TVET CERTIFICATE V in ANIMAL HEALTH

ANHMS 501

Competence

MAJOR SURGERY

Assisst In Major Surgery

Credits: 12

Learning hours: 120

Sector: Agriculture And Food Processing

Sub-sector: Animal Health

Module Note Issue date: June, 2020

Purpose statement

This core module describes the skills, knowledge and attitude required by the learner to perform major surgery. Any veterinary has to do surgery in his professional work. So, this competence is very important for the Veterinary Nurse training. Upon completion of this module, the trainee will be able to: Perform head and neck surgery Perform abdominal surgery Perform orthopedic surgery.

Table of content

	and post operatives procedures	

Total Number of Pages: 61

INTRODUCTION

Major surgery is any invasive operative procedure in which a more extensive resection is performed, e.g. a body cavity is entered, organs are removed, or normal anatomy is altered. In general, if a mesenchymal barrier is opened (pleural cavity, peritoneum, meninges), the surgery is considered major. For surgical procedures that do not clearly fall in the above categories, the chance for significant inadvertent microbial contamination is to be a primary consideration. Generally, the classification of major will be applied only to procedures in which the animal is anticipated to survive longer than 24 hours. If the animal is to be terminated in less than 24 hours, techniques applicable to minor surgical procedures may be used. A procedure previously classified as minor will be changed to major if microbial contamination proves to be a significant problem. In general, the standards for major surgery apply only to non-rodent species. However, if microbial contamination proves to be a significant problem with procedures carried out in rodents, the standards for non-rodent species must be applied.
All major surgical procedures in non-rodent species must use appropriate surgical techniques and must be conducted in facilities intended for survival surgery and used only for that purpose. The facilities must be designed and managed to insure a level of sanitation appropriate for aseptic surgery. The operating room should contain only the equipment and supplies required to support the procedure being performed. A separate area, apart from the surgery room, must be provided for preparing the animal for surgery although the final surgical preparation, not to include clipping of hair, may be conducted in the surgery. An area equipped with surgical scrub sinks should be apart from the operating room. A surgical-support area should be provided for storing instruments and sterile supplies and for washing and sterilizing instruments. With this syllabus, the learner will benefit the compiled theoretical and practical skills as finisher leading him to the qualification of Veterinary technician.

Learning Unit 1: Head And Neck Surgery

The first Learning Unit will treat separately the surgery of the head and neck surgery most important work of this concept starts by the Management of an oesophageal choke, Surgery of the third eyelid and Eye enucleation.

The Description of those three major surgeries will methodically be followed in the following manner : Clinical Signs, Diagnosis, Pre-operatory procedures, Operatory procedures and the Post operatory care.

L.O. 1.1 Manage oesophageal choke

Choke is an obstruction in the oesophagus (food pipe) and an emergency in all species if it also obstructs the airway.

Topic-1: Description of oesophageal choke

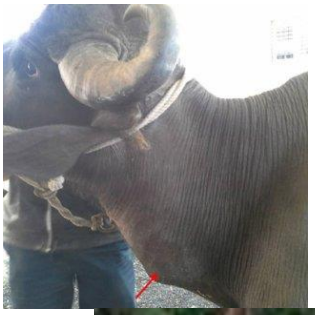
In cattle the object is usually stuck high up in the oesophagus near the throat, or it can be in the entrance to the windpipe, which is rapidly fatal.
Objects causing choke include plastic bags, potatoes and other whole vegetables, or large fruit like mangoes, apples and oranges.

Fig.1. Choke in cow with stretched neck **Fig.2. Choke in horse with** exaggerated

Topic-2: Clinical Signs

The signs of choke include:

- ✓ Anxiety, distress, head shaking, stretching the neck out, exaggerated Mouthing and forced attempts to swallow
- ✓ Profuse salivation, maybe regurgitation of food and water
- ✓ Unusual lump may be felt along the ventral neck
- ✓ Bloat occurs rapidly because of animal's inability to belch history – but do not rely on information about the paddock being apparently clean. Cattle have little oral discrimination, meaning they tend to vacuum up the oddest things while grazing.



Topic-3: Diagnosis

Clinical signs often point to choke but they do not indicate of the Patient has aspirated, the condition of the esophagus or the nature of the obstruction.
Passage of a nasogastric tube is an effective way to determine if the esophagus is obstructed. Endoscopic examination can help to visualize the esophagus, determine the extent of damage or nature of the impaction. Ultrasonography can be useful as well. A veterinarian can listen to the lungs to assess abnormalities that may indicate aspiration pneumonia.

Topic-4: Pre-operatory procedures

This phase includes the stapes of Identification and preparation of materials, drugs, and restraining techniques.

➢ *Identification and preparation of materials*

The most important materials are:

- Cloves for the surgical team (suits, boots, gloves...)
- Container with Water,
- Surgical kit for soft tissue surgery(scalpel and handle, straight and curved scissor, straight and curved forcepses, absorbable and non-absorbable sutures and suture needles, gauze and swabs,

➢ *Identification and preparation of drugs*

Required drugs are listed as following:

- ✓ Detergents(soap, savlon...)
- ✓ Antiseptics (Alcohol, iodine tincture, Methylene blue,...)
- ✓ Sedatives and local anaesthetics.
- ✓ Anti-inflammatories
- ✓ General antibiotics

➢ *Restraining technique:*

Take away feed and water, place the patient in the most stress-free environment possible. A sedated cattle and equine should be on standing position while canines are operated on a surgical table.

Topic-5: Operatory procedures

During foreign body removal technique, you can tentatively and gently massage the left side of the neck if you can palpate the obstruction. Do not ever spray water in the mouth in an attempt to dislodge the impaction. This increases the risk of pneumonia.
Sedatives or muscle relaxants may be given to reduce spasms and tone in the esophagus.

A nasogastric(or, oro-gastric) tube may be passed and the obstruction gently lavaged with water while the head is lowered, to attempt to break up the obstruction or push the material to the stomach then cooked in rumen.

If all the tentative manipulations failed, the steps below are executed to surgically solve the problem:

- ✓ Asepsis and antisepsis (scrubbing and shaving of the surgical site)
- ✓ Local anaesthesia (line infiltration)
- ✓ Incision (layer by layer) at a separate location of the foreign material
- ✓ Milk out the foreign material
- ✓ Suture the oesophagus by an absorbable suture like chromic gut;
- ✓ Suture the skin using a non-absorbable suture like silk or nylon

Topic-6: Post operatory care

The post operative care is based on:

- ✓ Feeding instructions, for herbivores, supply grass and moistened pellets slowly over a 24-hour period and gradually return to a normal diet by 7 – 21 days post-choke.
- ✓ Some horses may need permanent dietary changes if they experience chronic esophageal obstruction.
- ✓ An anti-inflammatory medication such as phenylbutazone or flunixin is often prescribed in an attempt to reduce inflammation and scar tissue formation, which may predispose a horse to choking again in the future.
- ✓ Depending on the length of time the horse was choked, antibiotics are prescribed if there is a risk of aspiration pneumonia.
- ✓ Monitor the temperature every day.

L.O 1.2. Surgery of the third eyelid

Neoplasms of the upper and lower lids and nictitating membrane (third eyelid) include squamous cell carcinoma (SCC) or 'cancer eye', and rarely other tumours such as papillomata, and fibrosarcoma. SCC is most significant in terms not only of incidence but also of economic importance and prognosis.

SCC occurs more frequently on the globe (65%) than upper and lower lids (30%) or third eyelid (5%), is very invasive locally, and may metastasise to the local lymph

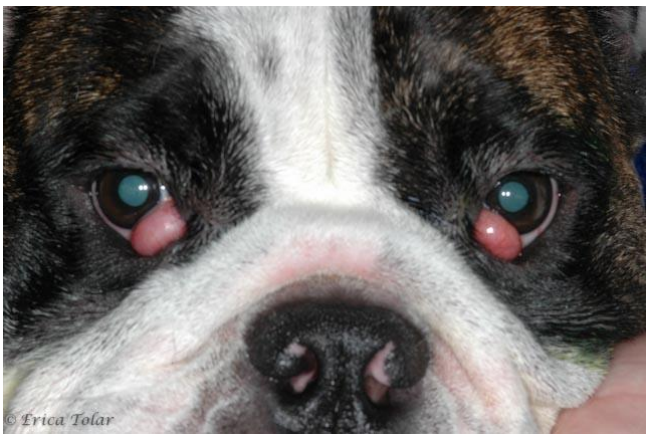
nodes (parotid, atlantal or retropharyngeal and the anterior cervical chain).

Topic-1: Clinical signs

SCC is largely confined to Hereford and Simmental breeds and their crosses, where the non-pigmented area is liable to develop neoplastic lesions under the influence of ultraviolet radiation from sunlight. Affected cattle are usually four to nine years old. About 85% of cattle with SCC lack pigment in the affected area.

The lesion is often an obvious proliferative irregular mass which may ulcerate through the skin to cause moderate distress and blepharospasm. Early lesions appear either as rice-grain-like plaques on the sclera or corneal surface, or as small firm nodules in the dermis. This precursor of a greyish white plaque at the nasal and temporal limbus develops into a

papilloma and carcinoma *in situ*. Lid lesions often start as a dirty brown, horn-like keratomata.



Topic-2: Indications of third eyelid surgery

Surgical removal of the third eyelid is strictly reserved for:

- ✓ Neoplasia of the nictitans and its gland or
- ✓ Traumatic injury severe enough to interfere with function of the nictitans and globe;

Removal for “cherry eyes”or cosmetic reasons is inappropriate.

Topic-3: Pre-operatory procedures:

Different materials are prepared such as:

- ✓ Cloves for the surgical team (suits, boots, gloves...)
- ✓ Container with Water,
- ✓ Surgical kit for soft tissue surgery (scalpel and handle, straight and curved scissor, straight and curved forcepses, gauze and swabs.

a. Identification and preparation of drugs

The following are drugs that should be prepared:

- Detergents (soap, savlon...)
- Antiseptics (Alcohol, iodine tincture, Methylene blue,...)
- Sedatives and local anaesthetics.
- Anti-inflammatories
- General antibiotics

b. Restraining technique:

Standing position is required for cattle and equine while a surgical table is needed to operate canines and felines.

Topic-4: Operatory procedures:

The following four stapes are required successfully operate this condition.

Anaesthesia

General anesthesia is required to perform this relatively short procedure in dogs and cats,while heavy sedation and sensory nerve blocks are adequate in standing horses.

Incisions

The surgical site is prepared and draped. A wire lid speculum aids exposure of the nictitans during the procedure.

- Gently grasp the dorsal margin of the third eyelid with small hemostats or Bishop Harmon toothed forceps.
- Pull the third eyelid up and outward; this makes the tumor more easily observed. Position and clamp a curved hemostat below the mass halfway across the base of the third eyelid at the most ventral region of the third eyelid; this minimizes postoperative hemorrhage.
- Position and clamp a second curved hemostat opposite the first hemostat, such that the base of the third eyelid is completely clamped.
- Use a no. 15 blade to incise the third eyelid along the hemostats.
- Continue the incision along the hemostats to remove the glandular tumor and third eyelid.
- Continue the incision from the other side.
- Leave the hemostats clamped for 2 to 3 minutes after nictitans removal

Suturing techniques

The conjunctival area at the base of the third eyelid can be carefully sutured with 5-0 Vicryl, or not sutured and left to granulate.

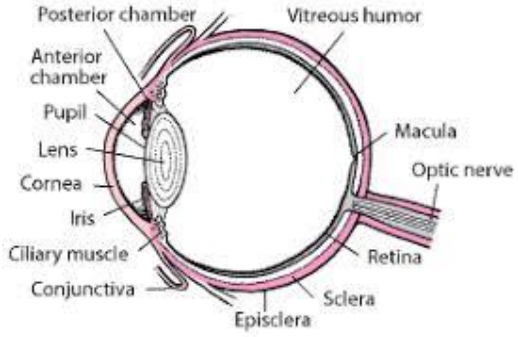
Topic-5: Post operative care

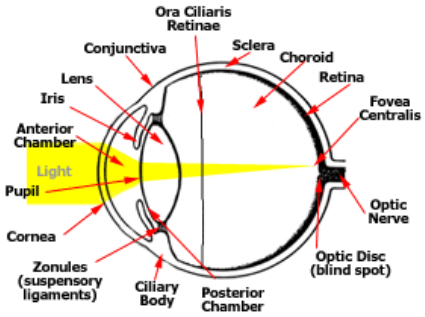
Postoperative hemorrhage is minor but can be controlled with pressure and light cautery. Topical antibiotics are indicated for 5 to 7 days after surgery.

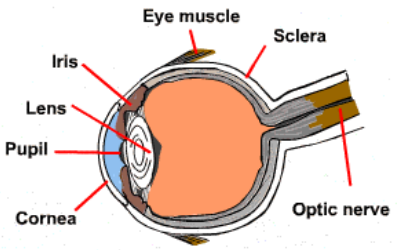
L.O 1.3. Eye enucleation

Enucleation is the surgical removal of the eyeball that leaves the eye muscles and remaining orbital contents intact.Enucleation is one of the most common orbital surgical procedures performed in cattle. Enucleation is technically simple, alleviates painful ophthalmic pathologies, and can halt the progression of neoplasias such as ocular squamous cell carcinoma (OSCC). While its value as a cost-effective procedure is evident to both practitioners and ranchers.

Topic-1: Eyes anatomy



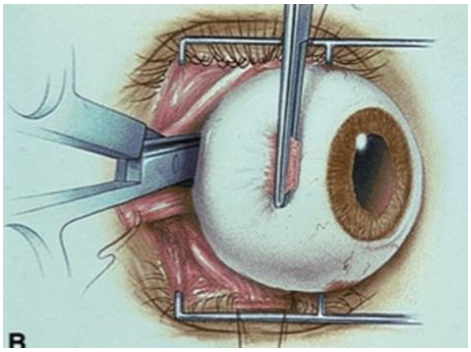




Topic-2: Indications of eye enucleation

We practice the the eye enucleation in the following cases:

- severe injury,
- to control pain in a blind eye,
- to treat some intra-ocular tumors,
- to alleviate a severe infection inside the eye, or
- Cosmetic improvement of a disfigured eye.



Eye muscle dissection with scissors **Wound and hemorrhage of the eye surgery**

Topic-3 : Pre-surgical procedures:

The appropriate materials, drugs and restraint techniques are the requirements for success at this phase of the eye surgery.

a. Identification and preparation of materials

During an eye enucleation the clinician should prepare the following materials:

- Cloves for the surgical team (suits, boots, gloves...)
- Container with Water,
- Surgical kit for soft tissue surgery(scalpel and handle, straight and curved scissor, straight and curved forceps, absorbable and non-absorbable sutures and suture needles, gauze and swabs,

b. Identification and preparation of drugs

The following are drugs that should be prepared:

- Detergents(soap, savlon...)
- Antiseptics(Alcohol, iodine tincture, Methylene blue,...)
- Sedatives and local anaesthetics.
- Anti-inflammatories
- General antibiotics

c. Restraining technique:

A sedated cattle and equine should be on standing position while canines are operated on a surgical table.

Topic-4: Operatory procedures:

Good anaesthesia, proper incisional and suturing procedures dominate this phase.

Anaesthesia

The procedure of anaesthesia is as follow performed.

a. Sedation: Appropriate sedation may be warranted in certain cattle. Use xylazine (0.05 mg/kg body weight and butorphenol (0.02 mg/kg) for standing restraint.

Auriculopalpebral Nerve Block: Surgical manipulation of the eye is facilitated by nerve blockade of the eyelids. Auriculopalpebral nerve block can be placed to reduce upper eyelid movement prior to performing a Peterson or retrobulbar block. The auriculopalpebral nerve can be palpated as it crosses the zygomatic arch, roughly 5-6 centimeters behind the supraorbital process.

