etiology—caused by microorganisms, mechanical m chemical
6. Location – metastasis, reactive
7. Organ involved.

***Sequela of inflammation (consequences):**

1. Resolution – complete resolution to the normal , which occur only when the damaged area is less.
2. Suppuration –occur when there is bacteria
3. Healing by scar tissue—occur when large area of damage and fibrous is the ultimate outcome.
4. Chronic inflammation –when the persist for weeks or months after initial injury.

***The effect of acute inflammation:**

A-Beneficial effect: 1-Of exudates–dilution of toxin , protective antibody, fibrin formation, stimulation of immune system , cellular nutrition
 2-Of phagocytosis – removal of irritant (causative agent) .

B-Harmful effect: 1-Hypersensitivity reaction 2-Swelling

The purport of ideal inflammation :

- 1-locatization of inflammation
- 2- distraction of bacteria
- 3-removal of irritant

Treatment :

Acute inflammation:

- 1- Removal of the causes 2- Rest
- 3-Cold application → a- cold water bath b- ice
- 4-anodyne preparation → ~~clo~~aine jelly

The purpose: is to releave pain , and prevent the vasodilatation , and the exudation by using of cold application

- 5- compression –application of compression bandage help in avoid inflammation swelling. It should be done after massage --genital massage with the direction of venous and lymphatic stream. The correct application of pressure bandage to 1-protect the wound 2- reduce swelling /is an art that must be learned through experience (not too tied , or not too loose). (when bandaging the upper portion of the leg , a bandage is first applied to the lower portion to maintain the position and to prevent edema of the distal extremity).

Chronic inflammation :

- 1-Warms and irritant application. This is useful for
 - a- promote circulation
 - b- enhance reabsorption of exudates by enhance the whole process of inflammation .

Hot fomentation → Dry head –e.g.(heated sand , heated rice bran, hot water bottle) covered in cloth.

Moist heat e.g. cloth dipped in hot water (poultices , have high osmotic tension e.g. Mg So₄ + glycerin, Linseed or rice bran).

Drugs which convert chronic inflammation into acute :

2-counter irritant : Temperature 40C° to 44.5C° , Rubificents (Iodine ointment, red iodide of mercury

3-Firing → Point



Needle

Line

4-Scarification –make multiple incision

5-Biers hyperaemia--- for septic inflammation :

a- Antiseptic application b Antibiotic application c-Biers hyperaemia

6- Radiation therapy by X-ray or Gamma radiation

7-Infrared light 8- Diathermia 9-Altrasound 10-Laser therapy 1.058 J/sec.

Anti inflammatory drugs : Aspirin , Indomethacin , Corticosteroids.

Wounds

Wounds: are discontinuity of the skin or tissue or traumatic separation of skin , mucous membrane, or organ surface, (ether it is surgical or accidental).

Classification of wound :

- 1- According to involvement of skin .
 - A- Closed wound ---skin not open e.g. Contusion
 - B-open wound --- Skin was cut 1-incised 2-laceration
 Or Simple ---only the skin was involved
 - Compound –when the skin and the deeper tissue are involved (like muscle, nerve , tendons and bones are involved)
- 2-According to the depth a- Superficial e.g. abrasion b- deep
- 3-According to presence or absence of infection.
 - a-Aseptic or clean--- e.g. Surgical wound .
 - b-Suspicious ----e.g. like gun shot wound
 - c-Septic or infected ---presence of pus/ or infection
- 4-According to the type of injury or the etiology.
 - a-Incised wound –like surgical wound make by scalpel
 - b-Abrasion ---like wound occur by friction
 - c- Laceration— the surface are irregular or teared like the wound caused by Barbed wire.
 - d-Punctured wound --- which caused by sharp pointed object like nail.
 - e-Perforating ----like Gun shot wound
 - f-Avulsion—separation of large amount of tissue
 - g-Envenomed wound ---like snake bite.

Wound healing: it mean replacement of the severed tissue by same tissue or other type of tissue and the healing process occur by two types.

- 1-Regeneration--- replacement by same tissue –like regenerate of epithelial cell of digestive , respiratory system.
- 2-Susbstitution—(connective tissue formation)(scar)substitution by fibrous scar tissue like wound healing).

Wound healing is divided into four stages (stages of wound healing):

These stages are overlapped and make continuous sequence of event in the healing of all superficial wounds .

- 1- inflammatory phase , phase of traumatic inflammation(0-3 days) the time depend on the amount of trauma, contamination associated with the initial trauma.

It have characterized by

 - a- fibrin deposits b- capillary engorgement and permeability.
 - c- exudation and wound edema.
 - d-increase in wound glycoprotein, enzymes etc.
- 2-Debridement or destructive phase(1-6 days) or begins 6 hrs after injury.
 - a-increase the number of neutrophils and mononuclear cells entering the wound (↑the activity of leukocytes and macrophages)
 - b-Activation of lytic enzymes.
 - c-physical changes in ground substance.

3-Proliferative phase (3-14 days)--- begins within 12hrsof wounding (the duration of this phase depend on the; a- size of the wound b-the type of the wound
 Characterized by fibroplasias , epithelialization, granulation tissue formation and wound contraction, --by myofibroblast

- A- Capillary proliferation B-Resorption of fibrin (fibrinolysis)
- C-Fibroblast proliferation.
- D-Increase in mucopolysaccharides and hydroxyproline (collagen)
- E-Rapid increase in tensile strength .

4-Maturation phase (14 days -1 years)--- is the longest stage of healing and characterized by :
 a- ↓in number of fibroblast within the wound area and ↓in capillary and wound cellularity .
 b-↑ in collagen. c- slow increase in tensile strength d- contraction of scar.

Types of wound healing :

- Healing either by : 1-primary healing (healing by first intention)
- 2-secondary healing (healing by second intention).

Primary healing :

It is uncomplicated healing process of clean incision which has been readily closed and that required minimal epithelialization and minimal granulation tissue formation e.g. surgical wound (incision) which characterized by small quantity of tissue loss, small quantity of exudates and the necrotic is to small and take les time for healing).

Secondary healing :

This type of healing occur when there is large quantity of tissue loss (cavity), large quantity of exudates , and large area of cellular damage. It is characterized by taking long time for healing , and large quantity of granulation tissue (the granulation tissue must fill the base of the wound before epithelialization) e.g. clean open wound , infected wound – the decision to allow a wound to heal by secondary healing –when :

- 1- failure of primary closure of wound 2- loss of tissue 3- infection

Factors affected wound healing :

Factors that after , disturb, or interfere with the wound healing may be general or systemic (general).

***General factors :**

1- Age ---

- *healing in older patient – a- decrease fibroplasias b- nutritional factors
- c-decrease in cell proliferation d- increase susceptibility to infection.
- *healing in young animals more quick than old animal.

2-Nutritional disease –prolong wound healing .

A-Protein deficiency –(hypoproteinaemia) –result in reduced activity of fibroblast , slow collagen development, and reduced tensile strength and wound disruption.

B-Vit. A deficiency –impair collage synthesis.

C-Vit. C deficiency—reduction in formation of ground substance.

D-Zinc deficiency --- delay wound healing .

E-Vit. K deficiency –haematoma formation , and serum collection, --wound disruption and infection .

3-Obesity ---holding power of the tissue ,the tissue of obese animal are usually friable and don't suture well ---tension on the suture line ---delay wound healing .

4- Genetic factors (or disease) ---like haemophilia, genetic coagulation defect .

5- Anemia ---- delay healing by reduced oxygen carrying capacity.

6-Leukopenia --- ↓ WBC ---increase in wound infection.

7- Neoplasia-

8-Fluid and electrolyte imbalance---dehydration---delayed healing.

9-Steroid administration ---delay healing (non- steroid anti-inflammatory drugs also).

10- Irradiation –ionized radiation –delay healing. (radiation therapy should be perform 30-45 days before and 5-7 days after).

***Local factors :**

1- Vascularity --- (availability of blood supply to the area) impairment of the blood supply (microcirculation) by ischemia(hypovolemia , delay in new capillary formation) , thrombosis, edema, contusion, drug induced (vasoconstriction e.g. epinephrine.).

2-Trauma--- repeated trauma, prolonged the first stage of wound (rough handling of the tissue) healing and reduce the tensile strength and delay healing.

3-Haematoma (collection of blood within or around the wound)—if affected the local blood supply , and it become good media for bacteria growth.

4- Duration of operation ---if the operation take more time make dryness of the tissue and more contamination.

5-Infection--- the most common factor affecting the wound healing in animals., bacterial infection –is the most serious and the bacteria have enzyme or toxin which destroy the tissue like collagenase , hyaluronidase , fibrolysin, coagulase , haemolysin.

6-Foreign body : ---presence of foreign body delay the healing process. For example :

A-Suture material—selection of the type of suture material, the technique by which applied , is more important , non absorbable suture material could form foci for infection.

B-Foreign particles –like (powder from the gloves) wood , gauze, surgical items.

C-The most important is the dead tissue (debris).

7-Accurate apposition of tissue layers (proper closure) is important to allow optimal conditions for the reformation of tissue layers continuity . **a-eversion b- apposition c- inversion.**

Malposition (improper closure) delay the epidermal union.

***Complication of wound :**

- | | | |
|---|-----------------------|---------------------|
| 1-Haemorrhage | 2-Cellulitis | 3-Traumatic fever |
| 4- Traumatic neuralgia | 5-Traumatic emphysema | 6-Gas gangrene |
| 7-Tetanus | 8- Actinobacillosis | 9-Adhesion |
| 10-Exuberant granulation tissue (proud flesh) | | 11- Venous thrombus |
| 12-Septicemia and byaemia. | 13-Shock | 14-Infection |
| 15-Ulceration | 16 –Abscess | 17- Sinus |
| | | 18- Haematoma |

***Haemorrhage:** escape of blood outside of the blood vessel (extravasations)_loss of blood due to rupture or cutting of the blood vessel –if not stopped lead to --- haemorrhagic shock.

In the wound these is continuous bleeding cause haematoma obliteration of operative site.

Control of the haemorrhage by –legation , pressure , artery forceps, or electrocautery.

If there is haemorrhage shock—give :

- | | |
|--|------------------------|
| 1-Intravenous transfusion of fluid (blood , plasma, saline) | 2- Give corticosteroid |
| 3-Antihistamin | 4- Sedative |

Debridement of wound =excision /management of wound that unsuitable for excision.

***Cellulitis:** it is an acute of diffuse pyogenic inflammation of tissue (subcutaneous tissue)

- Treatment ---by
- | | |
|--------------------------|---|
| 1-abtibiotics | 2- give drug to the symptom e.g.(fever) |
| 3-make drainage if need. | |

***Traumatic fever:** excessive traumatic to the tissue or infection.

Treatment –search on the cause and treat it.

***Traumatic neuralgia:** (pain) : it can be

1-Primary –abnormal length of pain.

2-Secondary- during cicatrisation (during healing) (healing tissue contract and make pain).

Treatment –by local application.

*** Traumatic emphysema :** This is due to infiltration of air in the subcutaneous tissue due to trauma to the respiratory system or GIT , you can hear crepitating sound.

Treatment : puncture the skin and make pressure on the air to forced outside or puncture and make pressure bandage.

Gas gangrene: (malignant oedema) caused by **Clos. septicum**, have two types.

1-local (swelling , is hot , oedematous, emphysematous, later the swelling depressed , cold and insensitive. When cut the swelling , there is grayish fluid with putrefaction smell.

