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General Surgery

By

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Surgery:

Latin: chirurgiae, meaning "hand work is an medical sciences specialty that uses operative manual and instrumental techniques on a patient to investigate and/or treat a pathological condition such as disease or injury, or to help improve bodily function or appearance

Surgery is art and Science



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Surgery build on many sciences:

Anatomy

Pathology

Physiology

Microbiology



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Goals of Surgery:

- 1- Restore the patient to normal state of health
- 2- Remove the pain
- 3- Welfare the animals (Castration, dehorning)
- 4- For diagnostics procedures (Exploratory puncture, exploratory laparotomy)



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Types of Surgery:

Surgery can be classified to different types.

Depended on the Severity

Emergency Surgery

Chock, Intestine obstruction

Irreducible hernia

Tentative (Elective Surgery)

Castration, Docking, Trimming of Ear

Dehorning,



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Depended on the System:

Abdominal Surgery

Thoracic Surgery

Orthopedic Surgery

Cosmetic Surgery

Digestive Surgery

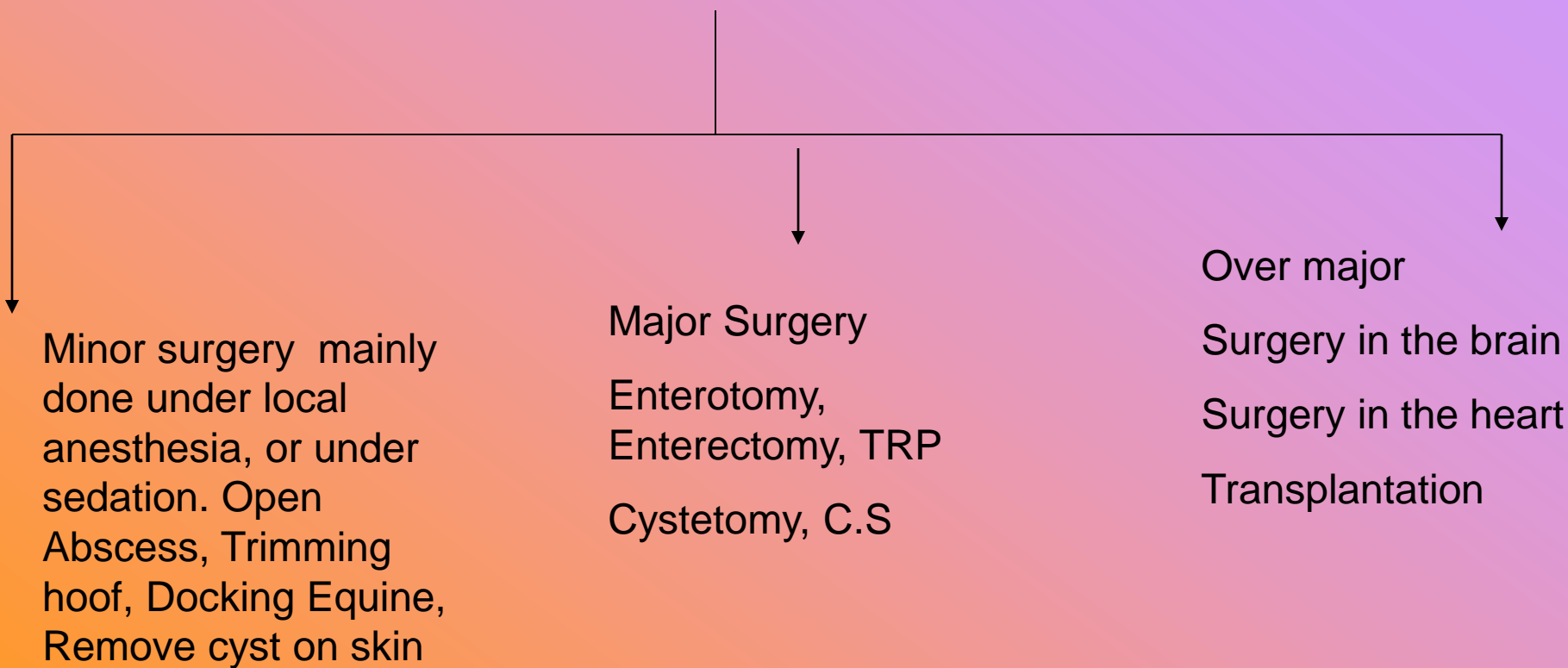
Eye Surgery



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Depended on the Danger (Life)





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Depended on the type

Tradional surgery

Laser surgery

Laparoscopic Surgery

Microscopic surgery



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Ethics in Surgery

In large animal surgery we must consider the economics of the surgery, this is contrast in human therapeutics

While in small animal surgery, this point is not very important

Prognosis of the Surgery

Values of animals

A viability of the instruments, facilities,
medicament.....



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Principle of Surgery

- 1- Gentle handling with tissue
- 2- Accurate homeostasis
- 3- Preservation of adequate blood supply
- 4- Strict asepsis
- 5- No tension on the tissue
- 6- Obliterate of dead space



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Properties of Surgeon:

- 1- Lades fingers
- 2- Lions heart
- 3- Soliman judgment
- 4-Eagles eye

Caps, Masks, and Other Types of Shielding



Beard Cover



Long Hair Cap with a pleated mask



Short Hair Cap with a



Long Hair Cap with a pleated mask



Boots used in large animal surgery



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Considerations in Surgery

- 1- History of the case
- 2- Examination of the Patient
- 3- The surgical risk



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Preoperative consideration:

A- Preparation of the owner:

Facts of the case

Discuss outcome of surgery, and its effect on the health and productive of animals

B-Preoperative procedures relating to the patient: this divided into three categories :

- 1- Identification of the patient
- 2- Special or predominantly pre-operative procedures which vary with the particular type of surgery to be performed
- 3- Routine or immediate presurgical preparation in all operations



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Patient identification:

Law

To avoid wrong animal operated, Not only animals should be identified but particular region also it is important

Special pre-operative procedure :

In case surgery in the abdominal we need bowel will be empty, fasting animals, give purgative animals before surgery.

in most cases 24 hours an adequate length of time with out food and 12 hours with out water

Prior to rectal, rectovaginal and anal surgery, the rectum should be evacuated manually, at the day of surgery



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Immediate presurgical preparations :

Position of the animal, standing position, recumbency

Clipping

Sheaving

Disinfection area



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Disposable Brushes

®Hibiclens

Packaged with antiseptic already contained within the brush

Antiseptic can be chlorhexidine or iodophor based surgical scrubs

Can be resterilized before each use

Can be used with chlorhexidine or iodophor based surgical scrubs





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Preoperative procedures related to the Surgeon:

In case of elective Surgery, The surgeon should mentally review the entire procedure , particularly if he do the operation for the first time,

Review the anatomy of the site

Emergency surgery unfortunately, permits little in the way of planned preparation, surgeon in this case depended on his previous training and experience

Physical preparations of the surgeon,

purpose, the elimination of the surgeon as carrier of infection to his animal patient.



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The performance of aseptic surgery implies a concerted effort on the part of the surgical team to prevent bacteria to operative site .

Infection can occurred from 4 source:

- 1- Surgeon including all team
- 2- Instruments, surgical equipment
- 3- Animals patient it self
- 4-The environment in which operation is performed



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Preparation of Surgeon

- 1- Cap and mask are to be worn they should be donned before scrubbing
- 2- 7 minute hand scrub, followed by immersion of the hands and arm with antiseptic solutions, scrub with soaps containing hexachlorophene
- 3- finger nails should always be kept short and before scrubbing orange stick should be used to remove dirt beneath the nails
- 4- The technique of hand scrubbing not resemble to that carried out before dinner
This can be done by applied a mixture of lampblack and olive oil to the hands and than scrubbing
- 5- The purpose of surgical gloves is one of protection of clinician against bacterial contamination transmitted to it by the surgeon.



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Steps of preparation of Surgeons

- 1- Remove the street clothes and replaces them with his work clothes
- 2- Caps fitted well onto the head to cover as much of hair as possible
- 3- Mask placed mouth and nose and fixed in position
- 4- Scrubbing is then carried for recommended period of time
- 5- An assistant open gown pack not touch ant part of gown, which donned in the approved manner
- 6- Finally gloves put on the hands , care taken to avoided touch outer surface



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Sterilization



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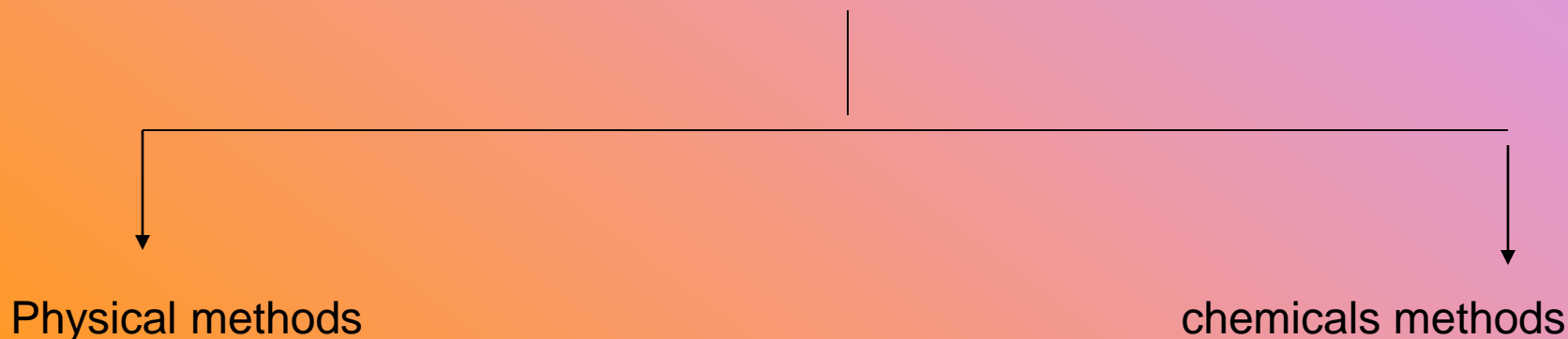


Sterilization of surgical Equipment and materials

Sterilization

It is defined as complete destruction of living organisms. Sterilization is the complete elimination of microbial viability including both the vegetative forms of bacteria and spores.

Methods of sterilization

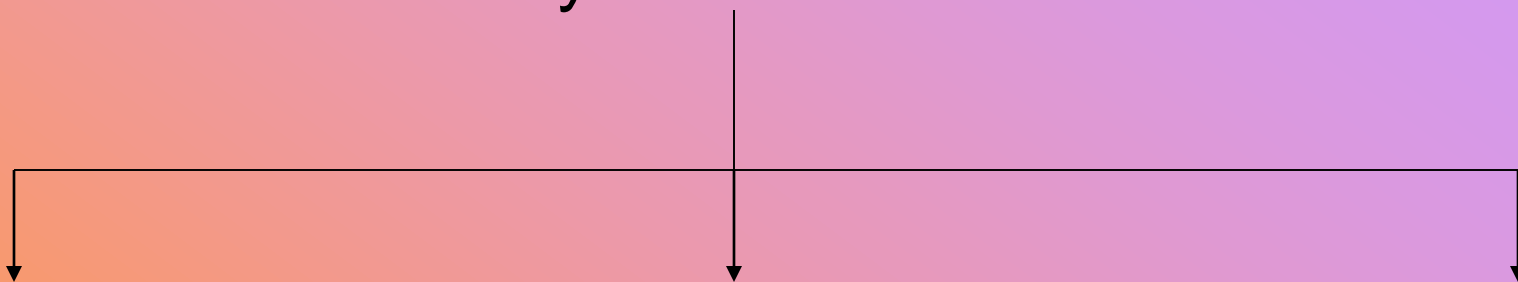




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Physical methods



Thermal energy

Filtration

Radiation energy

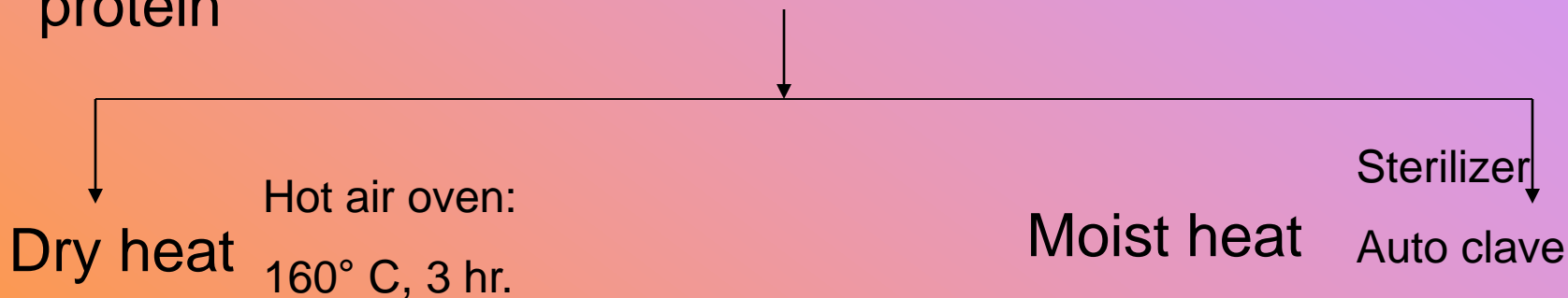


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Sterilization by thermal energy

Mechanism by which heat destroy microorganisms is not perfectly understood, Denaturation or destruction of cellular protein



Bacteria are destroyed by either wet or dry heat, although when moisture is present death occurs at lower temp. and shorter period of time, bacterial spores show greater resistance to dry heat than moist heat.