Inject 5 milliliters of 2% lidocaine HCl subcutaneously on the dorsal aspect of the zygomatic arch at this location.

Peterson Nerve Block: After performing a small local skin block over the intended site of puncture, a 3.8-cm long 14 gauge needle is inserted through the skin as a cannula for introduction of an 18-gauge 9-cm long needle for the nerve block. The cannula is inserted caudal to the junction of the supraorbital process and zygomatic arch and is introduced through the skin.

Then, the 18-gauge, 9-cm long needle is introduced through the cannula needle and is directed in a horizontal and slightly dorsal direction until the coronoid process is encountered. The needle is “walked off” the rostral aspect of the coronoid process and

advanced in a ventromedial direction along the caudal aspect of the orbit until the needle encounters the bony plate encasing the foramen orbitorotundum.

Once the needle is advanced to the foramen, it is advised that the needle be drawn back a few millimeters to reduce the risk of intrameningeal injection. After aspirating to assure the needle is not in the internal maxillary artery, 10-15 milliliters of lidocaine (2%)is deposited, with an additional 5 milliliters of lidocaine deposited as the needle is slowly withdrawn. Mydriasis indicates a successful block.

4 Point Retrobulbar Nerve Block: The 4-point retrobulbar block is technically easier and can be done more rapidly as compared with the Peterson eye block. In this technique, an 18 gauge, 9-cm long needle is introduced through the skin on the dorsal, lateral, ventral and medial aspects of the eye, at 12, 3, 6, and 9 o´clock positions, respectively.

Introduction of the needle through the conjunctiva should be avoided to reduce the occurrence of ocular contamination. The needle is directed behind the globe using the bony orbit as a guide. When the needle is introduced into retrobulbar sheath, the eye will move slightly with the tug of the needle.

After this location is reached and aspiration is performed to assure that the needle is not in a vessel, 5-10 milliliters of lidocaine (2%) is deposited at each site. Mydriasis indicates a successful block. Retrobulbar block: An alternative to the 4-point retrobulbar block is the single retrobulbar block. In this technique, the 9-cm long 18-gauge needle is bent into a ½ circle.

The needle is inserted immediately ventral to the dorsal orbital rim and directed such that the needle impacts into the bone of the orbit. Then the needle is advanced as it is rotated ventrally in a progressive manner such that the needle remains in close proximity to the bone.

After the needle is inserted to the caudal aspect of the eye, 20ml of 2% lidocaine HCl is administered after aspiration to ensure that the needle is not positioned in a vessel or other fluid structure. Successful deposition of lidocaine causes mild proptosis of the globe.

Ring Block: Additional local anesthesia of the eyelids is recommended as the Peterson and retrobulbar blocks typically result in incomplete analgesia of the eyelids. Five to ten milliliters lidocaine (2%) is infiltrated subcutaneously 2.5 centimeters from the eyelid margins as a ring block.

Incisions

The hair should be clipped, the skin disinfected with solutions such as betadine or chlorhexadine,

A transpalpebral ablation technique is utilized to remove the eye. The upper and lower eyelids are sutured closed or alternatively, eyelids can be closed using multiple towel clamps.

A circumferential skin incision is made approximately 1 centimeter from the edges of the eyelids. Using a combination of blunt and sharp dissection, Mayo scissors are used to dissect through the orbicularis oculi muscle, fascia, and subcutaneous tissue surrounding the eye.

The interior of the bony orbit is used as a guide. The medial and lateral canthal ligaments a resharply transected to allow access to the caudal aspect of the orbit.

As there is a large vessel associated with the medial canthus, transection of the medial canthal ligaments is best left until necessary. Complete excision of orbital tissue is necessary in most cases of eye removal. The retrobulbar musculature and the optic nerve sheath should be transected as far caudally as feasible. A vascular clamp can aid in hemostasis while additional excision of remaining orbital tissue is undertaken.
In cases where neoplastic infiltration of the bony orbit has occurred, affected areas of ocular periosteum should be thoroughly excised.

Suturing techniques

The skin incision can be closed in a variety of patterns with a non-absorbable suture such as No. 3 nylon. Common patterns include the Ford interlocking, cruciate or simple continuous. An interrupted suture should be placed in the medial canthal portion of the skin closure to allow for facilitation of drainage if necessary. If a cosmetic result is desired, a “trampoline” suture can be
employed to reduce the hollow appearance of the orbit.

However it is not recommended in cases where there is periorbital infection or neoplasia present. Placement of a trampoline suture is done by grasping the periosteum on the dorsal and ventral rim of the orbit using a simple continuous pattern with No2 polypropylene or equivalent nonabsorbable suture.
The sutures are tightened to allow for support of the overlying ocular skin.
The skin is subsequently sutured using a Ford interlocking, cruciate, or simple con
tinuous pattern and No. 2 or No. 3 nylon suture.

Topic-5: Post operative care

At this level, we shall follow the following:

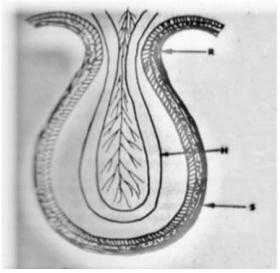
- ✓ General antibio therapy using for example penstreptomycine for 5 to 7 day injections.
- ✓ Regular Local antisepsis
- ✓ The skin sutures are removed routinely in 14 to 21 days, leaving the underlying trampoline sutures in place as a permanent support.

Learning Unit 2: Abdominal surgery

Abdominal surgery involves a surgical operation on organs inside the abdomen. This may include surgery on the stomach, gallbladder, small intestine, or large intestine(colon), liver, pancreas, spleen, esophagus, and appendix. Some reasons for abdominal surgery include infection, obstruction, tumors, or inflammatory bowel disease.

L.O. 2.1. Treatment of the hernia

A hernia is defined as the displacement of an organ through a normal aperture (a **true hernia**) or pathological aperture (**false hernia** or **rupture**). The mobile organs of the abdomen are most commonly displaced through apertures in the abdominal wall, diaphragm, inguinal canal or femoral canal.



- Def:
- Protrusion of body cavity contents
- Into normal / Abnormal opening in the wall of that cavity
- To lie beneath the intact skin or to occupy another body cavity

Topic-1: Description of hernia

In a true abdominal hernia, the displaced organs are contained within a **hernial sac** which consists of the parietal peritoneum together with any overlying soft tissues. In an **external hernia**, the skin forms the outermost layer and the hernial sac and its contents are palpable. **Internal hernias** involve an aperture within the abdominal cavity. Since the parietal peritoneum is torn when ruptures occur, these do not have defined hernial sacs. Hernias may be **congenital** or **acquired**. Congenital hernias usually result from a failure of physiological apertures (such as the umbilical canal) to close fully during embryonic or neonatal development whereas acquired hernias may be related to trauma, wounds or to physiological weakening of tissues with age, pregnancy or chronic straining.

pend

e a

d.

- **Reducible hernia**: The contents of the hernial sac can be moved back to their original position.
- **Incarceration**: If the hernial ring narrows or if the displaced organs expand, the contents of the hernial sac may be trapped or 'incarcerated'.
- **Strangulation**: The contents of the hernial sac are trapped and their blood supply is impaired. Initially, only venous drainage is reduced leading to oedema and congestion but infarction may occur if the arterial blood supply is also affected.

b. **Types of hernia**

- **Umbilical hernias** are congenital and result from a failure of closure of the foetal umbilical canal. They occur in all of the major domestic species.
- **Diaphragmatic hernias** may be congenital or, much more commonly, diaphragmatic ruptures may occur following blunt abdominal trauma in small animals.
- **Inguinal/scrotal hernias**may be congenital or acquired. Congenital hernias are rare and usually occur in young male dogs with late testicular descent.
- **Perineal hernias**are true hernias where abdominal organs move into space created by the weakening or rupture of muscles forming the pelvic diapragm and anus.
- **Richter's hernia** is a rare form of hernia in which only one wall of the small intestine is trapped in the hernial sac, resulting in a partial intestinal obstruction.

Topic-2: Pre-surgical procedures:

The identifying and preparation of materials, drug and restraint procedures are very important and should be well managed as followed.

a. Identification and preparation of materials

- ✓ Serrated Dressing Forceps
- ✓ Tissue Forceps
- ✓ Allis Tissue Forceps
- ✓ Forceps
- ✓ Scalpel Handle
- ✓ Mayo Scissors
- ✓ Instrument Tray
- ✓ Tray Cover
- ✓ Suture needles
- ✓ Sutures (resorbable and non-resorbable)
- ✓ Towel and towel clippers
- ✓ Hypodermic needles and syringes
- ✓ Gloves and other protective dressing

b. Identification and preparation of drugs

Following are drugs to provide:

- Detergents(soap, savlon...)
- Antiseptics(Alcohol, iodine tincture, Methylene blue,...)
- Sedatives and local anaesthetics.
- Anti-inflammatories
- General antibiotics

c. Restraining and preparation animals

In this condition restraint and preparation will depend on the spices and types of hernia. Sedation is firstly required then lateral recumbence or dorsal recumbence according to the site of hernia.

Topic-3:Operatory procedures

This operation is first of all started by series of injection of anaesthetics to alleviate the pain then the surgery proper follows.

Anaesthesia

a. **Premidication:** Diazepam (0.2mg/kg IV).
b. **Epidural anesthesia**: Lidocaine 2% (0.15ml/kg sacro-coccygeal) +/– Xylazine (0.05mg/kg). The xylazine increases the sedation of the calves and increases the duration of action of the epidural (3–5 hours vs. 1–2 if lidocaine is used alone). The calf is kept in sternal recumbency for 15 minutes after the epidural.During surgical preparation, a nasotracheal tube, especially if a double drip is used, should be placed. The easiest way to perform a nasotracheal intubation is with the calf in dorsal recumbency. The neck is straightened and the tube is slid slowly into the trachea paying attention to the breathing pattern of the calf (advancing the tube during inspiration).

c. **Local anesthesia:** ring block around the umbilicus (especially at the cranial aspect, which is not anesthetized by the epidural).
d. **Double drip:** 5% GGE mix with ketamine (2mg/ml) given to effect

Incisions

The skin is sterilized and draped. The infraumbilical skin is infiltrated with local anesthetic, and a curved incision is created around the umbilical depression. The subcutaneous tissues are dissected off the rectus sheath and linea alba to expose the hernia sac.

The sac is incised at its neck, and the sac is detached from the umbilical skin. The sac is opened, and adhesions from the omentum or bowel are divided and the contents, if viable, are returned to the peritoneal cavity. A small sac may be invaginated without being opened.

The sac is excised, and the peritoneum is sutured with a 2-0 absorbable suture. The rectus sheath is dissected on its anterior surface so that a 1.5- to 2.0-cm margin is visible around the defect. Similarly, adhesions on the peritoneal surface, just inside the fascial defect, are cleared for 360° to allow visualization of the suture repair.

Haemorrhage control

In this procedure no severe haemorrhage is managed, gauze is quite enough to control bleeding. Clamping with forceps and ligations are also utilized.

Suturing techniques

The fascial defect is closed transversely with interrupted monofilament 0 polypropylene or 0 ethibond sutures (Ethicon, Sommerville, NJ). Full-thickness bites are placed 1 to 1.5 cm from the edge of the defect and left untied until the final suture is placed.
The sutures are tied individually. Meticulous hemostasis is secured. The deep surface of the skin of the umbilical cicatrix is tacked down to the fascial repair with a 4-0 absorbable suture to preserve the natural appearance of the umbilicus. The skin is closed with a running 4-0 subcuticular suture. A cotton ball is placed in the umbilicus and a dressing applied.

The closure of the fascial defect is performed by imbricating the upper (“vest”) fascia over the lower (“trousers”) fascia with two rows of interrupted non-absorbable 0 sutures. The first row is placed high on the “vest” and at the free edge of the “trousers” . The free superior edge of the “vest” that overhangs the “trousers” is then secured with a second layer of inter-rupted nonabsorbable 0 sutures.

Topic-4: Post operative care

Antibiotics are given for 3 to 5 days and NSAIDs are repeated the day following surgery. Hay is
reintroduced over a 3 day period, especially on calves that had tension on the body wall during
closure. The calf is stall rested until the stitches are removed no more than 14 days after thesurgery. Leaving the stitches for a longer period increases the risk of surgical site infection.

L.O.2.2. Laparo-rumenotomy

The terms 'coeliotomy' and 'laparotomy' are both used to refer to the surgical opening of the abdominal cavity. Coeliotomy means in general, the opening of the abdominal cavity. Laparotomy is actually the opening of the abdomen by means of a flank incision. A rumenotomy is a routine surgical procedure where the rumen is surgically incised via the left abdominal wall.

Topic-1:Indications of rumenotomy

Indicated in the following conditions:

a) Persistant ruminal impaction.
b) Frothy Bloat.
c) Foreign bodies lodged in distal esophagus, rumen, and reticulum.
d) Traumatic reticulitis.
e) Atony of omasum and abomasum.
f) Reticular herniorraphy.
g) Exploratory rumenotomy for diagnosis of intraruminal diseases other than foreign bodies.
h) Ingestion of toxic plants.
i) Diaphragmatic hernia.

Topic-2:Laparo-rumenotomy approaches

The site of incision is:
Left mid flank vertical incision.
In case of traumatic reticulitis in large size animal the site of incision is parallel to last rib.
The site of incision is usually equidistant from tubercoxae and the last rib beginning 5 cm ventral to the lumbar transverse process

Pre-surgical procedures

Preparation of the team, materials and drugs, then patient;
The whole dorsum of left abdominal wall should be thoroughly cleaned with soap and water to remove all the dirt and dust before further preparation for surgery is done followed by shaving of left flank with surrounding area.

- ✓ Scrubbing should be done.
- ✓ Again clean with soap and water.
- ✓ Apply 70% isopropyl alcohol to the incision site.
- ✓ After that tincture iodine is painted over the site.
- ✓ Drapes are put over the site leaving the proposed site of incision.
- ✓ The bars of trevis, used to control the animal, which immediately faces the surgeon should be covered with sterile sheets and drapes.

Operative procedures

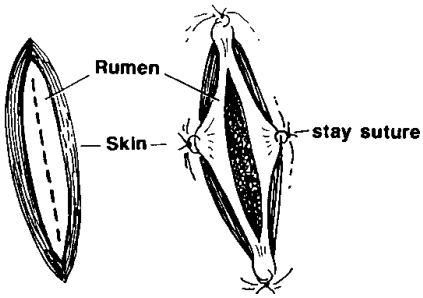
Following stapes are performed.

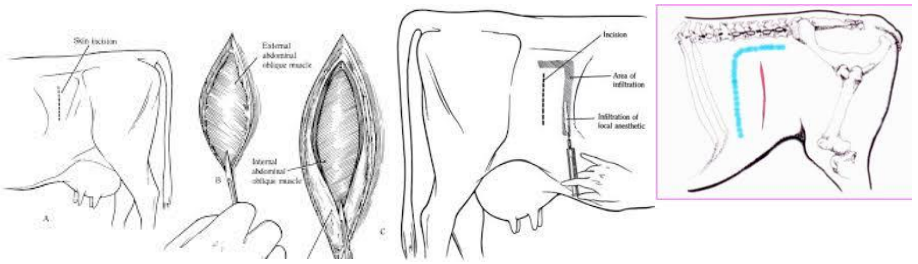
a. Anaesthesia

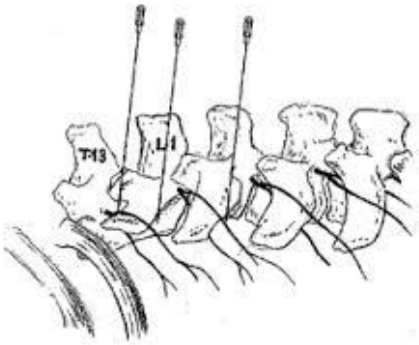
The rumenotomy operation is performed in standing position. The desensitization of flank area with animal in standing position can be achieved by:

- Inverted 'L' block
- Field block
- Paravertebral anaesthesia

In most of the animals Paravertebral anaesthesia is used and for this T13, L1 and L2 nerves are blocked. Although usually local anaesthesia of the flank and Paravertebral block is sufficient for rumenotomy, however in non cooperative animals tranquilization may be required.