2- general—have all the symptom of toxemia (↑temp. , anorexia, depression, cyanosis, then death).

Treatment : 1-systemic antibiotic.

2- treatment of the wound , removal of dead tissue , exposure to the air and apply antiseptic.

***Tetanus:** caused by toxin of **Clos. tetani** .

the incubation period 3-5 day.

Signs : 1-slow mastication 2- drooping of saliva 3-nostril dilated

4-paralysis of eyelid(protrusion of nictitating membrane over the eye)

5-stiffness(rigidity) of the facial and abdominal muscles.

6-spasm of muscles is more during noise. 7-stiffness of the limbs and tail.

Treatment: 1- systematic antibiotics 2-tetanus antitoxiod

3-sedative drugs or tranquilizers. 4-keep the animal in dry , quiet stable with slings

5-cleaning of the wound (dressing) exposure to the air .

***Actinobacillosis : (wood tongue):** it is very common disease in cattle , caused by

Actinobacillus spp. It make an swelling like abscess or fistula in the parotid or submandibular region. The swelling may be diffuse or circumscribe. It may be single or multiple.

The infection happen through on injury in the tongue caused by thorns and spiked vegetation (dry food).

Sings: salivation , bolus of food accumulate in the cheek, pouch, floor splashed with foamy saliva and half chewed boli, then in advance –there is wooden tongue.

Treatment : 5-10 gm sodium iodide crystals in the feed for 2 wks or 10% sodium iodide solution 1/v every 3rd day till the appearance of poisoning with iodide (iodism).

***Actinomycosis: (lumpy Jaw):** an infection disease affecting the upper and lower jaws caused by **Actinomyces bovis** , characterized by osteitis, exostosis, pus , discharging bone fistulae , and extensive ulcerating area. The infection occur through ulcers or abrasions in the mouth .

Treatment: include daily injections of penicillin I/M and into the lesion. This must continued at least for 14 days.

Supplemented by I/V injection of sodium iodide 10% either daily or twice a week – in severe case till the point of iodism.

***Adhesion or band :** one of the most complication , we can avoided it by :

1- gentle handling of the tissue 2- hyaluronidase (enzyme) 3-paraffine
The adhesion are two types 1-fibrinous adhesion 2- fibrous adhesion (band).

Exuberant granulation tissue : proud flesh

It is very common complication in horse –characterized by over production of granulation tissue , red in colour, easy to bleed.

Treatment –

1- caustic –by copper sulphat, electrocautary 2- excision 3- skin grafting in horse

***Venous thrombus (embolism) :** it may occlude the blood stream or transmit to an vital organ like brain / or heart (if it become infected –it is more serious)

Septicemia – presence of microorganism with toxin in blood stream.

General principle of treatment of wound :

1. Pre- operative of the site of injury
2. Sharp dissection.
3. Arrest haemorrhage-the best thing by artery forceps and minimum ligature or electrocautary because it increase the inflammatory phase .
4. Localize the infection(if it is infected wound).
5. Make drainage (drains). Are used for the removal of accumulated pus , serum, and old blood within a cavity or dead space –it should be positioned at the most depended part of the cavity and should be made of rubber or a plastic substance. (gauze is a poor substitute since it soon becomes saturated and act as plug instead of a drain) or make counter opening in an swelling. Then irrigation of the cavity by antiseptic solutions.
6. Debridement –removal of the dead tissue (management of wound that unsuitable for excision). It can be removed by enzyme , like streptokinase or by electrocautary, or by surgical excision.
7. Apply chemotherapy/ or antiseptic.
8. Suture after debridement or excision of wound. Never close the infected wound. We can close only the fresh wound and remove the suture at proper time (7-10 days).

Hemostasis, shock fluid therapy

Hemorrhage: loss of blood from the vascular system (escape of blood outside of the blood vessele) loss of blood due to rupture or cutting of the B.V.)

Causes :

wound (penetrating wound , incisions , contusions or lacerations)

- 1) liver disease –leads to fail of clot of the blood.
- 2) irradiation.
- 3) chemical poisoning (such as heparin, dicumarol, warfarin, phosphorus, arsenic, estrogens, venom).
- 4) blood disease (hemophilias, thrombocytopenic purpura).
- 5) localized disease of blood vessels.
- 6) neoplasms in areas adjacent to blood vessels.
- 7) high blood pressure.
- 8) aneurysms.
- 9) infection—such as anthrax.

Classification of hemorrhage:

- I. according to the source of the blood
 - 1-arterial –characterized by the blood is bright red and flows in spurts under pressure .
 - 2-venous -- characterized by the blood is bluish red and flows freely but not with great force.
 - 3-capillary--- characterized by the blood is oozes under very low pressure.
- II. According to the time of occurrence.
 - 1-primary –which occurs at the time of injury.
 - 2-intermediate –which occurs within 24 hrs of injury.
 - 3-secondary –which occurs more than 24 hrs after the initial injury (usually as a result of necrosis , suppuration , or ulceration of the blood vessels after application of ligature or ligature slip.
- III. According to the extent of hemorrhage .
 - 1-petechial –as a small hemorrhagic area within the skin , serosa, or mucosa.
 - 2-bruising –as a large area of hemorrhagic in subcutaneous tissue or submucosa.
 - 3-deep hemorrhage –refers to extravasations or suffusion into soft tissue

Hemostasis : -- arrest of hemorrhage(stop of bleeding). After accidental wound , hemorrhage must be controlled , and with surgical wound it must be prevented.

There are 3 factors involved in the spontaneous arrest of bleeding.

1. extravascular – concerned with the location of the vessel. The elastic nature of the surrounding tissue, such as –blood vessel in brain—more bleeding --stress, trauma , and ether anesthesia---release epinephrine—and make vasoconstriction.
2. vascular – after several (cutting) of blood vessel , the intimarolls inward and the vessels end retract—which provide suitable surface for accumulation of platelets and clot formation .
3. intravascular –blood clotting factors → activated by platelets morphologicachange –these factors +calcium change → prothrombin→ thrombin which activated fibrinogen→ fibrin→ make net work for clot formation.

Mechanical arrest of hemorrhage :

1. crushing --- crushing of the ends of bleeding vessel by haemostatic forceps (artery forceps). Stop bleeding and help to produce clot formation.
2. torsion—twisting the vessel before releasing the forceps both are useful for mall vessel.

3. ligation—this involves tying the end of a bleeding vessel to prevent further escape of blood. Ligation by suture material (like , catgut) also transfixation—fixation of the blood vessel with the surrounded tissue to prevent slipping.
4. suturing –suturing of appose wound edges –to arrest hemorrhage also suturing of large vessels like common carotid artery , jugular vein
5. pressure –by applying pressure by gauze against the bleeding point for sufficient time to allowed formation of clot. It is good method –advantage:
 - a- not leave foreign body (suture material)
 - b- not need tissue –like crushed dead tissue .
 - c- haematoma do not form.
 - d- for that the healing is better.
 ---apply pressure on the limb –for controlling of arterial bleeding .
 ---packing a bleeding area with gauze .(in extirpation)
6. tourniquet --
 - applying compression by rubber tube or band.
 - it should be used for short time , when the other methods of hemostasis are not a available.
 - Prolong application—caused gangrene , nerve injury , trauma shock may follow removal of tourniquet.
 - The tourniquet should be released at least every 20 minute to permit reoxygenation of tissue.
7. electrosurgery and electrocoagulation / or thermocautery , electrocautary.
 Burn tissue ---coagulate of protein.
 -Should be used only when hemorrhage is especially difficult to control, and it is impossible to grasp the bleeding points with a forceps.
8. hemostasis with topically applied substances (styptics). Styptic have stringent agent e.g. –glacial acetic acid, silver nitrate, ferric sulfate , ferric chloride, alum, and tannin
9. specific coagulant – gelfoam, fibrin foam, cephalin(ox brain), bone wax—arrest bleeding in bone and cartilage (tampon—gauze or cotton gauze)
10. systemic haemostatic agent :e.g. vitamin K, (cyclocarpon[®]), estrogen, ergometrine--- reduce postpartum hemorrhage (methergine^R).

***Shock: (Acute circulatory failure)**

- Inadequate blood flow to the vital organs (brain , heart , kidney, liver)lead to failure of vital organ to do normal activities , it occur when tissue or organ blood flow is inadequate to sustain normal cell activities and that is usually accompanied by lowered arterial blood pressure (systemic pressure below gomm Hg in previously normotensive individual a urine output of 25ml/ hours or less and evidence of increase sympathetic activity causing cutaneous vasoconstriction).

Types of circulatory shock: classification of shock

Shock can be classify according to the factors producing the characteristic circulatory changes (causes) into

- I. **Hypovolemic shock** (reduced blood volume) **traumatic shock.**
 - a-blood loss (external . internal , third space).
 - b- plasma loss (burns, gastrointestinal obstruction , pancreatitis).
 - c- loss of water and electrolytes (vomiting , diarrhea).
- II. **Vasculogenic shock** (peripheral pooling) :**neurogenic shock** (because it is associated with loss of vasomotor tone . (change in smooth muscle ton--- after venous return)
 - a-loss of tone in resistance and capacitance vessels.
 - 1-spinal or epidural anesthesia.
 - 2-CNS lesions causing vasomotor paralysis / or drugs
 - 3-Anaphylaxis.
 - b- Trapping in capacitance vessels --- endotoxin infusion in dogs. Characterized by --- failure of venous return, low cardiac index , low blood pressure, rapid pulse , low CVP, and low P_{aD_2} with increased arteriovenous oxygen difference.

Endotoxin—from gram negative bacteria (E. coli , proteus) release vasoactive substance (serotonin, histamine, kinins)
 - c- Prolonged, sever increase in peripheral resistance
- III.**Cardiac shock** (decrease ability of the heart as a pump) in human – classically related to the **Myocardial infarction.** The patient with carcinogenic shock usually has ; lowered arterial blood pressure, elevated CVP, decreased cardiac index, lowered arterial O_2 tension and increased arteriovenous O_2 difference.
 - a- myocardial depression (deep anesthesia, high epidural or spinal anesthesia).
 - b- Cardiac dysrhythmias.
 - c- Hemopneumothorax.
 - d- Cardiac tamponade.
 - e- Pulmonary emboli.
 - f-Cardiac tamponade.
 - g- Positive pressure ventilation.
- IV. **Maldistoibutive shock (septic shock)**.

Failure of normal cellular metabolic function related to blood flow maldistoibution and oxygen utilization.

The common courses of septic shock in veterinary patients:

 - 1-peritonitis 2-pyometra 3- gastroenteritis 4-intestnal strangulation
 - 5-penetrating abdominal wounds 6- prostatic infections
 - 7- contaminated skin wound –lead to sepsis

Hyperdynamic shock--- early phase of septic shock.
Hypodynamic shock--- delay phase of septic shock (if sepsis persists).

