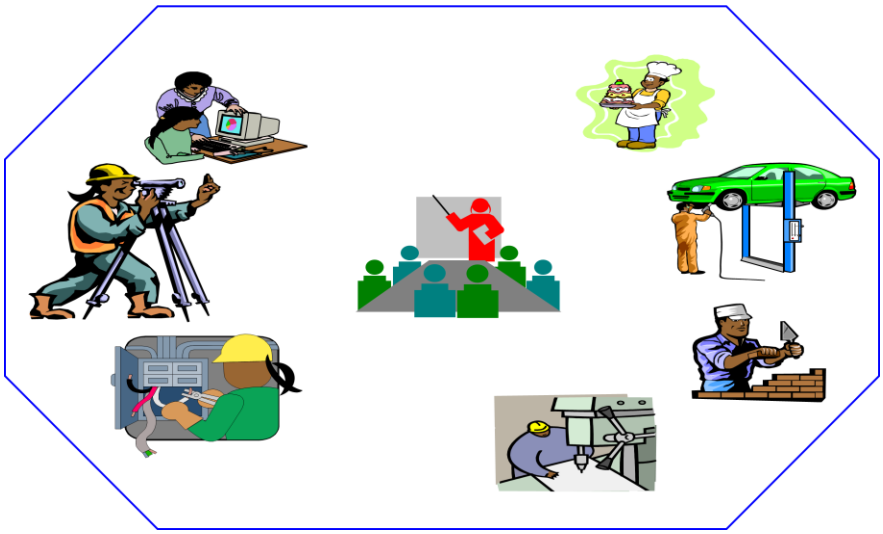
Animal health care Level-IV

Based on March 2018, version 3

Occupational standard



Module Title: Performing Minor Surgical and Obstetrical Operations

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East Africa Skills for Transformation and Regional Integration (EASTRIP) Project

Table of Contents

LG# 79	LO1#- Carry out pre-surgical preparation

Instruction sheet

learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

Implementing OHS procedures for surgical operations.

Preparing PPE, Materials, equipment and tools requiring for surgery.

preparing operation theatre

Carrying Pre-surgical patient preparation.

Providing Assistance on preparation of the surgical team.

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

Implement OHS procedures for surgical operations.

Prepare PPE, Materials, equipment and tools requiring for surgery.

prepare operation theatre

Carrying Pre-surgical patient preparation.

Provide Assistance on preparation of the surgical team.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.

2. Follow the instructions described below.

3. Read the information written in the “Information Sheets”.

4. Accomplish the “Self-checks” which are placed following all information sheets.

5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work

6. If you earned a satisfactory evaluation proceed to “Operation sheets

7. Perform “the Learning activity performance test”

Information sheet 1: Implementing OHS procedures for surgical operations

1.1. Introduction

Occupational health: The effect of work on human health and the impact of workers health on their work.

Occupational Health and Safety (OHS): Any occurrence which results in personal injury, disease or death, or property damage

A hazard: A hazard is anything that has the potential to harm the health or Safety of a person.

Risk: Risk is the significance of the hazard in terms of likelihood and severity of any possible injury.

Safety: The provision and control of work environment systems and human behavior which together give relative freedom from those conditions and circumstances which can cause personal injury, disease or death, or property damage.

Hazardous Substances Any substance that has the potential to harm the health of persons in the workplace and includes chemicals scheduled under the Poisons Act, chemicals classified under the Dangerous Goods Act (1975) or Hazardous Wastes

OHS policies: An OHS policy is a broad statement that says who is responsible for managing and monitoring OHS and lists any particular objectives for OHS, such as reducing vehicle accidents or days off work due to work-related illness or injury. It is supported by a set of OHS procedures and work instructions that together should cover what must be done to eliminate or minimize risks in the work-place

Procedures: Hazard policies and procedures, emergency policies and procedures, procedures for use of personal protective clothing and equipment, hazard identification and issue resolution procedures, job procedures and work instructions, reporting procedures, and the installation of workplace safety signage.

Occupational health & safety in vet surgery

Like any other jobs, there are professional hazards, which occur at veterinary surgery while performing surgical activities. Veterinary occupational health and safety policy and procedure help to reduce these veterinary occupational risks. Veterinarians, animal

handlers, animal health technicians and animal health assistances can be exposed to occupational health risks, while working around animal houses & veterinary clinics. With the knowledge of what causes injuries & disease, is easier to design and implement suitable measures to wards privations certain safety rules must be followed when attempting to capture, restrain, treat, feed or exercise animals

Application of OHS procedures and techniques in veterinary surgery

The essential requirements for any work with infectious agents are as follows:

- Personnel access to the surgery should be restricted.
- Protective clothing, including gloves, mask cover/gas mask must be worn in surgical area and removed when leaving the surgery
- Surgery room door should be closed when work is in progress & ventilation should be provided by extracting air from the room.
- Food or drink must be not stored or consumed in surgery room
- Smoking must not take place in the surgery room
- Emergency plan should be developed
- Materials for disposal must be transported without spillage in strong containers.
- Waste materials should be incinerate/burn
- Any accident must be recorded and reported to the safety officer
- using of relevant protective clothing and equipment
- Using gowns, goggles, cap and gloves.

1.2. Types of hazards or Common OHS Hazards occur from different activities

- **Zoonoses hazards:** are those diseases that can be transmitted from animals to humans. Some diseases can be transmitted to the professional during animal handling and medicating practices. E.g. bovine TB, anthrax, rabies
- **Allergy:** hypersensitivity reactions to the animal allergens are serious occupational health problems that developed in many individuals after repeated exposure.
- **Physical hazards -** falls, animal bites/ **Scratches**, needle stick/sharps injuries, radiation, kicking, radiation, temperature extremes, pressure extremes noise, Laboratory materials, tools machinery, biting, scratching etc.)

- **Slips, Trips and fall**
  - ✓ Bad housekeeping and poor drainage can make floors and other walking surfaces wet and slippery.
  - ✓ Electrical wires along the floor pose a tripping hazard.
  - ✓ You can fall if you are not provided with fall protection equipment, guardrails, and safe ladders.
- **Confined Spaces**
  - ✓ A confined space is an area with small openings for a worker to enter and exit and is not designed for regular work. Examples of confined spaces include manholes, sewer digesters and silos. There are many hazards in confined spaces.
- **Biting kicking by an animal.**

Animal bites and Scratches: is an ever present hazard that faces all employees working directly with lab animals or any diagnostic practices

- **Loading Unloading laboratory and clinic materials and drugs**

The load

The risk of back injury increases during lifting, carrying, pushing and pulling of loads, if the load is:

- ✓ Too heavy
- ✓ Too large
- ✓ Over load

Figure 1: imbalance load

- **Electrical hazard** when workers have to make use of faulty extension cords or work in environments littered with exposed power lines, they are directly at risk of electrical accidents. Such exposure can result in minor to major injuries especially burns, cardiac arrest, and even death in many cases.

Figure 1: Electrical hazard

- **Chemical hazards** - Anesthetic gas, ethylene oxide, insecticides and disinfectants, latex glove allergy, acid
  - ✓ **Corrosives:** These are chemicals that can cause irreversible bodily harm such as hydrochloric acid.
  - ✓ **Irritants:** Exposure to irritant chemicals can result in reversible inflammation of the contact skin area. Examples of irritant chemicals include strong solvents.
  - ✓ **Teratogens:** This class of chemicals can cause birth defects when employees are exposed to them. A popular teratogen in the workplace is thalidomide.
  - ✓ **Sensitizers**: A sensitizer, such as an isocyanine, can trigger allergic reactions upon exposure.
  - ✓ Some lab chemicals detergents, disinfectants, acids, drugs Acaricides etc
  - ✓ **Mutagens**: Exposure to this type of chemicals can lead to negative gene mutation and damage to the chromosomes. A good example of this chemical is benzene
  - ✓ **Carcinogens**: A carcinogen is a chemical that can trigger malignant growth in bodycells; thereby potentially causing cancer. Asbestos is a common carcinogen.

Employees can be exposed to these chemicals through inhalation, direct or indirect skin contact, ingestion, and injection.

- **Biologic hazards**

Example of Biological hazards

- ✓ Bacteria
- ✓ viruses
- ✓ Zoonotic Diseases
- ✓ Insects
- ✓ Plants
- ✓ Birds

- ✓ Animal

- **Ergonomic hazards include:**
  - ✓ Improperly adjusted workstations and chairs.
  - ✓ Frequent lifting.
  - ✓ Poor posture.
  - ✓ Awkward movements, especially if they are repetitive.
  - ✓ Using too much force, especially if it's done frequently.
  - ✓ Vibration.
- **Psychosocial Hazards**
  - ✓ Stress
  - ✓ Violence
  - ✓ Intimidation/fear and
  - ✓ Harassment
- **Asthma and allergies**

Animal-related asthma is the immune system's response to allergens including animal dander, scales, fur, body wastes and saliva. Workers including laboratory animal workers, veterinarians, veterinary technicians, livestock workers, garment workers, and horse handlers are all at risk of developing work-related allergy symptoms.

- **Anesthetic agents**

Anesthetic agents used in laboratory animals may also pose potential hazards to workers. These agents should be treated as hazardous chemicals with a risk assessment carried out of the chemical agents and the operations involved. A material safety data sheet (msds) should be available and understood by all relevant workers.

Steps in controlling OHS hazards and risks

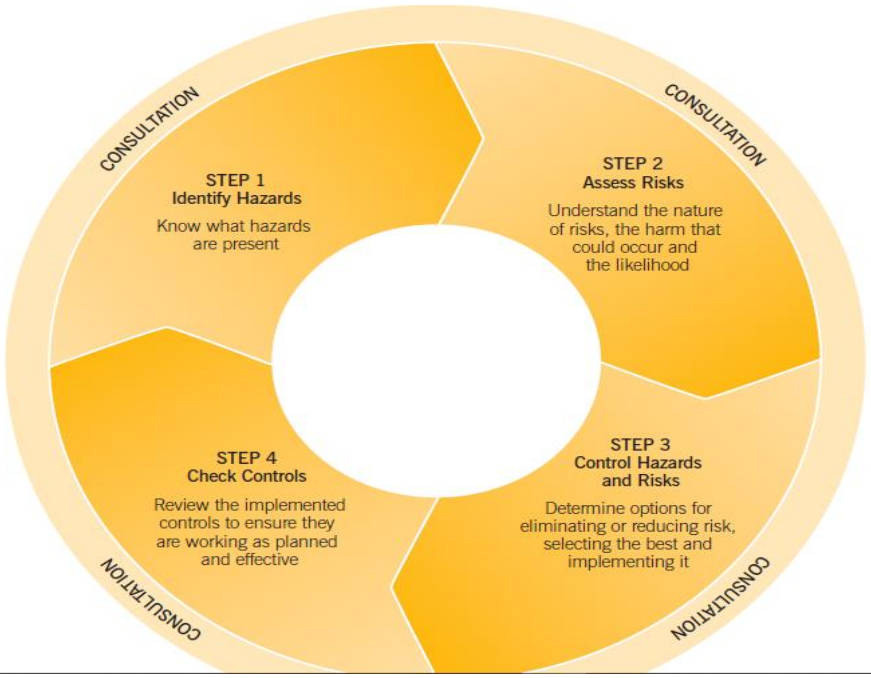


Figure 26: Steps in controlling OHS hazards and risks

Steps 1 – Identify hazards

Identifying hazards involves finding all of the foreseeable hazards in the workplace and understanding the possible harm that the hazards may cause.

Step 2 – Assess risks

Risk assessment is a process for developing knowledge and understanding about hazards and risks so that sound decisions can be taken about control. A formal risk assessment is unnecessary if the knowledge and understanding already exist. However, there will be many times when a risk assessment is the best way of building knowledge and understanding.

Risk assessment assists in determining:

- What levels of harm can occur
- How harm can occur
- The likelihood that harm will occur

Step 3 – Control hazards and risks

Duty-holders are required to ensure health and safety by controlling risks. Risks must be controlled by eliminating them so far as reasonably practicable or, if this is not possible, reducing the risks that remain so far as reasonably practicable.

Step 4 – Check controls

Controls that are put in place to protect the health and safety of people need to be monitored to ensure that they work as planned. This requires checking them and ensuring that processes are put in place to identify and quickly fix.

problems. Checking controls

Checking controls involves the same methods as in the initial hazard identification step (step 1), and creates the loop in which workplace health and safety measures are maintained. Common methods used to check the effectiveness of controls are:

- Inspecting the workplace
- Consulting employees
- Testing and measuring
- Using available information
- Analyzing records and data.

Self-check - Written test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Describe the Principles of Occupational Health and Safety Policies and Procedures (3pts)

2. List the type of hazards (7pts)

3. Psychosocial Hazards
   A. Stress
   B. Violence
   C. Intimidation/fear
   D. All

4. Which of the following Biological hazards
   A. Bacteria
   B. viruses
   C. Birds
   D. all

Note: Satisfactory rating –10 points Unsatisfactory - below 10 points.

Operation sheet 1: **Identify workplace Hazards**

1. Assess the risks in the workplace Following the five steps

Steps1 Identify the hazards

Step 2 Identifying who might be harmed by those hazards

Step3 Evaluate the risk

Step4 implementing controls and recording your findings

Step5 reviewing your assessment and re-assessing if necessary

Name: _____ **Date:** _____

Information sheet 2 : Preparing PPE, materials, equipment and tools

2.1. Introduction

Personal Protective Equipment (PPE): Personal protective equipment (PPE) may include eye and chemical protection, protective clothing, sunscreen lotion, gloves, safety harness and headgear, over all, gown.

The key difference between equipment and materials is that materials form the actual product and are the parts, components, ingredients and raw materials that become a part of the product whereas equipment refers to the tools, machinery, devices that help create the product.

Personal protective equipment

Personal protective equipment is special equipment you wear to create a barrier between you and germs. This barrier reduces the chance of touching, being exposed to, and spreading germs.

Personal protective equipment (PPE) helps prevent the spread of germs in the hospital. This can protect people and health care workers from infections.

2.2. Types of PPE

Wearing gloves protects your hands from germs and helps reduce the spread of germs.

- **Gloves**: Protects your hands from microbes and minimizes the possible spreading of microbes.

Fig 3: Latex Glove

- **Masks**: Cover your mouth and nasal area. Some masks have a see-through plastic piece, which also covers your eyes (shield). A special respiratory mask (respirator) forms a tight seal around your nose and mouth. It can be useful to minimize the inhalation of smaller microbes, such as tuberculosis bacteria. Click here for a comprehensive guide on selecting the appropriate face mask.

Fig 4: Face Mask

- **Eye protection**: This includes face shields as well as goggles. They can protect the mucous membranes of your eyes from bodily fluids. If the fluids make contact with the eyes, microbes within the fluid can enter the body through the mucous membranes.
- **Clothing:** Includes gowns, aprons, head covering, and shoe covers.

Fig 5: Surgery coat

- **Cap/head cover**

This protects the wearer's hair from particulate contamination and minimizes contamination of the environment by the wearer.

Fig 6: Head Cover

Shoe covers

Shoe covers: Lightweight fabric or plastic booties worn over shoes to prevent contamination of the shoes and to prevent contamination of the environment by material that may be on the shoes. Shoe covers are especially important in minimizing the spread of contamination from area to area, provided they are removed and replaced appropriately

Figure 7: shoe covers

General PPE Guidelines

- Wear gloves, when handling chemicals and/or body fluids.
- Wear safety shoes/boots/covers if hazardous or infectious substances are likely to splash.
- Wear apron/gown/coveralls- if hazardous or infectious substances are likely to splash.
- Use a respirator: when hazardous or infectious substances are airborne such as tuberculosis.
- Wear hearing protection: for loud noises such as from equipment.
- Remove PPE carefully to avoid contaminating yourself.
- Dispose of PPE in designated containers before leaving the area.

Tools and Equipment

Tools and Equipment means all hand tools, implements, camp equipment, drawing office and survey instruments, medical and surgical instruments and all articles of similar nature, whether or not they are of an expendable nature, which are not normally issued to officers personally for use in carrying out their official duties.

2.3. COMMON SURGICAL INSTRUMENTS

1. SCALPEL

Used for initial incision and cutting tissue. Consists of a blade and a handle. Surgeons often refer to the instrument by its blade number.

Fig 1: #10 Blade

Used primarily for making large skin incisions, e.g., in laparotomy.

Fig 2: #11 Blade

Used for making precise or sharply angled incisions.

Fig 3: #15 Blade

Smaller version of #10 blade used for making finer incisions.

2. SCISSORS

Used for cutting tissue, suture, or for dissection. Scissors can be straight or curved, and may be used for cutting heavy or finer structures.

Mayo Scissors: Heavy scissors available in multiple varieties. Straight scissors are used for cutting suture ("suture scissors"), while curved scissors are used for cutting heavy tissue (e.g., fascia).

Fig 1: Mayo Scissors

Metzenbaum Scissors: Lighter scissors used for cutting delicate tissue (e.g., heart) and for blunt dissection. Also called “Metz” in practice.

Fig 2: **Metzenbaum Scissors**

Pott’s Scissors: Fine scissors used for creating incisions in blood vessels.

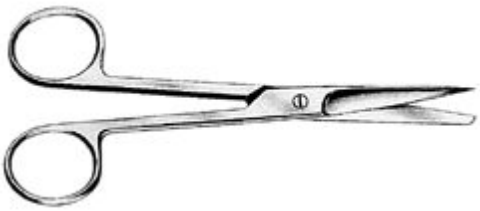
Fig 3: Pott’s Scissors

Scissors, Straight, Blunt, stainless steel
O.R Scissors, Straight, blunt, stainless steel

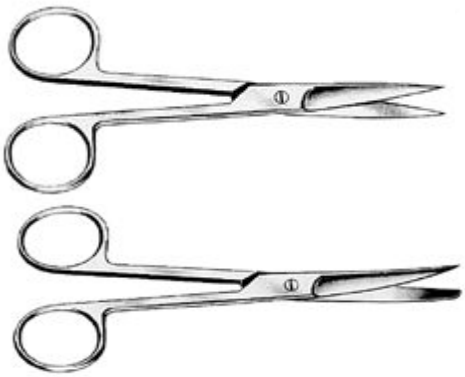
Scissors, Curved, Blunt, Stainless Steel
O.R. Scissors, Curved, Blunt, stainless steel

Scissors, curved, Sharp/Sharp, Stainless Steel
O.R. Scissors, Curved, Sharp/Sharp, stainless

Scissors, Straight, Sharp/Blunt, Stainless steel
O.R. Scissors, Straight, Sharp/Blunt, stainless Steel



Scissors, straight, sharp/sharp, stainless steel
O.R. scissors, straight, sharp/sharp, stainless steel



Scissors, curved, Sharp/Blunt, Stainless steel
O.R Scissors, Curved, Sharp/Blunt, stainless steel

3. FORCEPS

Also known as non-locking forceps, grasping forceps, thumb forceps, or pick-ups. Used for grasping tissue or objects. Can be toothed (serrated) or non-toothed at the tip.

1. **Tissue Forceps**

Adson Forceps: Non-toothed forceps used for fine handling of tissue and traction during dissection.

Fig 1: Adson Forceps

Russian Forceps: Used for atraumatic tissue grasping during dissection

Fig 2: Russian Forceps

Kelly Clamp: Larger size variation of hemostat with similar function for grasping larger tissues or vessels.

Fig 3: **Kelly Clamp**

Thumb Dressing Forceps: Thumb Dressing Forceps, Stainless steel,

Fig 6: **Thumb Dressing Forceps**

3. Needles

Needles come in many shapes and cutting edges for various applications.

Needle Shape

The shape of the needle is also important. The curvature of the needle allows for use in specialized applications. Curved needles are used in most general surgical procedures, while straight needles are used for skin and subcuticular suturing.

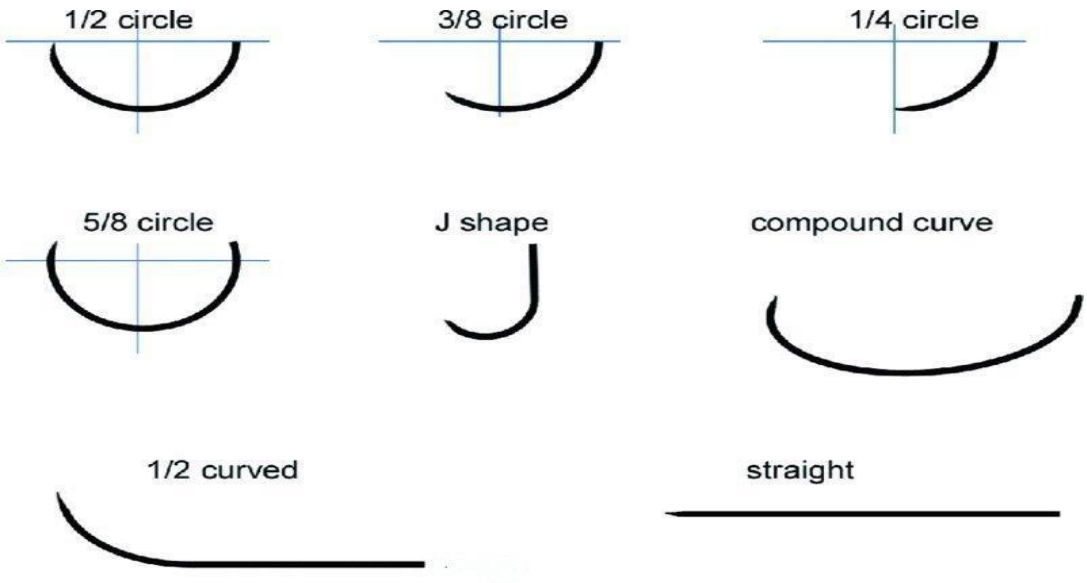


Figure-4-needle shape

Needle may be straight or curved and curvature according to circle angle, divided to (1/4 circle, 1/2 circle, 3/8 circle and 5/8 circle). The choice of needle shape always dependent to the accessibility of tissue which will undergo surgical procedure, the more confined surgery site requires more curvature.

The most common shapes are:

- **Quarter circle**

  It has a little curvature, use on convex surface and delicate surgery, typically use on ophthalmic procedures, facial aesthetic, eyelids, fascia, and microsurgery.

- **One-half circle**:

  It has a large arc to use in confined sites, the application area is skin, muscle, peritoneum, eye, abdominal surgery and gastrointestinal tract.

- **Three- eighths circle:** The most common needles use in large and superficial wound and it's impossible to use in deep cavities. This needle applied in skin, hand surgery, fascia, muscle, subcuticular.

- **Five-eighths circle**:

  These needles perfect with deep and confined cavities due to the needle design make a maneuvering in small location easier. Application area Intraoral, urogenital, and an rectal procedures.

- **One-half curved (ski needle)**:

  The curved portion for this needle passes through tissue easily, used in laparoscopic technique and skin closure.

- **shape needle**:

  Used on deep incision so it used in laparoscopic surgery without any injury to visceral and applied in vagina and rectum.

- **Compound curved needles**:

  Used on oral, eye and anterior segment ophthalmic surgery.

- **Straight needle**:

  Can be used without needle holder as is the case of curvature needle and there is a high risk of accidently sticking yourself. It uses in easily accessible tissue, typically in abdominal surgery.

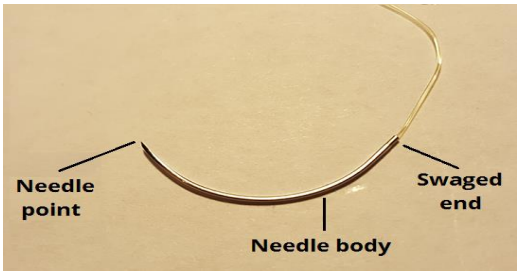


Fig1: parts of needles

4. Needle holder: Used to hold suturing needles

Fig 1: Needle holder

General Function of materials and equipment's

- Protect personnel who enter animal facilities and/or perform animal procedures from exposure to animal dander, hair, secretions, and excretions that may cause allergic respiratory and skin responses, or that may cause illness.
- Prevent exposure (to animal dander, hair, secretions, and excretions) of persons by contact with persons who have been in animal facilities or have conducted animal procedures.