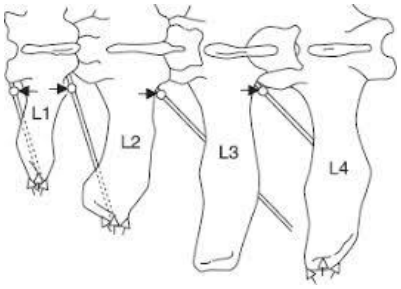


Figure 5 The technique of the line block anesthesia (LB) where the red and black color denote nerve supply and LB block with 2% of lidocaine and deep red line denotes a line of incision.

b. Incisions

- The skin is incised with a smooth but firm motion. The pressure on the scalpel should be adequate enough to ensure complete penetration of the skin. Dissection of the subcutaneous fascia and oblique muscles continues to expose the glistening aponeurosis of transverse abdominis muscle.
- Different muscles from outside to inside are incised one by one along with their fascia after grasping them with Allis tissue forceps. In the last peritoneum is grasped with allis tissue forceps and then it is incised taking care not to cause any injury to underlying rumen.
- The length of incision from skin to the peritoneum should be in descending order to facilitate closure.
- The skin incision should be long enough to allow the surgeon's arm inside the abdomen. If the rumen is not full, the walls of rumen and abdomen separate out spontaneously to facilitate exploration.
- The abdominal cavity should be thoroughly explored to examine the wall of diaphragm, outer wall of reticulum, spleen and liver for any pathological lesion.

- A thorough search is made by inserting hand in the abdominal cavity through the incision and rolling over the rumen on all sides to rule out any herniation, abcessation or foreign bodies.
- No attempt should be made to break down the firm adhesions if present.
- If the rumen is grossly distended, aspiration is done by piercing a 16" needle on dorsal aspect.
- A fold of rumen is exteriorized. For better exteriorization, retention and to avoid contamination of abdominal cavity with ruminal contents, several ruminal fixation techniques are used such as:

i. Stay suture technique:

After laparotomy, the rumen has to be pulled out gently out of the laparotomy incision and rumen walls were anchored to the incision dorsally, ventrally, cranially and caudally by placing four or more sutures between ruminal walls and skin by using no.2 silk or nylon as suture material.

Ii. Rumen skin fixation sutures technique

After rumenotomy the rumen wall can be fixed to the skin incision by a continuous inverting suture pattern to pull the rumen over the edges of the skin incision.

iii. Weingarth ring technique

Following laparotomy, a Weingarth ring is fixed to the dorsal commisure of the incision by its thumb screw. The rumen is fixed to the ring. As the rumen wall is incised hooks are placed into cut edges of ruminal wall, pulled out and hooked around the frame until the rumen had been reflected outward all the way around the incision.

iv. Rumen skin clamp fixation technique

The rumen is incised and fixed with skin on either side with the help of towel clamps.Maximum 80% of the ruminal contents may be evacuated. If complete rumen is emptied fresh cud or microflora should be kept in rumen before its closure. The hand is then inserted in the rumen and entire rumen, reticulum, reticulo-ruminal fold and esophageal groove are searched out and if any foreign body is present, it is removed. A magnet may be introduced and swept over rumen and reticulum to retrieve any metallic substance. After surgical intervention the surgeon rescrubs his hands and the edges of rumen incision are thoroughly cleaned and redrapped.

c. Haemorrhage control

Use of gauze is enough to control bleeding. Clamping with forceps and ligations are utilized.

d. Suturing techniques

The rumen incision is closed by double row of continuous inverting sutures using chromic catgut no. 2 or 3.

- ❖ The suture site and exposed area is irrigated with polyionic fluids with or without antiseptic solution.
- ❖ Rumen fixation instruments or sutures are removed and all the soiled substances are discarded.
- ❖ The surgeon scrubs again before starting the suturing of peritoneum, muscle and skin incision.

e. Closure of laparotomy incision:

A flank laparotomy incision can be sutured in different layers depending on the preference of surgeon. Most preffered method is closure in 4 layers.

- ❖ The 1st layer of a simple continuous suture is applied using no 2 or 3 catgut on peritoneum and transverse abdominis muscle.
- ❖ The two oblique muscle are sutured together in 2nd layer with catgut or silk No. 2.
- ❖ Subcuticular sutures are applied to bring the opposite edges of skin near to each other and to obliterate dead space.
- ❖ Suturing of skin by placing series of simple interrupted or interrupted mattress sutures leaving 3-4 stay sutures to apply the gauge piece or bandage piece to cover the wound.

f. Post operative care

This is managed differently within the following order:

- ✓ Course of antibiotic coverage for 5-7 days.
- ✓ Anti inflammatory/analgesics drugs for 2-3 days
- ✓ Dressing on alternate days for 7-10 days
- ✓ Fluid therapy, if required.
- ✓ Mild osmotic laxative, may assist in prompting gut motility
- ✓ Light diet to animal for few days after the surgery
- ✓ Removal of Skin sutures on 8th to 10th day post operation day.

L.O.2.3. Hysterectomy

The name hysterectomy comes from two Greek words, “hystera” meaning uterus, and “ectomy” meaning removal, thus hysterectomy is the surgical removal of the uterus which usually includes the cervix (neck of the uterus).

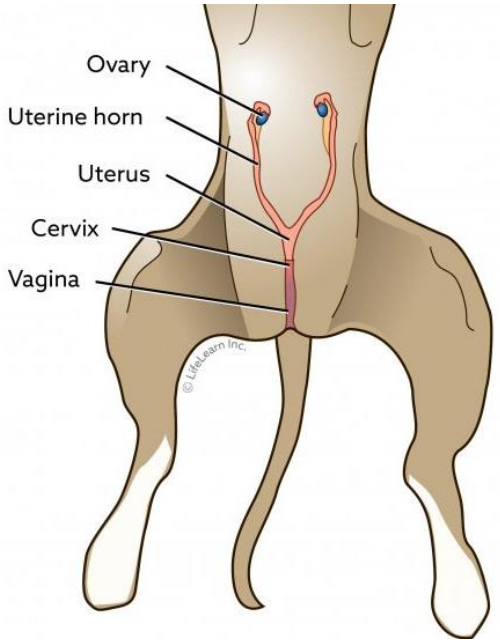
A hysterectomy can be performed for therapeutic or non-therapeutic reasons.

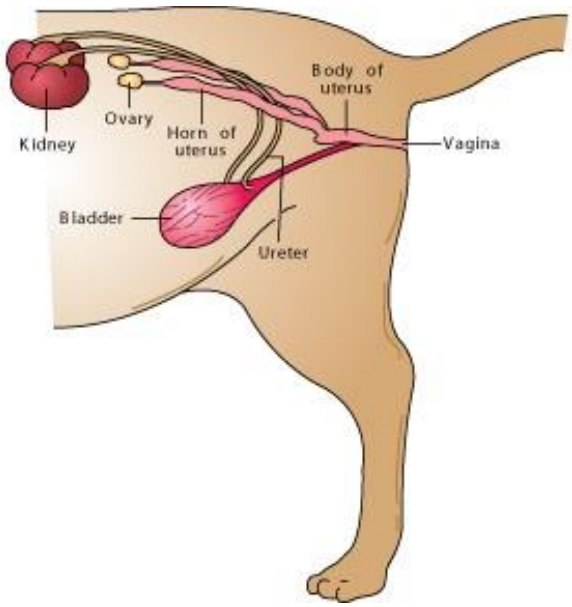
Topic-1: Indications of hysterectomy

A hysterectomy is performed for several medical reasons:

- ✓ It prevents females(dogs and cats) from going into heat.
- ✓ It prevents females(dogs and cats) from getting pregnant.
- ✓ It significantly helps prevent females(dogs and cats) from get breast cancer later in life.

- ✓ It prevents females(dogs and cats) from getting uterine infections later in life.
- ✓ convenience
- ✓ In addition to these medical reasons, it prevents unwanted pregnancies, a significant problem in our society. Millions of dogs are euthanized every year because they are strays.





Topic-2: Pre-surgical procedures

During this moment the surgery team mast identify all the required materials and drugs.

a. Identification and preparation of materials

In addition to the standard laparotomy kit, the surgeon requires the following instruments:

- ✓ 2 babcock forceps,
- ✓ 4 artery forceps,
- ✓ 4 doyen bowel clamps,
- ✓ Retractors and hooks
- ✓ Muzzle
- ✓ Resorbable multifilament suture material, VICRYL, Dec 3

And finally material for the septic phase of the surgery:

scalpel, mayo scissors, and resorbable VICRYL Dec 3.5 or 4 for closure of the abdominal wall.

b. Identification and preparation of drugs

- Detergents(soap, savlon...)
- Antiseptics(Alcohol, iodine tincture, Methylene blue,...)
- Sedatives and local anaesthetics.
- Anti-inflammatories
- General antibiotics

Topic-3: Restraining and preparation animals

Twenty four hours preventing food then The patient is muzzled , sedated, dorsally recumbent , the surgical site is aseptically prepared.

Topic-4: Operative procedures

The following are the steps to undergo during this surgery.

Anaesthesia

Two categories of anesthesia techniques are utilized for hysterectomy. These are general and regional (spinal or epidural). With general anesthesia, the patient is rendered completely unconscious. With spinal or epidural anesthesia, the patient is temporarily paralyzed, "numbed from the waist down" (T6-T8 level), and moderately sedated.
If spinal anesthesia (subarachnoid block/SAB) is intended, the anesthetist will select a 22-, 25-, or 26 -gauge spinal needle to access the subarachnoid space. Use of smaller spinal needles, whenever possible, is associated with reduced incidence of spinal headache.18 Successful puncture is apparent when clear cerebral spinal fluid (CSF) is returned. Anesthetic solution is then injected into the subarachnoid space and the patient is positioned supine until the spinal "sets"at the appropriate dermatomal level.
A T6 to T8 dermatomal level, once achieved, provides excellent anesthesia for uterine surgery.
Lithotomy or supine positioning may then proceed. Spinal anesthesia, depending upon the local anesthetic solution selected (lidocaine, tetracaine, marcaine), can last from one to three hours. With epidural anesthesia, a 17-gauge Tuohy introducer is directed into the epidural space.
An epidural catheter is then threaded though the Tuohy into the epidural space to a depth of about 3 cm.
After removal of the introducer, a small "test" dose of lidocaine with epinephrine is injected into the catheter. This maneuver helps to detect an undesired intravascular cannula tion with the epidural catheter. If the catheter lies in an epidural vein, tachycardia (about 20 beats per minute above the baseline heart rate) is apparent due to intravenous injection of epinephrine.
Once proper placement is confirmed, the catheter is secured to the patient's back. Doses of anesthetic solution are then given continuously or by bolus to attain appropriate dermatomal levels of anesthesia. As mentioned earlier, the epidural catheter may be used postoperatively for pain management withlocal anesthetics or narcotics.
General anesthesia commences after intravenous boluses of hypnotic, paralytic, analgesic and amnestic drugs produce unconsciousness and loss of reflexes. During this period of profound, drug-induced obtundation, endotracheal intubation with a cuffed endotracheal tube or less frequently, a laryngeal mask airway (LMA) is performed. When proper airway placement is insured by bilateral equal breath sounds, presence of end tidal carbon dioxide (ETCO2) and an equally rising thorax, the tube is secured.

The patient's eyes are lubricated with water-soluble ointment and covered with tape to protect them from corneal injury. Manual "bagging" or mechanical ventilation via a gas machine suffuses mixtures of oxygen, nitrous oxide, and inhalational anesthetic agents, such as Forane, Sevoflurane, or Desflurane into the patient's lungs.

Alternatively, total intravenous anesthesia (TIVA) can be induced without the use of inhalational anesthetic gases. Intravenous injection of large doses of narcotics, benzodiazepines, and hypnotic agents cause unconsciousness, amnesia , and analgesia. Muscle relaxing drugs, which produce temporary paralysis of abdominal, thoracic, and pelvic musculature, further enhance surgical access for both inhalational and intravenous techniques.

Incisions

A sterile drape is placed over the surgical site.

- ✓ A scalpel is used to incise the skin at the middle of the abdomen(linear alba), and then the abdominal cavity is opened.
- ✓ The organs of the female reproductive tract are identified and
- ✓ the major blood vessels supplying the oviduct and the uterus are ligated (tied off).
- ✓ Sutures (stitches) that dissolve over time are used to tie off the blood vessels and also to close the uterus above the cervix and oviduct at 3-5cm end.
- ✓ sharp incisions are applied to excise the uterus and its horns by two distant cuts taking care to the ligating sutures of both ends.
- ✓ Sometime, surgical staples are used in place of sutures.
- ✓ The abdominal incision is then closed with one or two layers of sutures (stitches).
- ✓ The outer layer of skin is closed with sutures or surgical staples;

Topic-5. Post operative care

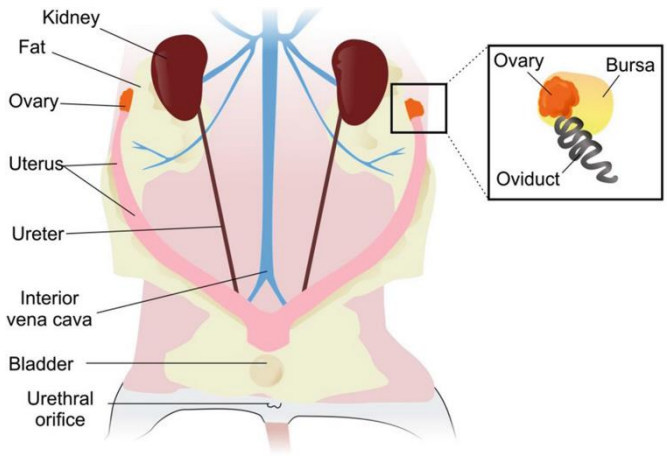
Postoperative medication should be given to relieve pain, which is judged in most cases to be mild to moderate and can be effectively eliminated with safe and effective pain medicines. Generally young dogs are acting normally within 24 to 48 hours and are released one or two days after surgery. It is difficult to determine that they just completed surgery. The home care requires reduced activity until the stitches are removed in 10 to 14 days. The incision line should be inspected daily for signs of redness, discharge, swelling or pain.

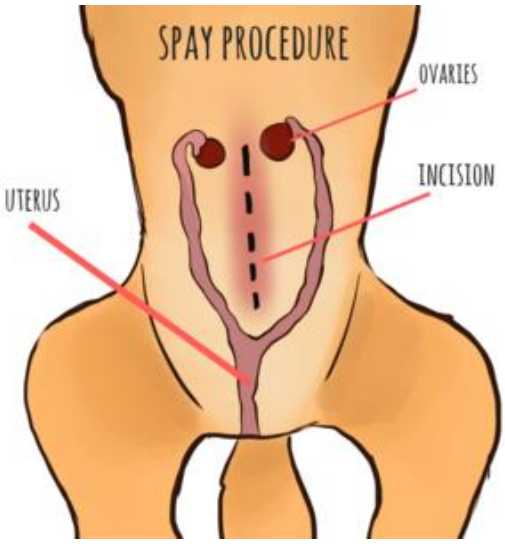
L.O. 2.4. Ovariectomy

Ovariectomy is one of the most frequently performed surgical techniques in veterinary practice
because it is the most reliable means of pet population control. The Ovariectomy is routinely performed and has replaced Ovariohysterctomy. Has the standard approach for gonadectomy; the uterus is onlyremoved when uterine pathology is present.