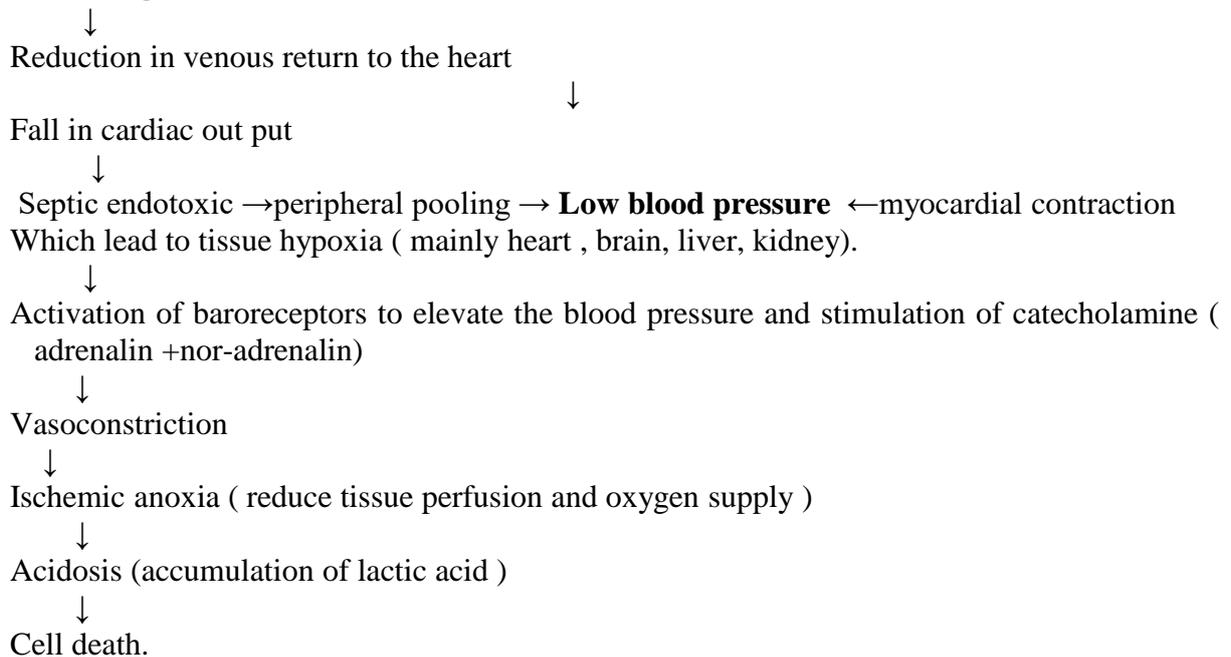
Clinical signs of shock:

The typical signs include.

- 1- Tachycardia---↑ heart rate (rapid) .
- 2- Tachypnea---↑ respiratory rate (rapid)hyperventilation .
- 3- Diminished heart sounds.
- 4- Hypotension a-lower pulse pressure (weak or absent in peripheral vessels)
b- slow capillary refill time(grater than two seconds) .
c- muscle weakness.
d-cold extremities.
- 5.depressed mental state (indifference to stimuli) (in human slow in talk , slow in thinking).
- 6.decrease urine output(oliguria and anuria).
- 7.pale or slightly cyanotic mucous membrane.

Pathophysiological changes in shock:

Hemorrhage trauma stress→ reduction in total blood volume



Treatment :

- Shock prevention :**
- 1-blood transfusion during operation .
 - 2-infusion of I/V fluid during operation .
 - 3-adminstration of diuretics during the surgical procedure (for prevention of decrease postoperative renal function)
 - 4-sodium bicarbonate solution or ringer solution.

Treatment :

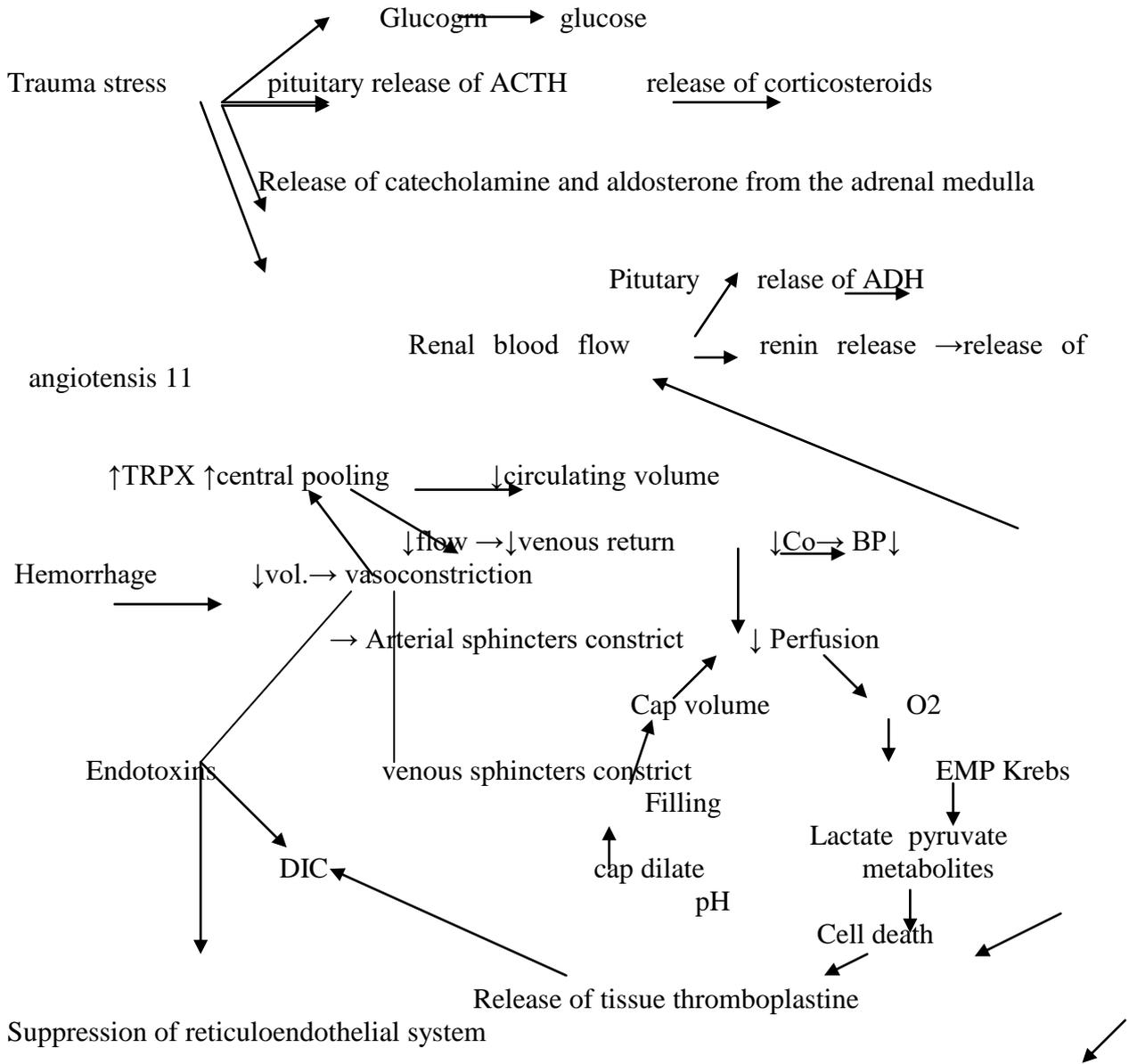
- 1- blood transfusion --- when the hematocrit is below 35% or the Hb below 11gm.
- 2- Fluid therapy –when the hematocrit is about 35% when giving fluid should monitoring the CVP. 5-8 cm H2O). normal saline ,5% dextrose saline, lactate Ringers solution.(colloid and crystalloid)—plasma.
- 3- Administration of corticosteroids (in large doses).
- 4- Vasodilator (alpha blocker) e.g chlorpromazine.
- 5- Glucagons.
- 6- Beta-blocking agent .
- 7- Digitalis.

In large animal (horse and cattle). The volume of fluid to be administration to a dehydrated patient may be estimated by use of the following formula.
(patient PCV) (the normal PCV 45) x 0.66 x weight of animal (in pounds) x 4=the number of millimeters of fluid necessary to overcome the dehydration present.

- * however the horse may be 30% deficient in total body water before the skin is clinically abnormal.
- * the water need for daily maintenance is estimated to be 40 ml / Kg B.W. / 24 hrs(this is sufficient for all loss from the skin , respiratory treat , and for urine formation) then men 4.5 gallon of water / day for 1000 pound 454 Kg horse.

The intravenous fluid which present:

- 1- lactated Ringers solution 2-normal saline 3-5% dextrose
- * Degree of skin turgor
- * dryness o m.m
- * sunken of eye
- * the cornea become dull.



Abscess:

Abscess: circumscribed cavity containing pus .(closed cavity containing pus)

Causes: always the pyogenic bacteria like Staph. Strep, Coryn. E.coli, Pseudomonas, Actinobacillus. ect .

Formation and structure of an acute abscess :

an acute abscess form after a period of 3-5 days from the penetration of pyogenic bacteria , an acute inflammation was occur , including vasodilatation , migration of leukocyte , exudation and swelling formation, firstly the abscess may extent rapidly , later and due to the reaction of the surrounding tissue make the microscopic section through the lesion at this stage will show well differentiated zones (1- central zone (area) which have dead tissue (cellular debris) live and dead polymorphonuclear cells, serum and lymph--- and 2- peripheral zone of acute inflammation)which fades gradually into the surrounding healthy tissue.

Classification:

Abscesses can be classify into :

1-Hot or acute /when the evolution is rapid .

2- cold or chronic /ogress is slow.

Also those can be subdivided into :

Superficial---when it found over the body.

Deep --- when it situation is deep like (larynx, pharynx, rectum)

Idiopathic

Symptomatic .

Multiple (metastatic abscesses)_(generalized).

The cold can be subdivided into :

Soft ----(when the wall is thin)

Hard ---(when the wall is thick).

Symptom : it is vary depending on the type of abscess and the situation.

Hot superficial abscess: characterized by :

1-more or less circumscribed inflammatory swelling.

2-painful on manipulation.

3-the center of swelling gradually become softer while the periphery remain firm--- when the center become very thin , the abscess is said to be pointing.

4-fluctuating

5- hot (painful, hot fluctuation and edema at border).

Hot (acute) deep abscess : characterized by .

1- febrile symptom.

2-no local manifestation may seen until the swelling arrived near the surface.

3-stiffness of the affected part (due to edema and painful).

In case of chronic (cold):

1-painless or slightly painful.

2-no fluctuation –except in case of soft have the appearance of cyst.

3-cold (or fibrotic) in case of hard cold abscess and there is no edema.

Diagnosis : the abscess can be diagnosed from the signs and should be differentiated from the following.

Differential diagnosis : cyst , tumor , hygroma, haematoma, hernia.

- ***Cyst**: it is non- inflammatory swelling containing fluid or semifluid , and it could be congenital.
- ***Tumor** : mass of new tissue , have no physiological function , grows independently of the surrounding and either , it is Benign or malignant.
- ***Hygroma**: distension of the synovial sheaths or synovial bursa due to chronic irritation, it occur only on joint, and it is slow in development.
- ***Haematoma**: collection of blood below the skin due to rupture of blood vessels .
- ***Hernia**: it is passage of the abdominal organs through an natural or acquired opening , which the peritoneum and the skin are entire (presence of hernial ring)

symptom	Abscess	Cyst	Tumor	Hygroma	Haematoma	Hernia
Heat	+	-	-	±	+	-
Pain	+	-	±	±	+	±
Fluctuation	+	+	-	+	-	-
Cription	-	-	-	-	+	-
Pit on pressure	+	-	-	-	+	+
Demarcation	-	+	+	+	-	+
Exploratory puncture	Pus	No inflammatory fluid / mucous	-	Synovial fluid	Serum or blood	-

Exploratory puncture : make a puncture in the swelling (mass) to know the contain.