- Minimize the risk of possible ocular, oral, or dermal exposure to chemical disinfectants.
- Minimize the transmission of disease agents among animals..
- This procedure applies to anyone entering an animal or procedure room occupied by one or more animals.

Self-check 1- **Written test**

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Test 1: Short Answer Questions

1. List some tools and equipment's used in surgical operation activities (4pts)
2. Mention some PPE(2PTS)

Test 2: choice

1. Which of the following is sharp materials (2pts)

   A. face mask B. needle C. gauze D. all

Note: Satisfactory rating –8 points Unsatisfactory – below 8 points

Information sheet 3: preparing operation Theatre

3.1. Introduction

The operating theatre is where major sterile surgical procedures are carried out.

A totally clean environment is essential and the room is constructed so that this can be maintained. The theatre has just one entrance and only personnel directly involved may enter. Clean/disinfect all areas of the room, this includes but is not limited to: overhead lights, surgery tables, anesthesia machines, mayo stand, monitors, etc.

Surgical facilities used for surgery must be designed and maintained in such a way that they help prevent the development of post-procedural infections.

Design features include:

- Separation of the preparation areas from the surgery area
- Minimization of personnel traffic flow through the surgery area
- Air flow should be away from the surgery area.
- Room surfaces should be non-porous and easily sanitized
- A regular room cleaning and disinfection schedule should be established for dedicated surgical suites (i.e. daily cleaning of floors and work surfaces, weekly to monthly cleaning of walls and cabinets)
- The surgery area should be free of all equipment and materials not necessary for the procedure. Any stored items should be in cabinets or drawers.

Fig 1: operation room

3.2. The place for Operations:

- In the open air it must be performed under cover.
- In the open air hay shed can be utilized for the purpose.
- If space is available in the veterinary surgeon's establishment a suitable inexpensive operating theatre can be constructed.

3.2.1. The following details of its construction and equipment may be mentioned.

- Dimensions, 20x10 feet high are sufficient dimensions.
- Floor should be Concrete and be easily cleaned.
- Smooth cement walls, which are easily washed and disinfected.
- Sufficient light in the operating room.
- Large windows so arranged as to given a maximum amount of light.
- Suspension electric lamps capable of being raised or lowered.
- For small animals properly equipped operating room with comfortable.
- All operating requirements should be within lay reach instrument cabinets and sterilizing accommodation may be installed in the theatre or in an adjusting room.

3.2.2. Infection prevention in the Operating Theatre (room)

Infection prevention in the operating is achieved through careful use of aseptic techniques in order to:

- Prevent contamination of the open wound.
- Isolate the operative site from the surrounding unsterile physical environment.
- Create and maintain a sterile field in which surgery can be performed safely.
- Properly preparing a patient for clinical procedures
- Hand washing
- Using surgical materials
- Maintaining a sterile field
- Using good surgical technique
- Maintaining a safe environment during surgical procedure.

Time for operation: - The operation may be performed at any time of the **day** but the **morning** if preferable to the afternoon.

3.2.3. Pre-operative preparation.

- Before beginning a surgical procedure there should be a meeting of the surgical team to develop a surgical plan.
- The surgical plan should identify:
  - ❖ Personnel involved
  - ❖ Their roles and training
  - ❖ Type of operative procedure
  - ❖ Equipment and supplies needed
  - ❖ Identify location of operating room
  - ❖ Post-operative care, need for antibiotics, and
  - ❖ Mechanism for keeping all relevant records.
- preparation area
- anesthetize the patient after of feed 24 hours and water 12 hours
- put the sterilized surgical pack including the instrument gown and gloves
- surgical team should wear the gown and glove

3.2.4. Surgical Facility Location

In general the surgical facility should have the following components:

- Animal preparation room
- Instrument preparation room
- Surgeon preparation room
- Holding and recovery room and
- An operating room.

3.2.5. Lighting in the operating room should be bright. Lighting should be sufficient to perform the procedures but should not be make the operating area hot.

Animal preparation e.g. clipping of hair, cleaning and anesthesia induction should not be performed in the operating room but rather in the animal preparation room. The

surfaces in the room including floors, walls and ceiling must be non-porous, vacuum-packed, durable and sanitizable. The area should be maintained clean and free from clutter and access limited to people involved in the procedures being performed. A schedule for cleaning and sanitizing the rooms should be maintained

Examples of common hard surface disinfectants for cabinets, surgery tables, lights, etc.

- Alcohols (70% ethyl alcohol, 85% isopropyl alcohol)
- Quaternary ammonium compounds
- Aldehydes e.g. glutaraldehyde
- Phenolic
- Sodium hypochlorite
- Chlorine dioxide
- Chlorhexidine rapidly bactericidal and persistent also effective against many viruses, active in the presence of blood.

3.3. Instrument Preparation

- Surgical instruments and supplies must be sterilized before they are used
- Clean all instruments and materials prior to sterilization. Dirt, blood and gross contaminants should be completely removed.
- Always soak instruments in water with
- Detergent immediately after surgery to remove blood and debris, and to facilitate cleaning. Instruments can be washed manually with a brush or in a washer sterilizer.
- Dry and safely store the Instruments after cleaning.
- Take special care to avoid damaging delicate instruments.

Fig 2: PPE

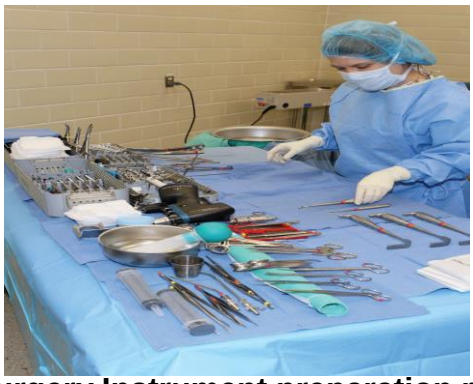


Fig 3: Surgery Instrument preparation room

3.3.1. Physical sterilization

Instruments may be sterilized by physical or chemical means. Steam sterilization in an **autoclave** (121°C for 15 min or 131°C for 3 min) is extremely effective. Autoclaves should not be used for temperature sensitive instruments. Some corrosion may occur and sharp instruments may be blunted.

3.3.2. Chemical sterilization

A variety of chemicals can be used to sterilize heat sensitive materials. All chemicals must be rinsed from the instruments using sterile saline or sterile water to avoid tissue damage.

Examples of common chemical sterilants include:

- 2% Glutaraldehyde
- 8% Formaldehyde plus 70% alcohol
- 7% stabilized hydrogen peroxides
- 7.35% hydrogen peroxide and 0.23% per acetic acid
- Chlorine dioxide
- 1.37% Sodium hypochlorite

3.4. Pre-operative preparation

- preparation the area
- pre medicate and anesthetize the patient after of feed 24 hours and water 12 hours

- put the sterilized surgical pack including the instrument gown and gloves
- surgical team should wear the gown and glove
- Material preparation.

3.4.1. Preparation of the Surgeon

The patient must be protected from organisms that can be carried and shed by the surgeon. These organisms reside on the surgeon's skin, hair, in the nose or mouth, or may be carried on dust particles from the floor or room surfaces; however it is a significant source of contamination in some types of surgery.

- Sterile gloves should be used for all survival procedures
- The surgeon's hands and arms should be cleaned.
- A cap/hair cover, face mask, shoe covers and sterile gown must be worn.
- Sterile gloves (exam gloves acceptable for non-survival surgery), hair cover, and surgical mask must be worn for survival surgery on animals.
- A clean lab coat is recommended.
- Minimizing traffic flow and conversation in the operating room significantly reduces the risk of contamination of the surgical site.

3.4.2. Surgeon Preparation Procedures

- Prior to scrubbing hands, the surgeon should do a surgical cap, facemasks, surgical scrubs and appropriate shoes.
- Remove jewelry items and ensure that fingernails are trimmed short.
- Scrubbing should be thorough beginning at the tip of the fingers all the way to the elbows using a surgical scrub containing a germicide e.g. chlorhexidine.
- At the end of the scrub dry your hands with a sterile towel beginning at the tip of the fingers to the elbow. Rotate the towel and repeat the procedure on the other hand.
- After drying the hands, proceed to put on a sterile gown. Lift the gown, unfold away from the table, and insert your arms into the sleeves. The assistant closes the back of the gown, and the surgeon closes the waist tie

.

Fig 4: cloth preparation room

- Open the paper covering on the gloves as illustrated. Insert the gloves as shown making sure not to touch any non-sterile surfaces. If you accidentally touch a non-sterile surface with your gown or gloves discard them and re-gown and/or re-glove as appropriate.
- Always maintain a zone of sterility in front of you. Clasp your hands in front of you making sure the hands are above the table, above your waist and no higher than your shoulders.

Fig 5: washing room

3.4.3. Preparation of surgical team

- The surgeon and assistant surgeons scrub themselves
- First the arm and hands should be washed with clean water and soap
- Fingers thumb should be brushed with sterile brush then palm and back of the hand
- Pour 70% iso-propyl of ethyl alcohol over the hand and arms put on sterile gloves.

3.4.4. Responsibilities of the surgical team

- Before the procedure, supplies are gathered (pack, suture material, blade, etc.), the surgery table is set up and the patient is prepared
- The primary surgeon will perform the bulk/size of the procedure
- The assistant helps throughout the procedure by holding tissue out of the way, soaking the blood, getting instruments ready, etc.
- After the procedure, the surgery table must be cleaned and the area prepared for the next procedure, instruments must be washed and the surgical pack wrapped and autoclaved.
- Before the patient leaves the recovery area, the surgeon is responsible for writing a very brief surgery report to note areas of difficulty or complications encountered during the procedure.

Self-check 1- Written test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to prepare operation theater/rom (4PTS)
2. List Responsibilities of the surgical team(3pts)
3. Describe surgeon Preparation Procedures(3 pts)
4. common chemical sterilants
   A. 2% Glutaraldehyde
   B. 8% Formaldehyde plus 70% alcohol
   C. 7% stabilized hydrogen peroxides
   D. All

Note: Satisfactory rating –10 points Unsatisfactory - below 10 points

Operation Sheet 1: **Pre-operative preparation**

Procedures

1. preparation the area
2. pre medicate and anesthetize the patient after of feed 24 hours and water 12 hours
3. put the sterilized surgical pack including the instrument gown and gloves
4. surgical team should wear the gown and glove
5. Material preparation.

Name: ---------- Date: ----------

Information Sheet 4: Carrying Pre-surgical patient preparation

4.1. Introduction

The majority of post-procedural infections are the result of contamination of the surgical site with resident or transient skin bacteria from the patient. Therefore, decontamination of the surgical site and prevention of contamination from other areas is the best means of preventing post-procedural infections. Normally, the patient's hair should be removed from the surgical site. This should be done with an electric clipper or depilatory rather than a razor. Hair removal should be performed immediately prior to the surgery. The patient's skin should be scrubbed with a disinfectant such as povidone iodine or chlorhexidine. Scrubbing should start at the center of the surgical site and move to the outside in a linear or circular manner. Scrub the surgical site with a disinfectant and rinse/scrub with alcohol or sterile water or saline to remove debris. Repeat at least three times or until site is free of visible debris. Often a disinfectant solution is then painted onto the surgical site and left to dry.

4.2. Preparation of site of operation/ Skin preparation

- Remove hair by shaving
- Wash three or four times with soap and water (until all visible dirt is removed)
- Clean with sterile cotton or gauze
- Start at site of incision and move to the periphery
- Discard the gauze after cleaning the periphery
- Scrub with soap paint the entire surgical sit with 20% tincture of iodine
- Take the patient to operation room
- Administer fluids IV

4.3. Draping

The decision to drape depends on the nature of the procedure being done. For extensive procedures it is necessary to drape, using towels, stockinettes or plastic wraps. Drapes help to maintain a sterile field and preserve body heat. While drapes play an important role in reducing contamination of the surgical site, faulty technique may increase contamination. Drapes must cover the animal and table.

4.4. Heat loss

Anesthesia alters thermoregulation and reduces metabolism. Loss of heat also occurs from open body cavity and evaporation of body fluids. Loss of heat can significantly prolong the duration of anesthetic, which in turn increases the risk of complications. Animals should always be kept warm with a hot water blanket.

4.5. Fluid loss

Animals can experience extensive fluid loss during surgery. Fluid loss occurs primarily as a result of evaporation from body cavities and due to blood loss. Reduce intra-operative fluid loss by irrigating the operative field with warmed sterile saline, and by administration of warm, sterile isotonic fluids parenteral during the surgery. Control blood loss during surgery by cauterizing or ligating potential bleeders. Monitor water and food intake, body condition and animal weight post-surgically.

4.6. Operating Room Conduct

- Reduce contamination in the environment
- Gentle tissue handling
- Minimal tissue handling
- Effective hemostasis
- Correct suture material and techniques
- Appropriate use of instruments
- Adequate monitoring of the animal.

Self-check 1: Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Define

1. Fluid and
2. Heat loss (4pts)

Note: Satisfactory rating – 4 points Unsatisfactory - below 4 points.

Operation sheet 1: Preparation of site of operation

Procedures

1. Remove hair by shaving
2. Wash three or four times with soap and water (until all visible dirt is removed)
3. Clean with sterile cotton or gauze
4. Start at site of incision and move to the periphery
5. Discard the gauze after cleaning the periphery
6. Scrub with soap paint the entire surgical sit with 20% tincture of iodine
7. Take the patient to operation room
8. Administer fluids IV

Name: ---------- Date: ----------

Information sheet 5: Providing Assistance on preparation of the surgical team.

5.1. Introduction

The veterinary assistant has important responsibilities during surgery preparation. The assistant's job entails helping the veterinarian to prepare the surgery room, the tools and instruments, the animals, and the surgeon. The veterinary assistant needs to be sure an aseptic environment is available to provide the best conditions for the welfare of the patient should use a disinfectant to clean all surfaces. Close or adjust all the windows to allow necessary ventilation without permitting drafts or the influx of airborne dust and other pollutants.

Anesthetic equipment, supplies, ties for the patient, and all necessary surgical equipment should be readily accessible. Sterile bundles and packs should be in place, but left unopened prior to scrubbing. Lastly, the assistant must clean and disinfect the surgery table.

5.2. Assisting the Surgeon

The assistant should have the scrub soap, sterile brushes, shoe covers, caps, and masks readily accessible. If disposable caps and masks are not used they should be freshly laundered (they do not need to be sterile).

5.3. Maintaining Sterile Conditions

Any person entering a room prepared for surgery, or where surgery is in progress, must wear clean clothes and shoes that are free of dust and dirt. The face, head, and hair of anyone who comes near the operating table should be covered with a freshly laundered cap and mask or new disposable covers. Operating room personnel should leave the room to cough or sneeze.

5.4. Preparation of surgical team

- The surgeon and assistant surgeons scrub themselves
- First the arm and hands should be washed with clean water and soap
- Fingers thumb should be brushed with sterile brush then palm and back of the hand
- Pour 70% iso-propyl of ethyl alcohol over the hand and arms put on sterile gloves.

5.5. Responsibilities of the surgical team

- Before the procedure, supplies are gathered (pack, suture material, blade, etc.), the surgery table is set up and the patient is prepared
- The primary surgeon will perform the bulk/size of the procedure
- The assistant helps throughout the procedure by holding tissue out of the way, soaking the blood, getting instruments ready, etc.
- After the procedure, the surgery table must be cleaned and the area prepared for the next procedure, instruments must be washed and the surgical pack wrapped and autoclaved.
- Before the patient leaves the recovery area, the surgeon is responsible for writing a very brief surgery report to note areas of difficulty or complications encountered during the procedure.

Self-check 1: Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Describe 3 Responsibility of assistants (4pts)

Note: Satisfactory rating – 4 points **Unsatisfactory - below 4 points**

Operation Sheet 1: Preparation of surgical team

Procedures

1. The surgeon and assistant surgeons scrub themselves
2. First the arm and hands should be washed with clean water and soap
3. Fingers thumb should be brushed with sterile brush then palm and back of the hand
4. Pour 70% iso-propyl of ethyl alcohol over the hand and arms put on sterile gloves.

Name: ---------- Date: ----------

LG # 80	LO #2: Perform minor surgical and obstetrical operations

Instruction sheet

learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Providing assistance during operating minor surgery.
- Applying different Suture patterns and knots.
- Administering Pre-anesthetic and pre-operative medication.
- Administering regional and local anesthesia.
- Performing Pre-anesthetic and pre-operative evaluations.
- Performing minor surgical operations
- Managing minor obstetrical and gynecological cases

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Provide assistance during operating major surgery.
- Apply different Suture patterns and knots.
- Administer Pre-anesthetic and pre-operative medication.
- Administer regional and local anesthesia.
- Perform Pre-anaesthetic and pre-operative evaluations
- Perform minor surgical operations
- Manage minor obstetrical and gynecological cases

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test”

Information Sheet 1: providing assistance during operating minor surgery

1. Introduction

Minor surgery is a surgical procedure that does not expose a body cavity and causes little or no physical impairment. Examples include: wound suturing, peripheral vessel cannulation, dehorning, repair of prolapses, and most procedures routinely done on an outpatient basis in veterinary clinical practice. Animals undergoing a minor surgical procedure typically do not show significant signs of postoperative pain, have minimal complications, and quickly return to normal function.

Minor surgery requires appropriate anesthesia, analgesia, sterile technique, wound closure, if applicable (sutures, staples, tissue glue, and/or bandaging), postoperative wound care, and frequent postoperative monitoring of the animal until healed and/or achieved a normal health status.

1.1. Before a minor surgery can begin

- Prepare the room where the procedure will occur.
- Clean and sterilize the room and equipment.
- Assemble the sterile tools and materials
- Make sure the doctor has everything they need.
- Attention to detail here is critical, especially regarding proper sterilization.

1.2. During the surgery

- Assist the physician by handing them the surgical tools they need, such as scalpels and scissors.
- Set up a sterile field by gathering sterile packages and tools
- Clean the surgical site with iodine or chloroprene solutions
- Perform a venipuncture to be used during the procedure
- Use suction to give doctor a better view of work area
- Retrieve equipment that becomes needed during procedure

- Wipe away blood or pus from the surgical site.

Fig 1: Gloved Assistant must arrange the instrument table.

1.3. After Surgery

After completion of the surgery, the assistant should clean and sterilize all instruments, accessories, and supplies for reuse. Launder and autoclave gowns and drapes, and launder the caps and masks if necessary. When all equipment has been cleaned and placed in storage, thoroughly scrub and disinfect the room

Self-check 1: Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention assistant role and duties before and after surgery (6pts)
2. Before a minor surgery can begin

A. Prepare the room where the procedure will occur.
B. Clean and sterilize the room and equipment.
C. Assemble the sterile tools and materials
D. All

Note: Satisfactory rating –6 points Unsatisfactory – below-6 points

Operation Sheet 1: During the surgery

Procedures

1. Assist the physician by handing them the surgical tools they need, such as scalpels and scissors.
2. Set up a sterile field by gathering sterile packages and tools
3. Clean the surgical site with iodine or chloroprene solutions
4. Perform a venipuncture to be used during the procedure
5. Use suction to give doctor a better view of work area
6. Retrieve equipment that becomes needed during procedure
7. Wipe away blood or pus from the surgical site.

Name: ---------- Date: ----------

Operation Sheet 2: After surgery

Procedures

After completion of the surgery, the assistant should

- clean and sterilize all instruments,
- Accessories and supplies for reuse.
- Launder and autoclave gowns and drapes, and
- Launder the caps and masks if necessary.
- When all equipment has been cleaned and placed in storage, thoroughly scrub and disinfect the room

Name: ---------- Date: ----------

Information sheet 2: Applying different Suture patterns and knots.

2.1. Introduction

A surgical suture is one of the most common medical devices used by doctors during surgeries. The suture helps in holding body tissues together after a surgery or an injury. The application of a suture essentially involves the use of a needle along with an attached thread. Today, doctors have access to a wide variety and types of surgical sutures of different sizes, shapes and thread materials.

2.2. Types and patterns in veterinary surgery

Appropriate suture material and needle type must also be considered for successful closure and healing. Other wound closure options are available, such as most types of glue, staples or adhesive tape, although these are generally for the most minor of wounds.

2.2.1. Suture material

Choice of appropriate suture material and its gauge is dependent on the anatomical location of the wound, the tissue type to be sutured, the tension of the tissue and the length of time the suture is to remain in situ for proper healing of the wound. Smaller gauges of suture offer less trauma to the tissue but are more delicate; knots should be tied gently but firmly to prevent breakage of the suture material.

Suture material may be absorbable or non-absorbable, synthetically-produced or natural, and may be mono or multi-filament. Each will have differing tensile strengths which deteriorate over time. All of these factors should be taken into account when choosing a suture material.

2.2.2. Types of sutures material

- **Absorbable Sutures**
  - ✓ **Catgut Sutures**

A catgut suture is a natural, monofilament absorbable suture which has good tensile strength. The suture retains optimal strength in order to hold tissues together. Catgut is a smooth and flexible suture with good knotting, and based on its size, it completely

disappears between 60 to 120 days. The eventual disintegration of this suture makes it good to use in healing tissues rapidly.

Fig 2: Catgut chromic

- ✓ **Polydioxanone Sutures**

A type of synthetic monofilament suture, the polydioxanone suture or is used to repair various kinds of soft-tissue wounds, abdominal closures. Surgeons also use this suture during paediatric cardiac procedures.

Fig Polydioxanone Sutures

- ✓ **Poliglecaprone Sutures**

The Poliglecaprone suture is a synthetic monofilament suture, generally used to repair soft tissues. It is commonly used for the purpose of subcuticular dermis closures on a patient's face, and as a ligature. These sutures promote scar-free, aesthetic healing. The suture material is used in case of vascular anastomosis procedures that connect blood vessels.

Fig 3: Poliglecaprone Sutures

✓ **Polyglactin Sutures**

The Polyglactin Suture comprises a synthetic braid, which is good to repair lacerations on the face and hands and is the most preferred option for general soft tissue approximation. Like the Poliglecaprone suture, this suture too is used in of vascular anastomosis procedures. Polyglactin sutures typically have a mild tissue reaction, for the duration of the absorption process but are a better alternative to catgut sutures as the absorption level of this suture is more predictable. Also, this suture exhibits little to no tissue reaction.

Fig 4: Polyglactin Sutures

- **Non-absorbable suture materials**

Non-absorbable sutures are designed to either be left permanently in the body or are to be removed after a certain healing period. Permanently placed, non-absorbable sutures are generally used in tissue where even though healing may occur; the new tissue may never have the needed strength to support itself. The effective tensile strength of such sutures remains high over time. When used to close skin, non-absorbable sutures are usually removed in 10-14 days, but this may vary by location and situation.

Fig 1: Non-absorbable suture materials

2.3. Suture needles

An appropriate needle should be chosen based on the tissue type being sutured, to minimize trauma and prevent a delayed wound healing time. Needles are available in a variety of lengths, gauges and shapes and are also described by the taper type. Needles may be either swaged-on (attached to the suture material) or non-swaged (have an eye for passing the suture material through) .(Swaged needles are less traumatic to the tissue than eyed needles, as there is no doubling up of the suture material as there would be in an un-swaged needle when it passes through the needle eye.