Topic-1: Description of Ovariectomy

This is an elective sterilization of female dogs and cats is one of the most common procedures performed in veterinary practice and is considered by private veterinary practitioners as one of the most important skills required of new graduates. Potential benefits of sterilization include population control, prevention of diseases of the reproductive tract, and elimination of undesirable be haviors associated with hormonal cycling.





Topic-2: Indications

An ovariectomy is indicated in the following conditions:

a. disorders of the ovaria, pseudopregnancy, diabetes mellitus or acromegaly.
b. Prevention of undesired pregnancy
c. Prevention of mammary tumors
d. Another indication is that of convenience,

Topic-3: Pre-surgical procedures

Preoperative tests depend in part on the age and general health of the dog. In young dogs, minimal tests are needed provided the pet has been vaccinated, dewormed and proven healthy based on physical examination. Often simple blood tests, such as a packed cell volume or blood count, will be done prior to anesthesia. In older dogs, it would be common to perform a routine blood count, serum biochemical tests, urinalysis and possibly a chest X-ray or EKG prior to anesthesia. These recommendations vary on a case by-case basis and depend on the overall health of the dog.

Identification and preparation of materials

Collect the following materials :

- ✓ 2 babcock forceps,
- ✓ 4 artery forceps,
- ✓ 4 doyen bowel clamps,
- ✓ Retractors and hooks
- ✓ muzzle
- ✓ resorbable multifilament suture material, VICRYL, Dec 3
- ✓ scalpel, mayo scissors, and resorbable VICRYL Dec 3.5 or 4 for closure of the abdominal wall.

Identification and preparation of drugs

provide the Following drugs:

- Detergents(soap, savlon...)
- Antiseptics(Alcohol, iodine tincture, Methylene blue,...)
- Sedatives and local anaesthetics.
- Anti-inflammatories
- General antibiotics

Topic-4: Operative procedures

The procedures are detailed as following:
The surgeon should wear a clean and sterile gown, scrub their hands thoroughly using surgical scrub solution, and wear sterile gloves

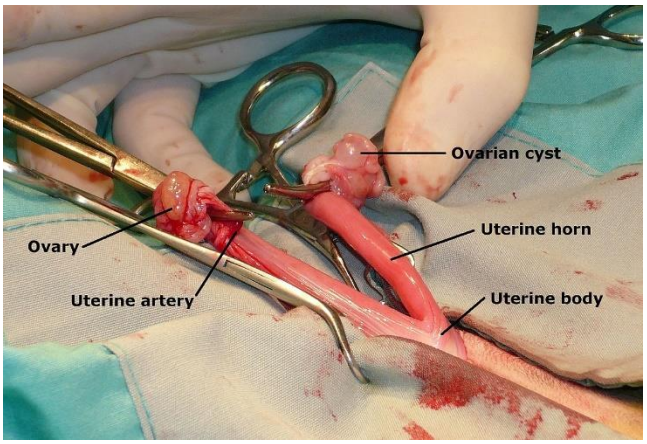
The surgical zone should be carefully scrubbed using the same type of surgical scrub solution as used by the surgeon, and disinfected using alcohol and surgical antiseptic solution several times over.

Anaesthesia

IV premedication with valium and morphine at 0.25 mg/kg and 0.1 mg/kg, respectively, followed by induction of anaesthesia with propofol at a dose of 5 mg/kg, the volume is increased slowly until the animal is sufficiently well anaesthetised to enable intubation. Isoflurane gas is then used to maintain anaesthesia; a flow rate of 2% is normally sufficient to maintain a good level of anaesthesia until the end of the procedure. To control perioperative pain, morphine can be administered at the same dose as for premedication, to a maximum of 10 injections/hour to avoid exceeding the threshold of toxicity.

Once anaesthetised, the bitch is positioned in dorsal recumbency with her front legs pulled forward and tied to the table, and the back legs tied back; the bitch is then put on a drip with previously warmed normal saline (0.9%) with glucose.

NB: An infiltration of local anaesthetic like lidocaine can be injected thought the line of incision at the linear Alba.



Incisions

Easy access to the genital apparatus is gained via the linea alba; the incision starts at the umbilicus and ends 2 to 3 cm cranial to the anterior border of the pubis. This approach provides direct access to the uterine horns and facilitates prehension of the ovaries.

- The skin is incised along the linea alba, that is, the sheath of the rectus abdominus, starting from the umbilicus and ending a few centimetres in front of the pubis.
- Using a pair of scissors, the subcutaneous connective tissue, which may contain a substantial amount of fatty tissue, is bluntly dissected to visualise the linea alba.

- Haemostasis is performed before opening the abdominal cavity. If simple swabbing proves insufficient, any bleeders should be ligated or twisted to obtain a very clean surgical field.
- Using rat-tooth forceps, the linea alba is grasped in the middle and tented up before being incised with a pair of scissors.
- The peritoneum is then punctured using a cannula that is slid towards the umbilicus to enable incision of the linea alba without damaging the abdominal contents, with the cutting edge of the blade turned uppermost. The same procedure is then performed in the opposite direction towards the pubis.
- If the uterine horns are voluminous they will be seen in the bottom of the surgical field following incision of the peritoneum; normal-sized horns will not be visible, for example, following recovery from postoestral metritis or during routine spaying.
- To find the uterine horns easily, the operating table is tilted so that the animal's head is below its feet, to move the abdominal organs towards the diaphragm; this is known as the TRENDELENBURG position.
- To locate the genital apparatus with ease, the bladder is retracted laterally; cranial to the bladder, the body of the uterus and bifurcation of the horns are easily locatable.
- One of the horns is then followed cranially up to the ovary, which is hidden in the fat-filled ovarian bursa.
- The ovary is not visible but can be felt through this ovarian bursa.
- It is a 1-2 cm long mass, which is exposed after incision of the bursa.
- The ovary is grasped and babcock forceps placed. The latter are handed to an assistant who holds the ovarian pedicle taught out of the abdomen to facilitate placement of a ligature as close as possible to the root of the pedicle to ensure haemostasis of the ovarian artery.
- The broad ligament is then punctured with a clamp to grasp the suture material and a ligature is placed in the ovarian pedicle as close as possible to the lumbar wall. Once this ligature has been placed, the ends of the threads are kept long so that the ovarian pedicle can be found with ease in the event of haemorrhage.
- A clamp is then placed between this ligature and the ovary, and the pedicle is sectioned between the two. The ovarian pedicle is held throughout this procedure with a clamp. The quality of the haemostasis is checked; the long ends of the suture material on the ovarian pedicle are then cut.

In some cases, such as in the event of hypertrophy of the vascular bundle, it may be advisable to place two ligatures, one around the artery and one around the ovarian vein. Never hold the ligature itself with the clamp, as it might slip off the pedicle when being released back into the abdomen.

- If the broad ligament is seen to contain large vessels, they should be ligated prior to be being cut.
- However, if the vessels are invisible and buried under fat, the ligament can simply be torn in the middle above the uterine artery by exerting traction between two swabs with the fingers to tear it from front to back to the level of the cervix, and as close as possible to the lumbar wall.

- A point of resistance will be encountered within the round ligament; this corresponds to the vaginal process (which corresponds to the scrotum in the male) which explains the risk of inguinal herniation of the uterus in bitches following relaxation of the latter.
- Another technique for sectioning the broad ligament involves the placement of a row of overlapping mattress sutures along the length of the ligament before making the section with a scalpel or a pair of scissors.
- Once the ovarian pedicle has been sectioned, the second horn is located and the corresponding ovarian bursa grasped with Babcock forceps.
- The ovarian pedicle and broad ligament are sectioned as described previously.
- Finally, the two uterine horns are replaced back onto pelvis.

Suturing techniques

The prolapse of intestinal loops through the incision can cause significant heat and fluid loss, which can have very serious consequences, especially if the bitch is already suffering from deterioration in general status due to severe pyometria, for example. It is therefore advisable to suture the anterior portion of the laparotomy wound before continuing the surgery.

However, if the haemostasis of the ovarian pedicles or broad ligaments is a source of concern, the placement of a few forceps should suffice to provide temporary closure of the anterior portion of the laparotomy wound.

Topic-5: Post operative care

The animal is warmed, especially if the female was in poor condition prior to the procedure, she must be rolled in a blanket and placed in a heated kennel.

Intravenous fluid therapy is administered with isotonic saline along with an injection of Vitamin

C and corticosteroids. The bitch is then placed under antibiotic therapy for at least 5 days.

Sutures must be protected by a collar placed on the neck of the patient to imitate wound biting.

The sutures are removed after 10 days. Any stagnant uterine secretions in the cervix and vagina will be eliminated in the days following and then cease completely.

Elisabeth Collar is used to limit wound biting

L.O. 2.5. Foetotomy

Removal or division of certain parts of foetus to reduce the size of the foetus is called foetotomy.

Foetotomy is used most commonly in cattle, occasionally in horses, rarely in sheep and goats and almost never in pigs and small animals.

Topic-1: Description of foetotomy

When a whole foetus is divided into small pieces,the operation is known as complete foetotomy.
While, *when a small part of the foetus is removed,the operation is known as incomplete foetotomy.*

Advantages of foetotomy :

- ✓ It reduces the size of the foetus.
- ✓ It avoides caesarean operation.
- ✓ It require little assistance.
- ✓ It prevents possible trauma or injury to the dam during use of excessive force traction.

Disadvantages of foetotomy :

- ✓ It may be dangerous, cause injuries or lacerations to the uterus or birth canal by instruments or sharp edges of bones.
- ✓ The process may be time-taking and exhausting for both the dam and the operator.
- ✓ It may be dangerous to the veterinarian by wound from instruments.

- ✓ If the foetus is emphysematous, there is a possibility of infection to the operator's arm.

Topic-2: Pre-surgical procedures

In Foetotomy various procedures are followed to meet the targeted removal of the dead foetus.

Selection and preparation of materials

The following materials are required :

- ✓ Utrecht model fetotome and threader
- ✓ Wire saw handles
- ✓ Fetotome saw wire
- ✓ Krey hook
- ✓ Wire introducer
- ✓ Fetotomy (palm) knife
- ✓ Fetotomy wire and sterile wire cutters
- ✓ Lubricanta is needed.
- ✓ A sterile stomach pump and stomach tube
- ✓ Obstetrical (OB) or calving chains
- ✓ Handles for the calving chains
- ✓ Sterile latex gloves
- ✓ Shoulder-length fingerless gloves
- ✓ OB suit
- ✓ 1-long spinal needle (~4 inches long)
- ✓ 10 cc syringe
- ✓ Suture thread, sterilized
- ✓ Curved suture needles, sterilized
- ✓ Surgical scissors

Selection and preparation of drugs

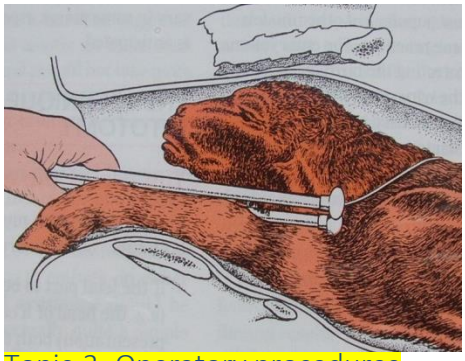
This surgery should need the Following Drugs:

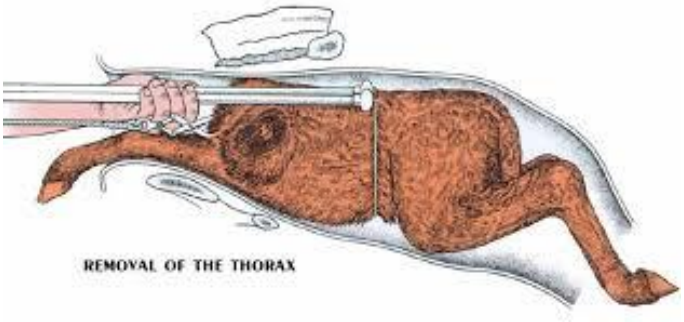
- ✓ Propylene-iodine Solution
- ✓ Lidocane or any other local anaesthetic
- ✓ LA200 or Oxymycine LA200
- ✓ Uterine pills to put in uterus to prevent infection

Retraining and preparation animals

For Restraint, We prefer to perform fetotomy procedures on a tranquilized, standing female in a large stall bedded with nonslip material, preferably clean straw.2–5,10–14 Parturients are unpredictable
and the clinician should take what ever precautions are necessary to permit a safe examination—both for the patient and the veterinarian. The presence of a dead fetus means that only the female need be considered when administering chemical restraint. The use low doses of xylazine (0.3–0.5 mg/kg IV) and butorphanol (0.01–0.02 mg/kg IV) in

conjunction with a twitch or lip chain. Epidural anesthesia may not eliminate the abdominal contractions, but it does provide analgesia to the perineal region.15 It is useful to reduce the reflex straining initiated by manipulations within the birth canal. Tranquilization, with or without
an epidural, is also good for restraint.
The remaining cases required either short-term or prolonged general anesthesia.





Topic-3: Operatory procedures

Two techniques of foetotomy are in practice: subcutaneous and percutaneous.

Subcutaneous foetotomy : *Removal of decorticated limb (skinlesslimb) to reduce the size of foetus is called subcutaneous foetotomy.*

A. Technique of subcutaneous foetotomy :

0. Fore limb:

- ✓ The fore limb is snared around the pastern instead of around the fetlock (generally, during traction, fetlock is used for application of rope).
- ✓ Continuous traction is applied on the snare by one assistant
- ✓ A small incision is made with a scalpel into the skin in front of fetlock joint.
- ✓ A longitudinal incision is made with the help of Robert's foetotomy knife from the fetlock to the scapula.
- ✓ Dissect the skin (separation of skin from the muscles) with the help of fingers around the leg and extend it to the scapular region.
- ✓ This is followed by division of the muscles connecting the scapula and thorax by Robert's knife.
- ✓ Next step is to disarticulate the fetlock joint without severing the skin.
- ✓ The other fore limb has been flexed and replaced in the uterus to provide more space. The skin is being incised or separated from fetlock to the scapula, using Robert's foetotomy knife or Keller's spatula.
- ✓ After disarticulation of the fetlock joint, the limb is removed "through the skin" and traction is applied to the denuded limb. Note that the preservation of the digits with the skin serves for effective attachment of the traction cord.

- ✓ Now, a snare is attached to the distal end of the metacarpal bone.
- ✓ With the help of two assistants, uniformly increasing force traction is applied on the snare (which is attached to the distal end of metacarpal bone).
- ✓ Due to this constantly increasing force traction, decorticated limb (skinless limb) is detached from the thorax and remove it.
- ✓ The digits or feet still attached to the skin, serve as a point of fixation for a traction cord in the final delivery of the foetus.
- ✓ In this way, the limb with the scapula is removed without crushing the maternal passage. Generally the removal of one fore limb gives a sufficient reduction in the foetal diameter to allow delivery by force traction. If delivery is not possible after this operation, the other fore leg must be removed in the same way.

1. Hind limb:

- A skin incision is made on the medial aspect of the leg from fetlock joint to the under aspect of pelvis and the fingers are used for separation of skin.
  After disarticulating the fetlock joint, a wooden rod is inserted under the tendon Achilles and fixed by a 'finger of eight cord'.
- The hip joint is disarticulated by rotation and traction of wooden rod and the decorticated limb is withdrawn from the pelvis.
- The hip joint is disarticulated by torsion. The other limb is repelled as far as possible. The phalanges in the skin serve for the fixation of a foot-snare.