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Dry heat:

can sterilization surgical instrument, disadvantage, can not sterilization , clothes, cotton, gauze , also destroy sharpness of instrument

Moist heat:

Autoclave means self closing

121 °C , 15 minute 1.5 Bar

It is killed both spore and vegetative form of bacteria

Suitable for all instruments, cotton, gauze



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Steam sterilization procedure:

1- Cleaning of surgical supplies prior to sterilization:

Gross contamination must be removed from surgical instrument, instrument usually should be cleaned after used either manually, or with ultrasonic cleaning equipment, Instrument should be rinsed with cold water to remove blood finally should washed with warm water containing detergent. The instrument are loaded loosely in wire mesh trays and dried

2- Preparation of surgical packs and loading of the autoclave.

Instruments and supplies should be packed according to their intended use, the system of packing should be standardized, each type of pack should always contain the same material. Materials should be positioned in pack to allow complete steam penetration

3-Autoclave operation (121 C, 15 minute 1.5 bar). A number of indicator system are available to monitor the effectiveness, indicator placed in the center of each pack. All indicators undergo either chemical or biological changes in response



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Chemical indicators most commonly are paper strips impregnated with chemical that undergoes a color change when certain temp. is reached

Biological indicators are superior to chemical indicators, all system employ a heat resistant organism, most commonly used spore of *Bacillus stearothermophilus*

4- Sterile pack storage: sterile pack should stored in closed cabinets, pack should be dated, safe storage times for packs wrapped in commonly used , 1-7 week.



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Sterilization by filtrations

Filtration refers to the separation of particulate material from liquid and gases. The mechanism which microorganisms or other particles are removed. Pharmaceuticals are commonly sterilized by filtration

Sterilization by Radiation

Radiation kills organisms by producing ionization in or near the organism, Gamma rays, X-ray, and ultraviolet rays , certain materials sensitive to heat or chemicals are sterilization by radiation, tissue grafts, gamma radiations, surgical gloves



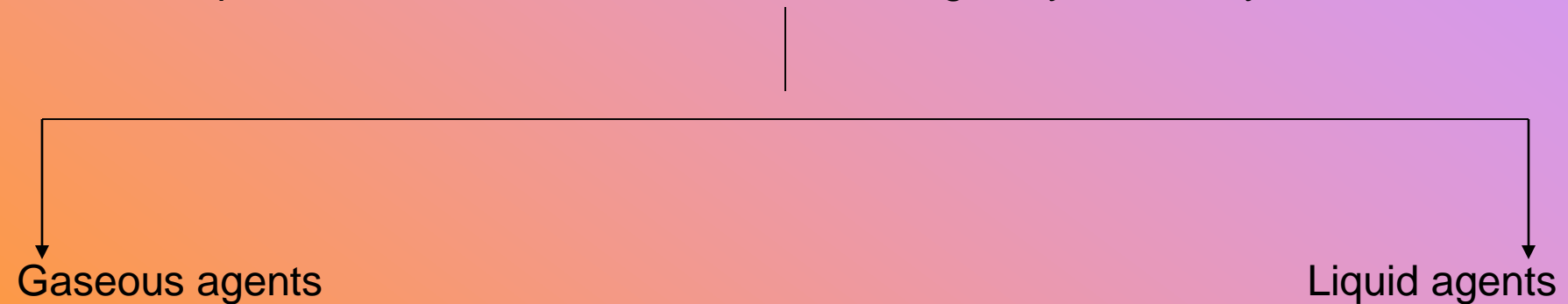
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Chemicals sterilization

It refers to the use of gaseous or liquid chemicals

It developed to sterilize materials that are damaged by wet or dry heat



- Ethylene oxide
- Formaldehyde
- Betapropiolactone.

Liquid agents



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Ethylene oxide

It is most popular gaseous agents > It is flammable and explosive except when mixed with carbon dioxide. It is capable to destroying all known microorganism including bacteria, spores, fungi, and larger virus

Formaldehyd

Pure formaldehyde is a white solid that gives off gaseous formaldehyde at room temperature. Formaldehyde gas has been used to sterilize medical and surgical equipment, vegetative form killed within 1-2 hours. Up to 12 hours is required to kill bacterial spores

Betapropiolactone

Betapropiolactone has been used to sterilize hospital rooms and animal housing buildings. It acts more rapidly than does either ethylene and formaldehyde main disadvantage , damage plastic surface highly toxic and carcogenic



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Cold sterilization:

It refers to the practice of soaking instruments in disinfectant solutions

Disinfectant

It is an agent that destroy all organism on non living tissue

Antiseptic:

It is an agent that inhibition growth of pathogenic organisms on living tissue



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Alcohols:

Ethyl alcohol and isopropyl alcohol kill bacteria by the coagulation of protein, Ethanol is generally used as 70% solution, and isopropyl alcohol is effective in concentration up to 99%

Aldehydes:

Formaldehyde is available as formalin 1:37% solution, it is capable to kill all bacteria, viruses, and spores, it is toxic and irritant to skin. Glutaraldehyde in dilute concentration is less toxic than formaldehyde and has similar activity

Chlorhexidine:

This is an antiseptic agent available in detergent, tincture, and aqueous formulation, used as an agent for skin preparation



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Iodines:

Inorganic iodine are good bactericidal agents but stain fabrics and tissue. They have good viricidal but poor sporicidal activity. Concentration more than 3.5% are toxic to tissue

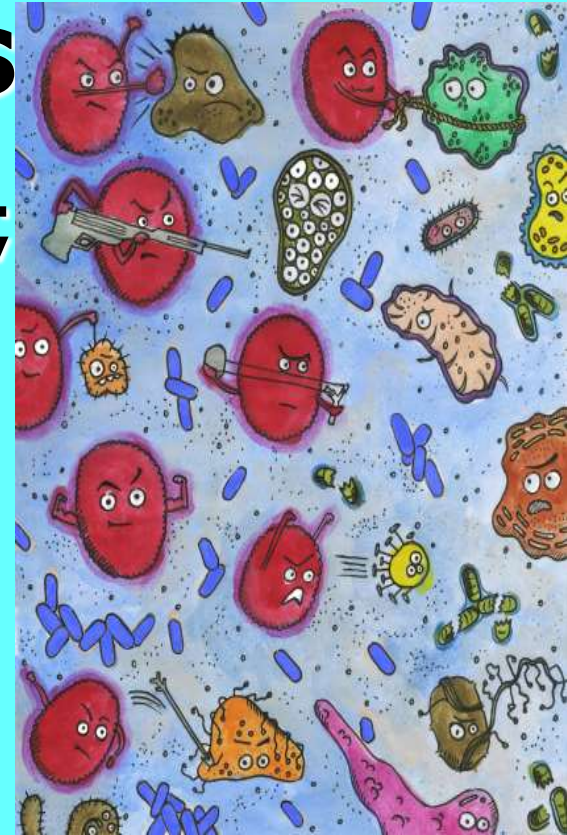
Phenol or carbolic acid is oldest known germicidal agent, phenolic derivatives have replaced phenol generally and may be divided into two groups. Cresol used as disinfectants on environmental surface, and bisphenol are used as antiseptics

Quaternary ammonium compounds:

Such as benzalkonium chloride are synthetic detergents

Requirements for antiseptics and disinfectants

- Must have a broad spectrum of action;
- Rapid onset of action;
- Should have a small latency period;
- Should have a high activity;
- Must be chemically resistant;
- High availability and low cost;
- Lack of local irritant or allergic effects on tissues;
- Minimal absorption from the place of their application;
- Low toxicity.



Classification of Antiseptics and Disinfectants (according chemical structure)

I. Inorganic substances

1. Halogens:

- Iodine (2%, 3%, 5% alcohol solution)
- Povidon-Iod (Betadinum)
- Iodophorm
- Lugol's solution
- Chlorhexidine

2. Oxidizing agents:

- Hydrogen peroxide
- Potassium permanganate

3. Acids and alkalis:

- Boric acid
- Salicylic acid
- Solution of ammonia

4. Metallic salts:

- Silver nitrate
- Copper sulfate
- Zinc sulfate
- Zinc oxide



Classification continuation

II. Organic substances

1. Aldehydes:

- Formaldehyde (Formalinum)
- Glutaraldehyde



2. Alcohols:

- Spiritus aethylicus (Ethyl alcohol)

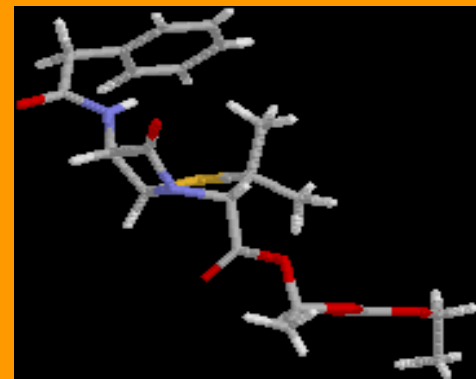
3. Phenol derivatives:

- Phenol (Phenolum purum, Carbolic acid)
- Cresol (Tricresolum)

- Benzylbenzoat

4. Dyes:

- Methylene blue
- Brilliant green (Viride nitens)
- Etacridin lactate





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Principles of Surgical Asepsis



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Wound infection have been a major problem since surgery began, Surgeon developed many methods to prevent wound infection. Wound infection still occur today. The increased use of antimicrobial agent tend to decrease wound infection

Prevention of nosocomial (hospital acquired) infections requires strict attention to all details of aseptic technique



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Asepsis:

Absence of pathogenic microbes in living tissue

Sterilization:

Is the process of killing all microorganism with the use of either Physical or chemical agents

Antiseptic:

It is a chemical agent that either kills pathogenic microorganism or inhibits their growth it is reversed for agents applied to the body.