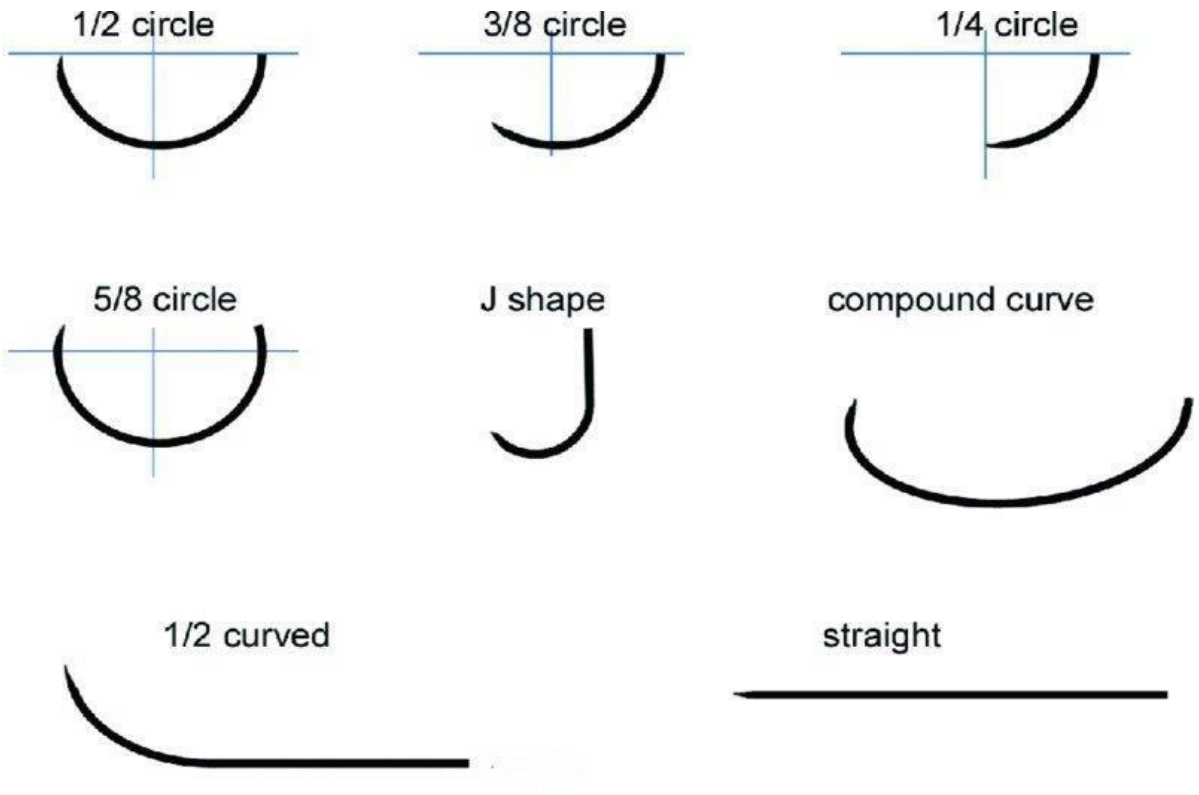


Fig 5: Different types of suture needles**.**

2.4. Common suture patterns

2.4.1. Continuous sutures patterns

- **Simple continuous sutures**

Procedure

1. Place an initial knot.
2. Take a bite of 0.5–1 cm from either side of the wound.
3. Pull suture material tight so wound edges are appositional.

4. Repeat the suture a short distance away from the first; the bite should start from the same side each time as the original bite, until the wound has been closed.
5. Place a knot to secure the wound-closure.

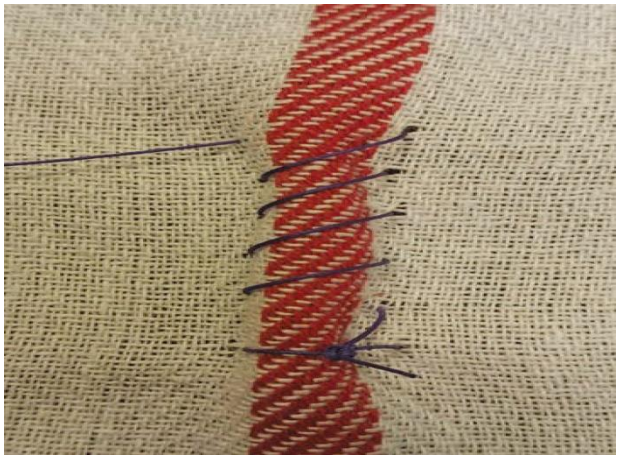


Figure 3. Simple continuous sutures

- **Ford interlocking sutures**

Procedures

1. A modification of a simple continuous suture.
2. Secure the suture material with a knot.
3. A bite is taken from each side of the wound.
4. Prior to pulling the suture tight, the material is threaded through the loop leaving an ‘L’ shaped suture.
5. Repeat until the wound is closed.
6. These create better skin apposition than a simple continuous suture.

Figure 4. Ford interlocking sutures.

- **Intra-dermal sutures**

Procedures

1. Another modification of a simple continuous suture.
2. The suture passes horizontally through the layers of the dermis, taking a bite from alternating wound edges, and the skin is pulled closed with no sutures visible.
3. This is a suture of low strength so is usually used in areas with low tension, however in a higher tension wound, skin sutures may be used in addition.
4. Intra-dermal sutures are more comfortable for the patient and help to prevent patient interference, they avoid tracking of infection into the wound and there is minimal scarring.

Figure 5. Intra-dermal sutures.

- **Purse-string sutures**

Procedures

1. A bite is taken at regular intervals around the perimeter of an opening, so that when pulled tight, it can be made smaller or closed completely.
2. Useful for areas such as the rectum (to correct a prolapse) or to create a water-tight seal around a tube.

Figure 6. Purse-string sutures.

- **Interrupted patterns**

Interrupted sutures are used to relieve tension, or in areas where more strength is required. They are not as economical as a continuous suture as a knot must be tied after each suture placement, using a great deal more suture material. Should one of the sutures fail, this will not affect the rest of the sutures placed in the wound.

- ✓ **Simple interrupted**

Procedures

1. A bite is taken symmetrically at equal distance from either side of the wound, and pulled tight.
2. A knot is placed, and the suture material is trimmed before repeating the method until the wound is closed.
3. This type of suture is useful for closure of the linea alba during abdominal surgery or other areas requiring more strength

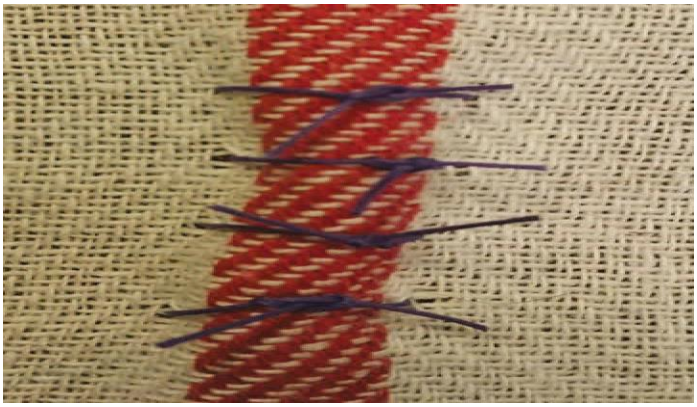


Figure 7. Simple interrupted sutures.

- ✓ **Interrupted cruciate**

Procedures

1. An ‘X’ shape is created over the wound.
2. A bite is taken from one side, passing to the other, before advancing forwards by 8–10 mm then repeating from the original bite side.
3. A knot is then placed to join the suture ends, over the top of the wound.
4. For this suture to be most effective, a square should be created with the corners of the suture.
5. This suture is used for tension relief and is stronger and quicker than simple interrupted sutures, as more of the wound is closed with each suture placed.

Figure 8. Interrupted cruciate sutures.

- ✓ **Horizontal mattress/U form/**

Procedures

1. The needle is passed from one side of the wound to the other (2–5 mm away from the wound edge), then horizontally back across the wound, leaving a short gap (6–8 mm) between the bites.
2. This creates a horizontal suture either side of the wound.
3. A knot is then placed to join the suture material on the original side.
4. This suture is mostly used for relieving tension.

Figure 9. Horizontal mattress sutures.

- ✓ **Vertical mattress/Far- far Near-near/**

Procedures

1. A bite is taken 8–10 mm away from the wound, and passes through to an equal distance away from the wound on the opposite side.
2. The suture is then repeated back across the wound, but this time, a bite is taken vertically from the original bite 3–4 mm away from the wound, creating a vertical suture on either side.
3. A knot is then placed to join the suture material on the original side.
4. This suture is more effective at relieving tension than the horizontal mattress

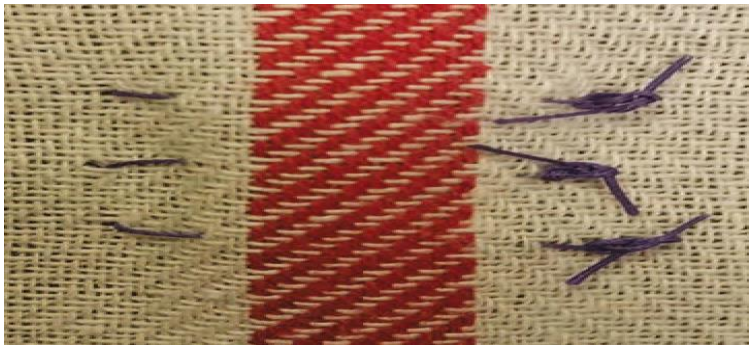


Figure 10. Vertical mattress sutures.

- ✓ **Lembert suture**

Procedures

1. The needle is placed perpendicular to the epidermis at a distance of about 8 mm from the edge of the wound.
2. With precise wrist movements, the needle is rotated under the surface of the dermis and the needle tip is removed 2 mm far from the wound edge on the ipsilateral side of the skin.

Figure 11. Lembert suture.

- ✓ **Cushing/Connell sutures.**

Connell and Cushing patterns for which the veterinary surgeon would be responsible. Connell and Cushing are completed in the same way, with Cushing passing through the deeper tissue layers.

Figure 12. Cushing/Connell sutures.

2.4.2. Suture knots

Knot security is defined by the quality of the knot, the technique used, the type of suture used, the body tissue, the moisture content of the wound, and whether infection is present). The smaller the knot, the less tissue reaction, resulting in a more minimal scar The knot consists of the loop, knot and ears. Knots may be hand tied or tied using instruments, but should not be over tightened to avoid discomfort to the patient, and to make the sutures easier to remove.

Absorbable sutures may be cut fairly short, leaving a length of 2–3 mm. Minimal absorbable sutures should be left internally to reduce any tissue reactions that may occur. Non-absorbable sutures should be left longer (around 10 mm) as they will require removal once the wound has healed, usually in 10–14 days.

2.4.2.1. Square (reef) knot

- The most common surgical knot.
- Taking one end of the suture material, pass it over the other end and back under the loop created.
- Pull tight over the wound and repeat in the opposite direction.
- Tying in opposite directions helps avoid slippage of the material.
- A minimum of three throws should be done, depending on the suture material used.

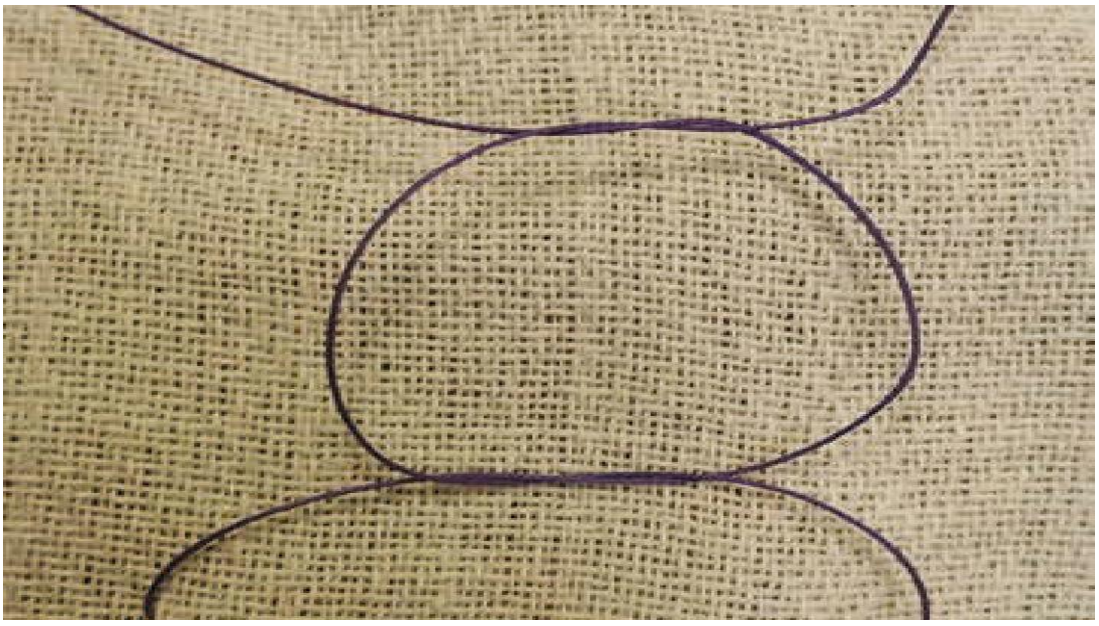


Figure 13. Square knot.

2.4.2.2.. Surgeon's knot

- Start with the first stage of a square knot, and once enough throws have been completed, finish with the final stage of a square knot.

2.4.2.3. Buried knot

- Used at the beginning of a row of intradermal sutures, a bite is taken at the end of the wound at each side through the dermis, before being secured with a Surgeon's knot.
- The knot remains within the dermal layers.

2.4.2.4. Aberdeen knot

- Useful for finishing a row of intra-dermal sutures.
- A loop is left from the final suture before pulling the material completely through, and another loop is made from the suture length and passed through the first loop.
- This is pulled tight leaving another loop and length.
- This can be repeated for the desired number of throws, and is ended by passing the whole length through the loop and pulling tight.
- The needle can then be inserted into the incision line and back out of the skin to bury the knot beneath the surface.

Note

Knot failure will result in

- Sever haemorrhage
- Herniation the (the presence of normal organ in to abnormal
- Death

Self-check 1: Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Knot failure will result in (2 pts.)
    A. Sever haemorrhage
    B. Herniation the (the presence of normal organ in to abnormal
    C. Death
    D. All

2. Define suture (1 pts.)

3. Mention 5 suturing techniques and explain each of them (5 pts.)

Note: Satisfactory rating –8 points Unsatisfactory - below 8 points

LAP Test 1: Practical Demonstration

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minutes.

Task1: perform simple continuous

Task: perform interrupted

Task3: perform vertical

Task4: perform horizontal

Task5: perform lembert

Task 6: perform cushioning suturing techniques

Name: ---------- Date: ----------

Information sheet 3: Administering Pre-anesthetic and pre-operative medication.

3.1. Introduction

Medication may be necessary before anesthesia to achieve a calm animal that will not show excessive excitement. Pre-anesthetic medication should be aimed at control of fear and excitement by the use of sedatives and at the reduction of parasympathetic tone by agents such as **atropine**. Atropine should be used selectively as a drying agent when excessive salivation may occur, or to control vagal tone, but must not be given routinely.

Potent analgesics can be administered prior to anesthesia, when an animal may already be suffering from pain or is about to undergo a painful procedure. Early control of pain under such circumstances will smooth out the course of anesthesia and will mean that central depression will be more easily achieved with a lower dose of anesthetic agent.

3.1.1. Common pre-anesthetic agents

- Atropine sulphate,
- Hyoscine,
- Morphine,
- Xylazine

3.1.2. Types of anaesthetics

- **Inhalation Anesthetics**

Inhalation anesthesia is superior to most injectable forms of anesthesia in safety and efficacy. It is easy to adjust the anesthetic depth. Because the anesthetics are eliminated from the blood by exhalation, with less reliance on drug metabolism to remove the drug from the body, there is less chance for drug-induced toxicity. Inhalation anesthetics are always administered to effect, because the dosage can vary greatly among individual animals and different animal species. The disadvantages to inhalant anesthesia are the complexity and cost of the equipment needed to administer the anesthesia, and potential hazards to personnel. All inhalant drugs are volatile liquids. They should not be stored in animal rooms because the vapors are either flammable or toxic to inhale over extended periods of time. In particular, ether must be stored in a proper hood or cabinet for flammable materials.

Examples of: Inhalant Agents

Ether, hloroform, methoxyflurane, Halothane, Isoflurane, Nitrous oxide, Enflurane, Carbon dioxide (CO_2)

- **Induction of Anesthesia.**

The main objective for induction of anesthesia should be that the animal will pass from a calm and relaxed pre-anesthetic period to a state of **unconsciousness** with the minimum of **distress** or discomfort. This does not necessarily mean that speed is essential because the animal that becomes quietly unconscious sometime after a simple injection may show no signs of distress. There are two commonly used methods for induction of anesthesia: by

A. Injection of anesthetic agents or

B. Inhalation of gases

- **Injectable anesthetics.**

Injectable anaesthesia is administered by any **parenteral** route, but the intravenous route of administration is generally preferred as it allows titration of the dose to produce the desired effect. If the size of the animal or lack of suitable superficial veins precludes the use of this route, then injections can be given intraperitoneally, intramuscularly or subcutaneously with a decreasing speed of onset of effect because of a slower rate of absorption. Common injectable anaesthetics in laboratory animal medicine and research are

- ✓ Barbiturates
- ✓ Propafol and saffan (both are steroidal anaesthetic agents) and
- ✓ Ketamine/xylazine combination (this comination has characteristics of NLA especially if used with buprenorphine).

Disadvantage injectable anesthesia

Potent depressants of vital physiological functions so that overdoses of most are potentially life threatening and fatalities are always a risk.

- **Inhalation anaesthetics**: which are sometimes called volatile anaesthetics, are compounds that enter the body through the lungs and are carried by the blood to body tissues?

Inhalation anaesthetics:

- ✓ **Halothane**: causes unconsciousness but provides little pain relief.
- ✓ **Enflurane**: is less potent, but produces a rapid onset of anaesthesia and possibly a faster recovery.
- ✓ **Ether**: a volatile colourless liquid with a pleasant smell.

- ✓ **Chloroform:** A colourless liquid that rapidly changes to a vapour and causes unconsciousness if inhaled.

Purpose of pre-anesthetic medication

The general **purpose** of premedication is to provide the patient with a comfortable dreamless sleep the night **before the** operation, and a **pre**- **anesthetic** period with

- Sedation
- Sleep
- Amnesia and tranquility without loss of consciousness.
- To minimize secretions
- As prophylaxis for suppression of vagal and other autonomic reflex activity.

Self-check 1: Writing Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Common pre-anesthetic agents (2 pts)
    A. Atropine sulphate
    B. Hyoscine
    C. Morphine
    D. Xylazine

2. Define anesthesia (3pts)

Note: Satisfactory rating –5 points Unsatisfactory - below 5 points

Information sheet 4: Administering regional and local anesthesia.

4.1 Introduction

Anaesthesia is a drug that makes a person or an animal unable to feel anything, especially pain, either in the whole body or in a part of the body. These drugs may be injected, inhaled, or applied directly to the surface of the body.

4.2. Type of anaesthesia

- **Local anaesthesia**: is loss of sensation in a limited body area and they have no direct effect on the C.N.S. Common local anaesthetics are
    - ✓ Lidocaine (Xylocaine)**:** Dose horse 6-10ml, cattle 5-6ml, sheep 3-4ml.
    - ✓ Novocaine
    - ✓ Bupivicaine
    - ✓ Proparicaine

Local anaesthetics may be administered by **Infiltration or infusion**- injection beneath the skin and their tissue layers along the site of an incision before or after a procedure Local anaesthetics, such as lidocaine jelly, may be useful for some surgical wounds. Anaesthetic effects are seen within 15 minutes of administration and may last from 45 minutes to several hours, depending on the drug used.

- **Regional or spinal anaesthesia**-

Injection into the vertebral canal, epidural. To avoid systemic toxicity, care must always be taken not to inject local anaesthetics into blood vessels.

Regional anaesthesia: Blocks pain to a larger part of your body. You may also get medicine to help you relax or **sleep**. Regional anaesthetics, such as lidocaine jelly, may be useful for some surgical wounds. Types of regional anaesthesia include:

- ✓ **Peripheral nerve blocks.** This is a shot of anaesthetic to block pain around a specific nerve or group of nerves. Blocks are often used for procedures on the hands, arms, **feet**, legs, or face.
- ✓ **Epidural and spinal anaesthesia.** This is a shot of anaesthetic near the spinal cord and the nerves that connect to it. It blocks pain from an entire region of the body, such as the belly, hips, or legs.

- **General anaesthesia**: is complete loss of sensation. Affects your **brain** and the rest of your body. You may get some anaesthetics through a vein (intravenously, or IV), and you may breathe in some anaesthetics. With general anaesthesia, you're unconscious and you don't feel pain during the surgery.

  Example: Pentabarbitone sodium and Thiopentone sodium

Dose: Horse, cattle, sheep, pig by injection 10mg/kg

Ketamine hydrochloride 10mg, 50mg, 100mg/ml

There are two major types of anaesthetics used for general anaesthesia

1. **Inhalation and**
2. **Intravenous anaesthetics**

Inhalation anaesthetics: which are sometimes called volatile anaesthetics, are compounds that enter the body through the lungs and are carried by the blood to body tissues

- **Intravenous anaesthetics**: Commonly administered intravenous general anaesthetics include.
  - ✓ Ketamine
  - ✓ Tthiopental (a barbiturate)
  - ✓ Methohexital (Brevital)
  - ✓ propofol (Diprivan).

4.3. Methods of Administration

Anesthetic agents can be administered in several ways:

1. Injectable Anaesthesia

Injectable anesthetics can be administered by various routes depending upon the specific compound.

- **Intravenous (IV)**

Method- An appropriate vein must be selected, the jugular veins are best.

- **Intramuscular (IM)**

Method- Insert the needle into a large muscle mass. Draw back slightly. If blood is aspirated, you are in a blood vessel. Redirect the needle. When the needle is placed correctly, inject the drug. The best muscle masses to use are the caudal thigh muscles.

- **Subcutaneous (SC)**

Method- Pinch an area of loose skin. Inject into the centre of the "tent" created by pinching.

Post anesthetic care

- **Immediate Recovery Period**

The period from cessation of anesthesia or completion of surgery until sternal recumbency is regained.

- ❖ Animals are carefully observed every 5 minutes; anesthetized animals are never left unattended.
- ❖ The animal is wrapped in a paper towel and placed in a clean dry cage.
- ❖ Extremities (feet or tail) are palpated or rectal temperature is taken.
- ❖ Additional eye lubricant is instilled at this time.
- ❖ As any anesthetic of 30 minutes duration or longer will usually result in hypothermia, plastic bottles or bags of warm (not hot to the touch) water, a Snuggle Safe Microwave Disc, or a hot water circulation pad is provided for supplemental heat.
- ❖ Rate and depth of respiration is visually monitored.
- ❖ Color of mucous membranes, ears and tail are monitored to confirm normal tissue perfusion.
- ❖ Reflexes (i.e. pedal, palpebral and eye position) are monitored to assess recovery from anesthesia.
- ❖ If recovery is protracted, animal is turned every 10 minutes to improve respirations and decrease recovery time.
- ❖ For surgical procedures longer than 30 minutes and/or where fluid loss due to hemorrhage or evaporation is anticipated, fluid support will be provided. Warmed subcutaneous or intravenous fluids (Ringer's Lactate or sterile saline) are given at the rate of 10-15 ml/kg/hour to prevent dehydration and/or electrolyte imbalance.
- ❖ The analgesic regime will be followed as indicated in the approved protocol.
- ❖ The procedure performed and any complications experienced will be noted on the animal's cage card.

- **Intermediate Recovery Period**

The period from sternal recumbence until the animal is able to walk.