B. Percutaneous foetotomy :

Removal or division of certain parts of the foetus along with skin to reduce the size of foetus is called percutaneous foetotomy.

Technique of percutaneous foetotomy :

For percutaneous foetotomy, generally Thygesen's foetotome is used. Epidural anaesthesia should be given before starting the foetotomy because it reduces or stops the straining. If relaxation of uterine musculature is required, Clenbuterol should be used. At least one person is required to restrain the patient and ideally two person to assist the obstetrician. The metal saw wire must be threaded through one or both the tubes of Thygesen's foetotome before use according to conditions.

- ✓ If, the foetal part to be sectioned (cut) is directly accessible (eg. the head of a calf in normal anterior presentation)both the tubes should be threaded.
- ✓ If the foetal part to be sectioned is not directly accessible, then only one tube of the fo~totome is threaded. The other end of wire is attached to the introducer which is passed around the part (to be cut) and pulled out from the birth canal and then passed through the other tube of foetotome.
- ✓ Placement of wire is always facilitated by generous use of obstetrical lubricant. About 2 litres or more of lubricant should be applied into the uterus.

- ✓ After fixing the loop around the foetus to be cut, tightly pull the wire.
- ✓ A deep incision is made at this position with knife to accommodate the wire.
- ✓ At this stage, the obstetrician should carefullycheck the position.
- ✓ Now, sawing is started by an assistant using initially short strokes, then long strokes and foetotome is held firmly in position by the obstetrician.
- ✓ Initially the wire takes a little more time to engage in the skin of the part so short sawing strokes should be used at this stage.
- ✓ Muscle is readily sawn but more effort is required for bone.
- ✓ The efficiency of sawing is increased, if the partis kept in tension by force traction.
- ✓ Once the foetal parthas been cut, the wire will suddenly encounter much less resistance.
- ✓ The foetotome is then removed and the sectioned foetal part is retrieved and removed.
- ✓ Great care must be taken during removal of part to ensure that birth canal is not damaged by sharp bony fragments.
- ✓ An attempt is now made to deliver the calf by traction.

I. Complete foetotomy in anterior presentation :

(i) Removal of the head:

If head is protruding from the vulva - attach rope to the head and simply cut the head with a knife or scalpel. If head is within vagina : Fix the loop of foetotomy wire over the base of the neck and then saw as close to the shoulder as possible.

(ii) Removal of fore legs: Fix the loop of foetotomy wire over the top of scapula of the leg to be removed and then saw the foreleg. After removing the head and one fore leg, an attempt should be made to deliver the calf by traction. If birth is not yet possible, remove the second leg also.

(iii) Transverse division of thorax: The thorax of the calf is removed by sawing the body across the caudal to the ribs in the lumbar region.

(iv) Removal of abdominal viscera: After removal of thorax, foetal abdominal viscera become exposed and is removed manually foetus.

(v) Longitudinal division of pelvis: Now the rear end of the foetus is inside the uterus after removal of the thorax. Divide the pelvic girdle longitudinally so that the caudal part of the foetus may be
removed in two smaller parts. Sectioning of pelvis is helped by holding it in position throughself-tightening hooks (Krey-Schottler's hook).

II. Complete foetotomy in posterior presentation:

i. Removal of hind limbs:

The foetotome instrument is threaded and the wire-loop is placed over one foot and passed over the limb so that the end of the loop lies anterior and medial to the wing of foetal ilium.

Now, the head of instrument is placed lateral to the anus, and the tail of the calf must be included in the loop. This prevents the wire to slip down the leg.

After fixing the loop, sawing is started and the severed limb is removed. If delivery is still impossible, the other hind limb must be removed and the fetus should be withdrawn as far as possible.

ii. Transverse division of trunk :

If delivery is still impossible, then its trunk must be bisected by means of the wire loop.

iii. Longitudinal division of anterior part of body :

One or if necessary both forelimbs are amputed by passing the wire between neck and fore limb.

To perform complete foetotomy in anterior and posterior presentation, following cuts are required :

Anterior Presentation :

No. of cuts	Parts to be amputated	Position of the wire saw	Position of the foetotome
1st cut	Head	Around the neck	Posterior part of the mandible
2nd cut	First fore limb	Between elbow joint & chest	Near scapula
3rd cut	Second forelimb	-do-	-do-
4th cut (Transverse division of thorax)	Posterier part of the chest	At right angle of foetotome head around foetus	Posterior of last foetal rib dorsally
5th cut (Longitudinal division of pelvis)	Pelvis bisection	In between tail & tuber ischii	Just cranial to the tuber coxae of the limb

Posterior presentation :

No. of cuts	Parts to be amputated	Position of saw wire	Position of the foetotome
1st cut	First hind limb	Between tuber ischium and tail head.	Near trochantor.
2nd cut	Second hind limb	-do-	-do-
3rd cut	Transverse division of foetal trunk (lumbar area)	At right angle to foetotome head around the foetus	Just caudal to foetal rib.
4th cut	Diagonal longitudinal division of fore-part.	Neck and fore limb on side and medial to opposite limb	Posterior to scapular attachment

Topic-4: Post operative care

- Routine antibiotic cover (with strepto-penicillin for 5-7 days).
- Uterine lavage
- Treatment of the existing wounds at the birth canal
  Fluid therapy.

L.O.2.6. Performing caesarean section

A cesarean section ("C-section") is an incision through the abdominal wall into the abdomen which is used to isolate the uterus. An incision is made through the uterus in order to deliver the calf. C-sections are necessary in cattle when vaginal delivery is too difficult and is not progressing in the expected amount of time and therefore could endanger the life of the cow or the life of her calf.

Topic-1: Description of caesarean section

Causes of Dystocia (Difficult in birthing)

- Bony tissueabnormality
- Deviation of theuterus
- Deviation of the uterus
- Distension of the urinary bladder
- Fetal maldisposition
- Fetopelvic disproportion
- Maternal excitement
- Non dilation of the cervix
- Obstruction of the birth canal
- Obstructionof theuterinelumen
- Persistent hymen
- Soft tissue abnormality
- Uterine inertia
- Vulvalabnormalities

Cesarean section is potentially indicated in cases of dystocia when a calf cannot be delivered by fetal mutation and extraction. C-Sections are generally performed on calves that are too large, which is common with an immature heifer (first time mother) and for embryo transfer calves. Other indications include:

- ✓ Inadequate cervical dilation (not enough relaxation of the cervix muscles)
- ✓ Abnormal pelvic bone conformation (shape) in the cow
- ✓ Rupture of the cow's abdominal musculature

- ✓ Problems with uterine position or uterine function
- ✓ Abnormalities of the cow's uterus or vagina
- ✓ Abnormal calf position that is not correctable through the vagina
- ✓ Fetal monsters (congenital defects)
- ✓ Presence of a dead fetus

There are 8 available surgical approaches for the bovine cesarean section:

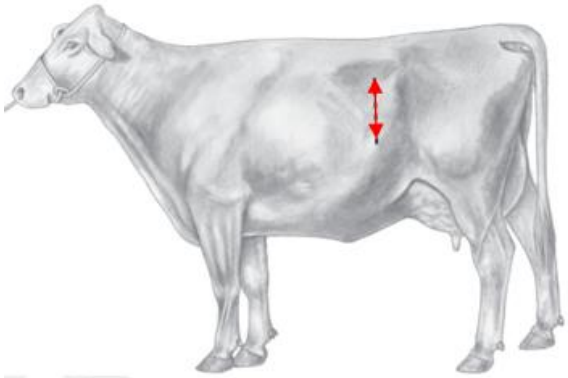
- ✓ The standing left paralumbar celiotomy,
- ✓ Standing right paralumbar celiotomy,
- ✓ Recumbent left paralumbar celiotomy,
- ✓ Recumbent right paralumbar celiotomy,
- ✓ Recumbent ventral midline celiotomy,
- ✓ Recumbent ventral paramedian celiotomy,
- ✓ Ventrolateral celiotomy,
- ✓ And the standing left oblique celiotomy.

Standing left paralumbar celiotomy

The standing left paralumbar celiotomy is the most commonly used approach for an uncomplicated cesarean section . In general, paralumbar 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.

Standing left paralumbar celiotomy. The placement of the incision is indicated by the dashed line.



Standing left paralumbar celiotomy. The placement of the incision is indicated by the Redline.

Standing right paralumbar celiotomy

This approach has all the indications and contraindications of the left paralumbar approach. The additional and perhaps most important difference between the left and right paralumbar approach is the difficulty in keeping viscera in the peritoneal cavity with the right paralumbar approach. Most practitioners studiously avoid this approach; however, some practitioners feel right horn pregnancies are more manageable with the right paralumbar 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.

Recumbent left paralumbar celiotomy

This approach differs little from the standing left paralumbar approach. Additional assistance is nearly always needed to cast the cow, if not recumbent already, and to place the cow in right lateral recumbency. The incision is made slightly more ventral than in the standing left paralumbar 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 paralumbar approach is used, due to increased tension on the muscle layers, but it is rarely problematic.

Recumbent right paralumbar celiotomy

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

Recumbent ventral midline celiotomy

This approach is straightforward and is most commonly used on a recumbent animal. If the incision is appropriately placed, the only body wall layers incised are the skin, subcutis, and the linea alba. Additional assistance is required to cast and position the cow for this

approach. The cow is typically positioned in dorsal recumbency, leaning toward the surgeon at a 45 degree angle.

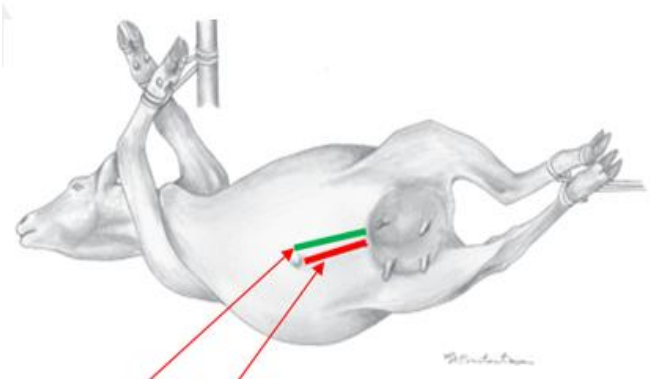
Both front and hind feet are tied to a gate or wall. This positioning is critical. If the cow is positioned either in exact dorsal recumbency or leaning away from the surgeon, exteriorization of the uterus becomes problematic, if not impossible. Once the peritoneal cavity has been opened, it may be necessary to pull the greater omentum cranially to expose the uterus. Exteriorizing the uterus is facilitated by untying the hind feet only and temporarily laying the hind limbs flat on the ground.

After removal of the fetus and closure of the uterus, the cow is repositioned in dorsal recumbency and the linea alba is closed. Closure of the abdominal wall is often difficult. You can close the linea with polyglactin 910 (#3 Vicryl, Ethicon; in an everting interrupted horizontal mattress pattern. Eversion of the linea permits the surgeon to oversew the linea with relative ease and safety. Other appositional suture patterns, including simple continuous, may be used. Some practitioners may choose to close the linea alba with a braided nonabsorbable suture; however, this choice will cause carcass contamination with foreign material. A surgeon's knot, 2 overhand knots on the 1st throw, facilitates appositional closure of the linea alba.

In cases where closure of the abdomen wall is difficult, loosening the back legs and using Bachaus towel clamps to appose the 2 sides of the incision will help to relieve the tension prior to tying the knots. Integrity of abdominal wall closure is critical. Less than optimal closure may result in either abdominal wall herniation or, in severe cases, evisceration of the cow. The ease with which the uterus is exteriorized with this approach makes it optimal for exteriorizing the uterus, a critical issue when the surgeon is attempting to remove an emphysematous fetus.

This approach is also ideally suited to 1st calf heifers of the beef breeds, because the incision is somewhat hidden and does not involve retail cuts, suggesting that this approach would be preferable, if the producer is likely to sell the animal for slaughter soon after the procedure.

This approach should be used when the large udder of older beef and dairy cows precludes extending the incision sufficiently caudad to permit ready exteriorization of the uterus, and when udder edema and the increased ventral vasculature make this approach more complicated.

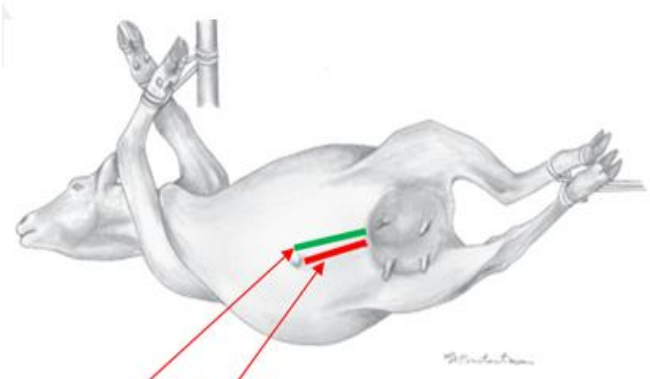


Recumbent ventral midline celiotomy and recumbent ventral paramédian celiotomy. The placement of the incision is indicated

Recumbent ventral paramedian 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 paramedian approach is more secure than that of the ventral midline approach. This makes little sense. Neither the internal sheath of the rectus abdominis muscle, nor the rectus abdominis muscle has substantial holding properties and it would seem that a 1-layer abdominal closure is easier and, hence, preferable to a 3-layer closure.



Recumbent ventral midline celiotomy and recumbent ventral paramédian celiotomy. The placement of the incision is indicated

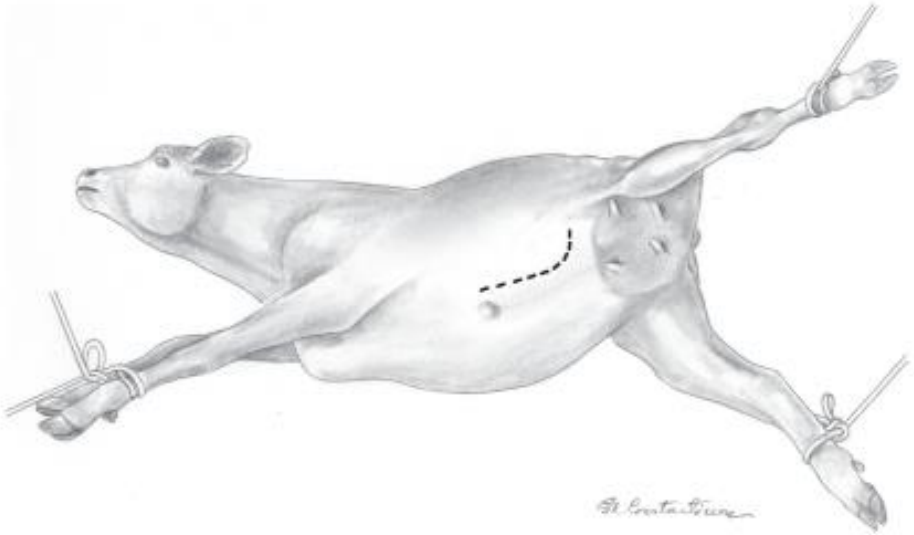
Ventrolateral celiotomy

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 hindlimbs 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 caudodorsally 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 paramedian 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 paramedian approaches and therefore, more prone to herniation and evisceration of the cow.