Treatment :

- 1- maturation (ripening) –by a- hot fomentation (poultices)
 b-application of irritant e.g Iodine ointment .
 c-application of Blistor . (is quicker in its results)
- 2-evacuation--- (opening remove of the contain. Include:
 a-preparation of the site as aseptic preparation.
 b-open at the most dependent part.(the lower most).
- 3-the ginning must be large enough to prevent reaccumulation .
- 4- remove pus and tissue debris.
- 6-apply antiseptic.
- 7-antibiotic locally (as a powder).
- 8-nerve close.

Sinus and fistula :

Sinus / blind purulent tract showing no tendency to heal(tract from the suppurative cavity to the surface).

Fistula / an abnormal opening (or passage) between two cavities or ducts. (the term fistula is frequently applied to a sinus).

Classification: fistula are either

- 1- congenital (previous urachus)
- 2- pathological :
 a- incomplete or blind or non communicating fistula with one opening only (sinus).
 b-complete or communicating which has two openings .
 c-idiopathic when they follow an abscess.
- 4-symptomatic when they are connected with deep lesions
- 5-purulent fistula (quitter).

6-excretory (urethral) and secretory (salivary) fistula.

7-physiological fistula (ruminal fistula).

Etiology : cause

1- due to delayed opening an abscess/ or opening not in the most dependent point.

2-presence of foreign body or necrotic tissue in the depth of the lesion.

3-existence of a specific lesion in the e.g. carcinoma, tuberculosis.

Symptoms :

1-the orifice may be very narrow and only admit a probe.

2-it may be surrounded by excessive granulation tissue when it is recent / or its border may be hard and fibrous when it is old.

3-the tract may be simple or bifurcated.

4-the tissue surrounding the tract is generally fibrosed.

5- there is purulent fistula may close for a variable time until a new abscess from then again opened.

6-the pus may be thick or serious grayish or reddish and may contain occasionally portions of necrotic tissue.

8-usually have fetid odor and there may be marked inflammatory symptoms associated with the sinus.

Treatment :

1- provide drainage – by incising the tract in downward direction or by making a counter opening .

2- use of caustics (liquid or solid) to cause sloughing of the interior of the fistula to its depth(sliver nitrate , carbolic acid).

3-application of hot iron (same action).

4- operation to open the fistula expose its depth , remove necrotic and callous tissue and provide for drainage (excision of fistula).

5-Baier's hyperaemic treatment.

Haematoma: is an extensive collection of blood beneath the skin , and may sometimes extend into muscular tissue , resulted from rupture of a blood vessel (mainly vein) (due to trauma, bruising due to fighting between animals). It is not necessary for skin to show evidence of injury .

Site : it occur in any part of the body , but in large animals mainly in upper part of the hind limb(in cattle) and less in shoulder region .

Symptoms: swelling are hot and painful in early evidence and cold , organized and fibrosed in late stages.

Treatment :

1-if the haematoma is small –application of iodine ointment induce the absorption of part of the fluid contents of the swelling –and may eventually disappear.

2-large haematoma

a- must be incised and evacuate it content after 7-10 days from occurrence of the trauma. If swelling is opened earlier –serious hemorrhage may happen. If opened later than 10 days – the blood will be organized into fibrous tissue and can be removed only with difficult and bleeding.

b-the inside of the cavity is then washed with mild antiseptic and swabbed with tincture iodine.

c-many necessary to pack the cavity with sterile gauze.

***another opening in treatment : that advisable not to treat haematoma in large animal and leave it to resolve naturally but it take months and lump developing, or may wait for 2-3 weeks before opening**

Cyst:

Cyst is a cavity in a tissue lined by epithelium or endothelium and containing a fluid or endothelial and containing a fluid or semifluid material and occasionally solid structures.

Etiology and classification: cyst are congenital or acquired

a- congenital cysts : result from the implantation of embryonic structure in an unnatural situation where they grow and produce the original structure e.g. dentigerous cyst (presence of tooth like structures in places other than the jaws). Dermoid cysts (are misplacement of a vestige of skin cause the development of a cyst containing hair and sebaceous cyst material in the substance of an organ like the testicles , the dermoid cyst of the conjunctiva , which grows at the junction of the sclera and cornea , and the presence of hair gives rise to keratitis.

b- Acquired cysts : are either retention cyst , distension cyst (exudation cyst) , parasitic cyst , degenerative cyst .

1- retention cyst – cyst develops when secretory duct (salivary duct) , gets obstructed and here the cyst is large in size or it is be small like hordoleum or styee---result from closed of the duct of meibpmian gland.

2-distension cyst – due to accumulation of fluid or exudates within an organ e.g. hydrocele, division of the synovial bursa , cyst of ovaries , cyst of thyroid gland.

3- parasitic cysts--- represent part of the life cycle of a parasite e.g. coenurus cerebralis in the brain of sheep, the pisiform cyst between the muscles and under the skin of rabbits.

4- degenerative cysts --- arise from the softening of a tumor, e.g. myxoma or chondroma, -- cystic spaces n ostitis fibrosa.

Treatment :

1- puncture of cyst by trocar and canular or seton needle (siphon) **to evacuate the** contents and the lining tissue is swabbed with irritant like Tr. Iodine 5% or carbolic acid to destroy it and leading to obliteration of the cavity. Small cyst may be incised along its entire length .

2- excision of the cyst –specially in tumor.

***Ulceration and ulcers :**

Ulceration –is the cellular death of superficial tissue leading to loss of substance , is due to traumatic , infective or neoplastic cause.

Ulcer :are the loss of epithelial tissue and the exposure of subepithelial tissue in an area of skin or mucous membrane. ((recent or old superficial wound involving cellular destruction of tissue and showing no tendency to heat))

Classification :

1- non –specific ulcers—are caused by trauma or pyogenic bacteria.

2-specific ulcers –are found in the course of certain specific disease such as ulcerative lymphangitis , glanders tuberculosis—etc.

3-malignant ulcers---e.g. rodent ulcer, epitheliomatous, and fungating.

Etiology :

- 1-repeated irritation of a wound—e.g. wound of ear or tip of tail of the dog. Or wound on the angle of flexion of knee or hock joint of horse.
- 2- presence of foreign body or necrotic tissue in the wound or presence of infection prevent healing.
- 3-loss of innervation –(of a part may followed by ulceration) if the part is wounded because the trophic influences of the nerve supply is lacking .
- 4-lack of blood supply.

***Symptom:**

- 1-it may start with a cutaneous excoriation , an abscess , or an eruption.
- 2- it has the form of a more or less rounded breach of surface varying in depth in different cases.
- 3- its borders may be hard or soft. The center of the lesion may be flat or concave and may show necrotic spots.
- 4-no granulation tissue on the surface are seen.
- 5- in most cases there is a serous purulent to blood stained or grayish discharge.
- 6- when the lesion is old , the ulcer becomes inactive and surrounded by fibrous tissue (callous ulcer), its edges are cut perpendicularly and are seen to be hardened.
- 7-when the gangrene occur at the level of the ulcer and the process spread rapidly, in depth and size , the lesion known as (phagedonic ulcer).

Diagnosis : from the symptom , the shape and location

Treatment :

- 1-removal of the cause ---
 - a- immobilization of the part , when there is continuous movement (incessant) .
 - b-prevent rubbing or scratching by the patient if it is due to it.
- 2-apply warm antiseptic fomentation, stupes or bathes- in case of septic inflammatory ulcers. Also moderate pressure with cotton and bandage will promote healing when the ulcer has disinfected.
- 3- apply astringent or caustic materials (agent) when the granulation tissue are excessive or unhealthy .
- 4- use of thermocautery—(which is an excellent agent) for destroying unhealthy or callous tissue and promoting normal granulation and circulation.
- 5-excessive of the ulcer –after excision suture the wound then usually heal by first intention.

***Necrosis and gangrene:** necrosis –local cellular death inside the living tissue (or it is small localized part of dead tissue).

Gangrene –large necrotic process affecting the hard and the soft tissue at the same time resulting in death of massive functional tissue of the body. Such as toe, foot, loop of intestine, testis and udder (mammary gland). If the necrotic process affecting the soft tissue only (soft part of the body –it may called sloughing .

Etiology : the cause of necrosis are .

- 1-interference with circulation-such as what may be produced by pressure e.g. sit-fast-caused by ill-filleting saddle.
- 2- toxins –bacterial toxins-produced as a result of abnormal metabolism as in diabetes.
- 3-the application of tissue destroying substance such as acids, alkalis of skin disinfectants.

4- skin necrosis may follow allergic conditions.

5-trophic changes resulting in death of cells may follow nerve damage as a sequel to neurotomy.

Classification and cause of gangrene:

1- primary gangrene—is the result of gangrene producing organisms (which produce gas within tissue) such as clostrid e.g. black leg, malignant edema.

2-secondary gangrene is the result of circulatory disturbances –followed by infection with putrefactive bacteria e.g. light bandage at a limb not involved the feet may cause foot gangrene (in dog and cat).

Gangrene may be classified into:

***Dry gangrene** –the usual cause are chronic arterial obstruction (due to arteriosclerosis , or calcification of the terminal arteries). Lack of arterial the dead part characterized by :

1- it become hard , dry and wrinkled . **2-**it has a dark brown or black color.

2- moist gangrene –the usual cause are the venous and arterial stasis. It is characterized by the tissue become purple , greenish or blackish in color , and increased in volume as a result to engorgement with blood and serum , sloughing of the epithelium, dark red foetid liquid discharge from the lesion, presence of a zone of inflammation surrounds the dead area.

The signs of dead area :

1- loss of pulsation **2-** loss of heat (become cold) **3-** loss of sensation

4-loss of function **5-**change of color and size.

Clinical signs :further to the signs mentioned in each type of gangrene there are signs of toxemia. Include (due to absorption of septic poisoning)

1-fever **2-** rapid pulse **3-**accelerated respiration **4-**bad appetite

5-painful **6-**impossible movement.

Diagnosis : it is easy – from the characteristic symptoms .

Prognosis: depend on the nature of the lesion, may insignificant, may dangerous—when sever toxemia e.g. gangrenous mastitis.

Treatment :general (systemic) include –relieve of pain , sufficient stimulant and tonics.

Local treatment include : **1-** remove of the cause.

2-scarification of the gangrenous tissue with knife or hot iron.

3-application of irritant at the periphery of the dead tissue to accelerate sloughing.

4-amputation of an organ.

Burns and scalds

Burns and scalds:

Burns=dry burn scald =wet or moist burn

A burn is caused by heat and various type of energy (such as light ray)ultraviolet ray , radiation , radium, radioactive substance , and electric current), some result from hot liquids coming in contact with the skin. Heat give rise to inflammation of various intensity. All tend to coagulate protoplasm, thus killing the cells and if sufficient sevet to carbonize it.

Types of burns:(classification depend on the depth).

1- burns of the first degree: (involvement only the epidermis) characterized by not immediately kill the epidermis , but cause only redness of the skin(erythema or hyperaemia), however the epidermis usually desquamates a week later as in the case of sun burns, mild burns by ultraviolet light, the radioactive isotopes.

2- A second degree burns : (involvement of the epiderm and mildly the degree). Is characterized by the formation of blister or vesicle. The heat cause the epidermis to die and get coagulate (coagulative necrosis). It also gives rise to inflammation in which so much lymph is poured out into the tissues that make (hydropic degeneration). There is much destruction of epidermal cells in the area of the vesicle , but living cells beneath the lesion soon fill the gap leading to recovery.