- ❖ If no complications arise, animal is monitored and care provided as described above every 30 to 60 minutes.
- ❖ Analgesia is provided as stated in the approved protocol.
- ❖ Once animal is moving around the cage it will be placed on regular bedding. Food will be provided on the cage floor.

- **Long Term Recovery Period**

The period before normal activity resumes and the incision is healed.

- ❖ Research staff will check on the animal early the following day and at least daily thereafter.
- ❖ The incision site is checked for clear or purulent discharge, redness, swelling, pain, suture removal by the animal, or incision breakdown.
- ❖ Signs of surgical complication such as herniation, infection, organ dysfunction, pain, etc. will prompt a consultation with a veterinarian.
- ❖ Research staff will ensure that the animal is eating, drinking, eliminating, and locomotion normally.
- ❖ Any abnormalities (i.e. dehydration, lethargy, in appetence) will warrant continued frequent monitoring and care; detailed records will be kept. The animal will be weighed, provided with supplemental fluids (IV, SC) and offered high energy foods.
- ❖ Continued weight loss, dehydration and lethargy are not acceptable and may required early euthanasia.

Self-check 1: Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Differentiate local and general anesthesia and list 2 local and general anaesthesia (3pts)
2. Route of administration (2pts)

Note: Satisfactory rating – 3 points Unsatisfactory - below 3 points.

Information sheet 5: Performing Pre-anesthetic and pre-operative evaluations

5.1. Introduction

Goals of preoperative evaluation are to assess the patient's medical status and ability to tolerate anesthesia for the planned procedure, reduce the risks of anesthesia and surgery, and to prepare the patient for the procedure

Basic principles of physical examination should apply to animals for pre-anesthetic evaluations.

- Patient's body temperature,
- heart rate and
- Respiratory rate (TPR) will be recorded in the anesthesia record.

General body condition and fluid status of the patient will be noted in the record, with particulars such as

- Obesity
- Cachexia and
- Dehydration.

Musculoskeletal abnormalities may include

- Fracture
- Deformity
- Lameness
- Ataxia and
- Paralysis, and

Integument abnormalities such as

- Skin tumor
- Alopecia and
- Parasitic infestation.

Any significant cardiopulmonary abnormalities may constitute a greater anesthetic hazard to the animal than abnormalities in other system such as benign skin tumor, and the anesthesia must be postponed until the condition in question is fully evaluated and corrected when possible.

Cardiopulmonary system is assessed by assaulting the heart and lung on both sides of the chest, and particular attention must be given for any unusual characteristics of heart rate and rhythm, murmurs, pulmonary crackles, and clarity of the breathing sound. Special considerations in anesthetic monitoring and greater choice of anesthetics must be made available in animals with underlying cardiopulmonary illness, as alteration of

pharmacokinetics both in injectable and inhalants in these patient groups may lead to prolonged recovery, exacerbated cardiopulmonary depression and increased incidence of anesthetic complications. Careful palpation of abdominal organs during physical examination will help detect abnormal size or texture of liver, spleen, kidneys or GIT. The physical examination findings coupled with clinical signs such as jaundice, polyuria, polydipsia or diarrhea can assist clinicians better evaluate and manage anesthetic risks.

Laboratory Evaluations

- Packed cell volume (PCV)
- Hematocrit
- Total plasma protein (TPP)
- Blood urea nitrogen (BUN) and
- Blood glucose.

Other tests that can provide additional screening and more detailed information regarding the patient status when warranted include

- Complete blood cell count (CBC)
- Chemistry profile (electrolytes
- Creatinine
- Enzyme levels)
- Blood gas analysis
- Urinalysis and
- Coagulation profiles.

Additionally, as indicated by physical exam and history, ECG, blood pressure measurement, radiography, ultrasonography, and may be carried out.

Drug interaction

Drug interaction of previously administered medication with anesthetics to be employed is an important consideration as overdosing or hypersensitivity may occur due to changes in metabolism and excretion. A medication such as chloramphenicol has been shown to compete in metabolism of anesthetics that are metabolized by cytochrome P450, necessitating the dose of anesthetics for induction. Following thorough preanesthetic work up, an anesthetic protocol is constructed based on the procedure and physiologic condition of the animal. A variety of drug choices are available, but an emphasis is directed to avoid drugs that may further compromise the preexisting disease, or to reduce anticipated adverse effects related with the procedures (e.g., avoiding ketamine in animals with previous seizure history or procedures such as myelogram)

Self-check 1: Writing Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Why it's important the evaluation pre-anesthetics activities (3pts)
2. Integument abnormalities such as (2pts)
    A. Skin tumor
    B. Alopecia
    C. Parasitic infestation.
    D. All

Note: Satisfactory rating – 5 points Unsatisfactory - below 5 points

Information sheet 6: Performing minor surgical operations

6.1. Introduction

Usually involves an incision and exposure of a tissue for an operative method or the operative manipulation of physiological or physical parameters to create a model of a clinical disease process or condition and/or treatment of a disease or condition. Surgery usually requires anesthesia, and is further sub-classified as major or minor.

6.2. Major Surgery:

Any surgical intervention that penetrates a body cavity (i.e. cranial, thoracic, abdominal, pelvic, ocular or orbital, skeletal, joint), or has the potential for producing a permanent impairment of a physical or physiological function.

Examples of major surgery include:

- Surgical access of a body cavity
- Injury or repair of a tendon or ligament
- Bisection (partial or complete) of muscle or tendon
- Amputation of a limb
- Nephrectomy or nephrectomy
- Open surgical biopsy of a major organ
- Surgical implantation of indwelling medical or monitoring devices
- Orthopedic procedures involving a surgical approach
- Neutering of male animals

Minor Surgery:

Any surgical intervention that does not penetrate a body cavity or that does not ordinarily have the potential to result in impairment of a vital physical or physiologicalal function.

Examples of minor surgery include:

- Tissue biopsy not involving surgical exposure of a body cavity
- Skin and subcutaneous implants
- Removal of small digits or tail amputation in small animals
- Surgical repair of a superficial injury/wound management
- Castration
- Hoof trimming
- Dehorning
- Docking etc

6.3. Aseptic Technique: A technique used for surgery or other procedures that is designed to maintain an object or anatomic area in a condition as free as possible from

all microorganisms and infection. It is used whenever body tissues must be penetrated and the animal is intended to recover from anesthesia. It is designed to protect the animal as well as the person performing the procedure and may require the use of a dedicated room or area. Aseptic technique is further defined below as strict or modified, depending on the type of procedure performed and the animal classification.

6.3.1. Strict Aseptic Technique includes:

- A dedicated, clean, and organized work area
- Pre-sanitized work area
- the pre-surgical or pre-procedural preparation of skin surfaces (i.e., hair clipped, skin shaved if applicable, disinfectant soap scrub)
- The surgery/procedure preparation of the skin site (iodophor and/or alcohol scrub)
- The sterile draping of the surgery/procedure skin site
- The use of sterile instruments and supplies
- surgeons prep (i.e., removal of jewelry from hands and wrists; 5 minutes of thorough scrubbing of fingers to elbows using surgical disinfectant
- wearing of surgical clothing (i.e., scrub suit, cap, mask, shoe covers, sterile gown, sterile gloves)
- The procedure must be performed in an area separate from other activities (a separate room is not required);
- The activity in the area must be limited to the procedure conducted;
- The area must be kept neat and uncluttered, and easily cleaned and sanitized;
- Personnel access to the area must be limited;
- Modified aseptic technique must be used.

6.4 Procedures in opening the surgical site

6.4.1. Surgical Technique

There are a number of things that surgeons can do to prevent post-procedural infections.

1. Be aware of instrument and hand position at all times.
2. Be gentle when handling tissues.
3. Use appropriate suture techniques

4. Any suture that will be buried in tissues should be either absorbable or monofilament (non-absorbable braided suture is irritating and can harbour bacteria)
5. Sutures should be placed uniformly and as close to the tissue edge as possible to prevent obstruction of blood flow- typically no more than 1 cm from the edge is necessary in large animals and 0.2 cm in small animals.

6.4.2. Basic surgical techniques

Incision

1. Use the “fingertip grip” rather than the “pencil grip” for skin incisions. This allows for maximum cutting edge contact and pressure, making a straighter incision with less skin trauma.
2. Use your free hand to spread skin to afford a smooth surface and tension while cutting.
3. Keep the blade perpendicular to the skin and draw it along the line of the planned incision.
4. Try to open the skin in one continuous smooth stroke. Making multiple lacerations traumatizes the skin.

6.4. 3. Haemorrhage control

1. The assistant should be prepared with mosquito forceps and gauze to control haemorrhage while the incision is made.
2. Most ‘bleeders’ will stop with pressure from a gauze sponge.
3. With larger skin vessels mosquito clamps may need to be applied.
4. “Clamps” can be removed after several minutes or when haemostasis is achieved.
5. Haemorrhage can always be controlled with pressure.

6.4.4. During operative procedures.

1. Animals should be monitored every 15 minutes to ensure that the animal is alive and doing well.
2. Check the colour of the mucus membranes, response to reflexes, heart and pulmonary functions.
3. Select the correct surgical instruments for the procedure to be performed.
4. Surgical instruments should be handled to minimize contamination.
5. Tissues should be handled gently avoiding unnecessary trauma.

6. Blood vessels that are likely to bleed should be ligated.
7. Avoid contamination of incisions sites.
8. Wounds should be closed with appropriate suture material and techniques using the right kind of needles.
9. In general absorbable sutures (e.g. cat gut) should be used for soft tissues.
10. Good surgical techniques will prevent post-surgical complications like infection, haemorrhage or even death.
11. Proper surgical and post-surgical records should be maintained.
12. Non-absorbable suture materials used to close skin wounds should be removed as soon as the wound is healed (7-10 days) or within two weeks, whichever occurs first.

6.5. Minor surgical Operation performing

- **Wound management**

Wound can be defined as disruption in normal **continuity** of tissue in any part of the body caused by

- Physical
- Chemical
- Biological Factors

Wound healing is the restoration of the tissue continuity.

Wound classification

1. According to the openness of the wound

A. Closed Wound

- Abscess
- Hematoma:
- Edema

B. Open Wound

- Incised wounds:
- Abrasions.
- Contusions:
- Lacerations6.
- Avulsions
- Penetrated wounds
- Punctured wound
- Contused wound
- Poisoned wound
- Virulent wounds

6.6. Suturing wounds

Abscess

- Is the circumscribed inflammatory lesion w/c consists of **purulent exudates** the puss surrounded by a limiting membrane the pyogenic membrane
- The pyogenic membrane serves to prevent dissipation of infections
- Develop in any parts of the body as a result of infections
- The character of the pus varies with the causative organisms

The causative organism includes:

- Streptococci
- Staphylococci
- Corynebacterium species
- E. Coli
- Pseudomonas aeruginosa
- Actinomyces bovis
- Actinomyces ligeresi

Classification of Abscess

Depending upon the course

- Acute Abscess
- Chronic Abscess

Depending upon location

- Superficial Abscess
- Deep Abscess

Acute Abscess:

- Develops rapidly in a period of 3 to 5 days from the commencement of infection
- Retained for a longer period and calcified
- Matures rapidly
- Progressively becomes softer and the center becomes thin

Differential Diagnosis

An abscess may be confused with Hematoma, Cyst, Hernia, and Tumor

- **Hematoma** feels doughy on palpation and may crepitate on pressure

- **Cyst** fluctuates uniformly, develops slowly and is not hard at periphery
- **Hernia** has a hernia ring, reducible and feels doughy
- **Tumor** is a solid mass and hard to touch.
- Abnormal growth of metaplasia and neoplasia

Chronic Abscess

- Slow to develops and shows little or no inflammatory reaction
- Painless or slightly painful
- Primary or secondary

Superficial Abscess: Located near the surface of the skin eg. Abscess behind the shoulder, yoke gall

Surgical procedures/ Treatment/

1. Aimed at its maturation and evacuation of its contents
2. Opened only when it becomes mature (if it is not matured secondary abscess may develops)
3. Maturation is hastened by application of Iodine ointment Fomentation.
4. Open with a scalpel.
5. While incising the incision should be parallel to the long axis of vessel
6. Explore for foreign bodies and dead tissues
7. Remove the content and irrigate with antiseptic lotion
8. Packed loosely with gauze to facilitate drainage and prevent closure of the wound before complete drainage of the pus

6.7. Surgical Procedures on Integuments

Integuments: Integuments are outer covering of the body it is one of the largest and most extensive organ systems in the body and includes:

- Skin
- Hair
- Claws
- Hoofs
- Horns
- Tail
- Varies glands

Function of the integuments

- Covers and protect the underlying tissues
- Acts as a first line of defense against microorganisms
- Has ability to regenerate and heal

- Carries out the protective and regulatory duties
- Important sensory organ
- Engaged in the synthesis of vitamin D and storage of nutrients

6.7.1. Hoof Trimming: Used as preventive measures and for treatment of various foot abnormalities

Procedures

1. Washing and cleaning of the hoof
2. Evaluate the shape, length and height abnormal hoof
3. Tranquilization or sedation of the animal
4. Securing in lateral recumbence
5. Draw a line on the hoof wall
6. Shortening of the elongated wall
7. Leveling of the claws

6.7.1 Basic instrument used for hoof trimming

- Hoof cutter
- Hoof knife
- Hoof rasp
- Electric Sander -smoother

6.7.2. Dehorning (Amputation of the Horn)

- The horn encloses the corneal process of the frontal bone, except in polled breeds of exotic cattle
- The corium of the horn completely envelops the horn core and fuses with periosteum
- The horn core is continuous with the frontal sinus
- At the base, the horn is thin and is continuous with the epidermis
- Until 2 months of age, the horn bud is not attached to the skull
- Prevent growing back after dehorning a ring of skin tissue **1 to 1.5 cm** around the base of the horn needs to be removed

6.7.2. Method of dehorning

1. Cosmetic Dehorning

Procedures

1. Skin incision is made encircling the base of the horn below the coronary band
2. Ligate the corneal vessel
3. By blunt dissection exposes the periosteum of the frontal bone
4. Remove horn from the base (horn amputation saw/emryotomy wire)
5. Cut the extra bone.
6. Suture the entire flap skin (interrupted mattress, non-absorbable suture material)
7. Apply protective bandage after covering with medical gauze

The cosmetic dehorning is done mainly in young animals less than 2 years

Infection may a serious complication- Systematic antibiotic is needed

Ketoprufen- is given to reduce pain

Surgery should not be done in rainy, dusty conditions or during fly seasons

Postoperative complications Hemorrhage, wound dehiscence, sinusitis, maggot infestation

Direct Cutting Method

- The entire horn is amputated with the help of embryotomy wire below the coronary band.
- Hemorrhage is controlled by ligating vessels or by thermocautery using hot iron

6.7.3. Tail Amputation or Docking

Tail is a long movable appendage with long hairs at the tip and seen at the back of the animal

Indications of Tail Amputation

- To improve the appearance of the animal
- Sacral fracture and subsequent neurolical deficit
- Coccygeal fracture or dislocation
- Neoplasm of tail
- Tail gangrene or necrosis

6.7.3.1. Methods of tail Amputation

1. Flap Method

Procedures

1. Animal restraining
2. Semilunar incision (skin, muscle on the dorsal and ventral surface of the tail)
3. Incision placed 2-3cm caudal to the intervertebral space to disarticulate)
4. Flap out skin cranially (to identify the exact intervertebral space)
5. Ligate the coccygeal vein and arteries
6. Tourniquet loosely
7. Appose the skin (Simple interrupted suture)
8. Tourniquet released after surgery
9. Apply tetanus prophylaxis

2. Using Docking Knife

Procedures

1. Animal restraint
2. Locate the site
3. Place the docking knife at the exact site of amputation
4. Amputate the tail forcibly
5. Tourniquet loosely
6. Apply sterile gauze impregnated in anesthetic solutions (check bleeding)
7. Tourniquet released after surgery
8. Apply tetanus prophylaxis (antitoxin)
9. Seasonal fly control

Post-operative care: Dressed with antibiotic daily until the tail heals

6.7.4. Fracture: is a complete or incomplete break in the continuity of bone or cartilage It accompanied by various degree of injury to the surrounding soft tissues

- Affect blood vessels
- Affect locomotors system
- Affect nerves

Fracture Classification

1) **Simple fracture (closed fracture)**

- Fracture that does not communicate with the environment
- No wound at the surface of the fracture site

2) Compound fracture (Open fracture)

- Open wound extending through the skin down to the bony injury
- More prone to bone infection

3) Diphyseal fracture

- Occur in the diaphyseal of long bones
- Further described as proximal third, middle or distal third of the diaphysis depending on the location/the fracture line

4) Metaphyseal fracture: Fracture with in the metaphysis of long bone

5. Epiphyseal fracture: It is fracture of epiphysis and further classified as proximal, or distal epiphyseal fractures

6) Fracture Dislocation: When a fracture of bone results into joint instability leading to subluxation or luxation (**dislocation**) of the joint

7. Montegia fracture: Refers of the olecranon process and dislocation of the elbow joint

8) Colle's fracture: Fracture of the distal end of radius

Clinical signs of fractures

- Pain
- Crepitation
- Abnormal mobility
- Change in angulation
- Local swelling
- Loss of function
- Crepitation
- Local swelling

Fracture Treatment

Splints

- Is a rigid material used to keep broken bone from moving
- Easy to apply
- Strong enough
- Inexpensive eg. Ambboo, metal bars

Casts

- Are stiff dressing usually made of plaster of paris used to immolize the fractured bones
- Most common
- Joints proximal and distal to the fracture site should be included in the cast
- Many distal radial and tibial fractures can be managed successfully by this method
- A cast should incorporate the foot of the animal to avoid pressure sores around the coronary band
- A cast should not end at the mid shaft of the radius or tibia to prevent sores.

The ideal casts should be:

Casts: A protective shell of fiberglass, plastic, or plaster, and bandage that is molded to protect broken or fractured limb(s) as it heals.

- Easy to apply
- Less expensive
- Hardens
- Quickly reaches its maximum strength soon after application
- Resistant to moisture and physical deterioration

6.7.5. Prolapse of the rectum

Rectal prolapse occurs in all the species of domestic animals, but, is observed more frequently in the bovine, porcine and ovine and with only occasional cases in the equine species. The condition is observed more commonly in young than the adult animal. There may be some congenital defects in the firmness of the fibrous attachments between the various layers of the rectum as a possible cause of rectal prolapse.

1. **The mucosal and**
2. **Complete prolapse of the rectal wall.**

The mucosal prolapse is seen in most cases frequently and in most cases occurs without any apparent cause. In this type of prolapse the protrusion of the mucosa is unaccompanied by the musculature of the rectum. If the prolapse is of recent occurrence and the mucous membrane is normal, it is returned to its normal position.

Complete prolapse of the rectum involves all of the structures of the bowel including the muscular is so that it may become very extensive.

Etiology: severe enteritis, parasites, lacerations, **neoplasia /tumours/** of the rectum or distal colon, urolithiasis/stone in urinary tract/, retained foetal membrane, dystocia, etc.

Clinical findings: an elongated, cylindrical mass protruding through the anal orifice.

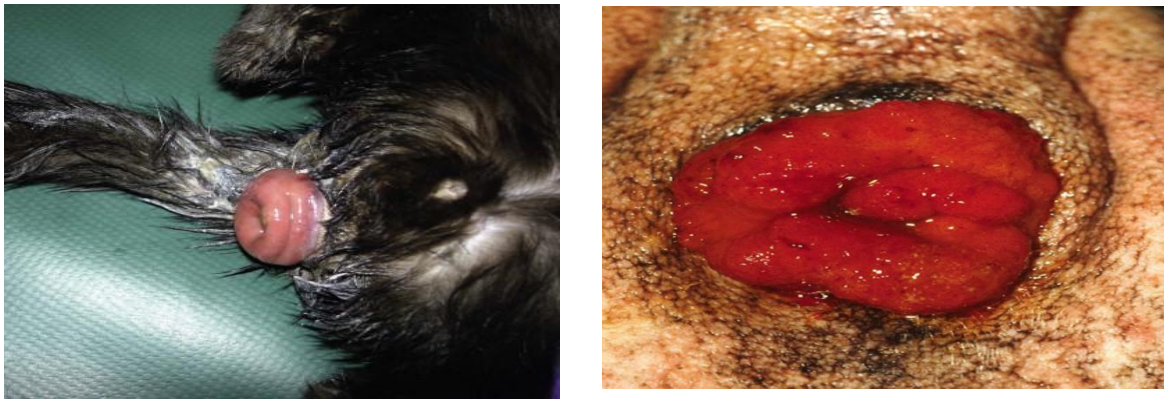


Fig 1: Rectal Prolapse

Treatment:

1. Hold the animal to stop it running a way. keep dogs and chickens, cats away from the animal
2. Clean the uterus with water, soap and antiseptic
3. Remove pieces of placenta stuck to the uterus gently by hand of possible.
4. Lift up the uterus and gently begin to push it back in to the animal
5. Put some antibiotic in to the uterus.
6. The lips of the vulva can be stitched to prevent the uterus from coming out again.

6. Laparotomy

This operation may be performed for examining the peritoneal or abdominal cavity for diagnostic purposes. It is also used in ovariectomies, reduction of the torsion of the uterus or intestines, intussusception of the intestine and traumatic gastritis. Also for cesarean section, rumenotomies, removal of neoplasms and rarely for extirpation of the kidney. The operation may be performed in either the right or left flank and preferably in the standing position. It is usually possible to operate by infiltrating the operative area with a local anesthetic, but, in addition some individual animals may require a sedative.

In most cases the operative area is between the last rib and the external angle of the ileum. This area should be thoroughly prepared for an antiseptic operation. The skin and underlying tissue may be infiltrated with a local anesthetic.

The incision in the skin may be started just below the transverse processes of the lumbar vertebrae and its length will depend upon the purpose of the operation. The scalpel used for the skin incision should not be used to divide the deeper tissue as it is usually contaminated with bacteria in the skin. Division of the external and internal oblique muscles may be made in the direction of their fibers, but in most cases, it is best to incise the muscles and peritoneum in the direction as the skin incision.

7. Hernia

A disorder in which a part of the body protrudes abnormally through a tear or opening in an adjacent part, especially of the abdomen. A true hernia is defined as having a hernia ring, sac, and contents. Hernias of the abdominal wall are common in all domestic species and include umbilical hernias and inguinal or scrotal hernias. Hernias may be direct (through a rent in the body wall) or indirect (through an already existing ring, such as the inguinal ring or umbilical ring). Congenital hernias tend to be indirect, although direct, traumatic hernias may arise during dystocia or obstetrical manipulations.

8. Atresia anal

Atresia: A condition in which body orifice or passage in the body is abnormally closed or absent.

Surgical treatment of atresia ani through circular anal skin removal has a good prognosis for survival. Colostomy is not an acceptable treatment from the calf's perspective because of the resulting poor condition but the high survival rate is important to allow continued milk production of the dam.

Clinical Relevance:

Early diagnosis, supportive treatment, and surgical correction are important in management of atresia coli.

9. **Nasogastric Tube Placement**

Nasogastric tube placement may be one of the more underutilized tools in treating our hospitalized veterinary patients.

The nasogastric tube offers multifunctional support by way of providing comfort, alleviating nausea and evacuating gastric fluid in patients with gastrointestinal stasis while providing the option to deliver essential nutrition and medications. All of this in a tool that is relatively inexpensive and easy to place. The cost may be offset by decreased time in the hospital in some patients.

Complications:

Complications include placement of the tube in the trachea or bronchi, aspiration pneumonia secondary to vomiting, regurgitation or tube dislodgement, epistaxis from irritation of the nasal mucosa, vomiting and regurgitation. Fluid losses and electrolyte imbalance may be secondary to removal of large volumes of gastric fluid from ileus but can be balanced by replacement therapies using intravenous fluids and electrolyte supplementation. Recent findings suggest that there was no increased risk for hypochloridemic alkalosis in patients with NG tube placement.