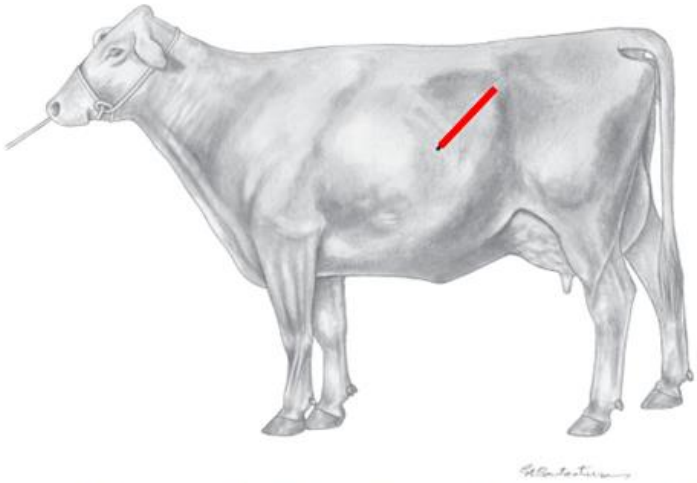
The proper positioning of the cow and incision site for the ventrolateral celiotomy. The placement of the incision is indicated by the dashed line.

Standing left oblique celiotomy

This described variation of the left paralumbar celiotomy approach has distinct advantages. In this approach, the incision starts 4 to 6 cm ventral and cranial to the tuber coxae, extends cranioventrad at a 45 degree angle to the ground, and terminates at the last rib. This incision extends further cranially and more ventrally than the traditional left paralumbar incision; it can

also be used in the recumbent left approach.

The external abdominal oblique muscle is incised in the same direction as the skin. The internal abdominal oblique and transversus abdominus muscles can then be gridded parallel to the incision using a combination of sharp and blunt dissection. Herniation is less problematic than with the ventral approaches; however, the apex of the gravid uterus is far more readily exteriorized in this procedure compared with the other standing procedures. This approach holds distinct advantages for surgeons with either smaller stature or less physical strength. The patient must be adequately restrained and must be able to remain standing, but as with the other standing procedures, minimal assistance is needed.



Standing left oblique celiotomy. The placement of the incision is indicated by the dashed line.

Each has its own advantages and disadvantages. Selection of an approach should be based on:

- The type of dystocia,
- The cow's condition,
- The environmental conditions,
- The availbility of assistance, and
- The surgeon's preference.

Topic-2: Identification and selection of caesarean section approaches

Although a number of procedures are available for cesarean section and these procedures vary greatly, there are common principles that guide the veterinarian in the selection of the surgical approach and conduct of the procedure. A paramount goal of cesarean section should be to limit the contamination of the peritoneal cavity with uterine contents. Peritoneal cavity contamination, particularly in cattle with dead, emphysematous fetuses, greatly increases the risk of peritonitis, limits the cow's chances of survival, and limits the surviving cow's productivity.

It is important to exteriorize the uterus. This aids in limiting peritoneal cavity contamination, thereby aiding in the prevention of peritonitis. The choice of surgical procedure has a direct bearing on whether the practitioner is able to exteriorize the uterus. Large fetuses, large cows, and small stature all limit the ability of the veterinarian to exteriorize the uterus.

Topic-3: Pre-operative procedures

These procedures are related to the required hygiene of the surgical tea, space, patient and material preparation.

Identification and preparation of materials

In this practice the following materials are required :

- ✓ Obstetrical (OB) or calving chains
- ✓ Handles for the calving chains
- ✓ Sterile latex gloves
- ✓ Extra large slit drape
- ✓ Propylene-iodine Scrub
- ✓ 2 large forceps, sterilized
- ✓ 4 large hemostats, sterilized
- ✓ Surgical blade and handle, sterilized
- ✓ Shoulder-length fingerless gloves
- ✓ OB suit
- ✓ 1-long spinal needle (~4 inches long)
- ✓ 10 cc syringe
- ✓ Suture thread, sterilized
- ✓ Curved suture needles, sterilized
- ✓ Surgical scissors
- ✓ Shaver and clippers
- ✓ Surgical scrub sponge/brush

Identification and preparation of drugs

Drugs are prepared as Following:

- ✓ Propylene-iodine Solution
- ✓ Lidocane or any other local anaesthetic
- ✓ LA200 or Oxymycine LA200
- ✓ Uterine pills to put in uterus to prevent infection
- ✓ 3 gallon (11.4 L). bucket of warm water.
- ✓ 70% Alcohol

Restraining and preparation animals

Standing position is required for cattle and equine especially in standing approaches.
Secure the head. The cow or heifer must have her head secured in a head-gate to prevent her from escaping before or during the surgery. You may confine the cow to a head gate of a handling facility you already have, or a calving or maternity pen specifically suited for this very practice.
Shave down the area where the incision will be. Most C-sections are performed on the left side of the cow, or according to whichever side the cow is laying on if she's a downer cow and cannot get up without risk of collapsing again. In this case with a standing cow, the left flank located just behind the last rib and before the hook of the pelvis is shaved. A quarter inch of hair or less should remain afterwards.

Scrub the shaved area. Squirt some pre-podine scrub onto the area that has been shaved, and rub down the area with hands, a sponge or scrub brush. Repeat until the area is clean or free of any tag (dirt or feces on the hide).
Wash the area down with 70% Alcohol. This will further disinfect the area.

Topic-4: Operative procedures

A certain number of operations is followed step by step starting by anaesthesia up to the closure of the wound.

Anaesthesia

Local anaesthetic. Administer local anaesthetic to spinal area (which involves a long needle inserted into a specific area of the spinal cord) that incision will be done on. Anaesthetic should kick in a few seconds after being administered, "deadening" or numbing the area so that the cow will feel no pain when she is cut open.

In sheep general anaesthesia may be used, for example using Saffan (alfadalone/alfaxalone), or halothane.

- ✓ This provides good relaxation and anaesthesia, and avoids any risk of unexpected movements of the animal during the procedure.
- ✓ There are always risks associated with general anaesthesia in ruminants, particularly since usually it is not possible to starve the animal before undertaking the caesarean section.

Local or regional anaesthesia:

- ✓ Paravertebral block, inverted L block or line block may be used for a flank approach in cattle.
- ✓ High epidural block (lumbosacral epidural), inverted L block or line block may be used for a paramedian approach in cattle.
- ✓ Paravertebral block of spinal nerves T13, L1, L2 and L3 is recommended in cattle.
- ✓ Paravertebral block, lumbosacral epidural or local infiltration at the incision site may be used in sheep.
- ✓ Epidural analgesia:

Epidural using lidocaineprovides adequate flank anaesthesia but usually also causes recumbency, which may be prolonged in cattle.

Both lumbosacral and sacrococcygeal epidural using xylazine0.07 mg/kg made up to a volume of 2.5 ml in sterile water have been used to provide surgical analgesia for caesarean section (left flank incision) in the ewe. A period of 40 to 50 minutes was allowed between injection and testing by skin-prick followed by incision. Following lumbosacral epidural injection, analgesia was considered good in five ewes and adequate in three ewes, while one ewe required additional local anaesthetic line block.

Incisions

Make an incision through the skin and into the abdominal cavity. The incision itself is usually no longer than 12 to 16 inches (30.5 to 40.6 cm) in length.

A relatively large incision is made into the abdomen so that one horn of the uterus can be brought to the outside. The uterus is carefully incised, chains are placed around the calf's limbs, and the calf is delivered.

Haemorrhage control

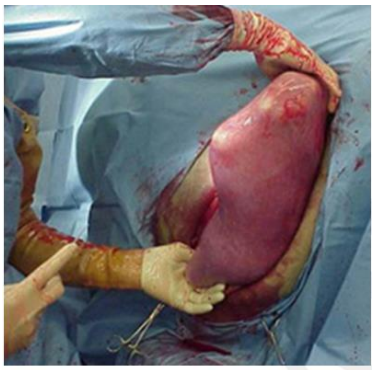
Use of gauze to control bleeding. Clamping with forceps and ligations are required when there is a high bleeding condition.

Extraction and provide new born care

- ✓ Reach inside the abdominal cavity to find the uterus,You should be able to feed the hard body of a calf through the uterine wall immediately where the incision was made.
- ✓ Pull the uterus to the outside as much as you can (be careful not be to be too forceful about it). Make an incision in the uterine wall, careful not to cut the calf in the process. This incision should be a few inches shorter than the previous one.
- ✓ Reach into the uterus and grab one of the calf's hind feet if it's in normal presentation. Pull that leg through the incision
- ✓ Rupture the amniotic sac, and grasp the hind leg that was just pulled out in the previous step, holding the uterus in position against the outer incision. Attach a calving chain to that leg, then have a helper hold that chain up.
- ✓ Reach in to find the other hind leg. Attach the second calving chain to that leg. Have your helper hold that chain up
- ✓ Pull out the calf. Get your helper to help you to pull the calf out of the uterus as quickly as possible. You may need an extra set of hands or two if the calf is particularly big and heavy, because the calf must be pulled up and out to avoid further damage to the incisions.

- ✓ Get the calf breathing. Get the person helping you (and other folks watching you do the surgery) to get the calf breathing,
- ✓ Give the calf a bottle of colostrum right away as well.

- ✓ Remove the placenta. Reach in the uterine cavity again and begin to remove the placenta from the uterine wall. This step is optional, since some vets like to remove the placenta while the uterine wall is still open. Other vets prefer to leave the placenta in the cow and let her expel it herself.
- ✓ Clean the cow's abdominal cavity. With a bucket of warm water with about 10 ml of Solution mixed in, wash out the abdominal cavity and the skin to clean it of amniotic fluid and blood.



The uterine horn is brought outside of the body &

Suturing techniques

- ✓ Suture up the uterine incision, then push it back into place
- ✓ Suture up the abdominal wall and skin incision

With another bucket of warm water and iodine Solution, wash down the incision to the skin.

- ✓ Release the cow after she has recovered from the local anaesthetic and allow her to be with her new calf.

Flank abdominal incision closed after performing a C-section

Topic-5: Post operative care

Prognosis for recovery after C-section is generally good. To avoid C-sections, the cow and bull being bred should be of similar size and cows should be monitored carefully when they are close to delivery. Postoperatively, the cow should be watched for dehydration and mastitis (mammary gland infection). Incisional complications and retained placentas (a placenta which is not passed within 24 hours) may also occur following C-section and may require treatment with antibiotics and anti-inflammatories.

There is certain risk of having to remove the placenta. Some vets are better at it than others, but an injection of antibiotics needs to be administered to a cow that has had her placenta removed via the incision. Removal of the placenta by humans have a much higher chance of inviting uterine infection than if a cow expelled the placenta herself.

Remove the sutures after 10-14days.

Cow with her calf that has just been delivered by a C-section

A cow that has been clipped in preparation for a standing C-section

Learning Unit 3: Performing Orthopedic Surgery

Orthopedics is: that branch of surgery which is specially concerned with the preservation and restoration of the function of the skeletal system, its joints, and associated structures like ligaments and tendons.

L.O.3.1. Sprain

A sprain is damage to or tearing of ligaments or a joint capsule. A strain refers to damage to or tearing of a muscle.

Topic-1: Description of sprain

A sprain is an injury involving the stretching or tearing of a ligament (tissue that connects bone to bone) or a joint capsule, which help provide joint stability. A severely damaged ligament or joint capsule can cause instability in a joint. Symptoms may include pain, inflammation, and in some cases, the inability to move a limb (arm, leg, foot). Sprains occur when a joint is forced beyond its normal range of motion.

The most common cause of a leg sprain in dogs is trauma or injury. If a dog is severely injured due to an automobile accident, falling, attack, high jump, fight or anything, joint ligaments may get stretched and when stretched, then can become ruptured or twisted, ending with a sprain.

Dogs with a sprain may show symptoms such as lameness, limping, pain, stress and swelling. These are the most common symptoms; more severe symptoms in advanced forms of a sprain may also be noted such as complete immobilization, shock, severe stress and possibly, aggressiveness.

Clinically, dog sprain has three different forms:

- **Level I:** This is the mildest form of a sprain in dogs. The minor part of a ligament is usually torn. A dog can still walk, but cannot run or jump. Swelling and pain are noticeable, but usually do not cause many dog walking problems.
- **Level II:** In this form, part of the dog ligament is torn and stretched. Bones remain intact, but severe swelling and pain along with lameness is noted. Dog with this type of canine sprain may not be able to walk properly, and joint function is termed, “abnormal”.
- **Level III:** This is the most severe form of dog sprain. The joint ligament is severely damaged, and is completely torn. Bones forming the joint do not remain intact, many researchers believe that this form should not be considered a sprain.

Topic-2: Treatment of sprain

The treatment of a leg sprain in dogs may vary, depending on the severity and therefore, most vets only

To reduce the pain, swelling and discomfort caused by the sprain, the vet may prescribe painkillers, as well as certain antibiotics or anti-inflammatory drugs. Many vets also recommend the use of certain dietary supplements, for strengthening the dog’s bones and joints.

Inflammation

Mild paw sprain cases usually resolve on its own within 36 – 48 hours, but this does not mean that the patient does not require any attention at all.

Treatment is usually accomplished with the administration of anti inflammatory drugs.

Pain killers in cases of dog paw sprain are never recommended, since dogs may feel comfortable and start walking; putting more pressure on already stretched and injured tissues.

If a dog experiences severe pain and stress, pain killers can be administered during the latter stages of the condition, but a dog should be kept confined.

If a dog is confirmed as having any nutritional deficiency, such as not having enough "Glucosamine", nutrients should be administered in an adequate amount.

Rest and supportive care is the key to achieving a timely recovery. A patient should be kept isolated, restricted and monitored.

Natural remedies not only hasten recovery, but strengthen muscular functionality and ability. Two products to consider are Paw Paw, which targets the paw specifically and Muscle and Joint Support, which helps strengthen and maintain the entire musculoskeletal system. These types of natural remedies are highly recommended to support any muscular condition your dog is suffering from.

Immobilization (compress or bandage)

A bandage in its simplest form is a strip of fabric used to dress and bind up wounds. Veterinary medicine has refined and elaborated upon this basic form, combining it with casts, slings, and splints to heal all kinds of injuries. These variations, however, all perform a bandage's four basic healing functions:

- ✓ To protect the wound from environmental bacteria
- ✓ To absorb wound secretions
- ✓ To immobilize the wound
- ✓ To exert pressure that helps prevent swelling or bleeding

Bandages can be readily applied to the head, neck, chest, tail or lower legs of a dog. Splints are usually applied below the knee on the back leg or below the midpoint of the humerus (the bone that connects the shoulder to the elbow) on the front leg.

Since the purpose of a bandage is to help immobilize an injured body part, it is usually changed less frequently. In puppies that are growing rapidly, the bandage may need to be changed weekly to allow it to be adjusted for proper fit. In adult dogs, a bandage may be left in place for several weeks if there are no complications.

Resting animals

Resting an animal with inflammatory spain will reinforce the following measures:

- Stop all play and bring your dog inside if possible.
- Apply an ice pack to the injured joint if the dog will allow it.
- Do not apply ice directly to the skin.
- Use tape or an elastic bandage to hold a cold pack in place.
- For the first twenty-four hours, use cold therapy.
- For the next twenty-four, use a heating pad or warm pack.
- Strictly limit your dog's activity for five to seven days.