3-burns of the third degree (deep burns) (involvement derm +epidermis)

Lead to the death of the epidermis as well as the dermis accompanied by severe inflammation , and the dead tissue sloughs leaving an ulcer which heals slow by the formation of connective tissue leading to scar formation, this tissue is covered with poorly nourished epithelium which can be a braded.

4-burns of fourth degree . the tissue is blacked and charred (carbonized) .

Scalds : burns caused by hot solutions , water, oil---etc. mostly cause burns of the first or second degree and seldom of the third degree.

Effect of burn:((pathophysiology)

Classification : depending on the extension –(the size of the area affected)in human been there is the (rule of nines)

If burns are extensive (including one –fourth to one –third of body surface)death occur within 24 hrs even if it is a first or a second degree burns (the prognosis depend on the degree and extension). In most sever burn death occur within one hour..

Signs: the animal show difficult respiration, heart weakness, fall in temperature (there are like the symptom of traumatic shock). In less sever burns death may be postponed several days. This is accompanied by burns death convulsion, lymph in the lung. and inflammation of the kidney.

Treatment : treatment should be directed towards the prevention of shock and septic complications and relieve (relief) pain (the pain is related to the extend of skin involvement , not to depth of burn.

The local treatment include :

1-cleaning of the part and apply Tr. Of iodine.

2-puncture or rapture of the vesicles if present .

*Application of saturated solution of picric acid as (analgesic and antiseptic) use of tannic acid in the form of jelly.

*Anodyne antiseptic ointment.

*Antimicrobial drugs—as dyes (gention violet), sulph and antibiotic preparations, foam , spray, powder).

3- after healing –skin grafting

Systemic treatment 1-administration of stimulant (caffeine)

2--administration of antihistamines

3- administration of cortisone

4-compensate of loss of fluid –by giving of fluid.

4-easy sterilized by autoclave.

Disadvantage : knot slip (it is difficult to put from knot by nylon, therefore long ends of sutures must be left to prevent unit of the knot.

Stainless steel: two types –multi(twisted) and monofilament(simple)

Advantage :

1-have good tensile strength.

2-produce little tissue reaction

3-easy to sterilized.

4-no capillary character, it ideal for tension suture and for closing infected wounds.

5-its very good for bone surgery and for repair of tendon joint capsule and other tissue that heal slowly.

Disadvantage :

1-more difficult to handle and require more time for suturing .

2-difficult in putting secure knot.

3-have tendency to cut the tissue .

4-surgical gloves are more easy torn.

5-cut ends of wire suture irritate the tissue.

6- it lates flexibility- it must be used in interrupted.

Aluminum wire : non corrosive, soft reaction and can remain for long time.

Suturing techniques

Suturing techniques : technique of knot tying :

Types of knot :

1-halfe hitch

2-granny knot.

3-aquare knot.

4-surgeons knot .

5-triple surgeons knot.

Wound suture :

The wound suture is used for closure of surgical wounds of small and large animals for cosmetic tissue repair , for hemostasis and for acceleration of wound healing .

I. Interrupted suture patterns.

a-simple interrupted suture.

Advantages 1-use where no excessive tension is expected.

2- used in case of exudates drainage

3-several ties can be removed without opening the entire suture

Disadvantage --if there is wound swelling and the suture is too tight the material passing over the

wound constrict the tissue and make it necrotic and the puncture channel dilates and the

secondary infection easily introduced.

b-interrupted horizontal mattress suture:

(u-suture , automatic ridge suture , four –stitch interrupted suture)

Advantages :

- 1- strong wound anastomosis .
- 2-it used in accident injuries.
- 3- used after operation of capped elbow.
- 4- used for skin suture after laparotomy through the flank or ventral abdominal wall.

Disadvantages:

- 1-make ridge remaining after healing .
- 2-if its too tight—there is less wound circulation.

c-vertical mattress suture :

advantage :1-provide better circulation and reduction in the occurrence of necrosis.

2-the wound edge comes in a perfect alignment (the wound edge lie one against the other),

d-Donati's vertical mattress suture : in this type –the skin is pierced twice only on the knots side while

in the opposite side the suture is intracutaneously only.

e-Mattress suture with rubber tube . is used in accident injuries when strong tension on the wound edges.

II. **Continuous sutures :**

Advantage (as a general):

- 1-using only one thread for all the suture line(minimize the threading and tying).
- 2-it can be applied more quickly than interrupted sutures.(reduce the suturing time).

Disadvantage (as a general):

- 1- if one knot or one stitch is tear or cut , the entire suture line become loosened.
- 2-more quantity of suture material remain in the tissue specially in internal suture (and in case of non –absorbable suture material).
- 3-difficult to put accurate edge-to edge apposition of the tissue layers(this result in greater scar formation).

A-simple continuous suture (furrier's suture)

- 1-its suitable for long operation wounds e.g muscle layers, peritoneum.
- 2-its may be used for skin suture if there is no excessive tension.

Disadvantages : easy to loose and if one stitch is cut , all the wound opened.

B-Reverdin's continuous suture (lock stitch).

- Advantages :1-** to prevent twisting of the incision.
2-better approximation of the wound edges is obtained.

C-Continuous subepidermal suture.

Continuous suture lie beneath the skin , it cannot be removed following healing (prefer to do by catgut).

This suture may be used in the flank in cattle (rumentomy, cesarean)(Zig-Zig suture).

E-Shoemaker's suture :

- 1-allows complete elimination of wound dead space.
- 2-specially recommended for suturing of hernial sac.

III. **-Wire sutures :**

1-intracutaneous suture with stainless steel wire.

- Advantage :1-** accurate apposition of wound edges.
2-the surface of the skin cannot be pinched as with other skin suture.
3-the blood supply of the wound edge not disturbed .
4-infection through stitch channels not occur.

Disadvantages : 1- cutting of the tissue .

2-not easy to cut the wire by ordinary scissors.

2-intracutaneous suture with:

1- twisted steel wire. 2-Can make the knot like silk. 3-Easy to cut by ordinary scissors.

3-Zimmermann's Aluminum wire suture :

Advantage : 1- aluminum wire well tolerated by the tissue even when remaining for 20 day.

2- not cut the tissue . 3-no suppuration in the puncture channel.

4-used in accident wound and in repair of umbilical and abdominal hernia(for relief of skin tension)

IV. Clip suture –suture with Michel's clips :

1-it be used (an head , limb, teat). Specially when it covered with a bandage.

2-the tension on the clips can be relieved by using interrupted suture or a round suture.

V. Circular or finger –eight suture.

1-suture using surgical pins. Can be use in eyelid , ear and nostril injuries, of horse .

2-suture using safety pins.

VI. Tension sutures :

1-wide and deeply placed interrupted sutures.

2-deep interrupted matters suture tied through rubber tube.

3-round-wound suture.

4-widly placed aluminum wire suture.

5-far-far-near-near suture.

6-far-near-near-far suture.

VII. Purse string suture- to close circular defect or reduce the size of an orifice.

Internal suture (inversion suture):

1-Lembert-suture are arranged perpendicular(vertical) to the wound/ the suture don't penetrate the lumen.

2-Cushing –the sutures is arranged parallel to the wound edge , but dose not penetrate the lumen(it must include the submucosa).

3-Connel- the suture is arranged parallel to the wound edge and penetrate the full thickness of the wall.

4-Schemedian-serosa to mucosa-from outside of one side to the inside of the other side.

Tumors

Tumors : (neoplasms)

Cellular disease in which new raw of cells develops to form abnormal mass of tissue grows without any control , serve no useful function and transmitter its capability to their progeny, and depending on the behavior can be classify into Benign and malignant tumor.

Benign tumor: usually grow slowly , are encapsulated , and don't invade surrounding tissue , it may be hard pedundulated or nodular, surgical easy to remove and didn't recurrent.

Malignant tumor: usually grow rapidly , are not encapsulated , may be locally invasion, have an increased blood supply , may be ulcerated and infected , infiltrative, metastasis surgical after removal.

Symptoms :the external appearance of tumors present wide variation (size , shape, location, color, consistency, presence of infection ulceration, haemorrhage or not , involvement of another tissue , involvement of lymph node (regional)

Benign tumor: remain localized , they resemble the patient tissue in their structure, they grow slowly , may be simple or multiple, usually encapsulated and freely movable in the tissue (under the skin) didn't invade the lymph vessels and lymph node.

The benign tumor are harmless but may cause serious results due to their position (e.g. benign tumor pressing over the brain tissue) e.g. big tumor –may or weight , a papilloma may cause stenosis or obstruction of an esophagus or even completely fill the bladder.

Malignant tumor: grow rapidly and infiltrate the tissue , cannot determine the exact boundary of the tumor (histologically), metastasis , by blood or lymph stream, involved of the regional lymph node (which its very important in prognosis). And the should be palpated to determine their consistency , size , shape , and fixation to surrounding tissue. Involved nodes may be enlarged , and firmer than normal nodes. Metastasis may also be reflected by hepatomegaly , splenomegaly, anemia, or abnormalities of the CNS .

Malignant tumor produce their harmful effect leading to death due to several factors such as (toxin production, primary localization in an important organ , secondary pyogenic infection, metastasis into the vital organs, chronic haemorrhage –lead to anemia, pain and chronic –in appetence and discomfort.

Diagnosis :

Is done by: 1-the symptom .

2-clinaly its important to know whether the tumor is malignant or not for determination of type

of treatment and prognosis.

***A definite diagnosis can only be made by :**

A-biopsy and histological examination (biopsy are a sample of tissue taken from living animal for histological exam). The biopsy may or may not involve complete. Surgical excision of the lesion. (if the mass is operable , it should be completely removed , if poor healing or insufficient skin for closure is anticipated or the tumor is radiosensitive, biopsy can be instituted to reduce the size of the mass prior to its complete excision.

B-radiography –which help in determination of the lesion and helpful in determination of metastasis of the tumor to the internal organ such as lung.

C-sex incidence –and involvement of sex organ (testes, ovary).

D-age incidence-old animal are susceptible .

Prognosis :Benign tumor are harmless except when it found or interfere with the function of the organ and if successfully removed they don't recur.

Treatment :

1-pedundulated tumors can be removed by applying a ligature of rubber or silk to their base – the circulation to the tumor is arrested and necrosis of the skin at its base taken place. A ligature cab even be used for sessile tumor. The wound caused by the ligature must be dressed with antiseptic application, or by red hot iron –these have the advantage of cutting and arrested haemorrhage.

2-the use of caustics –e.g. arsenic past , salicylic acid.

3-excision with the knife.

In case of malignant : such trial of treatment can be done .

1- The use of caustic –such as repeated application of Aqueous alcoholic arsenics solution.

2-Radiotherapy –radioactive substance

3-Chemotherapy –X-ray.

4-Excision –complete removal , with the regional l.n.

5-Amputation of the affected part. If this is applicable as in case of a limb, tail a penis.

6-Euthanasia of the animal –to relief of the pain and the suffering of the animals.

Orthopedic surgery

Orthopedic surgery: are discontinuity of the bony framework , it is a highly complex injuries (broken of the bone).