Materials:

1. 3-5 drops of tetracycline ne or penicillin (also can use 1-2cc of 2% lidocaine)
2. Sterile lubricant jelly
3. Appropriately sized tube:
4. Nylon suture material
5. Needle drivers and scissors and/or 22-gauge needle
6. Permanent marker

Procedure:

1. Gather the materials needed as listed above.
2. Apply 3-5 drops of local anesthetic down the nostril to be used while the nose of the patient is elevated. Allow 4-5 minutes for the drug to properly anesthetize the area.
3. Pass the end of the nylon suture through the pre-placed needle in the skin.
5. With equal amounts of nylon on either side of the skin attachment, tie a square knot in the nylon being sure that the suture is loose.
6. Now measure the tube from the tip of the nose to the appropriate landmark:
7. Lubricate the tip of tube with sterile lubricant jelly.
8. Grasp the animal’s muzzle firmly with your non-dominant hand.

9. Using your dominant hand introduce the tube into the ventromedial (ventral and medial line of nasal passages) aspect of the nasal cavity through the selected nostril.
10. Hold the head and neck in a neutral position as you advance the tube.
11. When the tube is advanced to the appropriate distance, aspirate the tube using the syringe.
12. Position the tube over the pre-placed square knot at the level of the indelible mark and begin the Finger Trap pattern around the tube.
13. Place a tape butterfly on the tube and secure to the side of the animal's head under the ear with suture.
14. Next, suture the tube to the cheek so that it is secured at two locations.

10. Caesarian section

Caesarian section, also called laparohysterotomy, means the extraction of the fetus or foeti from the mother animal, through a surgical opening in the abdominal wall and the uterus. It is commonly indicated in cases of dystocia when a calf cannot be delivered by normal parturition cascade.

10.1. Methods of caesarean section

- **The standing left Para-lumbar celiotomy,**

The standing left Para-lumbar celiotomy is the most commonly used approach for an uncomplicated cesarean section. In general, para-lumbar approaches are often favored by practitioners because most food animal practitioners are familiar with this approach. The approach is sufficiently similar to that used for rumenotomy and either the right or left approaches to correct abomasal displacement, so that most practitioners have a high degree of comfort with this approach. The incision is made vertically in the middle of the paralumbar fossa, starting approximately 10 cm ventral to the transverse processes of the lumbar vertebrae and continuing ventrally, far enough to allow removal of the calf. Closure of the abdominal wall is straightforward and relatively easy. Absorbable suture is used to close the abdominal musculature. The rumen aids in retaining the abdominal viscera within the peritoneal cavity. Absolute requirements for this procedure include an appropriate restraint facility and a cow capable of standing through the entire procedure. Contraindications for this procedure include an inability of the patient to stand through the procedure and large fetuses that preclude

exteriorization of the uterus. Lifting a uterus and calf to the paralumbar incision is usually difficult and occasionally impossible for some practitioners.

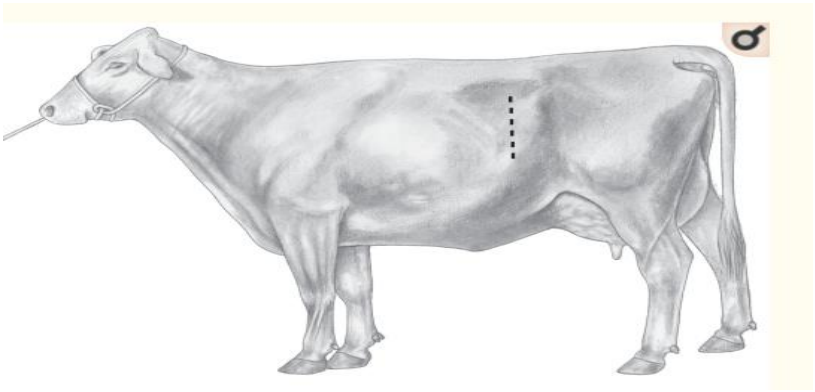


Fig 1: Standing **Left paralumbar celiotomy,**

- **Standing right Para lumbar celiotomy/ incision of the abdomen/**

This approach has all the indications and contraindications of the left Para lumbar approach the additional and perhaps most important difference between the left and right Para lumbar approach is the difficulty in keeping viscera in the peritoneal cavity with the right Para lumbar approach. Most practitioners studiously avoid this approach; however, some practitioners feel right horn pregnancies are more manageable with the right Para lumbar approach. This approach is helpful when a large calf can be palpated in the right horn with its limbs directed towards the right side of the cow or heifer and on cows with hydrotic condition of the uterus. In the case of an animal with such a condition, the location of the rumen and the increased size of the uterus seem to force the uterus into the right paralumbar fossa, permitting easier removal of the fetus, limiting abdominal contamination, and permitting the surgeon to leave substantial volumes of fluid within the lumen of the uterus. This is not to suggest that cesarean section is the treatment of choice for hydrotic conditions of the unterus; however, the practitioner is occasionally presented with cows whose hydrops condition is sufficiently advanced that it seems unlikely that the cow will survive an induced parturition.

- **Recumbent left Para lumbar celiotomy,**

This approach differs little from the standing left Para lumbar approach. Additional assistance is nearly always needed to cast the cow, if not recumbent already, and to place the cow in right lateral recumbence. The incision is made slightly more ventral than in the standing left Para lumbar celiotomy. Exteriorization of the uterus is often

difficult because the gravid uterus falls away from the incision. Closure is more difficult than when the standing left Para lumbar approach is used, due to increased tension on the muscle layers, but it is rarely problematic.

- **Recumbent right Para lumbar celiotomy,**

This approach is very seldom used, as it is very similar to that of recumbent left Para lumbar celiotomy and has the additional complication of not having the rumen to retain the abdominal viscera.

- **Recumbent ventral midline celiotomy,**

This approach is similar to the other ventral approaches, but it may be better suited for the older dairy or beef cow. The cow is positioned in right lateral recumbence. The hind limbs should be extended caudally and the upper limb abducted for the best exposure to the incision site. This approach uses a curvilinear incision that is roughly parallel to the last rib; it starts approximately 5 cm lateral to the umbilicus and courses caudo dorsally toward the inguinal area. This approach readily permits exteriorization of the uterus, making it suitable for removal of a large emphysematous fetus. In cattle with a large udder, the incision is more readily extended caudally than when the ventral midline or ventral Para-median approach is used. Consequently, this approach may have utility in dairy cows and older beef cows. In addition, this incision is not readily visible in a standing cow, which may be an advantage if the cow is going to be sold soon after the operation. Closure of the incision is often more difficult than with the other approaches, as more tension is placed on the muscle layers. The integrity of the abdominal wall closure is less secure than that of either the ventral midline or ventral Para median approaches and therefore, more prone to herniation and evisceration of the cow

- **Recumbent ventral Para-median celiotomy**

This approach is similar in most respects, including the advantages and contraindications, to the ventral midline approach. The abdominal wall incision is placed parallel and approximately 5 cm lateral to the linea-alba. Some authors have postulated that the abdominal wall closure of the Para-median approach is more secure than that of the ventral midline approach.

- **Ventro-lateral celiotomy**

This approach is similar to the other ventral approaches, but it may be better suited for the older dairy or beef cow. The cow is positioned in right lateral recumbency. The hind limbs should be extended caudally and the upper limb abducted for the best exposure to the incision site. This approach uses a curvilinear incision that is roughly parallel to the last rib; it starts approximately 5 cm lateral to the umbilicus and courses caudo-dorsally toward the inguinal area. This approach readily permits exteriorization of the uterus, making it suitable for removal of a large emphysematous fetus. In cattle with a large udder, the incision is more readily extended caudally than when the ventral midline or ventral Para median approach is used. Consequently, this approach may have utility in dairy cows and older beef cows. In addition, this incision is not readily visible in a standing cow, which may be an advantage if the cow is going to be sold soon after the operation. Closure of the incision is often more difficult than with the other approaches, as more tension is placed on the muscle layers. The integrity of the abdominal wall closure is less secure than that of either the ventral midline or ventral Para-median approaches and therefore, more prone to herniation and evisceration of the cow.

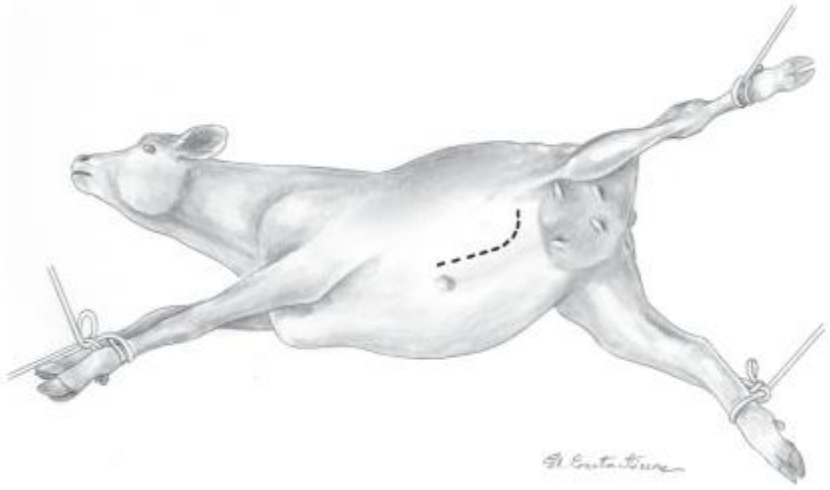


Fig 2: Ventrolateral celiotomy

- **The standing left oblique celiotomy.**

Each has its own advantages and disadvantages. The selection of an appropriate approach depends on the type of dystocia, the health status of the cow, the environmental conditions, the availability of assistance, and the surgeon's preference.

The indications for performing a caesarean section include maternal and fetal factors. Maternal indicators include immature heifers, pelvic deformities, failure of cervical dilation, uncorrectable uterine torsion, uterine tear, hydrops, a long gestation period, and prepartum paralysis.12,13 The current case report is prepared with the aim of describing the surgical management of caesarean section in dairy cow due to prolonged pregnancy with no sign of parturition is described.

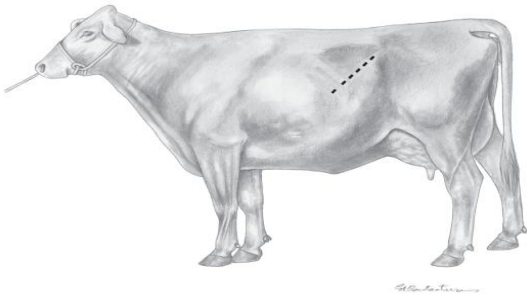


Fig 3: **standing left oblique celiotomy.**

10.2. Case History and Clinical Examination

A detailed clinical examination was performed by taking all the necessary parameters. Further close examination of vital organ parameters such as heart rate, respiratory rate, pulse rate, and mucous membrane was made and found within the physiological limits. In addition, upon rectal examination, most organs and structures of the fetus were palpated, but there was no response from the fetus. Accordingly, based on the history and clinical observation, the case was diagnosed as prolonged pregnancy and the team decided to be managed the case surgically by caesarean section.

10.2.1. Pre-operative Preparation of Surgical Site of the Cow

Procedures

3. Restraining the cow
4. The skin surface on the left paralumbar fossa was prepared aseptically by washing with water, soap and Salvon (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution).
5. Wash with clean water, soap and savlon 3%and Chlorhexidine gluconate 0.5% solution).

6. The hair was first clipped with sharp scissor and shaved with a razor blade and cleaned thoroughly with a standard solution of Salvon
7. Finally, the area was scrubbed three times with tincture iodine 2% solution to decrease the microbial load in the area and left dried till readying for caesarean section.

10.2.2. Animal Handling and Anesthetic Protocol

The cow was properly restrained with the combination of physical and chemical methods. Upon the physical restraining technique, the cow was handled with rope-assisted by personnel and fixed at one place against a well-built wood to adequately restrain the cow in standing position. In the chemical restraining technique, the cow was first sedated with Domidine (Detomidine hydrochloride, with a dose of 20 µg/kg intravenously. In addition, regional anesthesia of the left flank area was done using two percent lidocaine (Lidocaine hydrochloride 2%, Vedco Inc. Saint Joseph Missouri, USA) to desensitize the abdominal muscle and alleviate pain during surgical procedure. This was done by loading the lidocaine in a syringe with 18 gauge, 10 cm needle, 5 ml per each paravertebral space. The needle was inserted halfway between the intervertebral transverse process and the needle is slightly angled to reach and deposit the lidocaine in the subarachnoid space. Finally, two linear infiltrations were made in the pattern of inverted ‘T’ using local anesthetic lidocaine (60 ml) to desensitize and put in sufficient analgesia enclosing the site of incision and waited for 10-minutes.

10.2.3. Surgical Correction and Treatment

Following proper physical and chemical restraining and aseptic preparation of the surgical site (left flank), the cow was kept on appropriate direction for the next surgical procedure. A sharp vertical skin incision with a distance of approximately (~40 cm long) was made on the left flank region approximately (~10 cm) below the lumbar transverse process. After blunt dissection of the skin from the subcutaneous tissue, the incision was continued through the external and internal abdominal oblique, transverse abdominal muscle and peritoneum. Then all muscular layers together with skin were grasped with handheld retractor to get sufficient surgical field and exposure to the uterus. Upon insertion of a finger, slight adhesion of uterus with the lower abdominal

wall was found and it was gently detached and the uterus was retracted from it is right position to the left one

After the position and condition of the calf was determined, gently incision approximately (~40 cm) was made on the uterus. Then, the calf was taken out with the help of an assistant after proper stabilization of the uterus. However, the calf was non-viable and abnormally oversized (approximately 85 kgs) than anticipated under normal gestational conditions additionally; the uterus was filled with excess and abnormal dark brown colored blood and was properly drained and removed together with the placenta from the uterus. Then, the uterus was washed and cleaned with sterile isotonic saline solution before suturing. In addition, bleeding during the procedure was managed by applying sterile gauze, using different straight and curved hemostatic forceps and topical infiltration of epinephrine on bleeding site depending on the site and condition. Later, uterus was closed using a double layer of Utrecht suturing pattern with 1-0 size sterile absorbable polyglycolic acid (Shandong Sinorgmed Int'l Co., Ltd, China). The uterus and surrounding area were rinsed copiously with sterile isotonic saline solution and replaced in the abdomen to its normal position. Some fluid that leaks to the peritoneum was also sucked with sterile sponge and gauze. After proper abdominal lavage, the peritoneal incision was closed with a continuous lockstitch pattern using 2-0 size sterile absorbable polyglycolic acid. Besides, all three abdominal muscular layer were separately closed with simple interrupted pattern using 2-0 size sterile absorbable polyglycolic acid. Later, the skin was closed using silk 2-0 size in a horizontal interrupted mattress. Lastly, the area was properly cleaned and dressed with a 2% tincture iodine solution and admitted home).

10.2.4. Post-Operative Follow-Up and Result

Intermittent bleeding was noticed following skin suture but it is normal and helps to clean the wound unless continued for a long period. The dressing of the wound was done at second and third day's post-operative up to 14-days until it completely healed. Besides, Ceftriaxone (Dose-500 mg/kg) was also administered Intravenously (IV) for five days post-operation at the farmers' farm. Tetracycline wound spray was also applied around the wound. The owner was also advised to closely monitor the cow and avoid leaving the cow on the grass but advised to allow some exercise and supplied

with good nutrition to facilitate wound healing. After 20-day post-operation, the wound was healed completely and after two months of follow-up, the cow was under good health status. After the position and condition of the calf was determined, gently incision approximately (~40 cm) was made on the uterus. Then, the calf was taken out with the help of an assistant after proper stabilization of the uterus. However, the calf was non-viable and abnormally oversized (approximately 85 kgs) than anticipated under normal gestational conditions (Figure 1F). Additionally, the uterus was filled with excess and abnormal dark brown colored blood and was properly drained and removed together with the placenta from the uterus. Then, the uterus was washed and cleaned with sterile isotonic saline solution before suturing. In addition, bleeding during the procedure was managed by applying sterile gauze, using different straight and curved hemostatic available that will further limit the potential for contamination. Practitioners are encouraged to consider alternative approaches for certain conditions.13,16 This is in agreement with the surgical approach used in this case report. The main goals of the caesarean section are preservation of the cow and calf and the future reproductive efficiency of the cow.

Self-check 1: Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Differentiate Minor and major surgery (2pts)
2. List minor surgery (1pt)
3. How to treat wounds (2pts)
4. What is prolapse? (1pt)
5. Differentiate (4 pts.)
   - **A.** Hematoma
   - **B.** Cyst
   - **C.** Hernia
   - **D.** Tumor

Note: Satisfactory rating – 10 points Unsatisfactory - below 10points

Operation sheet 1: Hoof Trimming

Used as preventive measures and for treatment of various foot abnormalities

Procedures

3. Washing and cleaning of the hoof
4. Evaluate the shape, length and height abnormal hoof
5. Tranquilization or sedation of the animal
6. Securing in lateral recumbence
7. Draw a line on the hoof wall
8. Shortening of the elongated wall
9. Leveling of the claws

Name: ---------- Date: ----------

Operation sheet 2 : Dehorning (Amputation of the Horn)

Based on procedures perform Amputation of the horn

1. The horn encloses the corneal process of the frontal bone, except in polled breeds of exotic cattle
2. The corium of the horn completely envelops the horn core and fuses with periosteum
3. The horn core is continuous with the frontal sinus
4. At the base, the horn is thin and is continuous with the epidermis
5. Until 2 months of age, the horn bud is not attached to the skull
6. Prevent growing back after dehorning a ring of skin tissue **1 to 1.5 cm** around the base of the horn needs to be removed

Name: ----------Date: ----------

Operation sheet 3: **Tail Amputation**

Procedures

1. Skin incision is made encircling the base of the horn below the coronary band
2. Ligate the corneal vessel
3. By blunt dissection exposes the periosteum of the frontal bone
4. Remove horn from the base (horn amputation saw wire)
5. Cut the extra bone.
6. suture the entire flap skin (interrupted mattress, non-absorbable suture material)

Name: ---------- Date ----------

Information sheet 7: Managing minor obstetrical and gynecological cases

7.1. Introduction

Obstetrics: Branch of medicine dealing with the care of the female during pregnancy, at parturition and during post-partum period also known as midwifery.

Obstetrics deals with pregnancy, childbirth and the post-natal period, whereas gestation (from Latin: “to carry”) is the time between conception and birth. Gestation is typical for mammals, where an embryo/fetus develops in the uterus.

Gynecology: Branch of medicine dealing with the physiopathology of the female

7. 2. Managing cases

1. Equine castration

Castration is the most commonly performed surgical procedure in the horse. The most common reason for castration is that the horse is not going to be used for breeding purposes or to prevent behavioral problems. The benefits of castration in stallion are that the horse can then be placed with mares and/or geldings, and is easier to handle. Castration can be performed in either standing or recumbent animal.

Equine castration usually takes place in either the spring or autumn months in order to avoid bacteria-carrying flies in the summer and the mud of winter. Traditionally, castration is carried out in a horse’s yearling year, but there is no reason why the procedure cannot be undertaken at other times. However, both testicles *must* have descended into the scrotum before the castration takes place. If one testicle is undescended, then waiting to castrate is usually the most viable option. However, it is possible to carry out a full castration via laparoscopy to find the retained testicle, although this requires much more surgical intervention and therefore a longer recovery period.

Types of castration

Castration can be achieved in two ways. Which is right for your horse will be dependent on his age, size, and temperament, among other factors. Your equine veterinarian will be able to advise which is most suitable for your animal.

- **Open Castration**

Open castrations are the most popular method of this procedure and they can be performed by an experienced and qualified equine veterinarian in the usual environment of your horse.

Depending on the size and temperament of your horse, the procedure may be carried out under heavy sedation, a local or general anesthetic. In some cases, it is possible to castrate a horse while they are stood, but this is only undertaken in extremely laid-back and well-managed equines.

During open castration, one incision is made over each testicle, but rather than being closed with sutures, they are left open so that they can drain and heal freely.

- **Closed Castration**

Closed castrations must be performed under sterile conditions at your equine veterinarian's surgery and under a general anesthetic. While the procedure is the same, in a closed castration the wounds are sealed using sutures. This significantly reduces the likelihood of hemorrhaging, but the wounds are unable to drain as well as those in open castrations and many horses will develop reasonable swelling at the castration site in the days or even weeks after the operation.

Pre-Operative Preparation

- **Anesthesia & Restrain**

For all the horses, feed was withheld for 24 hours and water for 12 hours prior to anaesthetic induction. All the horses were premedicated with Xylazine (1.1 mg/kg body weight) i.v. After complete sedation was achieved, horse was restrtaine by sideline technique. Approximately, seven minute after administration of preanaesthetic; the anaesthesia was induced by Ketamine hydrochloride (2.2 mg/kg body weight) i.v., to the effect. If adequate sedation was not achieved after Xylazine then Diazepam (0.033 mg/kg body weight) i.v., was given in addition to Ketamine hydrochloride. The spermatic cords were desensitized by directly injecting Lignocaine hydrochloride, to block the spermatic nerve. Maintenance of anaesthesia was done by using Xylazine (0.5 mg/kg) and Ketamine hydrochloride (1.1 mg/kg) combination approximately 20 minute after initial dosages.

- **Surgical technique**

An incision was made through the scrotal skin, tunica dartos and scrotal fascia parallel to the median raphae, approximately 2 cm apart and 8 to 10 cm long (fig.1). In the closed method, the parietal tunic was not incised (fig.2), so that it could also be removed along with the testicle and a portion of the cord. Using digital dissection, the parietal tunic surrounding the testicle was freed of the scrotal fascia, and by placing traction on the testicle with one hand, the parietal tunic of the cord was separated from spermatic fascia with another hand (fig. 3). Once the parietal tunic was separated from the surrounding fascia, it was removed along with its contents using a castration clamp and transfixation of the spermatic cord using Catgut No. 2 (fig.4). In all the cases, spermatic cord was incised 2 cm below the ligature and testes were removed distal to the ligature (fig.5). After removal of the testes, In group-I (n=6), scrotal skin was closed by retention suture using nonabsorsable surgical suture material (fig.6) while rest of the six horses belonging to group-II (n=6), the scrotal skin was kept open following castration (fig.7).

- **Post-operative care**

The surgical wound was cleaned with Povidone iodine solution. Inj. Phenylbutazone (2.5 mg/kg b.w.) was administered for 5 days, i.m., s.i.d., Inj. Benzylpenicilline (12000 IU/kg b. w.) was administered daily for 5 days, i.v., with the combination of Inj. Gentamicin (6 mg/kg b. w.), i.v., once daily. The skin sutures were removed between 7th and 10th postoperative day based on wound healing. In case of open wound, daily antiseptic dressing was carried out by using 5% povidone iodine solution until healing

- **Complications**

Castration should always be performed by a qualified and experienced equine veterinarian. However, any surgery carries a risk of complications.

- ✓ Infection
- ✓ Post-operative bleeding.
- ✓ Swelling
- ✓ Hernia

2. Vagina and Uterine prolapse

A **prolapse** is the abnormal repositioning of an organ from its normal anatomical position. Cattle occasionally develop problems with prolapses near the time of calving. Two distinct types of prolapses occur in the reproductive tract of cattle: vaginal or uterine. While both types require medical attention and correction, timing of occurrence and prognosis differ.