Disinfectant:

It is chemical substance that kills microorganisms on non living tissue, such as instrument and equipment that can not exposed to heat

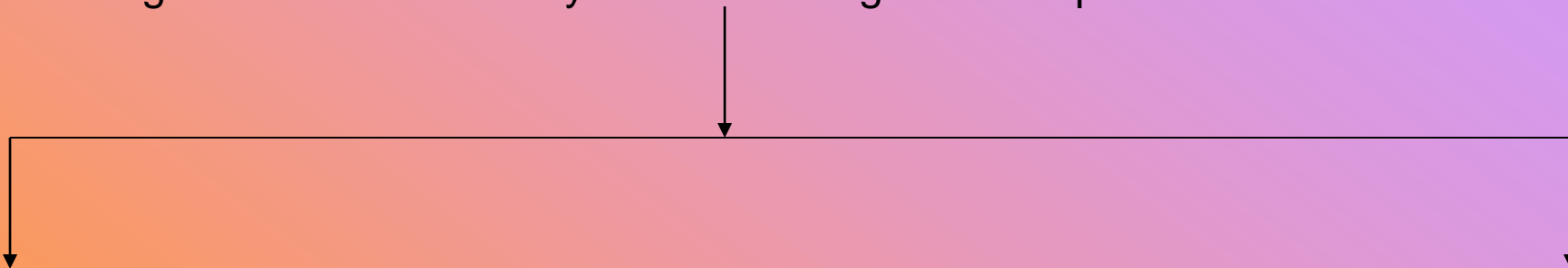


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Antimicrobial drugs

Drugs used to alter activity of microbial agent in the patient



Bacteriostatic: It is antimicrobial agents inhibit growth of bacteria

Bactericidal : Agent that killed bacteria



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Types of Surgical infections:

There are four major settings:

- 1- Primary surgical disease
- 2-Complication of an operation
- 3-Complication of diagnostic or support procedures
- 4-Infectious unrelated to the primary surgical disease



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Prevention of surgical infection

- 1- Proper selection and preparation of the patient
- 2- Surgical personnel preparation
- 3- Adequate sterilization of surgical equipment and materials
- 4- Proper maintenance of the surgical rooms
- 5- Attention to operative technique
- 6- Correct patient aftercare
- 7- Proper use of prophylactic antimicrobial agents



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Nosocomial infection

Infection that are acquired by the patient during the course of hospitalization

These infection may occur in anatomical sites other than the surgical wound and may developed preoperatively, postoperatively or even after the patient has been discharged



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Hemorrhage and Hemostasis



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Hemorrhage and Homeostasis

Loss of blood from the vascular system may be result of diapedesis or rhexis. Control of bleeding is very important because, Aside from anesthetic problems, the only problem in surgery is bleeding. Bleeding is eventually accompanied by shock, and loss of red blood reduce the oxygen carrying capacity of blood



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Causes:

1- penetrating wound

2- Incisions

3-Contusions or laceration

4- Blood may fail to clot within normal time because, Liver disease, irradiation, chemical poisoning, Walfarin, phosphorus, arsenic



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Types of Hemorrhage:

According to source



Arterial hemorrhage

Blood is bright red, and
flow under pressure



Venous hemorrhage

Blood is bluish-red and
flow freely



Capillary hemorrhage

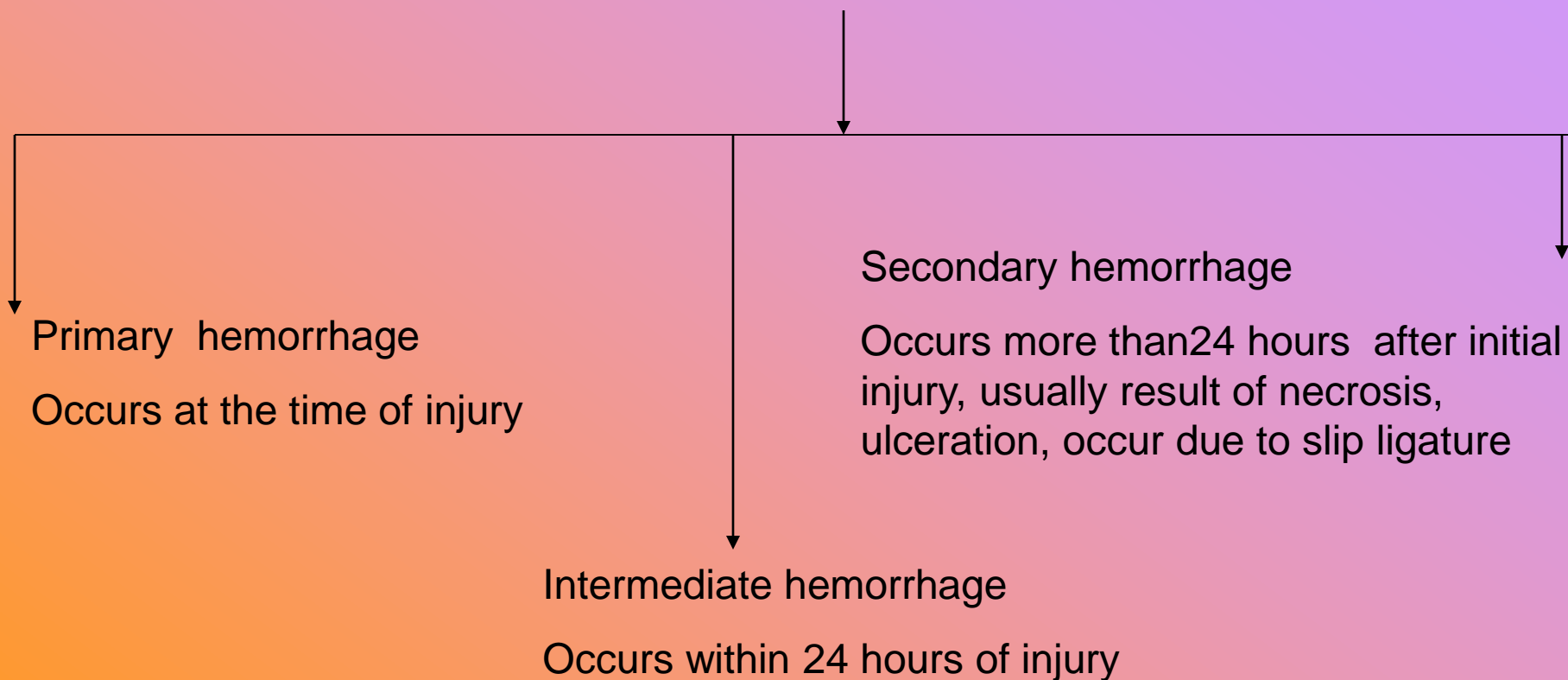
The blood oozes under
very low pressure



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According to time of occurrence as





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According to extent



Petechial hemorrhage

Small hemorrhagic areas within skin,
serosa, mucosa

Brushing bleeding

Which refers to larger areas of
subcutaneous or submucosal
hemorrhage

Deep hemorrhage

Which refers to
extravasations into
soft tissue.

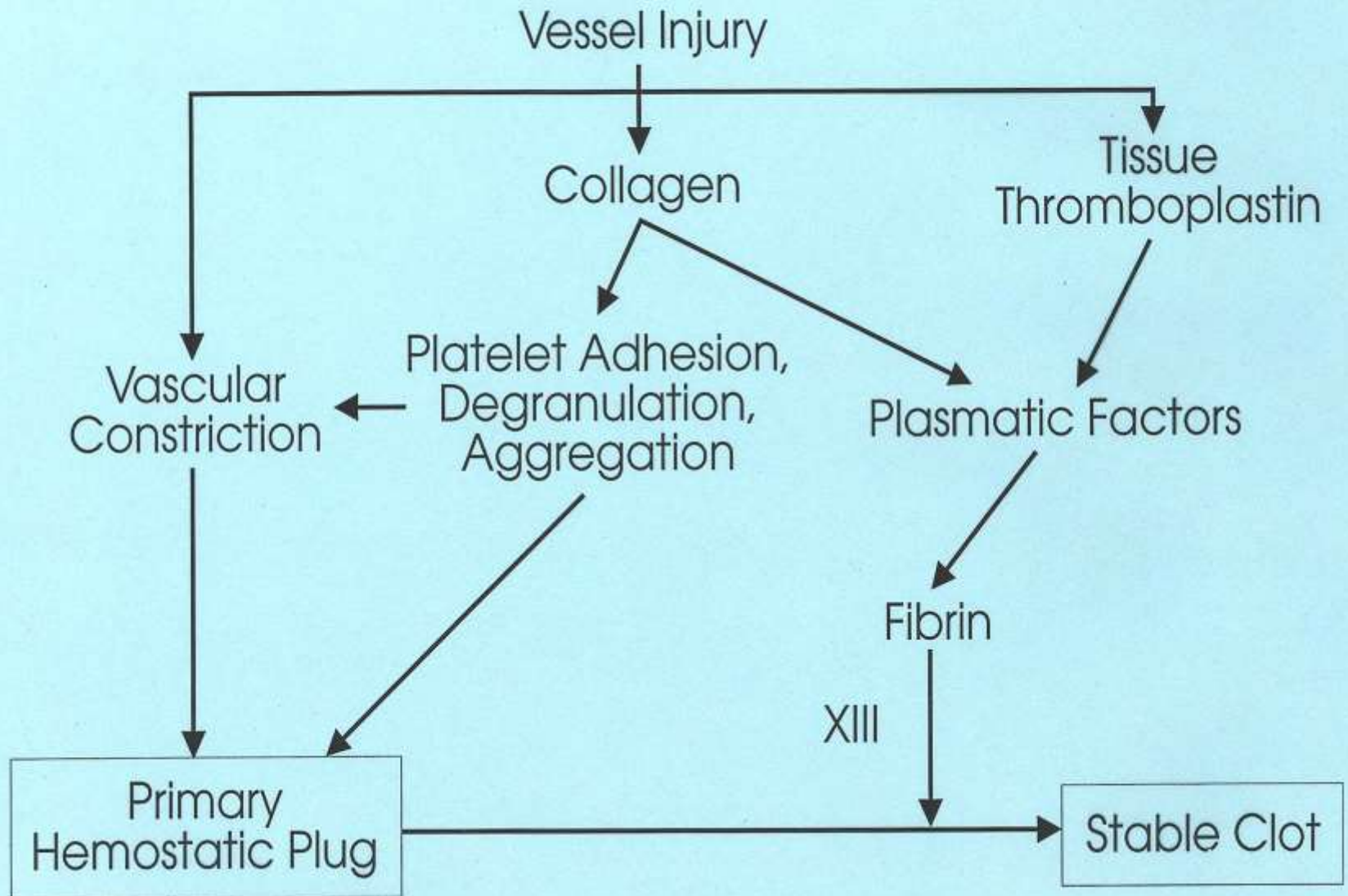


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Haemostasis

COMPONENTS OF HEMOSTASIS

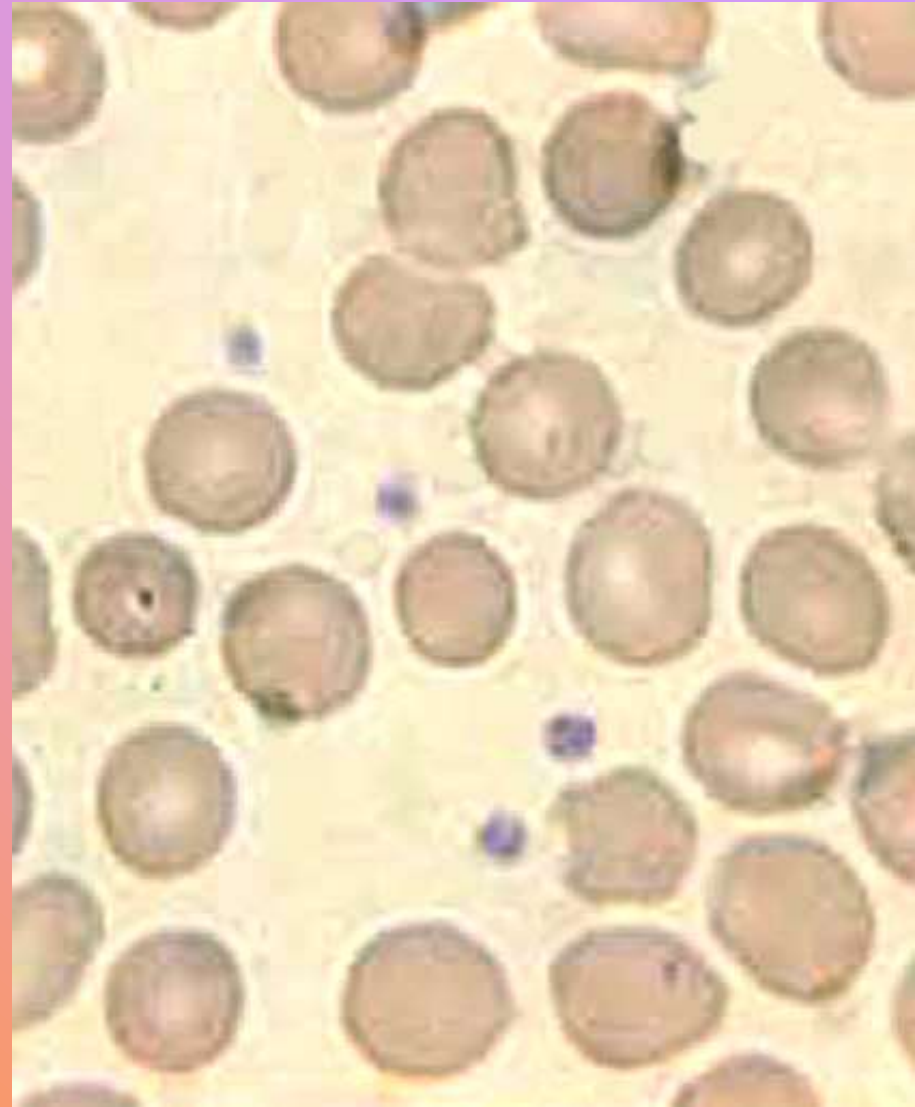


Process of Hemostasis

- Vascular injury
- Platelet adhesion and activation
- Platelet aggregation (1^o hemostatic plug)
- Fibrin formation via cascade (2^o hemostasis)
- Clot retraction (thrombasthenin)
- Fibrinolysis and healing

Role of Platelets

- Surveillance for vascular integrity
- Formation of 1^o hemostatic plug
- Activation of 2^o hemostasis
- Healing





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Hemostasis

There are at least 3 factors involved in the spontaneous arrest of bleeding

Extravascular:

Location of vessels, elastic nature of surrounding tissue, vessels passing through bone or cartilage are protected, vasoconstriction tends to reduce hemorrhage

Vascular:

When B.V injured the intima rolls inward and vessels end retract, providing suitable surface for accumulation of platelet and clot formation

Intravascular:

A series of blood clotting factors become activated when blood platelets undergo morphological changes in the presence of damaged endothelial tissue.