Healing and recovery follow up

The required followup should be done in following ways:

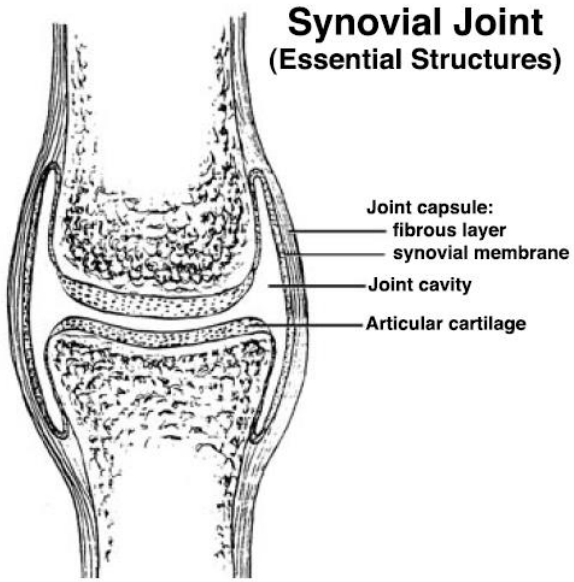
L.O.3.2. Treat dislocation

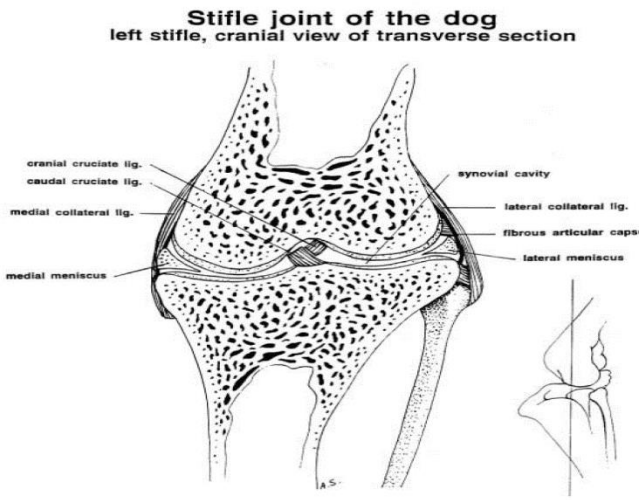
This problem dislocation is said to be frequent in larger dogs like Rottweilers, Alaskan Malamute, Dalmatian, Collie, Golden Retrievers and German Shepherds, although there may be instances where smaller dogs can also experience hip dysplasia.

Topic-1: Description of joint

These are points of articulation between two or more bones

Joints are classified according to manycriteria: movement, nature or type of the uniting material, Shape of the articulating surfaces, number of bones. Following are the typical features of the synovial joints.





Topic-2: Description of dislocation

Some of the common symptoms of dislocation include the following:

- ✓ Staggering or swaying
- ✓ Having problems or difficulty in standing up
- ✓ Decrease of physical activity or exercise
- ✓ Lameness of the dog's legs
- ✓ Dog shows signs of discomfort whenever attempting to stand up or lie down

- ✓ The dog has an abnormal looking gait
- ✓ The dog is reluctant to jump or run
- ✓ There may be instances where a clicking sound is heard as the dog walks or stands up

Topic-3: Pre-operative procedures

Before you perform the real procedure of treatment of a sprain you should identify and prepare the following points.

Identification and preparation of materials

These materials include:

- ✓ Adhesive tape
- ✓ Gauze
- ✓ Cotton cast padding
- ✓ Elastikon tape
- ✓ Sterile pad (if an open wound exists)
- ✓ Plaster of paris
- ✓ Needle and syringes
- ✓ Water

Identification and preparation of drugs

- ➢ *Non-steroidal anti-inflammatory drugs such as meloxicam*
- ➢ Joint Resolution: This product contains glucosamine and collagen,
- ➢ Local anaesthetics
- ➢ Sedatives
- ➢ General anaesthetics

Restraining and preparation animals

Depending on the severity of pain, the specie and health of the patient the injured animal will be recumbent or not, sedated or generally anaesthetized to safe the operation.

Topic-4.Operative procedures

During treatment , operator should follow the below mentioned procedures.

Restoration of joint in normal position

Immediately after the dislocation, the application of ice is helpful to control swelling and decrease pain. If the patient needs to be transported, it is important to prevent the joint from moving (immobilization). At times, a cast or splint may be used to immobilize the joint and ensure proper alignment and healing. The treatment of realigning bones following a dislocation is called reduction. This may include simple maneuvers that manipulate the joint to reposition the bones or surgical procedures to restore the joint to its normal position.

Immobilisation technique of joint:

Immobilization refers to the process of holding a joint or bone in place with a splint, cast, or brace. This is done to prevent an injured area from moving while it heals.

a. **Traditional splints**

Splints are used to add extra support to fractures of the bones.. Due to the natural position of the rear legs, bandaging the bones in a straight alignment can be detrimental. Splints are best used only in the front legs. After the cotton and stretch gauze have been applied, place a flat stick or straight piece of metal on either side of the leg and tape in place.

If no sticks or metal are available, rolled up newspaper or a magazine can be used. Place it next to the injured leg and tape in place. Cover the bandage and splint with elastic bandage such as VetRap® or Ace® bandage. Secure the top of the bandage to the animal by applying one layer of sticky tape. Make sure the hair and the bandage are included in the tape. This will prevent the bandage from sliding off. Bandages and splints do not help fractures of the humerus (upper arm bone) or femur (thigh bone). If you suspect that your pet has a fractured upper thigh bone or upper arm bone, do not use a bandage or splint.

Front Splint Rear Splint

b. Casts

Casts are a form of custom-made external immobilization that lie in contact with the skin and are made to conform to the injured part to act as a method of immobilization. Casts can be made for the entire body, as for spinal injuries, for any portion of the body (spica cast), or for just the extremities.

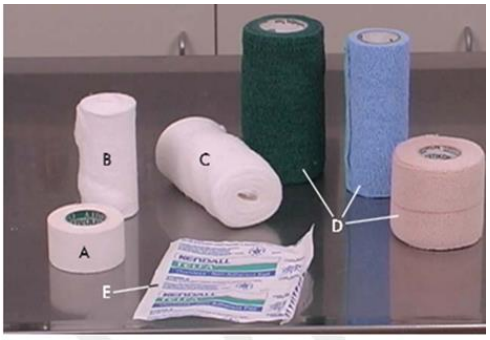
c. Bandages

Bandages are typically applied to help temporarily stabilize a joint luxation, fracture or to help reduce bleeding from a wound. If a wound is present, try to cover with a gauze pad or Telfa® pad. Begin wrapping several layers of cotton (roll cotton) around the leg. If the bandage is being used to stabilize a fracture, the joint above and below the fracture must be included in the bandage. If the fracture is in the humerus or femur, bandaging is not helpful and can make the fracture worse.

After several layers of cotton have been applied, next place several layers of stretch gauze over the roll cotton. This should be snug and compress the cotton. Having a snug bandage is crucial in stabilization and reducing pain. Be careful not to make the bandage so tight that

circulation is disrupted. Finish the bandage by applying an elastic bandage such as VetRap®, Ace® bandage or adhesive tape.
Secure the top of the bandage to the animal by applying one layer of sticky tape. Make sure the animal's hair and the bandage are included in the tape. This will prevent the bandage from sliding off. After the bandage is applied, frequently check the toes for swelling or coldness. If either is detected, remove the bandage.

Limb bandaging



Bandaging materials

Post operative procedures:

The post operative activities are respected depending on the type of joint problem.

Pain and infection Control

Painkiller with sedation can be administered when the patient is not comfortable.

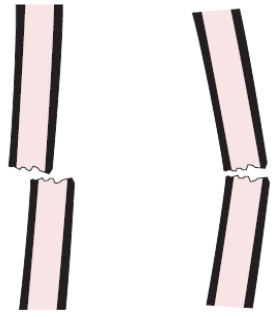
Healing and recovery follow up

The patient should be well controlled in terms of blood irrigation for the distal parts of the bandaged limbs.

Supportive structures use to protect the joint may be removed after minimal recovery depending on the age of the patient and the severity of injury.

L.O.3.3. Treat fracture

A fracture is a complete or incompletebreak in a boneresultingfromtheapplication of excessiveforce. A fracture usually results from traumatic injury to bones causing the continuity of bone tissues or bony cartilage to be disrupted or broken.



Topic-1: Description of fractures

A bone fracture or broken bone occurs when a force exerted against a bone is stronger than it can structurally withstand. The most common sites for bone fractures are the wrist, ankle

and hip, metatarsal and metacarpal bones. Treatments include setting the limb in a plaster cast or surgically pinning the bone ends back together.Broken bones take around four to eight weeks to heal, depending on the age and health of the animal and the type of break.

Causes of bone fractures

The Causes of bone fractures can include:

- ✓ Traumatic incidents such as sporting injuries, vehicle accidents and falls
- ✓ Conditions such as osteoporosis and some types of cancer that cause bones to fracture more easily, meaning even minor trauma and falls can become serious.

Symptoms of bone fractures

Fractures are different from other injuries to the skeleton such as dislocations, although in some cases it can be hard to tell them apart. Sometimes, a person may have more than one type of injury. The symptoms of a fracture depend on the particular bone and the severity of the injury, but may include:

- ➢ Pain
- ➢ Swelling
- ➢ Bruising
- ➢ Deformity
- ➢ Inability to use the limb

Types of fracture include:

Different types of fracture include:

a. **Closed (simple) fracture** – the broken bone has not pierced the skin
b. **Open (compound) fracture** – the broken bone juts out through the skin, or a wound leads to the fracture site. Infection and external bleeding are more likely
c. **Greenstick fracture** – a small, slender crack in the bone. This can occur in young animals, because their bones are more flexible that an adult's bones
d. **Hairline fracture** – the most common form is a stress fracture, often occurring in the foot or lower leg as a result of repeated stress from activities such as jogging or running
e. **Complicated fracture** – structures surrounding the fracture are injured. There may be damage to the veins, arteries or nerves, and there may also be injury to the lining of the bone (the periosteum)
f. **Comminuted fracture** – the bone is shattered into small pieces. This type of complicated fracture tends to heal more slowly
g. **Avulsion fracture** – muscles are anchored to bone with tendons, a type of connective tissue. Powerful muscle contractions can wrench the tendon free and pull out pieces of bone. This type of fracture is more common in the knee and shoulder joints
h. **Compression fracture** – occurs when two bones are forced against each other. The bones of the spine, called vertebrae, can have this type of fracture. Older animals, particularly those with osteoporosis, are at higher risk.

Topic-2: Pre-operative procedures

Before you perform the real procedure of treatment of fracture you should identify and prepare the following points.

Identification and preparation of materials

These materials include:

- ✓ Adhesive tape
- ✓ Cotton cast padding
- ✓ Elastikon tape
- ✓ Gauze
- ✓ Needle and syringes
- ✓ Plaster of paris
- ✓ Sterile pad (if an open wound exists)
- ✓ Water

Identification and preparation of drugs

- ➢ General anaesthetics
- ➢ Joint Resolution: This product contains glucosamine and collagen,
- ➢ Local anaesthetics
- ➢ *Non-steroidal anti-inflammatory drugs such as meloxicam*
- ➢ Sedatives

Restraining and preparation animals

Depending on the severity of pain, the specie and health of the patient the injured animal will be recumbent or not, sedated or generally anaesthetized to safe the operation.

Topic-3: Operative procedures:

During treatment , operator should follow the below mentioned procedures.

Fracture Reduction

Reduction is a surgical procedure to restore a fracture or dislocation to the correct alignment. This sense of the term "reduction" does not imply any sort of removal or quantitative decrease but rather implies a restoration: *re* ("back [to normal]") + *ducere* ("lead"/"bring"), *i.e.*, "bringing back to normal." When a bone fractures, the fragments lose their alignment in the form of displacement or angulation. For the fractured bone to heal without any deformity the bony fragments must be re-aligned to their normal anatomical position. Orthopedic surgery attempts to recreate the normal anatomy of the fractured bone by *reduction* of the displacement.

When reduction is decided upon it may be carried out in three ways:

- ➢ Closed manipulation
- ➢ Mechanical traction with or without manipulation
- ➢ Open operation.

a. Manipulative reduction

Closed manipulation is the standard initial method of reducing most common fractures. It is usually carried out under general anaesthesia, but local or regional anaesthesia is sometimes appropriate. The technique is simply to grasp the fragments through the soft tissues, to disimpact them if necessary, and then to adjust them as nearly as possible to their correct position.

b. Reduction by mechanical traction

When the contraction of large muscles exerts a strong displacing force, some mechanical aid may be necessary to draw the fragments out to the normal length of the bone. This particularly applies to fractures of the shaft of the femur, and to certain types of fracture or displacement of the cervical spine. Traction may be applied either by weights or by a screw device, and the aim
may be to gain full reduction rapidly at one sitting with anaesthesia, or to rely upon gradual reduction by prolonged traction without anaesthesia.

c. Operative reduction

When an acceptable reduction cannot be obtained, or maintained, by these conservative methods, the fragments are reduced under direct vision at open operation. Open reduction may also be required for some fractures involving articular surfaces, or when the fracture is complicated by damage to a nerve or artery. When operative reduction is resorted to, the opportunity should always be taken to fix the fragments internally to ensure that the position is maintained

Immobilisation technique of broken bones:

Like reduction, this second great principle of fracture treatment must be qualified by the words 'if necessary'. Whereas some fractures must be splinted rigidly, many do not require immobilisation to ensure union, and excessive immobilisation is actually harmful in some.
There are only three reasons for immobilising a fracture:

- To prevent displacement or angulation of the fragments
- To prevent movement that might interfere with union
- To relieve pain.

When immobilisation is deemed necessary there are four methods by which it may be effected:

- ✓ By a plaster of Paris cast or other external splint
- ✓ By continuous traction
- ✓ By external fixation
- ✓ By internal fixation.

a. Immobilisation by plaster, splint or brace

For most fractures the standard method of immobilisation is by a plaster of Paris cast. Also available are various proprietary substitutes for plaster, which offer the advantages of lighter weight, radiolucency and imperviousness to water, though at much greater cost.
For some fractures a splint made from metal, wood or plastic is more appropriate—for example, the Thomas's splint for fractures of the shaft of the femur, or a plastic collar for certain injuries of the cervical spine.

i. Plaster technique

Plaster of Paris is hemihydrated calcium sulphate. It reacts with water to form hydrated calcium sulphate. The reaction is exothermic, a fact that is evidenced by noticeable warming of the plaster during setting. Plaster bandages may be prepared by impregnating rolls of book muslin

with the dry powdered plaster, but except in a few developing countries, most hospitals now use ready-made proprietary bandages. These are best used with cold water because setting is too rapid with warm water.
Most surgeons use a thin lining of stockinet or cellulose bandage to prevent the plaster from sticking to the hairs and skin.
The use of a lining is certainly recommended because it adds greatly to the comfort of the plaster. If marked swelling is expected, as after an operation upon the limb, a more bulky padding of surgical cotton wool should be used.

The plaster bandages are applied in two forms: round-and-round bandages and longitudinal strips or 'slabs' to reinforce a particular area. Round-and round bandages must be applied smoothly without tension, the material being drawn out to its full width at each turn. Slabs are prepared by unrolling a bandage to and fro upon a table: an average slab consists of about 12 thicknesses.
The slabs are placed at points of weakness or stress and are held in place by further turns of plaster bandage.A plaster is best dried simply by exposure to the air: artificial heating is unnecessary. Aplaster will not dry satisfactorily if it is kept covered by clothing or bed-linen.