2.1. Vaginal Prolapse: a vaginal prolapse occurs due to increased pressure in the abdominal cavity during the latter stages of pregnancy. This type of prolapse is more common than a uterine prolapse and typically looks like a pink bulge of tissue ranging in size from a large grapefruit to a soccer ball. The bulge often retracts when the cow gets up and pressure is reduced. Once this tissue becomes prolapsed, it is exposed to environmental elements (e.g., dust, sun or manure) and to potential infectious organisms. Vaginal prolapses are recurring problems. If a vaginal prolapse occurs and is repaired, the cow is highly likely to prolapse again next year when calving. Vaginal prolapse can be an inherited trait, making the daughter of a cow that experienced this problem likely to also suffer a vaginal prolapse in her lifetime. For this reason, cattle that have had a vaginal prolapse should be culled, and their offspring should not be used for breeding purposes. This includes bull calves, as they may pass on the unfavorable genetic trait to female offspring and propagate the problem in the herd.

Causes

Older cows, cows carrying twins or cows with Brahman (Bos indicus) ancestry are more prone to have vaginal prolapses. Cows limited to grazing clover pastures could also be at a higher risk of vaginal prolapse due to phytoestrogens that may be produced by that forage type. To help prevent vaginal prolapses, it is impor-tant to restrict cows from becoming overly fat during the last trimester of pregnancy. Ideally, cows should be provided a ration to keep their body condition scores between 5 and 6 at the time of calving.

Surgical technique

Replacing procedures

The procedure for replacing a prolapsed vagina requires restraint of the cow, preferably with a pole behind her to prevent kicking. The vaginal tissue should be cleaned with

warm water and a mild disin-fectant prior to placing it back into the animal to prevent irritation and/or infection. If a prolapse has been exposed for a long period of time, the tissue may be dry, damaged and inflamed, making it very diffi-cult to perform the corrective procedure. Once the tissue is positioned correctly, several stitches can be applied around the vulva to keep the tissue in place. The cow should be able to urinate through the stitches. Near-term cows should be monitored regularly for signs of calving, as the stitches will need to be removed to prevent calving difficulty. Once the cow has given birth, the increased abdominal pres-sure that caused the prolapse will no longer exist, so the stitches will no longer be needed.

Fig 1: Vagina prolapses

3. Uterine Prolapse

A uterine prolapse is usually seen immediately following or within a few hours of calving. Compared to the vaginal prolapse, the uterine prolapse is larger, longer (usually hanging down to the hocks when standing), deep red in color and covered with the “buttons” where the placenta was attached.

A uterine prolapse is considered a medical emergency. This condition is life-threatening. If the affected cow is not treated quickly, she could go into shock or die from blood loss. Contact your veterinarian for assistance with this procedure. If the uterus is pushed back improperly, it could result in internal bleeding and death of the animal. -

Uterine prolapses are not heritable like vaginal prolapses. If the uterine prolapse is repaired properly, the cow may maintain a normal reproductive existence. However, a secondary infection of the replaced uterus may make the cow slow to rebreed or unable to breed back at all. Although there is no genetic predisposition to uterine prolapses,

cows that have experienced a prolapsed uterus have a higher risk of prolapsing again compared to cows that have never experienced this problem. –

Figure 2. Uterine prolapse

Surgical technique

The procedure for replacing a prolapsed uterine requires restraint of the cow, preferably with a pole behind her to prevent kicking. The vaginal tissue should be cleaned with warm water and a mild disinfectant prior to placing it back into the animal to prevent irritation and/or infection. If a prolapse has been exposed for a long period of time, the tissue may be dry, damaged and inflamed, making it very diffi-cult to perform the corrective procedure. Once the tissue is positioned correctly, several stitches can be applied around the vulva to keep the tissue in place. The cow should be able to urinate through the stitches. Near-term cows should be monitored regularly for signs of calving, as the stitches will need to be removed to prevent calving difficulty. Once the cow has given birth, the increased abdominal pres-sure that caused the prolapse will no longer exist, so the stitches will no longer be needed.

4. **Dystocia:**

This may occur when the fetus is large and or the mothers pelvis small or wrongly shaped for the babies to pass through easily, the term dystokia is applied to any abnormality or condition which renders birth young impossible or unduly difficult and prolonged.

Causes of dystocia-divided in to

1. Maternal causes

The maternal components of birth are the provision of expulsive force and a bony &soft tissue birth canal through the fetus can pass.

- **Failure of expulsive force**
  - ✓ Abdominal – inability to strain (due to aging, pain, diaphragmatic rupture, tracheal/laryngeal damages.
  - ✓ Obstruction of birth canal due to -Bony pelvis –fracture, breed, diet, immaturity, neoplasia, vulva(immaturity),
  - ✓ vagina(hymen, pre-vaginal abscess
  - ✓ Premature birth, Environmental disturbance, Myometral defects
- **Fetal causes**

The fetal components of birth include initiation of birth process the assumption of correct presentation, position, posture &size of the fetus.

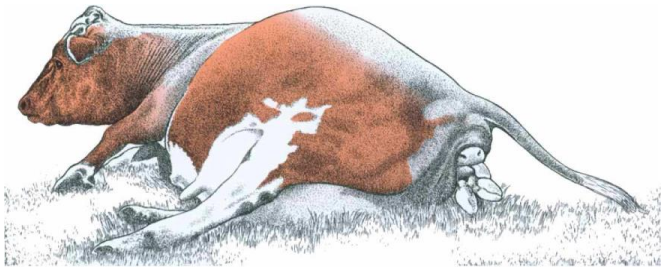


Fig 1: Dystocia

Abnormal presentation of fetus

1. Right anterior and left posterior presentation
2. Both the fore –limb appear but not the head
3. The head appears without the fore limb
4. One hind foot appears without the other.
5. The neck of the womb is twisted
6. Wrong presentation with the back turned.

Procedures: if the presentation is right anterior and left posterior presentation:

- **P**repare materials such as obstetric ropes hooks, antiseptic solution
- Set right leg flexion by pushing the fetus back into the womb and straightening the flexed leg.
- Tie the obstetric ropes to fetlocks
- Pull the foetus gently and slowly keeping the direction of traction in the line of the natural arch of sacral region

5. **Retention of placenta** if placenta is not detached within 5 to 6 hrs, it may be called retained placenta

Causes of retention of placenta

- Old age of a cow
- Brucellosis
- Lack of tonicity of uterus muscles
- Poor condition of health
- Other bacterial disease

Signs of retention of placenta: A portion of placenta may be seen hanging from vagina

Expulsion of placenta: when the placenta is discharged within 5 to 6 hrs of normal calving provided the cow is in good condition

If the placenta does not come out

Procedures

1. Wash your hand and arm with soap and disinfectants
2. Put your into the vagina and hold the placenta
3. Pull very gently if the placenta comes out easily pull it out.if it is difficult to pull it out leave it here. If some placenta hangs out, cut it off
4. Put some antibiotic through the cervix in to the uterus.
5. If the animal has a fever or looks sick give an antibiotic by injection.

6. Paraphimosis

Paraphimosis is a condition that only affects uncircumcised males. It develops when the foreskin can no longer be pulled forward over the tip of the penis. This causes the foreskin to become swollen and stuck, which may slow or stop the flow of blood to the tip of the penis. The condition can lead to serious complications if it isn't treated.

Paraphimosis most often occurs when a healthcare provider handles the foreskin improperly. They may not return the foreskin back to its normal position after a physical exam or medical procedure.

Symptoms of Paraphimosis

The main symptom of paraphimosis is the inability to return the foreskin back to its normal position over the tip of the penis.

Causes Paraphimosis include:

- Having an infection
- Experiencing physical trauma to the genital area
- Pulling the foreskin back too forcefully
- Having a foreskin that's tighter than normal
- Having a foreskin that has been pulled back for an extended period

7. Paraphimosis Treatement

Treatment will vary depending on your age and the severity of your condition. In general, the first step in treating paraphimosis is to reduce the swelling. Your doctor may do the following:

- Apply ice to the area
- Wrap a bandage tightly around the penis
- Use needles to drain pus or blood
- Inject hyaluronidase, which is an enzyme that helps reduce swelling

8. Phimosis:

Phimosis is a condition with too small opening of the prepuce. An abnormally small preputial orifice, resulting in inability to extrude the penis, may be congenital or acquired as a result of neoplasia, edema or fibrosis following trauma, inflammation or infection. Clinical signs are variable

Usually, the problem is unnoticed until dog attempts to mate and is unable to copulate

Pre-operative, antibiotic therapy consisted of intravenous Amoxycillin (15 mg/kg) and Meloxicam (0.2 mg/kg). The preputial orifice was reconstructed by removing a triangular wedge of tissue from dorsal aspect of orifice. The triangular wedge resection was oriented with base at mucocutaneous unction to create a larger preputial opening. The subcutaneous tissue along the ventral aspect of prepuce was closed by using 3-0 polyglactin 910 in a simple continuous pattern. The skin was closed by using 3-0 polyglactin 910 in a cruciate pattern. The patient recovered from anesthesia without complications.

Surgical Treatment

Pre-operative, the patient was complete off feed and off water since 6 hours. The patient was premedicated with Atropine sulphate (0.02 mg/ kg s/c). The preputial swelling was aspirated. Anesthesia was induced with intravenous combination of Ketamine hydrochloride (10 mg/ kg) and Diazepam (0.5 mg/kg) mixture and anesthesia was maintained with same. The animal/dogs/ was placed in dorsal recumbency. Its ventral abdomen and prepuce were clipped, aseptically prepared and draped in the standard fashion.Surgical enlargement of the preputial orifice.

9. Retained fetal membrane

Retention of fetal membranes, or retained placenta, usually is defined as failure to expel fetal membranes within 24 hr after parturition. Normally, expulsion occurs within 3–8 hr after calf delivery. The incidence in healthy dairy cows is 5%–15%, whereas the incidence in beef cows is lower. The incidence is increased by abortion (particularly with brucellosis or mycotic abortion), dystocia, twin birth, stillbirth, hypocalcemia, high environmental temperature, advancing age of the cow, premature birth or induction of parturition, placentitis, and nutritional disturbances. Cows with retained fetal membranes are at increased risk of metritis, displaced abomasum, and mastitis.

SurgicalTreatment

Manual removal of the retained membranes is no longer recommended and is potentially harmful. Trimming of excess tissue that is objectionable to animal handlers and contributes to gross contamination of the genital tract is permissible. Early use of antibiotics may also slow down the release of the membrane.

The best plan is to observe the cow closely for signs of illness and treat any symptoms that occur.

Regular weekly progesterone sampling can help determine if there has been any effect of the RP on the cow's return to normal reproductive activity.

Prevention

There are no standard preventative regimes for RP. Good dry cow management is the best way of preventing RP and reducing its effects. This will include supply of correct nutrients, particularly magnesium, and fat soluble vitamins, maximizing dry matter intake, maintaining the correct body condition score and supplying a clean dry environment.

Self-check 1: Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Define

1. Retention of placenta (1pts)
2. Dystocia (1pts)
3. prolapse of vagina (1pts)
4. Rectal prolapse (1pts)
5. Causes of retention of placenta (3pts)

Note: **Satisfactory rating - 7points** **Unsatisfactory - below 7points**

Operation Sheet 1: Dystocia management

Procedures: if the presentation is right anterior and left posterior presentation:

1. **P**repare materials such as obstetric ropes hooks, antiseptic solution
2. Set right leg flexion by pushing the foetus back into the wo mb and straightening the flexed leg.
3. Tie the obstetric ropes to fetlocks
4. Pull the foetus gently and slowly keeping the direction of traction in the line of the natural arch of sacral region

Name: ----------Date: ----------

Operation Sheet 2: Retention of placenta management

Procedures

1. Wash your hand and arm with soap and disinfectants
2. Put your into the vagina and hold the placenta
3. Pull very gently if the placenta comes out easily pull it out. If it is difficult to pull it out leave it here. If some placenta hangs out, cut it off
4. Put some antibiotic through the cervix in to the uterus.
5. If the animal has a fever or looks sick give an antibiotic by injection.

Name: ----------Date: ----------

Operation Sheet 3: Para-phymosis management

Treatment will vary depending on your age and the severity of your condition. In general, the first step in treating paraphimosis is to reduce the swelling.

Procedures

1. Apply ice to the area
2. Wrap a bandage tightly around the penis
3. Use needles to drain pus or blood
4. Inject hyaluronidase, which is an enzyme that helps reduce swelling

Name: ----------Date: ----------

LAP Test 1 : Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minutes.

Task1: perform retention of placenta
Task2: perform phymosis
Task3: perform paraphymosis
Task4: perform uterine prolapse
Task5: perform rectal prolapse

Name: ----------Date: ----------

LG # 81	LO #3: Carry out post-operative procedures

Instruction sheet

learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

LO3: Carry out post-operative procedures

- Manage animals post-anesthetically and post-operatively
- Applying Fluid therapy, medication, dressings, bandages and oxygen.
- Monitoring surgical wounds for signs of healing.
- Monitoring post-anesthetically, post-operatively and post-operative abnormalities.
- Recognizing Post-anesthetic and post-operative emergencies.
- Giving Advice to patient.
- Cleaning surgical materials and operation theatre.
- Disposing wastes.
- Recording and reporting.

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Manage animals post-anesthetically and post-operatively
- Apply Fluid therapy, medication, dressings, bandages and oxygen.
- Monitor surgical wounds for signs of healing.
- Monitor post-anesthetically, post-operatively and post-operative abnormalities.
- Recognize Post-anesthetic and post-operative emergencies.
- Give Advice to patient.
- Clean surgical materials and operation theatre.
- Dispose wastes.
- Record and report.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”.
4. Accomplish the “Self-checks” which are placed following all information sheets.

5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work

6. If you earned a satisfactory evaluation proceed to “Operation sheets

7. Perform “the Learning activity performance test”

Information Sheet 1: Manage animals post-anesthetically and post-operatively

1. Introduction

During the immediate post-operative period animals must be observed until they are able to right themselves and maintain sternal recumbence. The animal must be able to pull itself into sternal recumbence when laid on its side before it may be left unattended.

General Post-Operative/Anesthetic Complications and Treatments

Aspiration Pneumonia

Patients at risk for aspiration pneumonia are those that have esophageal (megaesophagus) or gastric fluid accumulation, and then either regurgitate or vomit during recovery. When this problem is anticipated, the esophagus and stomach should be suctioned to prevent aspiration If the animal is in lateral recumbency and begins to vomit, lower the head and neck and hold the mouth open (don't get bitten). Once the vomiting has passed, assess the mucous membrane color, respiratory rate, and breath sounds, suction and or swab the oral cavity (again, don't get bitten).

Hypoxemia

Reasons for hypoxia are listed in Figure 3. The most common reasons that may be encountered in the recovery period include airway obstruction, aspiration pneumonia or ventilation perfusion mismatch. Low ventilation perfusion mismatch occurs when there is flow past non-functional alveoli. Significant pulmonary congestion may be present in the "down lung" after prolonged lateral recumbency. In most instances the removal of the airway obstruction, administration of oxygen, positive pressure ventilation with or without positive end expiratory pressure may be used to treat hypoxemia.

Hyperthermia

Hyperthermia may be a result of rough recovery, ketamine administration in dogs or myelography. Placing the patient on a cage floor, wetting with tepid water or directing fans at the patient are all options for correcting hyperthermia. Tranquilization may be helpful in patients that are agitated. Because severe hyperthermia can result in increased oxygen consumption, oxygen should be administered. Crystalloids help to improve circulating blood volume and cool the patient. Development of malignant hyperthermia has been reported in the dog, horse and pig. This disease process is a genetically determined disorder of muscle metabolism. It is associated with halothane

administration but can be triggered by any anesthetic. If suspected, the offending anesthetic is discontinued and aggressive action is taken to lower the body temperature.

Hemorrhage

The surgical incision should be monitored during recovery. Excessive bleeding at the surgical site, increase in abdominal girth along with clinical signs suggestive of hypovolemia (pale mucous membranes, prolonged refill time, tachycardia, and poor pulse quality) could be indicative of internal bleeding. The causes for bleeding could be due to a slipped ligature, bleeding from small arteries that were not bleeding during closure or a coagulation disorder. Direct pressure should be applied and the doctor informed. The clinician may elect to perform an ultrasound and or perform an abdominocentesis or thoracentesis. Therapy may consist of continued direct pressure, fluid resuscitation and or surgical reexploration.

Hypotension

Anesthetic drugs can have a negative inotropic effect on the cardiovascular system. However, the most common cause of hypotension is hypovolemia. Induction of general anesthesia can unmask pre-existing fluid deficits. Therapy is indicated when the systolic and mean blood pressure approach 80 and 60 mmHg respectively. Therapy is directed at correcting fluid deficits either through the administration of crystalloids (50 - 55 ml/kg and 80 - 90 ml/kg in the cat and dog respectively), colloids (10 - 40 ml/kg) and 7.5 % hypertonic saline (4 - 6 ml/kg). Blood products are given to maintain a packed cell volume greater than 25% and/or the total protein greater than 3.5 g/dl. In those situations where fluid support is not sufficient sympathomimetics such as dopamine or dobutamine should be considered.

Cardiac Arrhythmias

Perhaps the most common arrhythmias observed in the recovery area are ventricular in origin. Treating the underlying cause, and in some instances oxygen supplementation and improved ventilation may help correct ventricular arrhythmias. If ventricular tachycardia is the problem, drug therapy may be indicated. Anti-arrhythmic therapy is indicated if the heart rate exceeds 180 bpm, the patient is cardiovascularly compromised, or the patient has multiform PVC’s. Lidocaine is generally considered the

drug of choice for treating ventricular tachycardia. It is initially given as a bolus at a dose rate of 1 – 4 mg/kg over 1 – 3 minutes in the dog. If the patient is responsive to the bolus it is then followed by a constant rate infusion of 40 – 100 µg/kg/minute IV. The bolus dose in a cat is 0.5 mg/kg slowly. Response to therapy can be the total abolishment of the PVC's, a reduction in the number of PVC's, a slowing of the rate, or improvement in the overall cardiovascular status.

Anesthetic overdose

Repeated injections of anesthetics during lengthy procedures may lead to prolonged recovery and occasionally organ failure resulting in death. The veterinarian may be able to suggest modifications to the anesthetic regime for prolonged procedures.

Swollen inflamed surgical wound. This complication may be caused by rough tissue handling, tightly placed sutures or infection.

The post-operative period can be divided into two phases:

- Anesthetic recovery phase and
- Long term post-op care.

Anesthetic Recovery Phase:

1. Animals should be placed in a clean, dry, quiet environment where they can be observed closely and continuously while they recover from anesthesia.
2. Animals in lateral recumbancy should be turned over every 30 minutes until they regain sternal recumbancy.
3. All food, water bowls and any other physical hazards should be removed from the cage where the animal is recovering.
4. Temperature, pulse, and respiration should be monitored every 15 minutes or more often if necessary. Water circulating heating pads, blankets or other heat sources should be used to help restore an optimal body temperature following anesthesia and surgery.
5. Extubate animal when it regains coughing and swallowing reflexes.
6. When animal regains sternal recumbency it may be returned to the housing room.

Long-term post-op care:

1. On day zero record the surgery date on cage card and place a red sedation / anesthesia card on cage.

2. Small amounts of water may be given once the animal has recovered from anesthesia.

3. Following major surgery, (extensive dissection of soft tissues, major entry into the pleural or peritoneal cavity, intraocular surgery, orthopedic or dental surgery or dissection into joints), monitor and record the animal's temperature once daily on days 1 and 2 post-op. If the temperature is normal on day 2, temperature monitoring may be discontinued. For abnormal temperatures submit a Sick Animal Report to Veterinary Services (see chart on right).

4. Check and record the condition of the surgical incision at least once daily for any swelling, drainage, signs of dehiscence or infection.

5. Observe and record the animal's attitude and appearance, food and water intake, urination and defecation.

6. Inform Veterinary Services of any concerns or signs of illness using a Sick Animal Report. Please provide any information concerning complications during that animal's surgical procedure.

7. Analgesics and other medications should be given as prescribed by your protocol and written on the surgical.

8. Provide date, time, as well as initials on all post-op entries.

9. Skin sutures or staples should be removed between 10-14 days postop.

Self-check 1: written test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Define

1. Hypothermia(2pts)
2. Hyperthermia(2pts)
3. Hypoxemia (2ptspts)

Note: Satisfactory rating – 6 points Unsatisfactory - below 6points

Information sheet 2: Applying Fluid therapy, medication, dressings, bandages and oxygen.

2.1. Introduction

Bandages and dressings are both used in wound management. A bandage is a piece of cloth or other material used to bind or wrap a diseased or injured part of the body.

Usually shaped as a strip or pad, bandages are either placed directly against the wound or used to bind a dressing to the wound. A dressing can consist of a wide range of materials, sometimes containing medication, placed directly against the wound.

Purpose

The purposes served by dressings include protecting wounds; promoting healing; and providing, retaining, or removing moisture. Bandages can be used to hold dressings in place, to relieve pain, and generally to make the patient comfortable. Elastic bandages are useful to provide ongoing pressure on wounds such as varicose veins, fractured ribs, and swollen joints.

The goals of bandaging include:

- limiting hemorrhage
- immobilizing the area
- preventing further trauma or contamination of the wound
- preventing wound desiccation
- absorbing exudate
- controlling infection
- aiding in mechanical debridement of the wound

When constructing bandages, several principles must be followed to avoid complications. The bandages should be sufficiently padded, applied evenly and snugly, composed of three layers (primary, secondary, and tertiary), and placed to avoid traumatizing the newly formed granulation tissue or epithelium.

The **first or primary layer directly contacts the wound** to allow tissue fluid to pass through to the secondary layer. The first layer may be

an **adherent** or **nonadherent** dressing. A nonadherent dressing is usually a fine mesh or foam, nonstick material. This layer prevents tissue desiccation and causes minimal

trauma. An adherent bandage uses a wide mesh material that allows tissue and debris to become incorporated into the bandage. This debris is then removed with the bandage change. However, because they are nonselective, healthy tissue may also be damaged.

Adherent bandages are **classified as dry to dry, wet to dry, or wet to wet** based on the composition of the primary layer. Dry-to-dry bandages consist of dry gauze applied to the wound. The bandages are painful to remove but enable significant tissue debridement. Wet-to-dry bandages are made with saline-moistened gauze placed directly on the wound. They are also painful to remove but result in less tissue desiccation than dry-to-dry bandages. Wet-to-wet bandages tend to damage the tissue bed by keeping it too moist.

The **secondary layer of a bandage absorbs tissue fluid, pads the wound, and supports or immobilizes the limb**. This layer is typically composed of cast padding or roll cotton.

The **tertiary layer functions to hold the primary and secondary layers in place, provide pressure, and keep the inner layers protected from the environment**. This layer is composed of adhesive tape or elastic wraps.

Bandages have a number of potential complications. Bandages applied too tight can result in neurovascular compromise and subsequent **tissue necrosis**. In some cases this damage can result in loss of a limb.

Bandages are used to help keep wounds moist for optimal healing. This can also result in excess moisture left in contact with healthy skin. The enzymes in wound exudate can cause **moisture-associated skin damage** (MASD) in healthy skin. MASD may also be induced by retention of urine or fecal matter within the bandage. Commercial barrier creams are available to protect healthy skin from MASD.

Impregnated gauze

Gauze dressings are also available impregnated with substances such as petroleum, iodine, bismuth, and zinc. The impregnated materials help make these dressings nonadherent and moderately occlusive. They add moisture to the wound bed and facilitate wound healing by decreasing trauma and preventing desiccation during dressing changes. They can function well as nonadherent primary dressings or used as

a contact layer on granulating wound beds combined with secondary gauze dressings They are commonly used on skin graft donor sites as a single layer and as the primary dressing overlying the actual skin graft Impregnated gauze is also commonly used on burn wounds because of its pain-free removal .

Fig 1: wound dressing by Impregnated gauze

Hydrogels

The main application of these dressings is hydrating dry wound beds and softening and loosening slough and necrotic wound debris. They are unable to absorb heavy drainage due to their high water concentration; they absorb very slowly and therefore are not useful on bleeding wounds, and they generally require a secondary dressing. They can be used on a variety of wounds including pressure ulcers, partial and full-thickness wounds, and vascular ulcers.