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Mechanical arrest of haemorrhage

1-Crushing

2-Torsion: can be twisting vessels by artery forceps

3-Ligation: This involves tying the end of bleeding vessels to prevent further escape blood materials which used same which used in suture

4-Suturing: Although suturing is used primarily to appose wound edges

5- pressure: Bleeding from surgical incision can be stopped by pressing a gauze sponge against the bleeding point

6- Tourniquet: by constricting band , should used for short time, tourniquets should be released every 20 minute

7- Electrosurgery and Electrocoagulation, Thermocautery burns tissues, and the coagulated tissues act as hemostatic plug



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Hemostasis with topically applied substances

Substances have an astringent effect on tissue and blood vessels, applied topically to small cuts, example ferric sulfate, ferric chloride, glacial acetic acid, silver nitrate, alum, tannic acid

Specific coagulant:

Gelfoam is a spongelike substance which has a large surface on which blood will clot, topical thrombin is a specific coagulant factor

Systemic hemostatic agents:

Vit K is necessary for formation of prothrombin, and helpful in preventing excessive hemorrhage



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Wound



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Wound:

A traumatic separation of skin, mucous membrane or organ surface.

Loss continuity of skin, mucus membrane

Closed wounds

Contusions

Abrasion

Open wound:

Incision

Laceration

Puncture

Penetrating



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Closed wound:

Contusions:

In these wound the skin is damaged but remains unbroken. Only connective tissue may be damaged, it is possible that muscles, tendons, nerve and even bone are involved.

Abrasions:

These wounds result from scraping or friction applied to the skin. Surgical intervention is unnecessary



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Open Wounds

Incisions wound:

Whether planned or accidental, incision are made by sharp object. The tissues are cleanly, and bruising of the margins is minimal

Laceration wound:

A laceration are made by a blunt object that tears tissue, some laceration produced a skin flap, or subcutaneous pocket, some laceration produce skin flap

Punctures wound:

These wound are caused by sharp-or blunt pointed objects, usually deep but have small opening. Foreign material may be detection



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Penetrating wound:

These wound communicate with the body cavities, they may result in internal infection such as peritonitis or empyema

Open Wound Classification

depended on the time.

- Four Classes
 - Clean (0-6 h)
 - Clean-contaminated (6-12 hr)
 - Contaminated
 - Dirty/infected (More than 12 hr)

Clean Wounds

- Most common is elective surgical incision
- Primary closure
- 1-5% rate of infection

Clean Contaminated

- Wounds contaminated by local flora despite aseptic technique
- Cholecystectomy, appendectomy and hysterectomy
- 3-11% infection rate

Contaminated

- Open traumatic wounds in nonsterile environment
- Open fractures
- Surgical procedures in which there is a gross deviation from sterile technique (emergent open cardiac massage)
- 10-17% infection rate

Dirty or Infected

- Gross/heavy contamination or active infection
- Perforated viscera, abscess and traumatic wounds
- >27% infection rate

Wound healing basics

Understanding •
healing is essential
to surgery and
trauma treatment





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Wound healing:

In lower forms of life, complete regeneration of injured tissue may occur.

Wound healing in mammals processes which occur, which include fibroplasia and epithelial regeneration

Wound healing is the foundation of surgery, when tissue injured either by surgical incision or otherwise a sequence of processes occur to close the wound, the surgeon should attempt to provide injured tissue with the best possible environment (apposition, removal of dead tissue, cleanliness

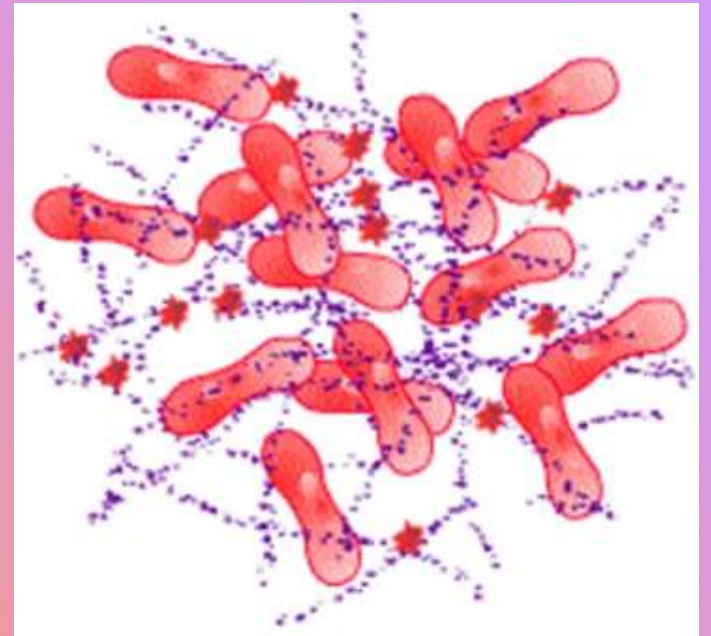
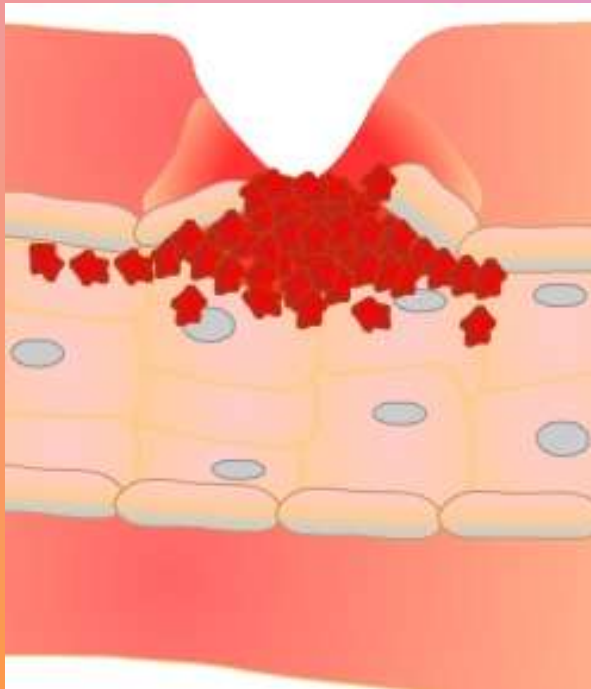
Wound Healing

- Four Stages
 - Hemostasis
 - Inflammatory
 - Proliferative
 - Remodeling

Wound healing Process

- Hemostasis Phase: Bleeding **0-3 days**
 - Begins directly after trauma or surgery breach
 - Bleeding helps to flush the wound
 - Instantly the vessels constrict, blood flow slows
 - Blood starts to clot
 - Protects from excessive blood loss
 - Clot dries= scab
 - Scab allows for protection and for healing underneath

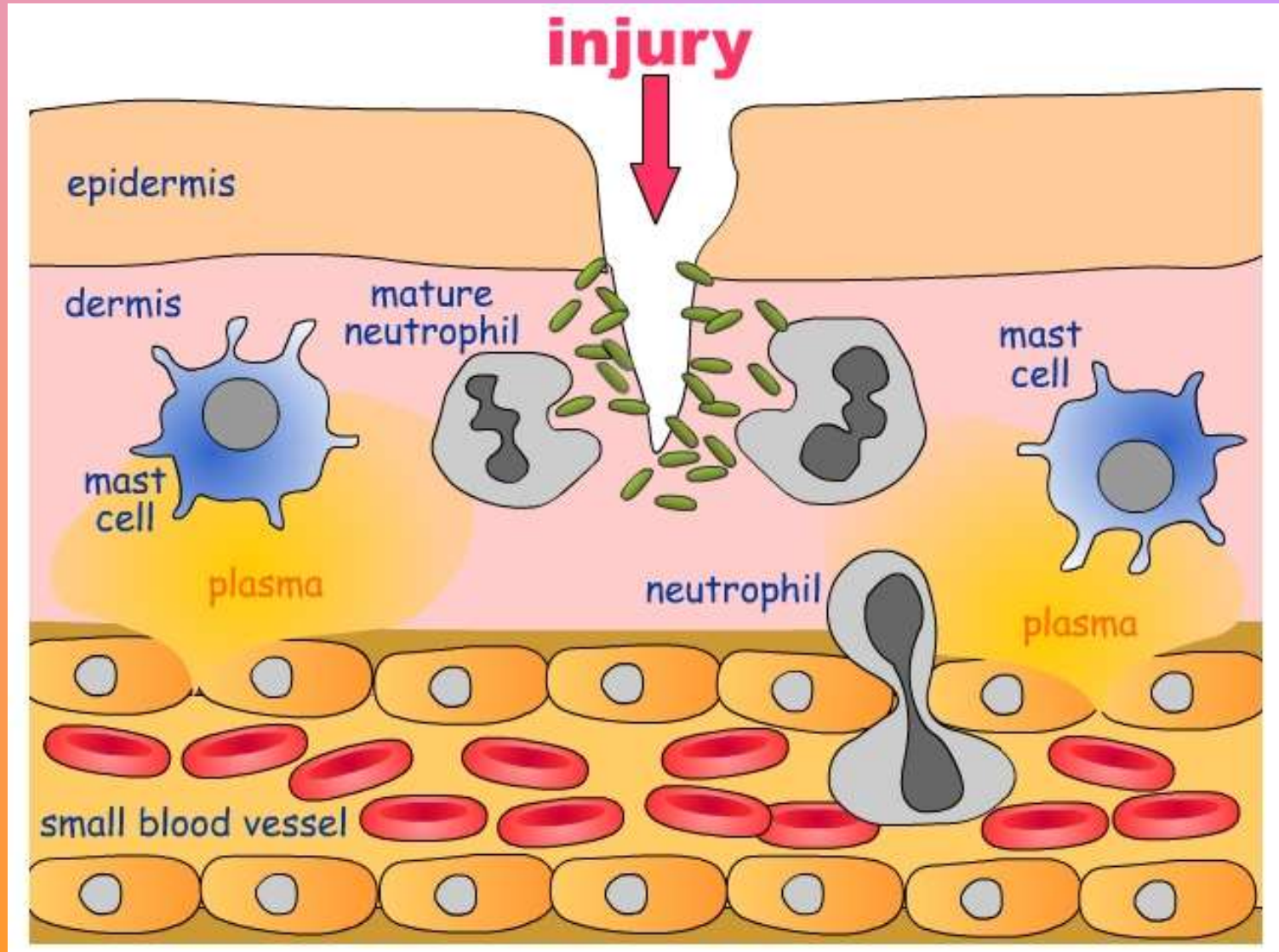
Hemostasis



Wound healing process

- Inflammation Phase: **(1-6 days)**
 - Blood vessels dilate
 - Bring more white blood cells to the area
 - White blood cells help destroy damaged tissue and bacteria
 - Dilated vessels increase heat into the region and produce red area
 - Damaged tissue releases plasma and adds to the swelling area
 - Signs of inflammation phase
 - Swelling, heat, redness, pain

Inflammation



Wound healing Process

- Repair/ Proliferation Phase (**3-14 day**)
 - Begins simultaneously with inflammation process
 - Connective tissue enter the damaged area and begin to form new fibrous connective tissue
 - Proliferation of cells in the new connective fibers and matrix
 - Capillaries begin to grow within the area
 - Produces a granular appearance on the skin
 - Tissue at this stage is called granulated tissue

Importance of Granulated Tissue

- This tissue fills the gap between the wound edges and sets barrier from infection
 - (Reminder) Rich supply of capillaries increases amount of white blood cells
- As the G tissue forms E tissue form across the edges
- Cells continue to layer and thicken

Wound healing process

- Remodeling Phase **(14 days + 1 year)**
 - Gap is closed (Second Intention Healing)
 - Occurs within several weeks of wound, but can last for years! (scar tissue)
 - Connective tissue w/in the wound becomes more organized and shrinks (scars shrink)
 - Strength of wound increases over time



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Factors effects on wound healing:

1-Hypoprotenemia

If serum protein concentration is below 2gm/100 ml, wound healing is inhibited. It seems that decrease plasma protein levels decrease fibroplasia. Feeding DL-Methionine or cystine prevent delayed healing. Methionine is converted to cystine which is the critical amino acid needed in wound healing and it is a component of one of the cellular enzyme in collagen synthesis.