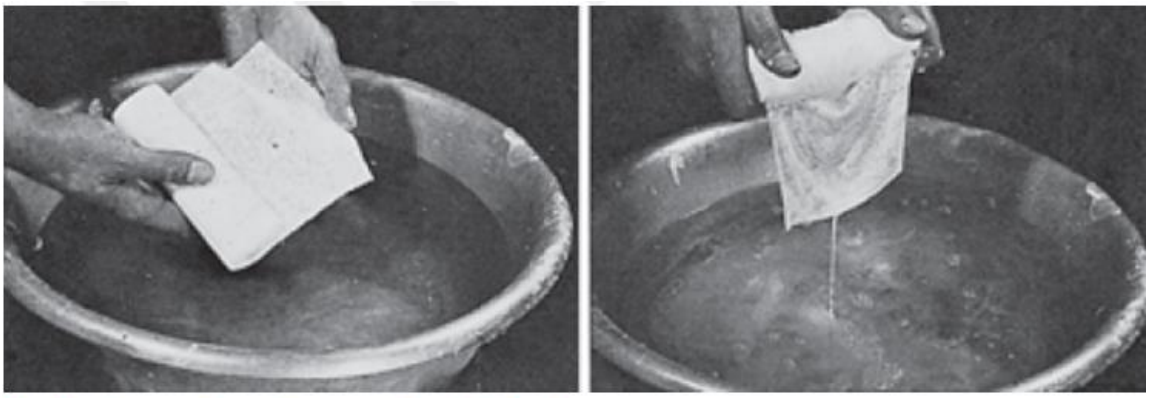
Synthetic (plastic) splinting materials are applied in much the same way as plaster bandages, usually with warm water. Since they are stronger weight for weight than plaster, fewer layers are required. Moulding to the body contours is more difficult than with plaster bandages.

ii. Removing a plaster

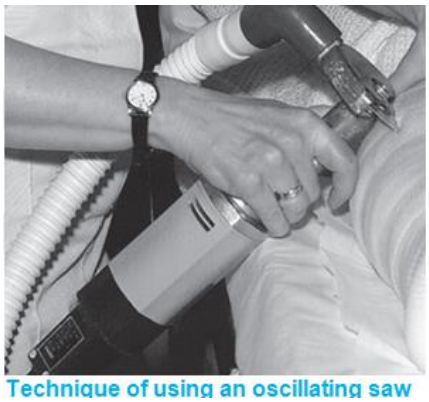
Despite the development of electrically powered oscillating plaster saws, the traditional plaster-cutting shears must still be relied upon for most plaster-cutting jobs, and it is important that
correct use of the shears be fully understood. The shears act on the principle of a punch, not of scissors. There are three essential points to remember in the operation of plaster shears:

- The line of cut should be over soft tissues and concavities and should avoid the bony prominences.
- The point of the shears should be slid along in the plane immediately deep to the plaster in the case of a cotton-lined plaster, between the plaster and the lining.
- Only one handle of the shears should be oscillated namely the handle that is farther away from the plaster.

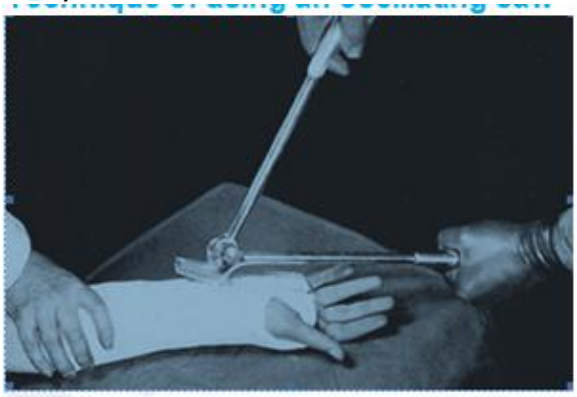
Apart from plaster of Paris, splints that are in general use are mostly those for the thigh and limbs and for the digits. Individual splints may also be made from malleable strips of aluminium, from wire, or from heat-mouldable plastic materials such as polyethylene foam. Rarely, a halo-thoracic splint is used for an unstable fracture.



Technique of soaking a plaster bandage



Technique of using an oscillating saw



Technique of operating the plaster shears

b. Cast bracing (functional bracing)

A brace has come to be understood as a supportive device that allows continued function of the part. Cast bracing, or functional fracture bracing (to use a better term), is a technique in which a fractured long bone is supported externally by plaster of Paris or by a mouldable plastic material in such a way that function of the adjacent joints is preserved and use of the limb for its normal purposes can be resumed. The technique entails snug fitting of the plaster or plastic material over the often about 5 or 6 weeks after the injury. Earlier application of the brace may result in a recurrence of the deformity. In the meantime, treatment should be continued by sustained traction or by a conventional plaster, depending upon the nature of the fracture.

c. Immobilisation by sustained traction

In some fractures notably those of the shaft of the femur and certain fractures of the shaft of the tibia or of the distal shaft of the humerus, it may be difficult or impossible to hold the fragments in proper position by a plaster or external splint alone. This is particularly so when the plane of the fracture is oblique or spiral, because the elastic pull of the muscles then tends to draw the distal fragment proximally so that it overlaps the proximal fragment. In such a case the pull of the muscles must be balanced by sustained traction upon the distal fragment, either by a weight or by some other mechanical device.

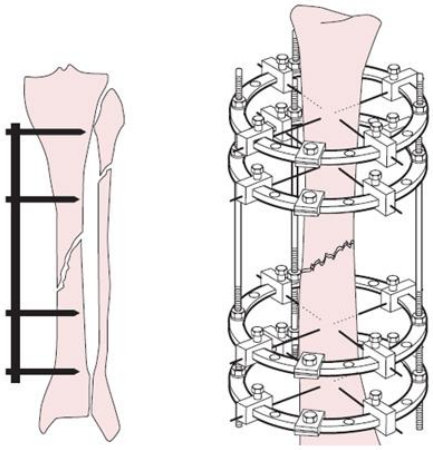
Sustained traction of this type is usually combined with some form of splintage to give support to the limb against angular deformity usually a Thomas's splint or modified version of it in the case of a femoral shaft fracture, or a Braun's splint in the case of the tibia. The

'gallows' or Bryant method of traction for femoral shaft fractures in young children employs the principle of immobilisation by traction without any additional splintage. Also in this category is traction upon the skull for cervical spine injuries.

d. Immobilisation by external fixation

Strictly, immobilisation in plaster or in a splint might be regarded as external fixation. By convention, however, the term external fixation is used to imply anchorage of the bone fragments to an external device such as a metal bar through the medium of pins inserted into the proximal and distal fragments of a long bone fracture. In its simplest form, external fixation may be provided by transfixing each fragment with a Steinmann pin and incorporating the protruding ends of the pins in a plaster of Paris splint.

This simple method is now seldom used, and
fixation is now by means of rigid bars or a frame—the fixator to which the pins are attached by clamps with multiaxial joints. Such systems allow adjustment of the position of the fragments and, if necessary, compression of the fractured bone ends together, after the fixator has been applied.
External fixation finds its main application in the management of open or infected fractures, where the use of internal fixation devices such as plates or nails is undesirable because of the risk that it carries of promoting or exacerbating infection.



Two types of external fixation

e. Immobilisation by internal fixation

Operative or internal fixation may be advised in the following circumstances:

- ✓ To provide early control of limb fractures when conservative methods would interfere with the management of other severe injuries, for instance of the head, thorax or abdomen
- ✓ As a method of choice in certain fractures, to secure immobilisation of the fracture and to allow early mobility of the patient, e.g. In the elderly patient with trochanteric hip fracture

- ✓ When it has been necessary to operate upon a fracture to secure adequate reduction
- ✓ If it is impossible in a closed fracture to maintain an acceptable position by splintage alone.

The following methods are currently in general use:

- ➢ Metal plate held by screws or locking plate (with screws fixed to the plate by threaded holes)
- ➢ Intramedullary nail, with or without cross-screw fixation for locking
- ➢ Dynamic compression screw-plate

- ➢ Condylar screw-plate
- ➢ Tension band wiring
- ➢ Transfixion screws.

The choice of method depends upon the site and pattern of the fracture.

i. **Plate and screws:**

This method is applicable to long bones. Usually a single six-hole plate suffices, but an eight-hole plate may be preferred for larger bones.

Fixation by ordinary plates has the disadvantage that the bone fragments are not forcibly pressed into close contact; indeed, if there is any absorption of the fracture surfaces the plate tends to hold the fragments apart, and this may sometimes be a factor in the causation of delayed union. In order to counter this disadvantage of simple plates and to improve coaptation at the time of plating, special compression plates are available by which the fragments are forced together before the plate is finally screwed home (compression plating).

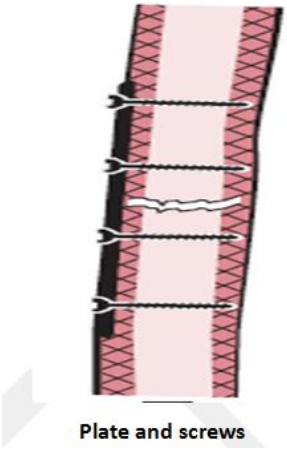
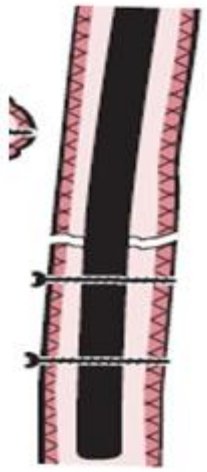


Plate and screws

ii. **Locking plate:**

A newer concept is the 'locking plate', that uses screws with heads that are threaded and when tightened lock into matching threads in the holes of the plate.

This produces a more rigid fixation in terms of length and angle, which is particularly valuable in comminuted fractures in osteoporotic bone. It can also be inserted with less stripping of soft tissue that preserves bone vascularity, particularly in the metaphyseal region.



Locking plate

iii. Intramedullary nail.

This technique is excellent for many fractures of the long bones, especially when the fracture is near the middle of the shaft. It is used regularly for fractures of the femur and tibia, and less commonly in the humerus. The original Kuntscher-type nail designed for the femur was hollow
and of clover-leaf section and achieved fixation by its tight fit in the narrowest isthmus of the shaft. This type has been replaced by the newer more versatile locking nail with a rounder cross-section, which offers notable advantages.

These have transverse holes at both ends, allowing the insertion of transfixion ('locking') screws through bone and nail under image intensifier radiographic control. This affords greater rigidity as well as resistance to rotation forces allowing their use in comminuted fractures, particularly in the wider medullary canal near the bone ends. Anew design of thinner more flexible solid nail is sometimes used for the management of shaft fractures in children.

iv. Compression screw-plate

The compression screw-plate (dynamic hip screw) is a standard method of fixation for fractures of the neck of the femur and for trochanteric fractures.

The screw component, which grips the femoral head, slides telescopically in the barrel to allow the bone fragments to be compressed together across the fracture. This compression effect is brought about by tightening a screw in the base of the barrel.

v. Transfixion screws

The use of a transfixion screw has wide application in the fixation of small detached fragments for instance the capitulum of the humerus, the olecranon process of the ulna or the medial malleolus of the tibia.

vi. Kirschner wire fixation

These thin flexible wires with sharpened ends are available in a number of diameters and provide a useful alternative to transfixion screws for the fixation of small bony fragments or for fractures of the small bones in the hand and foot.

Kirschner wire fixation

vii. Tension band wiring

This technique of fixation is most commonly used in the patella and olecranon, but can be applied to other small metaphyseal fragments such as the medial malleolus. It uses the mechanical principle of converting the tensile stresses of the muscles acting on the bone fragment, into a compressive force at the fracture site. This is achieved by means of tightening an eccentric figure-of-eight cerclage wire across the two fragments, stabilised by Kirschner wires or a screw inserted at right angles to the fracture line.

Metals used for internal fixation of fractures

Metals used for internal fixation of fractures or for internal prostheses must be resistant to corrosion in the tissues: silver, iron, ordinary steel and nickel-plated steel are all unsuitable.
A special stainless steel containing chromium, nickel and molybdenum is widely used, but a non-ferrous alloy containing chromium, cobalt and molybdenum has even better resistance to corrosion in the body and is used for all types of internal appliance except wire, for which it is technically unsuitable. The metallic element titanium and its alloys have also proved resistant to corrosion in the body and are used increasingly for the manufacture of prostheses and internal fixation devices.

Topic-4: Treatment of open fractures

An open (compound) fracture always demands urgent attention in a properly equipped operation theatre. The sooner the wound can be dealt with adequately the smaller is the risk of infection arising from contaminating organisms.

The object is to clean the wound and, whenever necessary, to remove all dead and devitalised tissue and all extraneous material, leaving healthy well vascularised tissues that are able to ward off infection from the organisms that must inevitably remain even after the most meticulous cleansing. The extent of the operation required depends upon the size and nature of the wound.

It is important that the wound should not be subjected to repeated examination, but should be kept covered with a sterile dressing until it can be visualised under optimum conditions in the operating room. The only hope of preventing serious infection lies in a most painstaking cleansing of the wound with the removal of all devitalised tissue, and in the avoidance of immediate skin closure.
Once the wound has been dealt with, the treatment of the fracture itself should follow the general principles already suggested for closed fractures. The only difference is that in open fractures there should be a greater reluctance to resort to operative methods of fixation,

especially if there seems to be a serious risk of infection; if it is decided that metallic internal fixation must be employed the metal should be placed well away from the wound. If the fracture is unstable and unsuitable for treatment by traction or by simple splintage alone, external fixation by pins inserted into the bone fragments and fixed to a rigid external bar is often the method of choice rather than internal fixation.

Post operative procedures:

The post operative activities are respected depending on the type of fracture.

Pain and infection Control

Painkiller with sedation can be administered until the patient is calm.
In case of an open fracture, a course of treatment with a broad-spectrum antibiotic, such as a third-generation cephalosporin, should be begun immediately and continued until the danger of infection is past.

A patient who has previously been immunized against tetanus by tetanus toxoid should be given a booster dose of toxoid. If the patient has not previously been immunised it is wise to begin immunization with a standard dose of toxoid and to follow this up with a second dose 6 weeks later.

In severe open fractures, with perhaps considerable loss of blood, there is a greater liability to shock than there is in closed fractures, and appropriate measures of resuscitation are often required.

Healing and recovery follow up

The patient should be well controlled in terms of blood irrigation for the distal parts of the bandaged limbs.

Supportive structures use to protect the fractured organ may be removed after minimal recovery depending on the age of the patient and the severity of injury. Generally a bone fracture is repaired within 3 to 8 weeks.

References

1. Fowler NG: (1968**)** *Canine limb supports*. J Small Anim Pract 9:523 Knecht CD: *Application of temporary splints*. Vet Clin North Am 5, No. 2:169, 1975
2. Sarmiento A: (1967**)** *A functional below-the-knee cast for tibial fractures*. J Bone Joint Surg 49A:855,
3. Schroeder EF: (1933).*The traction principle of treating fractures and dislocations in the dog and cat*. North Am Vet 14:32
4. Heinz Schott (1993)*A medicina kronikaja*. Officina Nova. Budapest
5. Jurgen Thorwald (1959) *A sebeszek evszazada. Gondolat*. Budapest.
6. Roy Porter. Ver es virtus(2003) *Az orvostudomany rovid tortenete.* HVG. Budapest
7. Gaal Csaba. Sebeszet(1997) *Medicina.* Budapest.
8. Kiss Janos Gastroenterologiai sebeszet. (2002) *Medicina.* Budapest
9. Lukacs Geza, Szallasi Arpad, Gazdag Istvan (2006)*100 eves a Magyar Sebesz Tarsasag*. Tonyo-Graf. Budapest,
10. Boros Mihaly (szerk). Sebeszeti mőtettan (2006) *Innovariant*. Szeged.
11. Gaal Csaba. Alapvetı sebesztechnika(2000) *Medicina.* Budapest
12. Szabo Zsolt. Sebeszeti varroanyagok (2004)*Medicina.* Budapest.
13. Kiss Janos. L.C. (1992) *Laparoscopos cholecystectomia*. Meditor. Budapest.
14. Mack P, Ooi LL. (1993) *Manual of basic operative laparoscopic and thoracoscopic surgery*. ForcesPublication, Singapore.
15. R.T.H Ng. (1994)*Microsurgery Training & Graded Excersises*. In: Peter Mack (ed): *Clinician'sGuide to Experimental Surgery.* Image Medicus, Singapore pp 155-188.
16. J.S.P. Lumley (1981) *Microsurgery: renewed sensation. Journal of the Royal Society of Medicine*; 74: 715-718.
17. J.H. Jacobson, E.L. Suarez. (1962) *Microvascular Surgery. Chest*; 41: 220-224