Fig 2: Wound dressing by hydrogel ointment

2.2. Applying Fluid therapy

Fluid therapy in farm animals

Fluid Therapy is the administration of fluids to a patient as a treatment or preventative measure. It can be administered via intravenous, intra-peritoneal, subcutaneous and

oral routes. Fluid therapy in animals is often difficult because large volumes are needed some times, moreover, animals must be restrained

Fluid therapy in animals is often difficult because large volumes are needed some times, moreover, animals must be restrained. However proper therapy can be very time consuming and monitoring is often difficult.

For these reasons, fluid therapy is often avoided in most of times in farm animals however there are clinical situations where either oral or intravenous fluids are necessary and cannot be avoided

For these reasons, fluid therapy is often avoided in most of times in farm animals however there are clinical situations where either oral or intravenous fluids are necessary and cannot be avoided

indications for fluid therapy 1- Fluid therapy is indicated either when there is a loss of fluid In cases of moderate to severe dehydration

Electrolytes abnormalities,3-Hypotension 4-Hypovolemia 5-Decreased oxygen delivery

Route of admiration of fluid therapy

Oral rehydration therapy Oral rehydration therapy (ORT) is a simple treatment for dehydration associated with diarrhea, particularly gastroenteritis/gastroenteropathy,for any causes

- **ORT consists** of a solution of salts and sugar which is taken by mouth. For most mild to moderate dehydration mostly in young animals the favorite treatment in an emergency department is ORT over intravenous replacement of fluid
- **Intravenous therapy** In severe dehydration, intravenous fluid replacement is preferred, and may be lifesaving. It is especially useful where there is depletion of fluid both in the intracellular space.

In addition, during surgical procedures, fluid requirement increases by increased evaporation, fluid shifts and/or excessive urine production. Even a small surgery may cause a loss of approx. 4 ml/kg/hour, and a large surgery approximately 8 ml/kg/hour, in addition to the basal fluid requirement

S/c therapy: -Intra peritoneal therapy: -Proctoclysis therapy: an enema, is the administration of fluid into the rectum as a hydration therapy. It is sometimes used for very ill persons with cancer

Terms used in body fluids ….

Total body water (TBW) – percentage of body composition consisting of water, approximately 60% of body weight

1. **Intracellular fluid (ICF) volume** – that part of the TBW contained within the cells, approximately 40% of body weight and 2/3rds of TBW
2. **Extracellular fluid (ECF) volume** – that portion of the TBW outside the cells, approximately 20% of body weight and 1/3rd of TBW. include interstitial fluid and blood plasma.
3. **Interstitial fluid volume** – that portion of the ECF outside the circulation and surrounding the cells
4. **Intravascular fluid volume**-the total blood volume consisting of red and white cells and plasma. May be estimated at approximately 5-7% of the body weight.

Classification of fluids according to its concentrations

- **Isotonic solution:** A solution that has the same salt concentration as cells and blood. Isotonic solutions are commonly used as intravenously infused fluids in patients
- **Hypotonic solution**: A solution that contains less dissolved particles (such as salt and other electrolytes) than is found in normal cells and blood. Hypotonic solutions are commonly used to give fluids intravenously to patients in order to treat or avoid dehydration

This type of solution provides free water, sodium, and chloride but does not provide calories or other electrolytes. An example of a hypotonic solution is 0.45% sodium chloride (0.45% NS), commonly called half normal saline

Hypertonic solution: A solution that contains more dissolved particles (such as salt and other electrolytes) than is found in normal cells and blood. For example, hypertonic solutions are used for soaking wounds

These solutions are infused to treat patients who have severe hyponatremia. Depending on the type of hypertonic fluid infused, it can provide patients with calories, free water, and some electrolytes. Examples of hypertonic solutions are dextrose 10% in water and dextrose 5% in 0.9% sodium chloride

Type of fluid therapy in animals

- Saline or Ringer's solution or
- Ringer's lactate or
- Hartmann solution(isotonic or sometimes hypotonic)

In cases of severe dehydration, these isotonic, non-alkalinizing solutions are generally recommended for replacement of large fluid volumes in adult ruminants

Ringer's solution is a composition of the blood serum and plasma If mild to moderate hypokalemia is present, potassium chloride can be added at a rate of 20 to 40 mEq/L during routine fluid administration.

If mild to moderate hypocalcemia is suspected, a 500 ml bottle of calcium gluconate can be added to 20 liters of fluids intended for intravenous administration

Dextrose – (Isotonic or Hypertonic) Often indicated for cattle in early lactation with severe ketosis, hepatic lipidosis, or hypoglycemia.

Glucose as a 5% solution can be administered at a slow rate for several days, however this delivers free water and can cause dilution of serum electrolytes

Note: patients with high intracranial pressure should not receive Dextrose because it increase cerebral edema

Sodium chloride (0.9% (Normal saline) (Isotonic)

Used to maintain hydration or to rehydrate animals in many situations including the treatment of shock decreased oral fluid intake, and to replace fluids lost due to an illness such as kidney disease and others

This type of solution will pass freely out of the blood vessels and are capable of entering all body compartments

They are inexpensive and readily available with a wide range of uses, not just in emergency. In addition assuming renal function is adequate any excess fluid or solutes will be excreted in urine

the Main problem in this solution may be short lived and there is a risk of interstitial oedema, dilution of RBCs and dilution of clotting factors.

It might use to treat low extracellular fluid, as in fluid volume deficit from- Hemorrhage - Severe vomiting or diarrhea - Heavy drainage fromGI suction, fistulas, or wounds,Shock, Mild hyponatremia,

Bicarbonate fluid therapy

Sodium bicarbonate is used as an alkalinising agent in the treatment of metabolic acidosis which may occur in many conditions including diabetes, starvation, hepatitis, cardiac arrest, shock, severe dehydration, renal insufficiency, severe diarrhea, or administration of acidifying salts (e.g. excessive sodium chloride, calcium chloride, ammonium chloride

Sodium bicarbonate is also used to increase urinary pH in order to increase the solubility of certain weak acids (e.g. cystine, sulphonamides, uric acid) and in the treatment of certain intoxications (e.g. methanol, phenobarbitone, salicylates) to decrease renal absorption of the drug or to correct acidosis

Sodium Bicarbonate is given as 8.4% Injection can be diluted with 0.9% sodium chloride injection.

Sodium bicarbonate is contraindicated in patients with renal failure, respiratory or metabolic alkalosis, hypoventilation, hypernatraemia, hypertension, oedema, congestive heart failure, eclampsia, potassium depletion or hypocalcaemia

Sings of response for fluid replacement

- Urination
- Rest
- Comfort
- Decrease PCV
- Decrease dehydration sings
- Body temperature back to normal
- Increase muscles tone
- Moisture of nose
- Normal mucus membrane
- Capillary Refill Time return to normal

Self-check 1: Written test

Name ---------- Date ----------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List fluid therapy medication(3pts)
2. Route of administration(4pts)
3. Sings of response for fluid replacement
    A. Urination
    B. Rest
    C. Comfort
    D. Decrease PCV
    E. All

4. Which of the following not Type of fluid therapy in animals?

    A. Saline or Ringer’s solution or
    B. Ringer's lactate
    C. A and B
    D. Na

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Information Sheet 3: Monitoring surgical wounds for signs of healing.

3.1. Introduction

Wound care in veterinary medicine is an essential part of patient management with great potential to impact the duration and extent of an animal's recovery from surgery or traumatic injury.

A wound is defined as a break in the continuity of a tissue of the body.1 A wound occurs when the integrity of any tissue is compromised (see Anatomy Review).

Because veterinary technicians are directly involved in patient monitoring and treatment, they play an integral role in the care and treatment of wounds. Understanding the general principles of wounds, wound healing, and various wound care techniques enables technicians to better assess patient progress and promptly recognize and address complications.

Wound healing

Phases of Wound Healing

There are 3 phases of wound healing; healing can take place on its own or with medical or surgical intervention.

Phase 1—Inflammatory Phase: This phase occurs immediately after injury and is mainly directed at minimizing blood loss from the injured area by hemostasis—vasoconstriction, platelet aggregation, and clot formation—followed by vasodilation and phagocytosis.

Phase 2—Proliferative Phase: In this phase, granulation, contraction, and epithelialization of the injured tissues occurs.

Phase 3—Remodeling Phase: This phase involves formation of new collagen, wound tissue strengthening, and scar formation

Methods of Wound Healing

- **First Intention:** Describes primary wound healing or closure; this type of healing is the best choice for healthy wounds in well-vascularized areas.
- **Second Intention**: Describes secondary wound healing or spontaneous healing. In this process the open wound is allowed to close by epithelialization and contraction (granulation tissue); this process of healing is best for contaminated or infected wounds.

- Secondary Closure: Wound closure > 5 days after injury; granulation tissue and epithelialized skin edges are excised and fresh tissue edges closed.
- Third Intention: Describes tertiary wound healing or delayed primary closure; it is best for infected or unhealthy wounds that are too contaminated for primary closure, but appear clean and well vascularized after approximately 2 to 5 days.
- Epithelialization: Describes healing of partial-thickness wounds, including first-degree burns and abrasions.

Treatment of wounds

How a wound is treated initially and the bandaging technique employed will greatly impact the outcome of a patient's injury. Poor treatment and bandaging techniques will delay healing, negatively affect patient outcome, and accrue unnecessary charges for the client.

Initial Treatment

The initial treatment of a wound should include:

- Clipping around the Wound: A water-soluble gel is placed in the wound and a large area of skin around the wound is clipped. The gel clumps the clipped hair together and prevents further wound contamination during clipping.
- Cleaning Around the Wound: The gel is flushed from the wound with sterile saline (see below) and the skin around the wound is scrubbed with chlorhexidine until debris is removed. Care should be taken to avoid introducing the surgical scrub into the wound as this may cause tissue damage.
- Cleaning the Wound: Irrigating the wound with adequate volumes of a sterile, balanced electrolyte solution will help decrease bacteria and flush debris from the wound.
    - ❖ The wound should be irrigated using a 20-mL syringe and an 18-gauge needle or catheter to provide the appropriate pressure.
    - ❖ It is important to remember that higher-pressure irrigation can cause tissue trauma and seed bacteria into the wound.

Wound Debridement

All dead and devitalized tissue should be surgically removed from the wound by debridement. This is best performed with a scalpel or sharp scissors under aseptic surgical conditions

- The wound and surrounding surgical field is draped.
- Debridement is started superficially. While debridement of skin can be somewhat conservative, fat and muscle tissue that does not bleed should be removed.
- Once the entire wound has been debrided to healthy tissue, it is again irrigated under appropriate pressure

A decision on closing the wound

- Wounds that are deemed healthy and can be closed without tension indicate primary closure. One or more gravity or closed suction drains (discussed later in the text) may be required to prevent fluid accumulation in wound dead space.
- If the wound is still considered contaminated or if, when closure is attempted, there is excessive tension on the wound edges, the wound should initially be left “open” and, ideally, bandaged.

Bandaging Technique

Once initial care is completed, the clinician determines the most appropriate type of bandage to apply (see The Benefits of Bandaging). The most common types of bandages are the modified Robert Jones bandage and the tie-over bandage. Tie-over bandages can be used anywhere on the body and are convenient for wounds occurring in areas that would preclude the use of a modified Robert Jones bandage (ie, the head, flank, or inguinal region). Tie-over bandages used for contaminated wounds usually have:

1. A primary/contact layer of sterile gauze packed into and on the wound
2. A secondary layer of sterile laparotomy sponges
3. A tertiary layer of waterproof material, which can be a surgical drape or an absorbent pad cut to cover the other layers

Stay sutures are placed in a circular pattern around the wound and umbilical tape is tied over to secure all of the layers in place

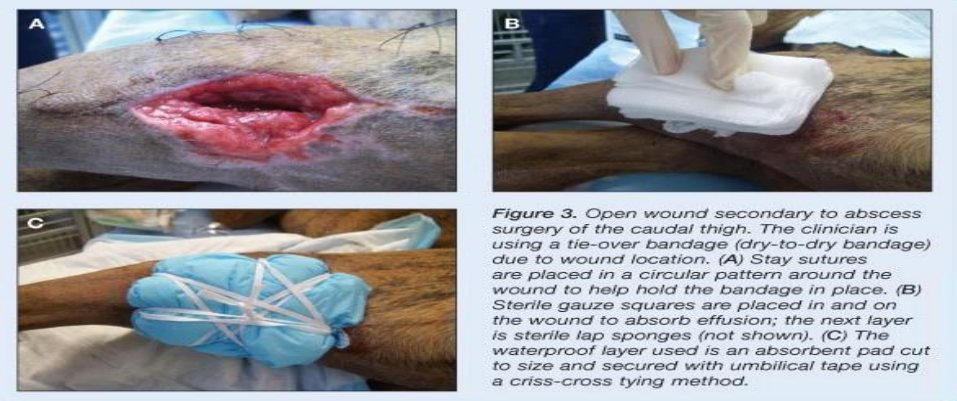


Figure 3. Open wound secondary to abscess surgery of the caudal thigh. The clinician is using a tie-over bandage (dry-to-dry bandage) due to wound location. (A) Stay sutures are placed in a circular pattern around the wound to help hold the bandage in place. (B) Sterile gauze squares are placed in and on the wound to absorb effusion; the next layer is sterile lap sponges (not shown). (C) The waterproof layer used is an absorbent pad cut to size and secured with umbilical tape using a criss-cross tying method.

Bandage Layers

All bandages are comprised of a contact layer, secondary layer, and a tertiary layer. The specific material used in each layer is determined by the type of wound and the bandage's particular function. The frequency of bandage changes depends on bandage type and wound exudate.

Primary layers may be adherent, nonadherent, or semi-occlusive.

- Adherent bandages include both dry-to-dry and wet-to-dry bandages; they are created with sterile gauze squares. It is important to remember that these sponges debride the wound and their removal may be painful to the patient.
  - ❖ Dry-to-dry bandages are used for wounds producing increased amounts of low-viscosity fluid/exudate and if foreign debris and necrotic tissue are present; for example, wounds that are producing a large volume of noninfected serum-like fluid.
  - ❖ Wet-to-dry bandages are indicated for wounds producing higher viscosity fluid/exudate and if loose debris is present; for example, wounds that are still contaminated after debridement and producing purulent exudate. The gauze sponges are moistened with a sterile, balanced electrolyte solution.
- **Non-adherent bandages**, such as Telfa pads (Kendall Brands, covidien.com), are used to cover a wound for protection but do not provide any additional benefits.
- **Non-adherent, semi-occlusive bandages** can be created using Vaseline-impregnated gauze, which is a material that allows fluid to absorb into the

intermediate layer of the bandage. It keeps the wound moist and allows atraumatic removal of the dressing.

- **Other semi-occlusive** bandages can be created using hydrocolloid- and hydrogel-type bandages.
  - ❖ Hydrocolloids form a non-adherent, semi-occlusive gel. The dressings are permeable to oxygen, carbon dioxide, and water and are comprised of a polyurethane layer, colloid matrix, and sterile backing. After wound contact, they become gel-like and form a protective layer.
  - ❖ Hydrogel is a non-adhesive, absorbent polyethylene oxide membrane that covers a gelatinous membrane, which absorbs exudate and keeps the wound moist.[2]

Both hydrocolloids and hydrogel may speed epithelialization on acute, partial-thickness wounds.

Secondary Layer

Secondary layers are comprised of bandage materials that can absorb exudate, secure the contact layer, and provide some pressure to decrease dead space and/or prevent edema. Examples of materials commonly used to create this layer are cast padding and roll cotton

Tertiary Layer

The purpose of the tertiary layer is primarily to secure other parts of the bandage. Conforming, stretch-gauze bandage is used. An outer layer of either Vetrap or Elastikon is used to secure the 3 layers of the bandage.

Drainage Systems

When there is an abundance of dead space related to the wound or a seroma formation secondary to the wound or surgical intervention, an active or passive draining system is needed for optimal success in wound healing.

Several types of draining systems are currently available in veterinary medicine.

- **Passive drains** do not involve suction but instead simply rely on the pressure differentials between body cavities and the exterior of the body to function.
- **Active drains** are maintained under either low- or high-pressure suction.

- The Penrose drain is a length of soft rubber tubing that is applied by inserting one end of the tubing into the wound or surgical site; then tunneling the tubing ventrally toward a small skin incision where it exits the body.
- The drain prevents the accumulation of fluid (ie, serosanguinous fluid, blood, purulent material) under the skin.
- The fluid doesn't exit through the tube itself, but rather around the tube, draining at the incision sites.
- The Penrose drain relies solely on gravity to function; there is no collection system associated with it.

Fig 1: passive drains

Active Drains

Jackson-Pratt drains are an active drain with a collection system attached. Although more expensive than passive drains, active drains may decrease the likelihood of an ascending wound infection developing through the drain. They also minimize the need for a band-age to absorb fluid, which is the case with a passive drain.

- This drain pulls excess fluid from the body using constant suction.
- The part of the drain in the wound or body cavity is made of Teflon and designed with a series of holes or openings that allow appropriate draining.
- The drain is connected to plastic tubing that is sutured to the skin at the insertion site; the exterior end of the tubing is connected to a plastic bulb, which creates negative pressure when squeezed and released, providing suction.

Bandage & Drain Care

Bandage Care

Bandages need to be frequently monitored to identify abnormal swelling of limbs or areas surrounding the bandage. Swelling proximally or distally to the bandage can indicate improper distribution of the bandage material, resulting in tissue damage. Inappropriately placed modified Robert Jones bandages are very likely to cause swelling of the toes, indicating an emergency and immediate notification of the clinician.

Drain Care

When monitoring patients with drains the technician should be evaluating the volume and character or the fluid being produced (ie, serous, serosanguinous, purulent) and paying close attention to abrupt changes, such as significant increase in fluid volume or difference in fluid type (ie, serous to hemorrhagic).

Self-check 1: Written test

Name---------- Date----------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to treat initial wound (3pts)
2. List the cause and type of wound(7pts)

Note: **Satisfactory rating - 10points** **Unsatisfactory - below -10 points**

Operation Sheet 1: Initial wound treatment

Procedures

- Clipping around the Wound:
- A water-soluble gel is placed in the wound and a large area of skin around the wound is clipped.
- The gel clumps the clipped hair together and prevents further wound contamination during clipping.
- The gel is flushed from the wound with sterile saline and the skin around the wound is scrubbed with chlorhexidine until debris is removed.
- Care should be taken to avoid introducing the surgical scrub into the wound as this may cause tissue damage.
- Irrigating the wound with adequate volumes of a sterile, balanced electrolyte solution will help decrease bacteria and flush debris from the wound.

Name: ---------- Date: ----------

Information Sheet 3: Monitoring post-anesthetically, post-operatively and post-operative abnormalities

3.1. Introduction

Recovery begins the moment that the administration of an anaesthetic agent ceases. We usually assume that once the vaporizer is turned off or injectable agent no longer administered that CNS depression reduces and the patient will "recover" without any further support and monitoring needed. This is often the case but occasionally healthy patients undergoing elective procedures or more commonly debilitated patients undergoing emergency or complicated surgery suffer some type of problem during recovery. To minimise the chances of an untoward event it is necessary to monitor and support these patients as they recover from anaesthesia.

3.2. Way of monitoring

- **BODY TEMPERATURE**

Patients commonly arrive from surgery with a low body temperature. This occurs for a number of reasons including the effects of sedative agents, reduced muscle activity, clipping, cold prep solutions, open body cavities and cool fluids (intra-abdominal and parenteral). Without added heat in recovery body temperature may continue to fall which markedly slows recovery as metabolization of drugs is impaired. In our practice we place the animal on a heating pad (or heated cage floor) if its temperature is below 37°C and add a heating lamp if temperature is below 35°C.

- **Respiration**

Respiratory rate and depth are rarely compromised in post-anaesthetic patients but they need to be checked because if abnormal could denote a serious problem. A low respiratory rate may be seen in animals that have become very cold or those that remain deeply anaesthetised. Rapid shallow ventilation may denote pain or difficulty in expanding the chest due to restrictions, e.g., bandaging, chest fluid or pneumothorax. If respiration appears to be severely compromised and it is not possible to determine why within a short period of time, it may be necessary to re-intubate the patient and manually ventilate until the problem can be corrected.

- **HEART RATE AND RHYTHM**

Heart rate is another parameter that should be checked shortly after the patient arrives in recovery. We expect heart rate to be near normal but it may be elevated in an animal that is hypovolaemic or in pain, or it may be slow secondary to hypothermia or drug administration

- **BLOOD PRESSURE**

Ideally, blood pressure should be measured but this can't always be achieved in a recovering patient so pulse pressure is often used instead. Pulse pressure is the difference between systolic pressure and diastolic pressure and gives some idea of tissue perfusion. You should be able to feel a strong pulse in the dorsal pedal artery of a dog unless it is cold but it is harder to palpate in cats because of the small size of the artery. If you can't feel the dorsal pedal artery, check the femoral artery--it should be easily palpable in both dogs and cats. A poor peripheral pulse could indicate intense vasoconstriction due to hypothermia, pain or hypovolaemia. Once hypothermia and pain have been ruled out as the cause, it may be necessary to provide a bolus of IV fluids, e.g., 10 ml/kg LRS to improve blood pressure.

- **MUCOUS MEMBRANE COLOR AND CAPILLARY REFILL TIME**

How useful is mucous membrane colour is in estimating tissue oxygenation? Well, it can be quite variable. Mucous membranes may continue to look pink when haemoglobin saturation is too low to maintain tissue oxygenation. If your practice has a pulse oximeter then check the patient's oxygenation if you have any concerns, e.g., patients that have had upper abdominal surgery, airway or thoracic surgery and brachycephalics breeds etc. If you have any concerns about mucous membrane colour or SaO_2 from the pulse oximeter then provide oxygen to the patient via a face mask attached to an anaesthetic machine until you can determine the cause for the problem or the condition resolves.

- **FREQUENCY OF MONITORING**

Patients need to be checked frequently initially and the time between checks can be extended with time. At our practice we check the patients every 15 minutes for about the first hour, increasing to 30 minutes or hourly thereafter depending on how well the animal is progressing.

- **Pain**

It is to be expected that pain will result following a surgical procedure. Analgesia should be provided before the patient becomes aware of the pain if possible. This makes the pain easier to control and reduces the chance of an excited recovery. How do you recognise pain in the recovering animal? Agitation, vocalisation, reluctance to move, aggression are all signs that may reflect pain.

3.3. Monitoring post-operatively following surgery.

- Surgical site should be inspected daily for any change i.e. swelling, discharge, redness, and bruising or mal odor.
- The normal appearance of a skin incision closed with staples is shown below. Mild bruising at the surgical site may be present for the first few days after surgery and an example of this is also shown below.
- To ensure that healing is progressing as expected. Depending on the exact
- Socks may be advised depending on the location of the surgical site.
- It is important to recognize that the skin is likely to heal within seven days

(Refer: Monitoring post-anesthetically)

Fig 1: Normal appearance of a surgical site closed with staples in the skin

3.4. Monitoring post-operative abnormalities

1. Hemorrhage

Hemorrhage The surgical incision should be monitored during recovery. Excessive bleeding at the surgical site, increase in abdominal girth along with clinical signs suggestive of hypovolemia (pale mucous membranes, prolonged refill time, tachycardia, and poor pulse quality) could be indicative of internal bleeding. The causes for bleeding could be due to a slipped ligature, bleeding from small arteries that were not bleeding during closure or a coagulation disorder.