2- Anemia and blood loss:

The healing wound depended on local microcirculation and supply necessary oxygen and other nutrient , therefore any factors interfere with microcirculation inhibits wound healing as in case of anemia due to blood loss



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3- Oxygen:

Oxygen is required for normal wound healing, so any decrease O₂ level will delay healing

4-Temperature:

wound had be reported to heal faster at environment temp. of 30 C than at normal room temp. (18-20) C. Decreasing room temp. from 20 C decrease tensile strength by 20%, vasoconstriction response decrease healing.

5-Uremia:

Uremia decrease wound healing by altering enzyme system, biochemical pathway and cellular metabolism wound strength is decreased in acute uremia.

6-Anti-inflammatory drugs:

Cortisone and its derivative decrease the role of protein synthesis stabilize lysosomal membrane and inhibits the normal inflammatory reaction. High doses of cortisone limit capillary binding, inhibit fibroblast proliferation decrease rate of epithelialization



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7-Vitamins and minerals:

Excessive doses of vit. A have been reported to increase the inflammatory reactions. The effect of Vit A is lysosomal labeling through an action on lysosomal membrane

a-Vit E:

It like cortisone, stabilize membrane. High dose of Vit E significantly retard wound healing and Collagen production

b-Vit C:

A deficiency of Vit C delay wound healing, Vit C is necessary for hydroxylation of proline and lysine for synthetic of collagen. Without Vit C the collagen molecular remain incomplete and may not be secreted by the fibroblast.



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c-Zinc:

Normal epithelial fibroplastic proliferation require the zinc-dependent enzyme DNA-polymerase and decrease transcriptase. Without adequate zinc level, epithelial cell and fibroblast may migrate normally, but they cannot multiply. Thus, epithelialization can not occur and Collagen synthesis is inadequate for wound healing

8-Radiation and Cytotoxic drugs:

Any agent that inhibit the division of local fibroblast or epithelial cell could delay or prevent wound healing , effect dividing cell

9-Dehydration and edema:

Dehydration delay wound healing, but moderate edema has little or no effect wound healing, marked edema has slight and temporarily inhibiting effect on healing



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10- Infection:

Infection have been shown to delay healing bacteria produce collagenases, which degrade collagen, the infected wound also had decreased fibroblastic activity. Bacteria change pH which may also effect healing.

11-Antiseptic:

Antiseptics destroy bacteria, but they also injury body cells. Any solution that is not isotonic can injury cells. Only isotonic solution should be directly applied to wound.



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Wound Healing



Primary Intention

Uncomplicated healing process of clean incision that has been readily closed and that required minimal epithelization and formation of granulation tissue

Secondary Intention

Healing process whereby granulation tissue must fill the base of wound before epithelization can be completed,
Deep Wound, untreated wound



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Treatment of Elective Surgical Wounds

Treatment should start with prevention of factors that can complicate wound healing, this mean delay surgery until the animal has been wormed , has been placed on better nutritional level, and when any systemic disease under control, weather time of year and facilites of postoperative handling, proper preperation surgical site

1-The surgical incision:

incision should cleanly made with sharp knife, parallel to normal lines and sufficient length, the wound should avoid, drying of tissue, traumatizing tissue by excessive mechanical retraction, blunt dissection for reduce the inflammatory response.



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2-Hemorrhage:

Application of proper tourniquet and or suction device is preferred to excessive swabbing, excessive electrocoagulation and ligation increase the local inflammation result destruction tissue. The application of Mosquito forceps to a bleeding vessels is the preferred method to hemostasis. Used of large crushing forceps should be avoided, Packing of an area to stop excessive hemorrhage may be necessary to prevent serious blood loss.

3-Drains:

Drains are used for maintenance of a passageway for the removal of accumulated pus, serum, and old blood within cavity or dead space, the drain should be positioned at the most dependent part of the cavity should be made of rubber, or plastic substance, Irrigation of cavity with antiseptic not usually recommended, Ringer's lactate solution are preferred when irrigation is necessary



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4-Sutures:

Ten-14 days of suture-supported wound healing time are required for most large animal surgical procedures that can not be externally supported by bandaging, with bandaging 7-or 8 days is sufficient. The need for sutures to remain for a period of time sufficient to minimize the possibility of wound break down

Remove of suture depended on many factors:

Surgeon's experience

Animal species

Temperament of the animal

Local reaction

Procedure employed

Time

Catch of animals



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There are no exact time to remove the suture materials, delay removing suture materials lead to infection

5- Postoperative immobilization and bandaging:

Normal healing processes of extremities are more likely to occur if the repaired wound can be externally supported and protected during time of stress. Specially when recovered from general anesthesia. Application of a firm well padded partially-immobilizing bandage will generally allow the horse to recover. With minimum of repair damage.



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Treatment of accidental traumatic wounds:

There are two main aspects of traumatic wound: first, is an emergency, second, it is contaminated. The emergency arises from complications, such as hemorrhage, shock, and the additional damage. All wounds are contaminated even a clean surgical wound which heals primarily, but, in comparison, the degree of contamination for traumatic wounds will always be greater because of the manner and method under which they occur. Wound therapy has two general division:

1- Emergency treatment

2-Final or definitive treatment



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1- Emergency treatment:

A- Control excessive hemorrhage

B-Effort should be made to prevent further bacterial contamination

C-Prevent animal from inflicting new or additional damage until the definitive treatment can be carried out.

D- Fractures will require some mean of immobilization.

E- Pressure bandaging will suffice in most cases

F- Systemic antibiotic therapy should be initiated at this time of major injuries.

G –Prophylaxis against tetanus should be considered for all wounds.



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Final or definitive treatment:

It should be carried as soon as possible. Final treatment consist of either an excision or debridement of the wound. The final treatment consist of either excision or debridement of the wound and its followed by reconstruction and tissue repair



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Wound Management:

Open wound should be closed as soon as possible. How closure is achieved depends on the initial classification of the wound.

Incised wounds that are seen early (within 6-8 hours) have less contamination than older wounds, in which the likelihood of infection is greater. Converting an incised wound to a clean wound usually requires minimal debridement and hemostasis. Primary closure can then be considered. If the wound is older, debridement is followed by leaving the wound open initially for three or four days and closing primarily at that time.



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Laceration and puncture wounds often require varying degrees of debridement. The aim of debridement is to convert a wound lined with damaged and potentially infected tissue to a surgically clean wound. Debridement removes dirt and bacteria as well as devitalized tissues that



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Wound dressings and bandaging

The purpose of bandaging a wound are :

- 1- To minimize haematoma and odema formation
- 2-To help obliterate dead space
- 3-To protect against additional contamination and truma
- 4-To absorb drainage
- 5- To minimize excessive motion



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Wound closure:

Whether the wound should be closed after the initial debridement or left open is not always an easy decision when there is any doubt, leave the wound open to heal by secondary intention, primary wound closure occur up to 8 hr. after primary injury. When contaminated wound like to suturing we should clean the wound perfectly remove all dead tissue .

Before primary closure performed, dead space should be eliminated . Suture can assist in the elimination of dead space but the number of suture should be kept to a minimum. The suture should be small in diameter and properly placed to gently appose tissue layers, Improper suture placement can retard healing



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Complications of wounds

1- Hemorrhage and traumatic anemia:

Results from loss of large quantity of blood, when hemorrhage is severe acute anemia will develop, the animal being in state of collapse with gasping respiration, running down pulse, and pallid mucous membrane, death may follow rapidly from cerebral ischemia

2-Syncope:

Characterized by sudden stoppage of the heart action, the patient appears to be dead, cause may be severe hemorrhage



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3-Shock:

4- Trumatic neurologia:

Manifested by continuous of an abnormal pain, it may confined to the region of the wound

5- Trumatic emphysema:

This is due to infiltration of the cellular tissue by air it is common complication of punctured wound of the respiratory tract.

6- Venous thrombosis:

It is the result of phlebitis appear in a vein that has been operred or contused at the site of wound



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7- Trumatic fever:

It happen due to absorption of toxin from the wound caused by the presence of bacteria

8- Septicemia and Pyemia :

Very little occur due to aseptic percussion and antibiotic drugs.

9- Gangrene

This is due to invasion of the wound by anaerobic microorganism, associated with deep wound

Problems in Wound healing

- Proud Flesh:
 - Common in lower leg wounds in horses
 - Over growth of granulated tissue prevents epithelial tissue from covering the wound





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Suture Materials and Tissue Adhesives



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Suture Materials:

Many different suture materials are available to veterinary surgeon, the choice of suture materials has too often been governed by the training, experience and preference of surgeon

Ideal suture materials

- 1- It should be suitable for use in any operation, the only variable being the size needed.
- 2- It should be easy to handle
- 3- Tissue reaction to the tissue should be minimal
- 4- The tensile strength should be high
- 5- Its knot should hold security with out cutting
- 6- It should be easy to thread and sterilize and should not shrink in tissue



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7- It should not electrolytic, no allergenic, and no carcinogenic