Cause and predisposing factors:

- 1- trauma** – which is the most common cause of fracture (is the immediate direct cause) such as , compression, bending , and twisting of the long bones, struck by an automobile stepping into a hole while running , catching a leg in gate or fence.
- 2-Heredit**y—animals with small round bones (metacarpal and metatarsal bones) are thick edematous joint are considered weak and susceptible to fracture.
Specific hereditary condition such as congenital porphyria in cattle and swine and double muscling in cattle prodigious animals to fractures.
- 3- Nutrition** – calcium , and phosphorous , vitamin D, vitamin A, should be supplied to the nutrition. Fluorine poisoning , is weakening of the skeleton with increase susceptibility to fracture.
- 4-Age** –young animals placed under stress –are susceptible for fracture, very old animals also have increased needs for calcium and vet. D. to maintain strong bones. (young bone bend and are predisposed to greenstick, or incomplete fractures , while old bones tend to sustain complete fractures)
- 5-Sex** –breeding males are the most susceptible for fracture.
- 6-Use** –the athletic horse is more likely to sustain a fracture than other animals.
- 7- Management**-- cohabitation of different species , sexes , and sizes of animals increase the chances of skeletal injury. Groups of animals forced through narrow openings.

Classification of fractures :

- 1- According to the involvement of the skin (or to their cause)**
 - a-closed –or simple fracture** –when the skin are not affected (when there is communication between the fractured bone and the exterior of the body)
 - b-opened –or compound fracture** –when the skin are affected when there is an opening through the skin and underlying soft tissues leading to the fracture.
- 2-According to the axis of the bone .**
 - a-transverse** (the bone is broken of a right angle to its long axis)
 - b-oblique**-(the line of fracture is diagonal to the axis of the bone)
 - c-spiral** –the line of fracture is curved
 - d-longitudinal.**
- 3- According to the involvement of the bone .**
 - a-complete**
 - b- incomplete** –a greenstick—in this fracture , the bone is partially broken and bent , these fractures occur primarily in young animals whose bones are resilient. Displacement is minimal and healing is rapid.(**a- star , b- fissure , and d- chip**)
in case of incomplete –these is no displacement of fragment.
- 4- According to the numbers of the bone fragments.**
 - a- comminuted fracture**- in which several fracture lines communicate at a common point (with good reduction and fixation their healing will not be delayed).
 - b- multiple** –in which the bone is splintered into 3 or more pieces , and the fracture lines do not meet . (

reduction of these fracture are difficult to achieve and maintain)

5- According to the position from the bone :

- a- diaphyseal. Fracture
- b- metaphyseal fracture .
- c- epiphyseal fracture .

6-According to the muscle tension:

- a- impacted (or compressed) –the fragments of the bone are driven together, slight shortening and angulations may occur . (Impact fracture --mainly in vertebral column)(compressed – mainly in case of accident in skull bone)
- b- Avulsion (or dis pacted) –bone fragment are detached by forcible muscular contraction. .(avulsion – mainly in F.T. tuberosity due to over tension of gastrocaenimous m.).

7-According to the reduction.

- a- stable fracture –if the fragment remain in position after reduction (such as greenstick, serrated and transverse)
- b- unstable fracture –tend to unstable after reduction such as multiple , oblique (which require firm) immobilization to maintain the alignment and length of bone

8-Pathological fracture –like the fractures associated with rickets, manulation, neoplasm, oestomalacia, osteoporosis.

9-Fatigue fracture –mainly in horse and man who clamp the hill and mountain.

Symptoms : (clinical signs) :

– The visible signs at the fracture area include. One or more of the following :

- 1- local swelling –is due to exudation or accumulation of blood.
- 2- deformity or change in angulations
- 3- abnormal mobility .
- 4- loss of function.
- 5- localized tenderness.
- 6- crepitus-sound produced due to friction of the fractured bone fragment

Diagnosis :

- 1- by the history .
- 2- by the clinical signs .
- 3- by the clinical examination which should include :
 - a- an assessment of the animals general health
 - b- determination of whether tissue or organs adjacent to the fracture or in other parts of the body have been damaged and to what extent.
 - c- an examination to ascertain whether fractures or dislocations are present in other parts of the body .
- 4- by radiographic examination.(at least two views taken to the injured areas.)

Bone healing : (healing of fractured bone)

Blood supply of the bone (blood supply of the bone are very important in bone healing .

The vascular supply of long bone consist from :

- 1- nutrient artery –usually enter along bone through the nutrient foramen .

- 2-periosteal vessels—have two vessels either from the muscles which attached firmly or from neighboring soft tissue .
- 3- metaphyseal vessels .
- 4-epiphyseal vessels .

Processes of healing include :

- 1-production of haematoma**, due to laceration of adjacent tissue and ruptured of blood vessels. The haematoma forms about the fracture site and within the medullary cavity at the broken bone. Fibrin deposit –invasion by pluripotential cell –haematoma –fibrin-clot –organization.
- 2-Callus formation** –external callus and internal callus. Callus –mean growth of new tissue around the fracture site which make bridge that unites the fragments. Callus considered as best nature way of stabilizing fracture and the more unstable fracture is the greeters callus formation. While rigid stability , the callus formation is minimal. Then proliferation of osteogenic cells will occur.
- 3- Consolidation-osteogenic cell.**
- 4-Remodling** –the size of the callus decrease and the bony bridge becomes remodeled into lamellar bone until the normal contour of the bone is restored.

Factors affected and interfere with bone healing (Economic and practical consideration)include :

- 1-Species of the animals .** dog , horse , cattle. Cattle are better orthopedic patient than horse .
- 2-Age –immature** animal are better orthopedic patient and have faster fracture healing than mature heaving animals .
- 3-sex- castrated animal.**
- 4-temperament of animal (natural disposition).**
- 5-location of injury -----in large animal**
 - *fore –leg injuries are usually easier than hind leg .
 - *fractures below the carpal or tarsal are more practical to repair than the fractures above these regions .
- 6- length of healing** –in large animal 10-12 wks. In growing animals (small animals 3-5 wks)the cast can be changed each 3-4 wks.
- 7-time delay** –between the time of fracture and the treatment be to repair (delay especially without temporary splinting).
- 8-Economic value.**

Treatment of fracture:

- I. **-Reduction** (reduction :replacement of bone fragments as nearly as possible to their original position.)
proper alignment and positioning of the fractured fragments.(the alignment are more important than positioning) either closed reduction or open reduction
- II. **-Immobilization (fixation)**
 - A-External immobilization ..**
 - 1-Splint** –wooden splint, aluminum , and thermoplastic splints.
Thermoplastic—is best –because its light weight , radiolucent, re-usable, additional molding and repositioning can be done by reheating .

(Splint are suitable for distal epiphyseal metacarpal and metatarsal fractures and fetlock dislocation.).

2-Cost (cooptation cast)-plaster of Paris /(resin bonded fiberglass). It is the most valuable external fixation device available for large animals.

To be effective : 1- it must immobilize the articulation proximal and distal to the fracture .

2-the amount of soft tissue between the cast and the injury site (bone) should be minimum.

It is best suited for injuries below the carpal or tarsus ,(or little above).

It can be used in combination with internal fixation or transfixation. plaster cast can be padded or non-padded (non-padded cast is better)

*aluminum walking bar –can be incorporated in the cast(the walking bar may transfer weight bearing from the ground surface to the proximal position of the cast above the injury).

-short cast (external just below the carpus or tarsus) is useful in fetlock luxations, proximal sesamoid fracture and flexor tendon injuries.

3-Modified Thomas splint. Are used for radial and tibial fracture. In large animal its used in combination with internal fixation or plaster casting.

4-Sting : 1-its is help in rest of large animal orthopedic patient .

2-reduce stress to the sound legs.

3-it used with intermittent periods of rest (it cannot be tolerated by the patient for the length time of fracture healing).

III. 5-Small stall confinement as an alternative method to slings.

IV. **B- Internal immobilization :**

V. **1-Intramedullary pinning** (Steinman pin, rush pins)

VI. **2-Intramedullary nailing** (kuntschner nails)for humeral and femoral fracture. The smaller and younger animals are have the grater chance for success.

VII. **3-Plating and compression plating** .

VIII. 4- Transfixation –by pin inserted transversely thought the fracture fragments (proximal and distal) with the protruding ends fixed by external bars and plaster.

IX. **5-Kirschner –Ehmer splints**. Have 4 pins (two in each fragment) and external bars and connectors and protruding outside.(in large animal use with combination and support)**along can be used in maxillary and medullary fractures.**

6- Wire (stainless steel wire) maxillary and mandibular fractures .

X. 7- Screw –ulnar , third carpal stab fracture , longitudinal fracture of third phalanx.

XI. **Complication of fracture :**

XII. 1-Pressure sores –due to cast or splint .

XIII. 2-Delyaed union . affirm clinical union may be evident by 3-4 wks in small young animal and 6-10 wks in large animals .

XIV. Causes :1- Inadequate immobilization (movement) .

XV. 2-Infection.

XVI. 3- Inadequate circulation.

XVII. 4- Foreign body reaction to internal fixation devices.

XVIII. 5- Presence of soft tissue between the fracture fragment(presence of gaps between the fracture fragments)

XIX. 3-Non-union : same causes ---failure of firm callus formation lead to un-bridging of the bone fragment and presence of gaps between the fracture fragments , characterized rounding of the edge of bone fragment.

XX. 4-Mal-union: imperfect positioning of the fragment may case –deformities and deviations.

XXI. 5- Osteomyelitis : bone infection –occur in open fracture , comminuted fracture and with internal fixation.

Lameness:

Lameness: it's a signs of disease in which the animals try to hold the affected limb or bear part of weight on affected limb , it is indicating of any structure or functional disturbance of one limb or more , it appear during movement or rest , it occur due to trauma, infection, metabolic disturbance, congenital deformity , disturbance of circulation, and disturbance of neurology .

Etiology :

- 1-**predisposing factors** –immaturity and weakness.
 - bad conformation of bony structure
 - defect in shoeing .
- 2-**exciting factors** –trauma.
 - congenital or acquired defect .
 - infection.
 - circulatory disturbance (iliac thrombosis)
 - nervous disturbance
 - muscular in coordination (due to fatigue)

Classification of lameness :

- 1-**Supporting leg lameness-** (weight supporting or limb is landing) occur when the animal putting the lame limb on the ground , is seen in animals suffering from affection of joint , ligament , bones ,motor nerves , or feet.
- 2-**Swinging leg lameness** – this type of lameness appear more clear during motion , it occur with the affection of joint capsule, muscle and tendons.
- 3-**Mixid lameness** –occur during motion and when supporting of limb accompanied with both affections.

Another classification :

- 1-**cold lameness** –occur during rest and disappear in exercise such as in spavin.
- 2- **hot lameness** –occur during exercise and disappear in rest .

Complementary lameness : lameness occur in the sound limb , due to uneven distribution of weight on anther limb or limbs .

Diagnosis of lameness:

Diagnosis is difficult and requires careful and prolonged observation of sound and lame horse during rest during motion. Its necessary to reach 3 factors.

- 1- which limb is lame
- 2-the seat of lameness.
- 3- the nature of the lesion.

The procedure of diagnosis include:

- 1- taking of history
- 2- inspection and examination
- 3- palpation
- 4-percussion
- 5- nerve block.
- 6- radiography
- 7- ultrasonography.

***History** : include asking about :

- nature of work (drought . hunting , races , breeding)-
- history of trauma if present.

- duration of lameness (acute or chronic) .
- abnormal gait (stumbling) such as in navicular disease
- type of previous treatment .
- time of shoeing (if any wrong) .

Inspection and examination of animal during rest and motion:

Examination during rest : must if any swelling , enlargement , flexion of the joint , or any abnormal posture. When the site of pain is below the knee , the animal put his foot a head the normal position.