Classification

Haemorrhage in the surgical patient can be classified into 3 main categories:

- **Primary bleeding** – bleeding that occurs within the intra-operative period

This should be resolved during the operation, with any major haemorrhages recorded in the operative notes and the patient monitored closely post-operatively

- **Reactive bleeding** – occurs within 24 hours of operation

Most cases of reactive haemorrhage are from a ligature that slips or a missed vessel. These vessels are often missed intraoperatively due to intraoperative hypotension and vasoconstriction, meaning only once the blood pressure normalises post-operatively will this bleeding occur

- **Secondary bleeding** occurs 7-10 days postoperatively

Secondary hemorrhage is often due to erosion of a vessel from a spreading infection. Secondary hemorrhage is most often seen when a heavily contaminated wound is closed primarily

2. Surgical Site Infection/SSI/

Surgical site infection (SSI) is an important cause of morbidity and mortality in veterinary patients. SSI as any infection occurring at the surgical site within 30 days of the procedure or within one year if an implant is used.

Recognizing SSI risk factors and making a concerted effort to monitor our patients for post-operative infection can have a positive effect on our patients, our clients and our practices.

Fig 1: surgical site infection

Factors which can contribute to surgical wound infection include host risk factors, surgical wound factors and the virulence and pathogencity of the bacteria involved. With respect to our patients, compromised immune system secondary to diabetes, chronic renal failure, hepatic insufficiency, and neoplasia can increase the risk of infection. Specifically documented in dogs and cats, endocrinopathies such as hyperadrenocorticism are associated with a dramatically higher risk of infection. Surgical wound factors documented in the veterinary literature with increased risk of SSI, include length of general anesthesia, length of surgical time, foreign material within the wound, wound classification, and presence of devitalized tissue within the surgical field. Additionally, clipping the patient more than an hour prior to surgery and inadequate skin preparation can foster an environment conducive to higher bacterial counts at the surgical site. Formation of a seroma or hematoma at the site can provide an excellent medium for bacterial growth. Previous treatment of the surgical site with radiotherapy is associated with significant increased risk of SSI.

Controlling methods

Reduction of surgical wound infection starts with a thorough patient assessment to identify any of the factors listed above. Following through with excellent aseptic technique covering both patient and staff preparation, minimizing the number of personnel in the surgical suite, adhering to a defined pre-surgical antimicrobial protocol, effective analgesia, expeditious discharge from hospital and effective hand hygiene practiced by all staff members are part of a multimodal approach to lowering surgical wound infection.

3. Swelling

Cryotherapy is usually used for three to four days post-operatively. Wrap an ice pack (e.g. a freezer gel pack, bag filled with crushed ice or frozen peas) in a tea towel. Apply to the surgical area for five to ten minutes. Repeat three to four times a day. This will help with any swelling and provide some pain relief too. Frostbite could occur if the ice pack is not wrapped or left on too long. Cyrotherapy can be more effective than bandaging for reducing post op swelling after certain surgeries such as tibial-plateau-leveling osteotomy

4. Abnormal distension

Acute abdominal distention following major abdominal surgery may **result from acute gastric dilatation**, leading to oliguria and increased airway pressures. Untreated gastric dilatation can cause abdominal compartment syndrome

Postoperative ileus (POI) may be defined as the impairment of gastrointestinal (GI) motility after intra-abdominal or no-abdominal surgery. It is characterized by bowel distention, lack of bowel sounds, accumulation of GI gas and fluid, and delayed passage of flatus and stool

A higher incidence is associated with abdominal and pelvic surgery, open laparotomy, longer surgery time, greater estimated blood loss, prolonged opioid use, and inhalational anesthesia.

Risk factors for POI include type of surgery and preexisting factors such as GI disease and physical inactivity. Consequences of the condition include patient discomfort, decreased patient satisfaction, and complications such as pain and nausea.[5]

Causes

The cause of ileus appears to be multifactorial POI may result from the use of postsurgical opioid pain relievers (e.g., morphine), which can slow or inhibit normal motility. Opioid analgesics relieve pain by blocking pain signals through stimulation of opioid receptors (mu receptors) located on the surface of the nerves that transmit these signals

TREATMENT OPTIONS

Several medications have been used for the treatment and prevention of POI, including FDA-approved drugs that have been used off-label.

Metoclopramide

Metoclopramide is a prokinetic agent that potentially could be used for POI management

Erythromycin

Another drug that has been used for POI because of its mechanism of action in the GI tract is erythromycin, a macrolide antibiotic that acts at motilin receptors in the intestinal tract and promotes GI motility in disorders such as diabetic gastroparesis.

5. Cardiovascular

Abnormal heart rate

Throughout the anesthetic event the anesthetist closely monitors the patient's cardiovascular status. Mucous membrane (mm) color, capillary refill time (CRT), heart rate/rhythm are usually assessed in 5 minute intervals.

An electrocardiogram (ECG) is used to monitor the heart's electrical activity – helpful in identifying arrhythmias. An esophageal stethoscope is an inexpensive piece of equipment used to obtain heart rate and sounds; this is a very valuable monitoring device for not only hearing heart sounds – also good for airway sounds. The use of a Doppler (blood pressure monitor) can also aide the anesthetist in acquiring the patient's heart rate.

5.1. **Bradycardia** (decreased heart rate) is a very common anesthetic complication. Generally speaking, bradycardia refers to heart rates < 70 bpm in small dogs, and, 100 bpm in cats. Causes of bradycardia: use of vagotonic drugs (alpha-2 adrenergic agonists or opioids), increased vagal tone (intubation, oculocardic reflex), hyperkalemia (increased potassium), hypothermia, hypoxia (decreased oxygen at the tissue level), and excessive depth.

Treatment

Treatment begins once the cause for bradycardia is determined. Vagal induced bradycardia is treated with the use of an anticholinergic (atropine, glycopyrrolate) given IV. Anticholinergics can be used preemptively for patients suspected of having high vagal tone (brachycephalic). Reflex bradycardia caused by the use of alpha-2 agonists (dexmedetomidine) need not be treated unless hypotension/reduced perfusion occur. Bradycardia caused by hyperkalemia, hypothermia, or excessive depth it is advised to treat the underlying cause.

6. **Mucous membrane (MM) color an and capillary refill time**

Pale mucous membranes may indicate blood loss or anemia or may result from poor perfusion. Purple or blue mucous membranes indicate cyanosis, a shortage of oxygen in the tissues. Cyanosis during anesthesia is usually the result of respiratory failure or upper airway obstruction and must be addressed immediately.

Pressure on the mucous membranes compressed the small capillaries and blocks blood flow to that area. When the pressure is released, the capillaries rapidly refill with blood and the color returns, provided the heart is able to generate sufficient blood pressure.
Other factors that may cause prolonged and capillary refill time/CRT/ or poor perfusion include hypothermia, vasodilation and cardiac failure.

7. Body Temperature

- Anesthesia will typically lower the body temperature and can lead to hypothermia, which can result in prolonged recovery from anesthesia as well as other complications. Small puppies and kittens are especially vulnerable.
- The greatest loss in body heat occurs within the first 20 minutes of anesthesia.
- Cold surfaces and excessive use of cold scrub solutions should be avoided. During surgery, ‘Snuggle Safe’ warming disks should be placed under a towel between the patient and surgery table to help the animal conserve body heat. Animals in recovery can be placed on a covered heating pad and covered with a blanket until the body temperature is normalized.
- Care should always be taken with any supplemental heat source to avoid burns or hyperthermia. Heating pads should ALWAYS be set at the LOW setting. Warming devices and hot water bottles should be wrapped in a towel or other barrier. Body temperature should be monitored frequently and supplemental heat should be discontinued when the patient's temperature is 99-100oF.

8. Respiration

Respiratory rate and depth are rarely compromised in post-anaesthetic patients but they need to be checked because if abnormal could denote a serious problem. A low respiratory rate may be seen in animals that have become very cold or those that remain deeply anaesthetised. Rapid shallow ventilation may denote pain or difficulty in expanding the chest due to restrictions, e.g., bandaging, chest fluid or pneumothorax. If respiration appears to be severely compromised and it is not possible to determine why within a short period of time, it may be necessary to intubate the patient and manually ventilate until the problem can be corrected.

9. Difficult recovery

The recovery period for some patients can be challenging and unpleasant. It is during the recovery period where most deaths occur. Patients in the recovery period should have supervision for at least the first few hours post-extubation.

Two **common r**ecovery complications are:

- Delayed recovery (>30 mins since termination of anesthesia) and
- Rapid recovery with or without pain.

10. Delayed recovery may be an indication excessive depth or slow elimination (hepatic, renal disease, poor perfusion, etc.)) of anesthetic agents. Hypothermia can also cause a delayed recovery. A prolonged recovery may be an indication of a serious condition that may eventually result in death of the patient.

A slow recovery causes depressed ventilation and slow elimination of inhalant anesthetics; this will further exacerbate hypothermia and slow metabolism (of injectable anesthetics) resulting a slower return to consciousness.

If a slow recovery is a result of hypothermia appropriate warming therapy (warm environment, warm IV fluids, warm water or warm air circulating blankets, and warm laundry) should begin immediately. Pre-warming and minimizing anesthesia time can help prevent this from happening.

Self-Check –1: Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List abnormalities of post operation activities (3pts)

Note: **Satisfactory rating - 3points** **Unsatisfactory - below 3 points**

Information sheet 5: Recognizing Post-anesthetic and post-operative emergencies

5.1. Introduction

Despite careful attention when monitoring the anesthetized patient, emergencies related to general anesthesia can and do occur. Most anesthetic emergencies can be divided into two groups:

• Unexpected crises that develop in normal, healthy patients presented for elective surgeries. These are often related to anesthetic machine and equipment errors and may be prevented with careful management.

• Events that develop as a result of the drugs given to produce general anesthesia. The side-effects of these drugs can be life threatening.

The most **common life threatening emergencies associated with anesthesia** and their treatment.

1. **Apnea:** Apnea is most often induced by IV induction agents.

- Apnea can occur with any agent, including thiopentone, propofol, etomidate, alfaxalone, or ketamine.
- It is most likely to occur when large doses of the drug are administered in a rapid bolus.
- Propofol, etomidate, or alfaxolone should be administered slowly and 'to effect', minimizing the potential for apnea (see also Chapter 3). Thiopentone can cause some stage II excitement at subanesthetic dosing.
- Transient apnea is not usually a major concern if the patient can be ventilated.

2. Hypoventilation

- Every anesthetized patient hypoventilates as a result of CNS respiratory center depression imposed by the anesthetic drug. The medullary respiratory center may not respond to higher levels of CO2 with increased ventilation.
- Hypoventilation is an insidious problem, as most veterinarians and technicians assume that an adequate respiratory rate and respiratory efforts equate to adequate alveolar ventilation and gas exchange.
- The amount of gas exchanged with each breath (tidal volume) has two components: dead space gas and alveolar ventilation.

- Dead space gas is the air that is in the conducting airways and is not available for gas exchange. It remains relatively constant and is the first gas in and out of the mouth or nasal passages, trachea, and other conducting units of the respiratory tree.
- Mechanical ventilators may be used to prevent or treat hypoventilation during general anesthesia.
- Assisting ventilation by occasional squeezing of the rebreathing bag (sighing) may help prevent hypoventilation and atelectasis.

3. Loss of Airway

Loss of airway is a condition that has resulted in the deaths of many otherwise healthy patients and is a primary reason for anesthetic emergencies in all species.

Some examples of conditions that can lead to patient mortality include:.

- Endotracheal tube occlusion by mucous plugs or blood.
- Kinking of the endotracheal tube.
- Over inflation of the endotracheal tube cuff.
- Endotracheal tube is too short.
- Endotracheal tube is too long, resulting in one-lung ventilation from improper tube placement.

4. Hypoxemia

Hypoxemia is a common complication of general anesthesia. The five major causes of hypoxemia

- Low inspired oxygen concentration most commonly occurs with equipment failures and errors.
- Hypoventilation is **breathing that is too shallow or too slow to meet the needs of the body**. If a person hypo ventilates, the body's carbon dioxide level rises. This causes a buildup of acid and too little oxygen in the blood. Animal/Persons/ with hypoventilation might feel sleepy.

Self-check 1: Written test

Name: ---------- Date: ----------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List 3 Post-anesthetic and post-operative emergencies(3pts)
2. Explai hypoventilation (1 pt)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

Information Sheet: Giving Advice to patient

6.1. Introduction

Advice an opinion that someone offers you about what you should do or how you should act in a particular situation:

6.2. Tips on giving medical advice to patients

- Show empathy.
- Build a relationship with your patient.
- Gather further information from your patient.
- Don't just give the patient a long list of advice.
- Make sure the structure of the consultation is clear.

6.3. Animal health advice tips for 2020

- Feeding animals in clean and smooth places
- Give clean water and foods
- Reduce intake of harmful foods
- Avoid harmful use of feeding
- Don’t mix with health animals
- No consume meat of sick animals
- No drink milk before withdrawal times
- Separate sick animal from health
- Vaccinate health animal
- immediate treatment of sick animals
- bury and burn dead animal
- Disinfect contaminated places and materials

Self-check 1: Written test

Name: ---------- Date: ----------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Advice (1pt)
2. List 4 Tips on giving medical advice to patients (4pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Information 7: Cleaning surgical materials and operation theatre

7.1 Introduction

Cleaning the operating theatre is an essential part of keeping patients and staff members safe. Cleaning the operating theatre and its immediate environment minimizes patients' and health care workers' exposure to potentially infectious microorganisms.

7.2. Cleaning happens at various times:

- When preparing a new operating theatre
- Every day, before surgery begins
- Between patients
- After the last operation of the day (known as terminal cleaning)
- Deeper cleans are carried out once a week and/or once a month.

7.3. Material needed

Cleaning equipment must be in plentiful supply so that there is a set each for the theatre, the toilet, and ancillary rooms. Sets should be stored separately.

- Mops and buckets
- Hard scrubbing brush
- Rubber pusher to remove excess water
- Strong disinfectant. This must be a germicidal agent that will kill the majority of microorganisms that can remain dormant on equipment. Check with the pharmacy department what is available and use the best quality at an affordable price.
- Absorbent dry and wet cleaning cloths
- Oil for oiling of wheels.

7.4. Before the day's surgery begins

- Clean the operating theatre every, every morning irrespective of whether it will be used or not.
- The person cleaning the OT should change into a clean gown, cap, mask, and clean utility gloves.
- Clean horizontal surfaces by wet wiping with a strong disinfectant. Every horizontal surface should be cleaned in the following pattern: top to bottom, then in to out. A damp cloth with hot, soapy water can also be used to wipe all surfaces, which are then dried using a dry cloth.

- Clean the patient room, its attachments, positioning devices, and patient transfer devices thoroughly using a damp cloth.
- Clean the sterile containers as well as all antiseptic bottles and the trays in which they are kept.
- Prepare waste bins by inserting color-coded waste collection bags.
- When the furniture and equipment are done, clean the floor by removing the excess dirt and dust and then mopping or using a hospital grade wet vacuum and the approved disinfectant. Take care not to agitate the dust, thereby spreading it.
- Once the operating theatre is clean, keep the door closed for 10–15 minutes with ventilation equipment on.
- Next, clean the scrub basin, tap, and surrounding walls using soap and water. Check any leaks. Clean the soap and antiseptic solution bottles at the scrub basin. Check that they are full and refill them if needed.

7.5. In between each patient

- After each operation, clean the soiled areas of the floor by wet-vacuuming or damp-mopping.
- Clean any furniture and equipment that came in contact with the patient or may have become soiled or damp, including the operating table, surgical lights, blood pressure cuffs, and tourniquets.
- Damp mop the area of the floor within 1.5 meters of the operating table.
- Collect and remove waste from the kick bucket and remove all other waste.
- Replace all bin liners
- Clean waste from equipment such as suction machines.

7.6. At the end of the day, after surgery

- Use a cloth and hot soapy water to wash all the surfaces, including the tops of operating tables and all stools.
- Switch equipment off at the mains. Wipe down electrical cables carefully using a cloth dampened with a small amount of alcohol or other disinfectant (to ensure minimal usage of fluid).
- Clean the legs and wheels of trolleys and tables.
- Damp dust hanging lights and other items on the ceiling.

- Clean operating microscopes and operating lenses after each theatre session. Do not clean microscopes or lenses using soapy water, as soap residue can damage the lens. Use a soft, non-abrasive cloth for the lens and a cloth dampened with alcohol or disinfectant for the microscope, including the handles.
- Clean anaesthesia machines and carts, IV poles, and patient monitors too.
- Change hand towels, patient sheets, and blankets in the theatre and toilet area after every use.
- Wash the floor using a mop and disinfectant.

7.7. Weekly cleaning

- Remove all articles from shelves and clean all surfaces thoroughly using hot, soapy water. Note: Do not get sterile items wet, as this will make the packaging permeable and therefore no longer sterile.
- Wash the floor using disinfectant.
- Wash and dry Instrument trolleys, including the wheels and the rungs.
- Scrub bowls and gallipots.
- Clean windows inside and outside.
- Dust high surfaces, such as the tops of cupboards and windowsills, whether they are used or not. This is to prevent the build-up of dust.

7.8. Monthly cleaning

- Move furniture such as cupboards or shelves away from the walls and clean the areas behind and under them. Clean the tops and the inside of cupboards, drawers and lockers. To prevent damage, remove all articles when doing so.
- Check expiry dates are checked and rotate stock so that items with expiry dates in the near future are at the front.
- Clean trolleys, IV stand stools, microscopes, etc. if needed.
- Wash curtains, if used in recovery areas, at least every three months.

7.9. Cleaning surgical materials

The cleaning of surgical instruments is defined as the process of removing foreign material (e.g., bioburden, biofilm) from the instruments and is usually accomplished using water with detergents or enzymatic products that are suitable for use. Surgical instruments must be thoroughly cleaned before high-level disinfection and sterilization

because inorganic and organic materials that remain on the surfaces of instruments interfere with the effectiveness of these processes. As you've been told many times, "If it's not clean, it can't be safe!"

Cleaning instruments is a dirty process and can lead to extensive contamination of sinks and surrounding areas, including surfaces, which increases the risk of cross-contamination of patients undergoing procedures in the area. Therefore, if more than point-of-use cleaning occurs in procedure areas, the following must be in place:

- All staff involved with cleaning of instruments and medical devices should be **trained** and have competencies for the procedures, chemicals, and equipment.
- Appropriate PPE should be available to all staff performing cleaning procedures.
- Written procedures and policies for the processes performed should be available to staff in the processing area.
- Procedures, chemicals, and methods of cleaning should be standardized across all areas as appropriate to the instruments and medical devices being processed.
- Infection prevention and control staff should monitor all instrument cleaning and reprocessing areas.

7.10. Factors that affect effectiveness of manual cleaning include:

- Quality of water
- Quality, concentration, and type of cleaning agent
- Cleaning method
- Rinsing and drying methods

7.11. Steps in the Instrument Cleaning Process

- Perform tasks at the point of use (in the operating theater or procedure room)
- Transport items to the processing area
- Receive and classify items
- Pre-soak instruments
- Wash and rinse instruments
- Dry instruments
- Inspect, repair, and lubricate instruments

7.12. Transport items to the processing area

- Place instruments in the instrument pan for transport to the instrument reprocessing area.
- Transport instruments in leak-proof containers with a biohazard label as soon as possible; keep them moist by covering them with a wet towel.

Self-Check 1: Written test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List 4 cleaning materials used for operative room(2pts)
2. Why it's important cleaning at theatre(2pts)

Note: Satisfactory rating – 4 points Unsatisfactory - below 4 points

Operation Sheet-1: **Cleaning at the end of the day after surgery**

Procedures

- Use a cloth and hot soapy water to wash all the surfaces, including the tops of operating tables and all stools.
- Switch equipment off at the mains. Wipe down electrical cables carefully using a cloth dampened with a small amount of alcohol or other disinfectant (to ensure minimal usage of fluid).
- Clean the legs and wheels of trolleys and tables.
- Damp dust hanging lights and other items on the ceiling.
- Clean operating microscopes and operating lenses after each theatre session. Do not clean microscopes or lenses using soapy water, as soap residue can damage the lens. Use a soft, non-abrasive cloth for the lens and a cloth dampened with alcohol or disinfectant for the microscope, including the handles.
- Clean anaesthesia machines and carts, IV poles, and patient monitors too.
- Change hand towels, patient sheets, and blankets in the theatre and toilet area after every use.
- Wash the floor using a mop and disinfectant.

Name: ---------- Date: ----------

LAP Test 1: Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minutes.

Task 1: Conduct OT cleaning activities before the day's surgery begins
Task 2: perform Cleaning activities In between each patient
Task 3: perform OT cleaning at the end of the day, after surgery

Name: ---------- Date: ----------

Information 8: Disposing surgical wastes

8.1. Introduction

Surgical waste is known as pathological waste that is removed from a patient during surgery. Such waste is then required to be disposed of in a pathological waste container at the conclusion of the procedure. Instruments used during surgeries which can include needles, scalpels, syringes and lancets should be disposed of in a sharps container, and any non-biological materials contaminated with blood or bodily fluids should be segregated into an approved regulated medical waste container

8.2. Understanding the most common types of medical waste

Although there are several ways to categorize and name medical waste, the different medical waste streams are all fairly similar. Once you understand the types of waste within each, you can ensure each type is disposed of correctly.

For example:

- All needles, scalpels, razor blades and any other sharp objects are generally referred to as Sharps. How they have been used will determine which type of medical waste they are categorized as – generally infectious, or
- Any body parts, human tissue or bodily fluid – as well as swabs and cultures
- The vast majority of medicines can be categorized into general pharmaceutical or medical waste / or biohazard waste/
- Gloves, aprons, gowns, and used plastic packaging (like empty syringes and bandages and gauzes will be hazardous/offensive waste.

Fig 1: Medical or clinical sharps yellow waste container

Different types of medical waste require different disposal techniques to ensure that any infectious materials cannot contaminate or spread to other areas.

Some general medical waste can be disposed of in

- Landfill.
- Medical incinerator.

The vast majority of medical waste must be incinerated to ensure that all traces of infections or pathogens are completely destroyed.

Self-Check –1: Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List surgical wastes (2pts)
2. Describe methods of reduction of surgical wastes (4pts)

Note: **Satisfactory rating - 6points** **Unsatisfactory - below 6 points**

Information sheet 9: Recording and Reporting

1. Introduction

The terms **medical record**, and **health record**, are used somewhat interchangeably to describe the systematic documentation of a single patient's medical history and care across time within one particular health care provider's jurisdiction.[1] A medical record includes a variety of types of "notes" entered over time by healthcare professionals, recording

- Observations
- Administration of drugs and therapies,
- Orders for the administration of drugs
- Therapies
- Test results
- x-rays and
- Reports, etc.

2. Characteristics of good Recording and Reporting:

- Accuracy:
- Conciseness:
- Up to date
- Organization
- Confidentiality
- Objectivity

3. Importance of records for patients

- Legal evidence
- It avoids duplication of treatment measures
- It avoids duplication of diagnostic and procedural measures
- It will assist in continuity of patient care
- It helps in health insurance of the patient

4. Importance of records for professionals

- Assure quality of care
- It will help in evaluation of medical care given by doctors
- It protects the doctor from legal activities

5. Importance of records for hospital/clinic/

- Legal protection of hospital
- Evaluate medical care given by doctor
- Evaluate performance of individual doctors
- It also assist in planning and justification of resources

6. Importance of records for public health

- Helps in early warning of epidemic and communicable disease
- Assist in planning preventive and social measures
- Provide information of vital statistics like mortality rate, morbidity rate, infant death rate etc.

7. Importance of records in education and research

- Forms basis of clinical research
- Aids in formal education of students and staff
- Reliable source of material for advancement in medical science.

Self-Check –1: Written Test

Name: ---------- Date: ----------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Differentiate record and report (2pts)
2. The Importance of record and report(2pts)
3. The porpoise of Record(1pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

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