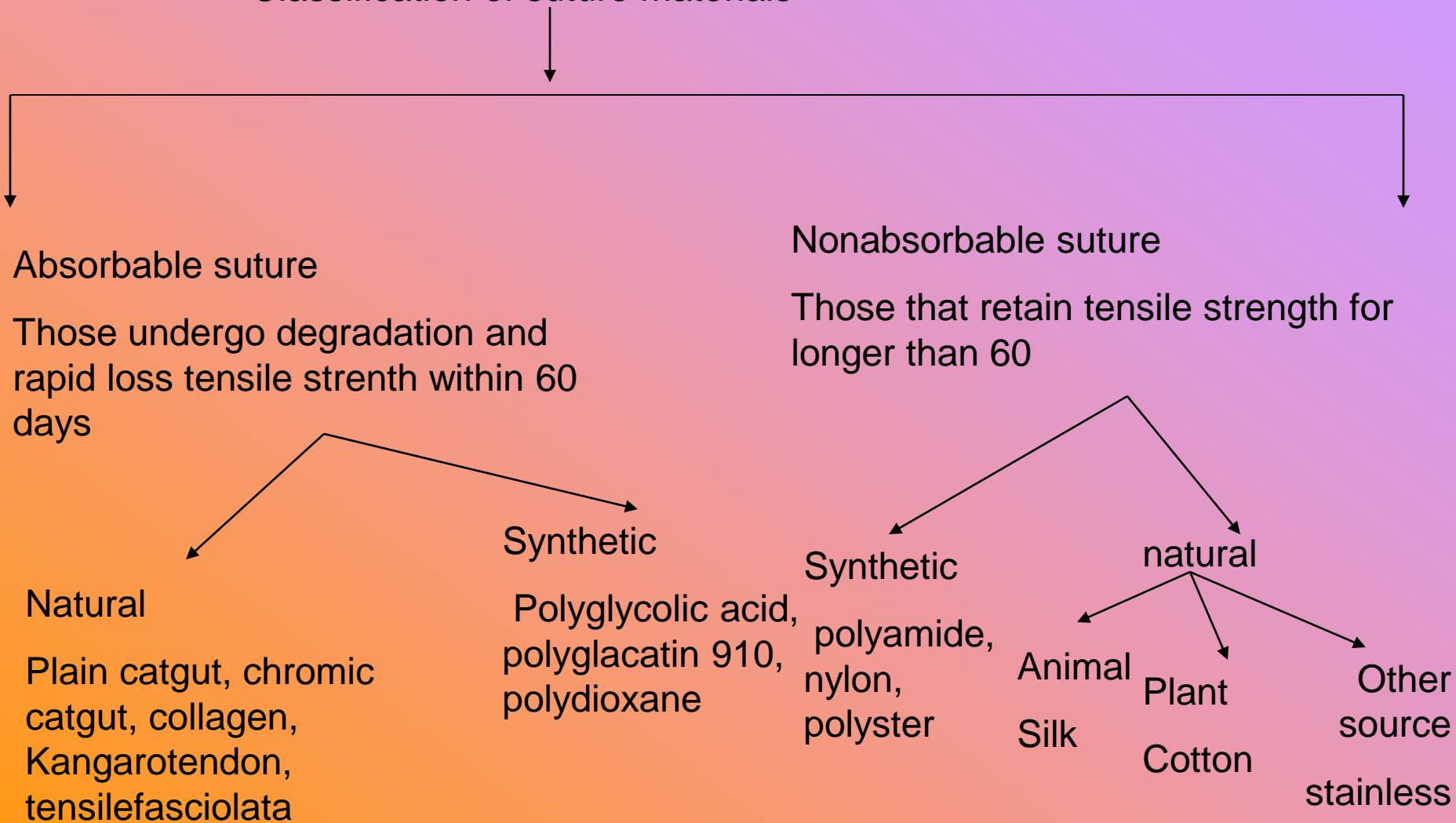
8- It should be absorbed with minimal tissue reaction after having served the purposes.

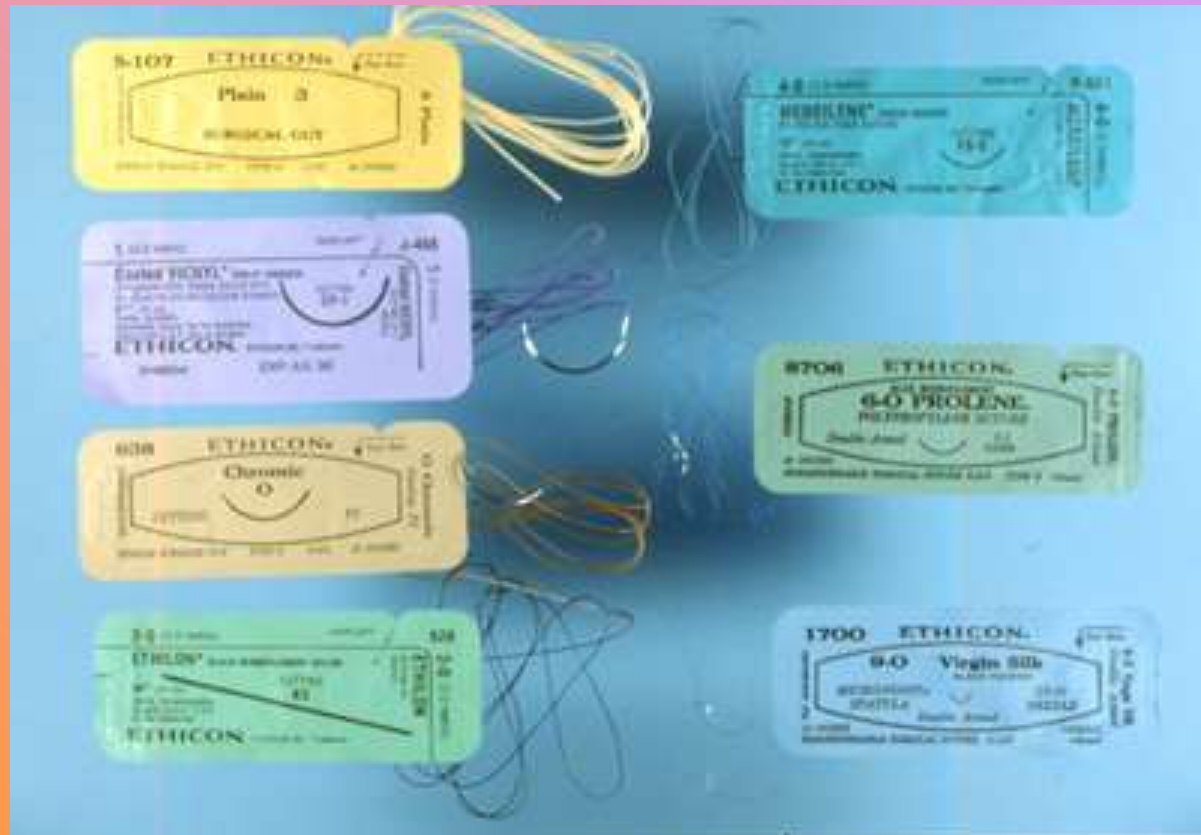


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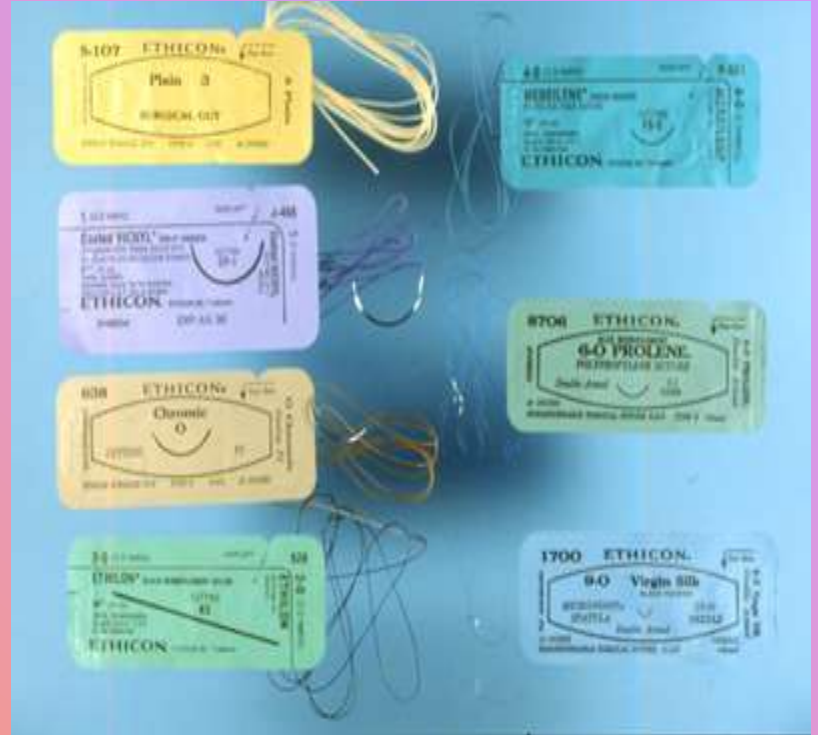
Classification of suture materials





Suture size is based on strength and diameter as **United States Pharmacopeia** decided by the

This system uses **(U.S.P "0"** as the baseline, average size suture. As suture diameter decreases, "0's" are added or numbers followed by a "0" (for example, 000 and 3-0 are the same size). As suture diameter increases above "0", numbers are assigned to the suture material



Properties of Suture Materials

<i>Absorbable sutures</i>				
Name	Brand Name	Tissue Reactivity	Knot Security	Handling
<u>Plain Catgut</u>	---	severe	poor	fair
<u>Chromic Catgut</u>	---	moderate	good	good
<u>Poliglecaprone 25</u>	Monocryl	minimal	good	good
Polyglactin 910	Vicryl	minimal	fair	good
<u>Polyglycolic acid</u>	Dexon	minimal	fair	good
<u>Polydioxanone</u>	PDS II	minimal	good	good

Non-absorbable sutures

Name	Brand Name	Tissue Reactivity	Knot Security	Handling
<u>Silk</u>	---	severe	good	excellent
<u>Braided Polyester</u>	Ethibond, Tevdek	moderate (if coating sheds)	poor	good
<u>Stainless Steel Wire</u>	---	practically none	excellent	poor
<u>Polypropylene</u>	Prolene, Fluorofil	minimal	good	fair
Polyethylene	---	minimal	poor	fair

Suture name	Source	Advantage	Disadvantage	Main uses
Catgut	Absorbable, natural	Adequate tensile strength Well tolerated by tissue Easy to handle	Some animal may sensitive Expensive Can not resrertilized Has some inflammatory reaction	GIT Mammary UB
Silk	Non absorbable natural	Easily to handle Well tolerated by tissue Inexpensive resterilized	Can not use in lumen Cause ulcer It act as nidus in GB,UB	Can use in skin All organs except, U, GB, UB
Nylon	Nonabsorbable synthetic	Minimal tissue reaction Good tensile strength Can be used in infection	Poor handling Not good in Knot security	Skin



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Tissue adhesives

The group of materials that have been used most extensively as tissue adhesives are the cyanoacrylates, it converted from liquid to a solid state by polymerization by a little amount of water present on the surface of tissue, setting time range between 2 to 60 seconds, depended thickness of tissue

Problems associated, some of them were toxic, also reported granuloma associated with use of tissue adhesive,

Severe wound infection when used in contaminated wounds

Delayed healing if the wound edges are separated.

It used in oral surgery, intestine anastomosis management of corneal ulcer, skin grafts



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Haematoma



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Haematoma:

An accumulation of free blood anywhere in the body, that has partially clotted to form a semi-solid mass.

Haematomas may be caused by injury or may occur spontaneously as a result of a bleeding or clotting disorder. In some sites, as within the skull, enlarging haematomas may be very dangerous. Infected haematomas may form abscesses

OR:

Accumulation of blood under subcutaneous tissue and skin due to rupture of blood vessels



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On manipulation it is found

Symptoms

It appear suddenly

Characterized by the formation of a uniformly fluctuating enlargement.

The liquid dose not completely fill the space

It can displaced from one part to other by manipulation,

Common site of lesion in the thigh, buttocks or forearm in large animals, in the dog ear hematoma



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Treatment:

Cold application and astringent application to arrest hemorrhage

2- Not open before 3 Week

3- Excision and remove after organized hematoma, put draine



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Treatment:

Cold application and astringent application to arrest hemorrhage

2- Not open before 3 Week

3- Excision and remove after organized hematoma, put draine



Hematoma occurs because the wall of a blood vessel wall, artery, vein or capillary, has been damaged and blood has leaked into tissues where it does not belong. The hematoma may be tiny, with just a dot of blood or it can be large and cause significant swelling be inflammatory or fluctuating and crepitating due to presence of liquid and coagulated blood.

Minor injuries occur routinely and the body is usually able to repair the damaged vessel wall by activating the blood clotting cascade and forming fibrin patches. Sometimes the repair fails if the damage is extensive and the large defect allows for continued bleeding. As well, if there is great pressure within the blood vessel, for example a major artery, the blood will continue to leak and the hematoma

❖ Types of haematomas:

Hematomas are often described based upon their location.

1. Cranial haematoma: Haematomas can be formed inside the cranium or brain following to the damage to the blood vessels due to trauma or increased blood pressure. They can be

- Epidural hematomas: between the skull and duramater
- Subdural hematomas : between the duramater and arachnoid mater
- Intra cerebral hematomas This type of haematoma is very difficult to manage in case of farm animals as involves more cost and is complex in nature..

2. Orthopaedic haematoma: Injuries and fractures are often associated with hematoma formation in and around bones. Bones are very vascular structures since the marrow is where blood cells are made. Fractures are always associated with hematomas at the fracture site. Fractures of long bones such as the thigh (femur) and upper arm (humerus) can be associated with a significant amount of bleeding, sometimes up to one unit of blood or 10% of the body's blood supply.

3. Pelvic haematoma

This is the haematoma in the pelvic cavity. This results from the tearing of the blood vessels during forceful parturition or any injury to the pelvic cavity. This is common in the high producing big breeds of cattle and buffalo.