- If the pain in the knee –put the foot in normal position .
- if the pain is above (in upper part) , the foot behind the normal position.
- when bilateral involvement of limb –there is frequent shifting of weight .

Examination during progression (motion) :

Watch the movement of head and neck for fore limb and the movement of hip and croup for hind limb.

- *in fore limb lameness –the head will drop when the sound limb reach to the ground , and its raised when the lame limb bears weight .
- *in hind limb lameness –the croup is raised when the lame limb bears weight and lowered when the weight is transferred to the sound limb.

The site of lameness can be diagnosed by :

- 1-inspection of the limb
- 2- palpation to know the nature of lameness or type of swelling .
- 3- passive movement of the joint (including extension , flexion, adduction , abduction and rotation) if they cause pain such as **spavin test** –in which we flex the hock joint forcibly for several minutes and then send the horse on at a trot, when the animal become lame (↑lameness) that mean the joint affected .
- 4-injection of local anesthesia over certain nerves (nerve block) .
- 5- radiography and ultrasonography.
- 6-make a special and through examination of the **foot** .
 - (a- inspection b- palpation c- percussion d- compression e- paring
 - f- measuring hoof by caliper g- nerve block h- radiography to know the nature of the lesion and the extension (extent of lameness) .

Affection of hoof in horses :

Sand crack : fissure in the wall of the hoof , usually parallel to the horny tubules .

Classification : it may be complete / or incomplete -simple / or complicated .--superficial / or deep.

- May be at the toe , or quarters or heels
- it may be false (when start from the ground border) or true when start from the coronary border.

Cause : trauma , false shoeing , sever extension of hoof joint , laminitis , use of animal in sandy ground for long time , over loading of animal.

Symptoms : 1- presence of crack.

- 2- lameness only in complicated cases (when the crack reach to the sensitive tissue)

Treatment : -- the aim of treatment is :

--the immobilization of the lips of the crack and promote the secretion of new horn to fill the crack

- 1- the hoof wall at the bearing surface should be lowered about 1 inch on either side of the crack.
- 2- when the crack not reach to the coronary border , make an curve incision or an triangular incision in the wall of the hoof by hoof knife or by burning to limit the upward progress of fissure.
- 3- the crack should be thoroughly cleaned , apply Tr. Iodine and bandage.
- 4- another method of treatment by drilling on both side of crack and sutured with stainless – steel wirein addition to cleaning and bandage .
- 5- or by using special type of shoe in case of quarter crack.

Corn : is a contusion of the sensitive tissue at the heel in the angle between the wall and the bar , the structure affected being the sensitive tissue of the sole , wall , or bar. The condition is most common in horses working in cities.

Etiology : 1- is very rare in un -shoed feet .

2- any defect in shoeing .

3-a stone accidentally fixed between the heel of the shoe and the frog may cause a bruise in this situation.

*** Symptoms :**

1- local symptom of a contusion with more or les acute inflammation.

2-lameness in different degree.

Diagnosis : made from the symptom.

Treatment : 1- remove the cause 2- paring the horn over the corn

3- when suppurative inflammation, try to remove pus.

4- when suppuration has extended upward beneath the wall its advisable to remove a –shaped portion of the wall to ensure the escape of the pus.

Seed toe : one of the disease of hoof characterized by separation of the wall from the subcorneal tissue , and the formation in the interspaced of crumbly pumice –stone like horn secreted by the sensitive lamina. This abnormal horn does not completely fill the space beneath the wall, which is consequently more or less hollow. Or define as (separation of the wall from the sensitive lamina at the toe and degeneration in the sensitive lamina.)

Etiology : unknown (not clear) but may due to chronic local laminitis.

Symptom: 1- presence of cavity and separation of the wall

2-Lameness when its complicated .

Treatment_: 1- rest 2- remove the shoe 3- paring of the wall

4- use of hot application to promote secretion of wall.

5-remove the new formation of horn and fill the space by tar.

6- put the animal in soft ground.

Keratoma: is a horn tumor growing from the aspect of the wall .

Etiology : 1-hyperactivity of the lamina or coronary band due to irritant or injury 2-trauma.

Treatment : 1-give rest 2- regulate the shoeing 3-make two parallel grooves in the wall around the tumor .

Thrush : is an affected of the frog characterized by an offensive grayish discharge from the central lacuna, and sometimes from the lateral lacunae, with more or less disintegration of the horn.

Etiology : constant moisture of the frog (prolong standing on dirty wet litter).

Symptoms : 1- local inflammation and discharge 2- lameness.

Diagnosis : by the symptom.

Treatment : 1- cleaning the area 2-apply carbolic acid 3- use of copper sulfate 4- use of antibiotic.

Laminitis (founder) : inflammation of the sensitive lamina of hoof occur in all the feet or in both fore –or both feet or in one foot , but never in only two diagonal or two lateral feet. It may be infectious or non-infectious, it is characterized by passive congestion of the lamina with blood , with sever pain. It may be acute or chronic.

Etiology : heavy body weight , unfit condition , hot weather, error in diet, over work, excessive weight on foot, exposure to cold an damp, toxæmia.

Classification: in related to the cause : grain founder , water founder , post parturient laminitis , grass foundry.

Symptom: pain, fever , and lameness.

Prognosis : guarded.

Treatment : 1- giving rest 2-giving of purgative (mineral oil, magnesium sulfate).
3-antihistamine. 4- forced exercise for 3hrs/ day. 5-diuretics to reduce congestion in the feet.

Quitter :its chronic purulent inflammation of a collateral cartilage of the hoof , characterized by necrosis of the cartilage and sinus formation at the coronary band level discharging pus.

Etiology :1-injury and infection 2- necrosis of the skin 3-supputative corn or sand crack.

Symptom: acute lameness of the affected foot , swelling at the coronate , then formation of sinus, usually have only one orifice , discharging pus.

Treatment : 1- injection of an antiseptic solution . 2- injection of a caustic liquid such as silver nitrate.
3-currating 4- thermocautary of the sinus 5- surgical removal of the affected cartilage

Side bone : an ossification of the collateral cartage , are usually found in the fore feet and most common in horses having poor conformation caused by trauma to the cartilage , or hereditary cause such as poor conformation characterized by presence of lameness in acute or in massive ossification, or may on lameness. Pressure on area produce pain –and the ossification can be seen in radiography.

Navicular disease : (navicular bursitis , podotrochleitis) .

Its chronic ostitis of the navicular bone , begins as bursitis of the navicular bursa between the deep flexor tendon and the navicular bone –as the disease progresses, degeneration and erosive lesion of the fibrocartilage begin on the tendinous surface of the bone.

Etiology : 1- inheritable disease 2-defect in shoeing 3-picked up nail.

Symptom:

- 1- intermittent lameness , appear when hard get .
- 2-the horn stand with the affected foot pointed on the toe.
- 3- examination with hoof tester pointed the pain at the center third of the frog.
- 4-radiographic exam. Reveal changes in the navicular bone .

Diagnosis:

1- by clinical signs. 2- by radiography

3-blocking of the posterior digital nerve can be an aid in diagnosis (low volar / or planter nerve block).

Treatment :

1- injection of navicular bursa with corticosteroids.

2-bilateral posterior digital neuectomy .

Prognosis : unfavorable .

Radiology :

Radiology :((Roentgenology)):

Science deal with the use of radiation energy (X-ray , radium , radioisotopes)for diagnosis and treatment .

Or/ science deal with the study of the diagnostic and therapeutic uses of ionizing radiation.(interpretation of radiographs).

Radiograph: (shadowgraph)(skiagram) :visible photographic. Records of X-ray =radiographic film.

Radiography: art and science of taking radiographs .

Radiologist : a man who working in radiology .

Radiographer: a man who taking radiographs.

X-ray : is an electromagnetic radiation of high energy (10^3-10^{10} ev) , and low wave length ($10^{-8}-10^{-16}$ meter) =(0.2-0.3 An) , its invisible , have ability of penetration of the bodies and tissue , travel in straight lines in the same light speed 186000 mile/ second, and penetrate the lenses without refraction. Its found after the ultraviolet in the electromagnetic spectrum. Television and radio waves →microwaves → infrared→ visible light→ ultraviolet-X-ray , gamma ray .

History of X-ray : its discovered in 1895 by the physicist Wilhelm Conrad Roentgen while doing experiments with electron flow in vacuum tubes, even he making a radiograph of his wife hand. After one month of its discovery published the first paper of its medical use , and after one year 39 books and 1044 paper on X-ray were published. W.C. Roentgen get the first Nobel prize in physicist (1901) for his discovery of X-ray .

Properties of X-ray : the X-ray photons like the visible light , travel in straight lines , have the same speed of visible light , and found under the same laws of visible light , but it have the following characters.

- 1-invisible. 2-trvel in straight lines.
- 3- have penetration power, the degree of penetration depended upon :
 - a- atomic number of the matter (the high atomic number like lead (82) is the more radiopaque , and the less atomic number matter like air is the more radiolucent)..
 - b- wave length (the shorter wave length , have more penetration) .
 - c- density of the matter. The ↑absorption by ↑the power of density (density of air less than the density of fluid)
 - d-thickness of the subject (or tissue)↑increase the thickness decrease the penetration.
- 4- fluoroscopy : X-ray when strik some material give fluorescence light like calcium tungstate which found in intensifying screen, and zinc cadmium sulphide, which used in fluoro-screen.
- 5- photographic effect-which can be regested on the radiographic film. As a visible photograph.
- 6- biological effect-the X-ray produce somatic and genetic changes .
- 7-ionization of cells.

Composition of the X-ray machine: it consist from:

- 1-the X-ray tube; which its glass tube , highly evacuated from air , have two electrodes (anode and cathode) , responsible for production of X-ray , and have many accessory equipment like cone, diaphragm , filter-----etc.

2-the transformers: which responsible to convert the normal current supply into suitable form for the operation of an X-ray tube. It include 1- the autotransformer(correct the input voltage)

2-step-downen (filament transformer).

3-the high tension transformer to produce high voltage).

3- the tube stand : which holding the tube .

4- the control panel-contain the meters , switches like on/off switch, the voltmeter, kilo voltage selector, the millimeters and mill amperage selector , the timer and the exposure button, fluoroscopy control.

Types of X-ray machine:

1-portable –X-ray machine 70-90 KV x 15-30 mA.

2- mobile –X-ray machine 90KV x 40-60 Ma

3-Fixed –X-ray machine 120-200 KV x 300-1000Ma.

The X-ray tube :

Highly evacuated glass tube have two electrodes .

1-the cathode(-) : which consist from an spiral tungsten filament set in a shallow cup to prevent outside movement of electrons, its responsible for production of cloud of electrons around the filament. The cathode have two functions:

a-act as negative electrode for the high tension circuit.

b-supply the electrons to carry the high tension current across the vacuum in the tube.

2-the Anode(+): have the target or the focus (focal spot)which made from tungsten set in 22.5° degree from the vertical on a solid bar of copper in alignment with the cathode to receive the bombardment of electrons.

Why select tungsten ?, because it have high melting point 3380 C° , but its bad heat conductor, for that it connect with the copper bar , which conduct the heat from target to the outside of the tube.

After bombardment of electrons with the target , less than 1%of its energy converted to production of large amount of heat, and for distribution of heat over larger area , Rotating anode is builder in modern X-ray machines. The focus should be very small (ideally should be a point source) within a range of 0.6-1.5 mm².