4. Intramuscular haematomas

Intramuscular hematomas formed between the muscular layers. Some muscles are surrounded by tough bands of tissues. If enough bleeding occurs, the pressure within these compartments can increase to the point that a 'compartment syndrome' can occur. In this situation, the blood supply of the muscle is compromised and the muscle and other structures such as nerves can be permanently damaged. This is most commonly seen in the lower leg and forearm.

5. Subcutaneous haematomas.

These occur due to trauma or injuries to the superficial blood vessels under the skin characterized by formation of haematomas in the subcutaneous layer.

6. Intra-abdominal haematomas

Regardless of how the blood gets into the abdomen, Haematomas may occur in solid organs such as the liver, spleen, or kidney. They may occur within the walls of the bowel, including the small Intestine (duodenum, jejunum, ileum) or the large intestine (colon). Haematomas may also form within the lining of the abdomen called the peritoneum or behind the peritoneum in the retroperitoneal space (retro=behind).

7. Aural or ear haematomas.

This is most common type of haematoma occurring in the animals. This occurs if an injury causes bleeding to the outside helix or cartilage structure of the ear. Often called boxer's, wrestler's ear, or cauliflower ear, blood gets trapped between the thin layer of skin and the cartilage itself. Since the ear cartilage gets its blood supply directly from the overlying skin, a hematoma can decrease blood flow causing parts of the cartilage to shrivel and die. Hematomas within the ear flaps ("aural haematomas") occur when head shaking breaks a blood vessel within the ear flap.

The ear flap may partially or completely swell with blood. The swelling maybe so large and painful that the opening of the ear canal is occluded. The extra weight of the ear flap may be uncomfortable and may lead to a permanent change in the carriage of the ears. This conditions more common in dogs but can occur cats as well. The ear flap will feel fluctuant and fluid-filled, like a water balloon



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❖ OTHER COMMON HAEMATOMAS OCCURRING IN ANIMALS Cattle:

- ❑ Teat/ Udder haematoma: caused by rubbing against hard ground, biting of calf during suckling.
- ❑ Mammary Vein Haematoma: Cattle can sustain huge hematomas cranial to the udder, probably resulting from trauma to the subcutaneous abdominal vein. Possible mechanisms that cause the trauma include lacerations, getting up and down, or fighting other cattle.



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Vaginal haematoma:

Fetus passage may damage the internal pudendal artery, resulting in formation of a large hematoma lateral to the vaginal wall. In rare cases, this condition may be bilateral. In most instances, these haematomata resolve spontaneously; sometimes they become infected and persist as abscesses. Haematomata of the vagina may protrude from the vulva. Hematoma of the vulva is usually obvious. Both may be readily drained after allowing 3 days for haemostasis.

Penile haematoma: A hematoma results from sudden or forceful bending of the erect penis. During the peak of erection, blood pressure within the corpus cavernosum penis rises to astronomical levels. Deviation of the penis at this point (by sudden movement of the cow or by thrusting of the bull against the thigh of the cow before intromissions achieved, results in rupture of the tunica albuginea and hemorrhage. The hematoma may be exacerbated by repeated mating attempts by the bull. The site of the hematoma is usually distal to the distal curve of the sigmoid flexure ..



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❖ Horse:

Shoulder haematoma: injury to the spur vein or external thoracic vein by the rider is common cause of haematoma in horse

❖ Dog/ Cat:

Aural haematoma: Haematoma of the ear flap. It is very common condition in dogs which have got very long pendulous ears. Blood and serum accumulate in between conchal cartilage and the skin of the skin of the ear. It results from prior contusion.

Dogs, cats and pigs suffer.

Vaginal mucus membrane haematoma: Caused due to injury during copulation, common in dogs but is seen in all species. Testicular

haematoma: improper ligation of the arteries during castration of dog or pig and improper surgical technique without proper haemostatic technique may result in the extravasation of the blood into the testicular cavity causing large haematomas



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ETIOLOGY

1-Trauma It is the most common cause of haematoma in animals. Trauma during various management operations and the animal itself causes the rupture of the delicate blood vessels giving rise to the extravasion of blood when a blood vessel is damaged blood leaks into the surrounding tissue; this blood tends to coagulate or clot. The greater the amount of bleeding that occurs, the larger the amount of clot formation.

❑ Trauma includes

- Rubbing against hard objects during sitting or accidentally causing udder haematoma in dairy cattle.
- Injury to teat during suckling milk by the claws also result in teat haematoma.

- Deviation of the penis at the time of peak erection (by sudden movement of the cow or by thrusting of the bull against the thigh of the cow before intromission is achieved, results in rupture of the tunica albuginea and hemorrhage resulting the haematoma formation.
- Damage to the internal pudendal artery during foetal passage causes haematoma of the vagina. The trauma during copulation also results in vaginal haematoma.).
- Pets that paw at their ears or shake their heads vigorously, especially those with large ears, can cause a hematoma. This pawing and shaking can be due to irritants around the face and ears, or irritants in the external ear canals like infections or foreign bodies(foxtails
- Damage to the spur vein or external thoracic vein in case of horses by horse riders.



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2. Itching produced due to allergic response may cause severe rubbing and scratching of the ears resulting to haematoma.

3. Ear mites *Otodectes cynotis* one of the very important cause of haematomas in dog. *S. Scabiei* and pediculosis (lice) may cause haematomas in pigs.

4. Autoimmune disease Sometimes autoimmune disease of the pinna tissue has found to cause haematomas of the



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❖ CLINICAL SIGNS:

In case of aural haematoma:

- Repeated shaking of the head,
- rubbing of ears and pain of the ear.
- Ear may appear as ovoid or round tendered, swelling, fluctuating on pressure.
- Swelling is either in the inner or outer surface of the ear.
- The ear flap may partially or completely swell with blood. The swelling may be so large and Painful that the opening of the ear canal is occluded
- The head is carried at an angle keeping the affected side lowermost.
- Discolouration of the skin, reddish to bluish red.
- Hematomas of the bladder wall (cystic hematoma) cause hematuria in neonatal foals



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CLINICAL SIGNS:

- In case of penile haematoma, when the initial haematoma is over 15 cm in diameter, more extensive damage to the penile adnexa (telescoping fascia) results, making restrictive adhesion formation more likely.
- Haematomata of the vagina may protrude from the vulva as bluish coloured sac like structure. Hematoma of the vulva is usually obvious.
- Secondary bacterial complications may lead the condition more painful and there maybe accumulation of pus.
- Swollen and oedematous testis with fluctuates uniformly on palpation with doughy consistency
- Puncture with needle (aspiration) will reveal oozing of blood and serum from the swelled part



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TREATMENT

The treatment of haematoma can be grouped into two categories:

1. Medical treatment
2. Surgical treatment



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Medical treatment:

Haematomas should not be insised as far as possible. Time should be given (2-3 wks) for resorption. If no resolution of haematoma occurs, then only incision is indicated.

This is also called conservative therapy where by a needle is inserted to drain out the fluid called aspiration and the area is bandaged tightly (esp in aural haematoma) to prevent the fluid from forming again.





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This is always not successful. The pet will also go home with oral medication to be used for 10 days. This treatment is usually repeated in one week, although some cases are healed after the first week of therapy. Pets that don't heal after the second treatment need surgical treatment.

- Mild cases can be treated with heparin (Thrombophob gel (German remedies) These may promote dispersion and absorption of blood
- Treatment for mite, lice, etc. to be resorted.
- Antibiotics can be administered to prevent secondary bacterial infections



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Surgical treatment:

The treatment of aural hematoma in animals will normally require surgery to be performed on the ear. Although the exact surgery involved will depend upon the cause of the damage. In some cases use may be made of needle aspiration. But recurrence of the condition is probable with this technique. Besides the damage itself, there is also the issue of any bacterial infection that may have been picked up and this could require a course of antibiotics.



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The first step in the surgical procedure is draining of the fluid. An stab incision is made with a scalpel blade and the

bloody fluid is drained. If solid substance is present, dissolve it in normal saline and aspirate.





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- ❖ During aural haematoma apply “thorough to through” i.e. horizontal mattress suture along the whole thickness, both sides of incision site.
- ❖ In case of removal of immature haematoma, there are chances of reoccurrence.
- ❖ Obliteration of all the dead space by suturing. To prevent the hematoma from refilling with fluid, multiple sutures are placed in the hematoma space either vertically or horizontally, either partly through or completely through the ear flap, with or with outear cartilage removal.
- ❖ Sometimes bandages are applied post-operatively. Sutures are generally left in place for 3 weeks to allow good scarring to take place so that refilling will not occur.



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TREATMENT

The treatment of haematoma can be grouped into two categories:

1. Medical treatment
2. Surgical treatment



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Abscess:

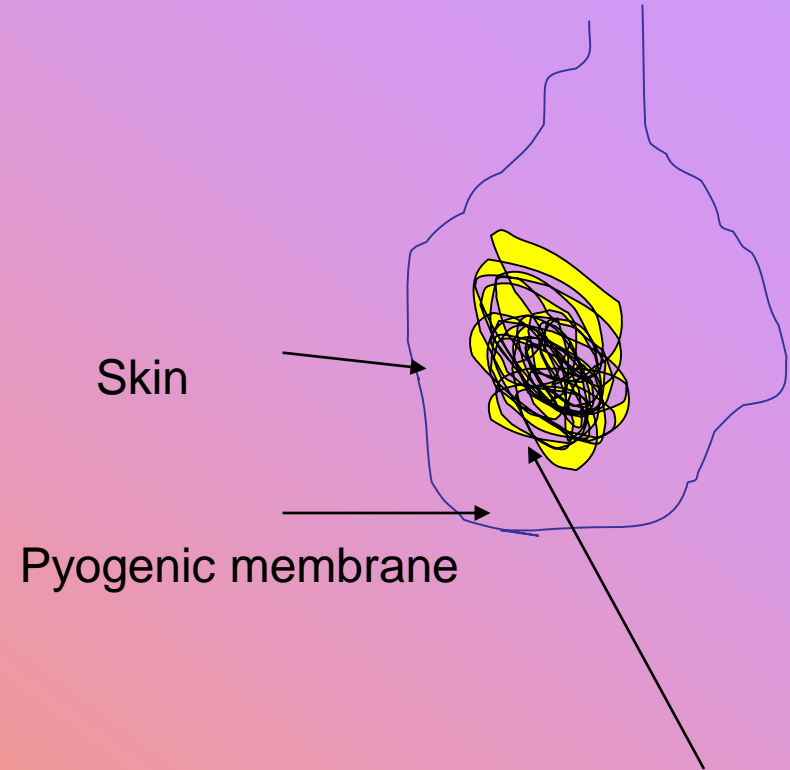
Circumscribe swelling containing pus.

It consist of Wall, Pyogenic membrane, pus

An abscess is a collection of pus. Pus is a thick fluid that usually contains white blood cells, dead tissue and germs (bacteria).

The pus may be yellow or green and may have a bad smell.

The usual cause of an abscess is an infection with bacteria. Certain bacteria are more likely to be 'pus-forming' as they make chemicals (toxins) that can damage the body's tissues.



Skin

Pyogenic membrane

Pus

It varied according to tissue, organisms



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These include *Staphylococcus aureus* and *Streptococcus pyogenes*. The infection causes the immune system to set off white blood cells and chemicals to fight the bacteria. In this 'battle' some tissue dies. A cavity forms and fills with pus. The cavity becomes bigger if the infection continues and the pus can't get out.

Causes

Abscesses occur when an area of tissue becomes infected and the body's immune system tries to fight it. White blood cells move through the walls of the blood vessels into the area of the infection and collect in the damaged tissue. During this process, pus forms. Pus is the buildup of fluid, living and dead white blood cells, dead tissue, and bacteria or other foreign substances.

Abscesses can form in almost any part of the body. The skin, under the skin, and the teeth are the most common sites. Abscesses may be caused by bacteria, parasites, and foreign substances.