Production of X-ray :

The X-ray produced when the accelerated electrons from the cathode strike the anode , the electron energy is converted to an X-ray energy and a large quantity of heat. There are two types for producing the X-ray :

1-Bremsstrahlung , which produce 70-90 % of the useful X-ray photons, by stopping or significantly slowing high-energy electrons, when the high energy electron penetrates orbital shell of an atom and passes into vicinity of nucleus , resulting in the conversion of their kinetic energy to X-ray .

2-characteristic radiation : when the bombarding electron with sufficient energy strikes an orbital electro, orbital vacancy is produced , resulting in emission of X-ray a specific energy level.

There are two types of X-ray :

1-soft X-ray –have long wave length and low penetration power.

2-hard X-ray –have short wave length and high penetration power.

Radiographic accessories : for getting the radiographs

- 1-KV=quality of the X-ray (penetration power).
- 2-mA =quantity of X-ray .
- 3- F.F.D =focal film distance (30-36)=1 meter .
- 4- time =time of exposure (which always related to the mA and written as mAs= milliampere per second.

KV=(Kilovoltage) =are the high tension across the X-ray tube which accelerated the electron from cathode to anode , or the pressure which forcing the electron to move in its course and give the penetration power to the produced X-ray.

KV=give short -wave length and penetration power of X-ray. The KV=responsible for the quality of X-ray .

mAs= milliamperage =the__ amount of electron travels across the X-ray tube during an exposure , which responsible on the amount of X-ray produced , and related to the time of exposure (length of exposure) for that best record as mAs.

mAs= responsible for the quantity of X-ray.

Radiation hazard and prevention : (dangerous of X-ray)

— The X-ray have two effect.

- 1-somatic effect
- 2-genetic effect.

Somatic effect : the X-ray ionized the tissue and make injury to the tissue , not all the body tissue in the same sensitivity to the X-ray , the most sensitive is the multiplying cells , such as the blood forming organs (bone marrow, lymphoid tissue, and spleen) , the gonads, embryo---etc.

The nervous system , the bone , are relatively radio-resistance. Mothers and boys below 16 years not allow to help in X-ray.

Genetic effect : the X-ray increase the incidence of mutations when the genital organs are irradiated (increase the number of abnormal births)

The excessive irradiation cause cancer, opacity of the lens and infertility.

Prevention:

- 1- all the persons involved should be away from the source of X-ray (stand as far away from the primary beam) , and the workers wear the apron have 0.5 mm lead, and protective gloves have 0.33 mm lead.
- 2-restrict the primary beam only on the examined area.
- 3-use of filter.
- 4-anesthetize the animal.
- 5-care should be exercised to not repeat the film.
- 6-covered the examination table by lead for protection of feet.
- 7-use of special badges for measuring the amount of body exposure.

Contrast radiography :

Contrast radiography ; are using the contrast media in radiography. Contrast media ; are media used in contrast radiography to enhance (increase)visualization of soft tissue , which are radiolucent and difficult to visualize in plane radiographs, such as positive contrast media like barium sulfate , and iodine compound , and negative contrast media like air.

Types of contrast media:

- 1-substances used in examination of alimentary tract .Insoluble and non-insoluble substances such as barium sulfate as in barium meal and barium enema.
- 2-water soluble agent. Such as organic iodine preparations, used in blood vessels, urinary system , brain –etc. like coronary urografin, hypaque, diagonal. etc.
- 3-agents excreted through the biliary system. Its also organic iodine preparations which after absorption from the GIT or following I/V injections are excreted by the liver and visualize the biliary system. Like biligrafine , cholecystopaques.
- 4-viscous and oily agents. Such as those used in bronchial tree and uterus , around the spinal cord such as Dionosil (oily and aqueous)—for lung , Neo-hydriol fluid.
- 5-gaseous agent. Like gas, O₂, Co₂, NO₂---etc.

Diagnostic and special procedures in radiology:

Techniques of contrast media.

- 1-Digestive system --a-oesophagogram—by using barium paest
b-upper gastrointestinal series-by barium meal.
c-lower gastrointestinal examination –by barium enema.
d-sialograph—for salivary glands.
- 2- Urinary system :
 - ***Pyelograph**—I/V injection of water soluble iodine preparation for visualization of kidney , ureters, and urinary bladder. By drip infusion/or bolus injection.
 - * **Cystography**—for urinary bladder.
- 3-Cholecystography—for gall bladder.
- 4-Bronchography—for lung and bronchial tree.
- 5-Fasciography—injection of air for visualization of muscle, tendon, and soft tissue.
- 6-Angiography—cardiac , cerebral , peripheral.
- 7-Myelography –for spinal cord.
- 8-Arthrography –for the joint .
- 9- Peritoneolgraphy –for peritoneal cavity

***Radiographic interpretation :**

Radiograph is a picture of the number of X-rays passing through something such as an animals body , not all of the X-ray pas through, but some will absorb by parts of body the bone is the greatest then the muscle, fluid , fat , air which is the lowest.

Number of important steps must be competed before interpreting .

- 1-case history
- 2-phsical examination
- 3- correct radiographic procedures.

Case history : as in any phase of diagnosis a complete and detailed knowledge of the animals medical history must be known for proper radiographic evaluation.

Physical examination: radiographic examination is ordered only after a clinical opinion has obtained. Generally the purpose of radiography is to confirm a clinical diagnosis or impression, not to make the diagnosis. Detailed and complete physical examination is necessary to establish a reason for radiography and to determine the part of the animal to examined radiographical. A good physical examination is often the most neglected step of the basic requirements.

Correct radiographic procedures:

- 1-two view 90 degree to each other and other angular view as necessary , this is important for locating pathological lesions standard positioning like RL,LL,VD,DV,AP,L ---etc.
- 2-good radiographic technique is the basic factor in interpretation.

3-special radiographic techniques such as the of contrast media, non –routine positioning .

Radiographic diagnosis :

Radiographic diagnosis consist of two important parts :

1- location of the lesion (determining the presence of an abnormality or not).

2-classification of the lesion (make differential diagnosis) location of the lesion.

a--the two radiographs placed on illuminators .

b- must be know the normal anatomy of each area .

c-Must be know the radiographic anatomy .

d-The radiographs should always be placed on the viewer in standard manner(R right side apposite the left

side of examiner , and the head of the animal to the left of examiner).

e- radiographic signs of a disease is the changes in the size , architecture, contour , density, position, and

function, should be observed.

f-systematic examination, should be done ,like

osseous system ,(bone , cortex) , compare one side with the other .

abdomen –study GIT (liver , stomach, small and large intestine) contour, size , and position of each part.

Urinary system. Kidney , bladder, and external structures.

Genital organs.

Spleen , skull, thorax, extremities.

Note : =don't view the radiograph of abdomen and thorax at too close range.

=close exam for bone , may need the use of spotlight.

Classification of lesion:

What pathological syndrome is present :

1-development –congenital, cleft palate, ductus arteriosus, valvulor insufficiency , stricture of ureter etc.

2- metabolic---rickets.

3-traumatic –fracture.

4-infectious –actinomycosis.

5-neoplastic—tumor .

6-degenerative –erosion of the articular surfaces.

C T Scan : is a computerized axial tomography scan. The C T scan work by taking multiple X-ray images which are generated by a computer into cross-sectional pictures of the internal organs and structures of the body (mainly brain). The patient put in a donut hole and the X-ray tube rotate around his body to generate hundred of images known as slices , these images are processed by a computer to allow the doctor to se soft tissue structures in great details.

MRI : is the name indicating utilizing magnetic fields to image the brain tissue (instead of x-ray utilized in C T Scan). The patient lies wholly within a magnetic tunnel and surrounded by a large magnet.

Ultrasound : uses of high –frequency sound wave to produce images of the internal organs and structures of the body. It is a quick method for imaging without the use of radiation. Using ultrasound, sound waves are sent through the body by a tool called transducer. A gel is applied to the surface of the skin in the area that is to be imaged , and the transducer is placed immediately over it. Internal structures reflect the sound waves emitted by the transducer and displayed on a monitor.

Fluoroscopy : is one method of image receptor system in which used of fluorescent screen instead of X-ray film, and the X-ray tube which used from the continuous radiation output type, instead of single exposure type.

In the fluoroscopy , the X-ray tube is located under the X-ray table , and the fluorescent screen put above the animal. The fluorescent screen convert the X-ray photons to visible light viewed directly , this technique used to observe the function of the organs.

Disadvantage:

- 1- the image is dim and requires accommodation for dark vision.
- 2-should be used in dark place.
- 3- have poor image quality (much poor than radiograph).
- 4-have serious radiation hazards-due to the long observation time , and the continuous production of X-ray , X-ray toward the upper extremities of the examiner.
- 5- the cost of the X-ray tube.

These disadvantage make no place for fluoroscopy in vet . practice and overcome these disadvantages –now use image intensification system.

Image intensification system (IIS) (television monitor)

The advantage :

- 1- no need dark accommodation of the viewers eye.
- 2- the examination is done in normal lighting condition.
- 3-image brightness is produced by electronically multiplying the number of light photons produced.
- 4-the image is viewed n a mirror or seen on a television monitor.
- 5- the brightness is obtained electronically rather than by increasing radiation level.
- 6-the duration of radiation exposure is lower than with fluoroscopy.

Disadvantage : high cost .

Alternative procedures now used.

- 1-comuted tomography---C T Scan
- 2-magnetic resonance imaging –MRI.
- 3-ultrasound.

Laser

Laser : is an acronym for Light Amplification by Stimulation Emission of Radiation.

The laser produced from excited atoms when stimulated by photons to produce new photons resemble the stimulating photons.

Properties of laser : the laser beam differ than the normal light by the following properties.

Following properties.

- 1-low divergence (collimation) . Laser beam (light)dose not diverge or diverge in very small amount.
- 2- monochromicity . Laser light consist from one wave length, while the visible light consist from different colors , each color have special wave length.
- 3-coherence. When laser beam fall on white rough surface , we can see light spots and other dark spots, which can be seen in visible light (normal light).
- 4-high focus ability and high intensity. The intensity is 50 times more than sun light .

Types of laser :

a-dependng on type of radiation : 1- pulse laser 2-contnuous laser .

b-dependng on active medium.

- 1- solid state lasers e.g. ruby laser, Neodium with glass , Neodium and γ AC
- 2-Gas laser e.g. Helium neon laser, Argon laser, Co₂ laser.
- 3-dye laser e.g. Argon or nitrogen. (the liquid state laser).

Other type of laser

- 1-metal vapor laser e.g. Selenium-hydrogen laser.
- 2-chemical laser e.g. flor with detrium.
- 3-excimer laser.
- 4-semiconduction laser.

Laser-tissue interaction:

(The mechanism of action of laser in the tissue)

The effect of laser in the tissue is depending on the penetration , absorption, reflection and scattering of the ray in the tissue .

The laser light which absorb from the tissue may cause :

- coagulation –lead to necrosis and hemostasis.
- Vaporization –lead to cutting and debulking
- sonic effect –lead to membrane disruption.

The laser react with tissue to give series of activity like :

- 1-thermal reactions 2-photochemical reactions 3-electrodynamic reactions.

Advantage of using laser in surgery :

- 1- non-touching technique.
- 2-getting dry surgical site (no bleeding) .
- 3-decrease blood loss.
- 4-do not interfere between patient and monitors.
- 5- no edema , no fibrosis , no stenosis postoperatively.
- 6- complete destruction of the residual tumor cells , for that there is no chance for recurrence of tumor or expansion.
- 7-more accuracy in surgery.
- 8-no need for use of ordinary surgical instruments .