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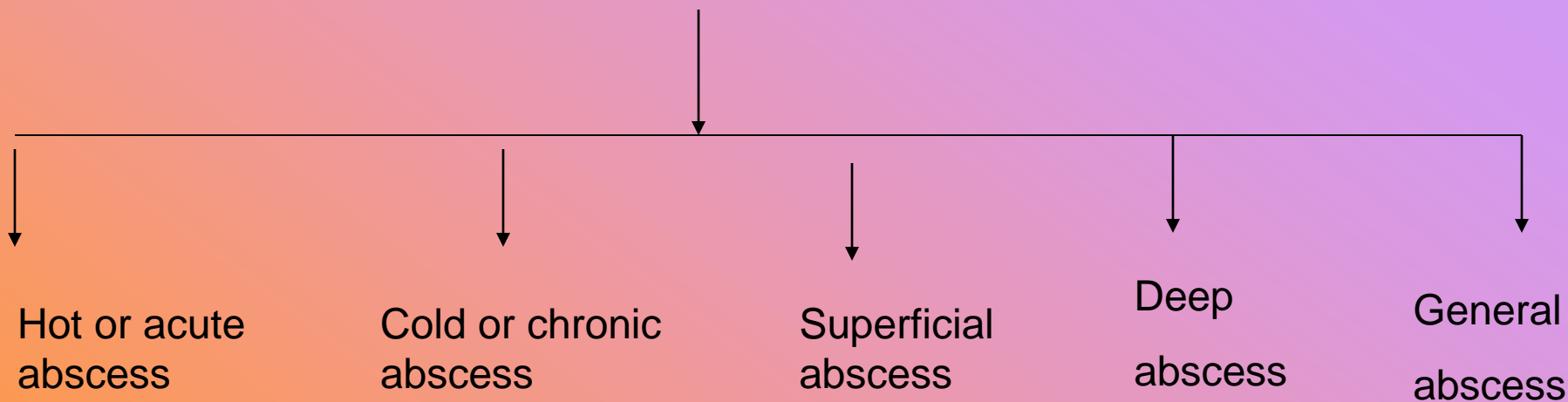
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Abscess





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Acute Abscess:

It forms after a period of 3-5 days from the infection, symptoms firm swelling very painful on manipulation , Hot , content gradually become softer, fluctuation under pressure, if left center become very thin

Differential diagnosis :

Cyst, Haematoma, Hernia, Tumor, Hygroma

Treatment:

- 1- Maturation
- 2- Opening



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1- Maturation:

Application of hot fomentation or blister (Iodine ointment)

2- Opening:

Until obviously fluctuating until all pus are collected in one cavity, if opened before all pus collected in one cavity secondary abscess may form in the inflamed tissue, Abscess usually opened with + Knife or Scalpel opening are made at most depended part of the region which is fluctuating , open by this way :

1- incise the Skin

2- push a blunt instrument such as artery forceps until enter cavity

3- Having opened the abscess explore the cavity with the finger to ascertain if it contains a foreign body or necrotic tissue

4- Counter opening may be done for provided good drainage to pus

5- Destroy the pyogenic membrane

6- Irrigation cavity with an antiseptic lotion after it evacuation



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7-leave the open Abscess with out suture

8- Put a drian soaked with tincture iodine for better drainage

9- Change drain every day until complete cleaning from any pus

Chronic Abscess

Show little or no inflammatory reaction, they developed slowly, are painless, or slightly painful, persist for along time , result from slight and repeated injuries

Chronic abscess may be classified as hard cold abscess, soft cold abscess

Hard cold is surrounded by hard fibrous tissues and contain small amount of pus

Soft cold abscess has a thin wall contain comparatively large quantity of pus



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Symptoms:

Hard mass accompany with symptoms of inflammation which disappear after short time lesion assume more as fibroma of an abscess

Treatment:

Same line a in acute abscess. Blister applied to render the abscess acute and bring pus to the surface before opening it



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Cyst



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Cyst :

Swelling containing fluid material and occasionally solid structure such as teeth and hair (dentigerous cyst, dermoid cyst)

Characterized by

1- Uniformly fluctuating

2-non inflammatory and slowly in development

Diagnosis Expletory punctucre

Treatment:

1- Puncture to evacuated it contain and then injected with an irritant liquid such as Tincture iodine or 5% solution of carbolic acid to destroy it smooth lining and set up inflammation and granulation which lead to fill the cavity

2- Incision with scalpel to release the content followed by application of an irritant as in 1.

3- Excision of the cyst as tumor



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Tumors



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Tumors:

It can be defined as a mass of new tissue having no physiological use which persists and grows independently of its surrounding structures. The terms neoplasm and tumor are frequently the same.

The external appearance of tumors has wide variations. The consistency of a tumor usually gives significant indications of the nature of many neoplasms. For example, osteosarcoma and chondroma have almost a strong hardness, but some fibromas may be softened by edema.

Hemorrhage, necrosis, mucus degeneration or cyst formation and some become very hard fibrosis or calcification.

Ulceration is frequently seen in neoplasms of the skin and mucous membrane.



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If the neoplasm occur in gland the cavity of that gland may be perforated or maybe stimulated to excessive activity.

Classification of tumors:

1- Benign tumor:

Resembles the tissue from which is originated, it is encapsulated and slow in growth, the skin not adherit to them, they do not ulcerated on their surface it cause little damage to the host. If death occur it may be interference with the function of vital organ, because the location and size rather than destructive of tissue.

Malignant tumor:

Cauterized by rapid growth and because of it infiltrative manner of development is fixed in the tissue. The cell of malignant neoplasms usually atypical to some degree and have tendency to involve the surrounding tissue. The skin is usually adherit to the surface and is frequently ulcerated at there level.



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Because of the infiltrative of malignant cell into the surrounding tissue the macroscopic boundary may not be microscopic and all of the neoplastic cells not be removed If this occur the remaining cells act as a focus of growth.

Names of tumors:

Type I Connective tissue

- 1- Fibroma composed of C.T
- 2- Chondroma, composed of cartilage
- 3-Osteoma Composed of bone
- 4- Myxoma, composed of mucus memberane
- 5- Lipoma, composed of fat tissue
- 6-Melanoma derived from pigment producing cell
- 7-Sarcoma a cellulat tumor composed of anaplastic tissue any of the above type.



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Type II Epithelial and glandular:

- 1- Papilloma tumor of epithelium
- 2- Adenoma glandular epithelium
- 3-Carnioma

Sarcoma

It is malignant type of tumor composed of cell of the connective tissue. The majority of the sarcoma are bulky, soft and vascular. This soft consistency reflect the cellular character of rapidly growing tumors. In general the gross apperance depended largely upon the tissue of origin as fibrosarcoma, chondrosarcoma, osteosarcoma, liposarocoma lymphosarcoma. Sarcoma are usually single but multiple tumors arise in nerve trunks of the skin.

Growth usually rapid and locally destructive. Due to infiltrative type of growth it may be difficult to excision or remove and it retained after excision. Metastasis is observed in advantage stage of most sarcoma



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Diagnosis:

The clinical manifestations are the first important in the diagnosis of tumor

1- presence of swelling or enlargement as sore which does not heal.

2- Abnormal or bloody discharge

3- It is very important that gross diagnosis of tumor should be done as fast as possible

4- The most important aids in the diagnosis is a biopsy obtaining of the tissue from the live host for microscopic examination.

Metastasis



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Treatment of tumor:

- 1-The best method of treatment for neoplasm is early complete surgical removal some neoplasm are very vascular and proper precaution should be made to treat shock.
- 2- Radiotherapy
- 3-Vaccination.



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Sinus



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Sinus : A blind purulent tract showing no tendency to heal

Fistula : Abnormal opening or passage between two cavity or duct and the surface of the body .

Frequently fistula applied to Sinus

Forms of Fistula:

- 1-Complete fistula which has two opening
- 2-Incomplete or blind fistula, has only one opening
- 3-Congenital fistula (Patent urachus)
- 4-Pathological fistula
- 5-Purulent fistula
- 6-Excretory and secretory fistula



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Etiology

A Sinus or blind fistula is usually due to something which maintains a constant discharge from a hollow wound or abscess cavity. The cause may be:

- 1- drainage from a purulent cavity
- 2- Presence of foreign body or necrotic tissues
- 3- The existence of a specific lesion in the tissue e.g carcinoma, myosis, tuberculosis



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Symptoms

- 1-The orifice of the sinus may be very narrow and only admit probe
- 2- It may be surrounded by excessive granulation when it is recent, or its border may be hard and fibrous when it is old.
- 3- There may be more than one opening leading to the center of the lesion when necrotic tissue is present in depth.
- 4- A sinus may close for a variable time until a new abscess forms.



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Treatment

- 1- providing drainage
- 2- The use of liquid or solid caustic
- 3- Open the sinus
- 4-Arrest of movement in the wall of cavity
- 5-Pencilline injection.



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Gangrene



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Gangrene :

Death and putrefaction of tissue while attached to living body

Necrosis:

Death of tissue with absence of infection

Gangrene divided into two group:

1-Gangrene resulting from direct damage to the tissue caused by mechanical, physical or chemical agent or by bacteria. Organisms which most frequently the direct cause of gangrene are those of malignant odema, necrosis, anthrax and black leg



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Traumatic gangrene occurs as a result of compression interfering with nerve and blood supplier of a part. Burns and frost bite give arise to gangrene as do also caustic agent.

2- Gangrene due to indirect change in tissues:

Arises from venous, arterial, or cardiac or nerve affections in the blood. As the result of these conditions the tissue involved are deprived of their nutrition and consequently loss their vitality.



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Clinically gangrene is classified as

1- Dry gangrene (mostly due to arterial occlusion) it is like mummification of the tissue in which it become dry and reduced in volume purifications practically absent.

2- Moist gangrene:

Mostly due to venous occlusion, occur in tissue has high amount of liquid, like udder. They become disintegrated and liquefied by the action of putrefactive bacteria. The lesion contains volatile odor, with soluble poisons, when absorbed cause toxaemia.



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Local symptoms:

Dry gangrene tissue become altered in appearance and diminished in volume

Most gangrene tissue become purple greenish or blackish in color and increased in volumes being engorged with blood and serum

Prognosis:

Depended on the nature of the lesion, which may vary from an insignificant ulcer to the sloughing of a large mass of tissue, the condition is dangerous when the toxemia is severe. Death may occur within 24 hr.



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Treatment

1- Remove the cause.

2- Scarfication with the knife or puncture of the engorged gangrene tissue may be performed to permit the escape of toxic liquids and allowing the introduction of antiseptic lotion to counter act the putrefaction. The danger of this method in wounding of healthy tissue at the same time and allowing the entrance of organisms present in the lesion leading perhaps to a fetal septicemia

3- Application of an irritant may be applied at the periphery of the dead part to produce increase hyperemia and phagocytosis thus accelerate the separation of dead tissue in case of dry and moist gangrene

4- Amputation of an organ a limb affected with gangrene may be performed in certain cases.



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Burns



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Cause: Heat, electrical current, hot liquid (acids, alkaline) when come contact with skin Burns wound depended on it dept and surface area

1-First degree burns: only the epidermis is involved the basal layer of the epidermis is not destroy. And the wound heal in 3-6 days without scaring it is present in sunburn in human and in some thermal injury in dogs caused by gas explosion and hot liquid.

2- Second degree burns: The epidermis and part of dermis are destroyed. In human both 1st and 2nd degree burns contain blister, but these are not usually seen in animals skin except in pig.

3- Third degree burns: The entire thickness of the skin and all skin subcutanues are destroyed.

In general the 3rd degree burn wound has an intensive surface, unlike 1st and 2nd degree



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Pathology of Burns:

Following a superficial burn, the skin becomes red and thickened to hyperemia and odema in deeper layers.

Partial-thickness burns produce severe damage to the epidermis. The capillaries, venuels become dilated and congested and permit the escape of plasma. This result in massive edema of s/c tissue and leukocytes migrate from damaged vessels into the surrounding tissue.

In full thickness burns: the entire skin is coagulated into hemogenous layer or sheet as a result of heat effect on protein. The superficial BVS of S/c tissues are thrombosed resulting in dry gangrene of damaged tissue.



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Treatment of Burns:

- 1- hair on the burn surface and surrounding skin is removed.
- 2-Area gently washed with water and mild soap or a detergent antiseptic such as providene iodine or chlorhexidine.
- 3-All debris, shreds of tissue and loose necrotic material are removed
- 4-Then the area is irrigated thoroughly with warm isotonic saline solution
- 5- A surface burn (1st and 2nd degree) is covered with suitable antiseptic or antibiotic cream and the lesion is bandaged if it is needed