Regional and Clinical Surgery- II
and Lameness
(VSR 512; 0+2)

MANUAL

CONTRIBUTORS

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2007
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LANDMARK FOR APPROACHES TO VARIOUS VISERAL ORGANS IN LARGE ANIMALS

THORACIC CAVITY

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ABDOMINAL CAVITY

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<td>Flank approaches</td>
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LANDMARK FOR APPROACHES TO VARIOUS VISERAL ORGANS IN SMALL ANIMALS

DOG & CAT

**THORACIC CAVITY**

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<td>Cranial lung lobe, pericardium</td>
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<td>Middle lung lobe</td>
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<td>Caudal lung lobe, accessory lung lobe</td>
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<td>Ventral midline approach</td>
<td>For almost all the abdominal organs</td>
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<td>Good access to dorsally located abdominal organs including kidney, ovaries and uterus.</td>
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<td>Lower flank, above the mammary gland for caesarian sections.</td>
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<td>Provide access to the cranial and ventral past of the abdominal cavity including organs such as stomach, spleen and caecum.</td>
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<td>Increased access to the cranial abdomen</td>
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I. ABDOMINOCENTESIS

INDICATIONS:

Differential diagnosis of colic is of critical importance in peritonitis and mainly in cattle where chances of peritonitis are more.

SURGICAL SITE:

- Lowest point of abdomen at linea alba.

ANESTHETIC TECHNIQUES & CONTROL:

If fine needle is used, no need of anaesthetic agents, but with a larger needle local anesthesia can be infiltrated at site.

SURGICAL PROCEDURE:

1. First detect the linea alba, clip & shave the area.

2. Insert 18G needle (4cm) through the abdominal wall at the linea alba on the lowest point of abdomen.

3. Then move the needle slightly to correctly place it to enable free flow of peritoneal fluid.

4. At least four attempts are made before calling paracentesis as negative & these should be made 6-8cm away from the primary puncture.

REMARKS:

i) Sterile plain tube is to be used for collection.

ii) EDTA is used as a preservative.

iii) The collected sample should be divided, one, one half for the total nucleated cell count as for blood, and the other half for cytological examination and differential white cell counts. Centrifuge for the latter at 1500 rpm for 5 minutes.

II. RUMINOCENTESIS

From the left flank region with the help of 18 gauze needle (5inch in length).
III. LIVER BIOPSY

INDICATIONS:
1. To confirm a lab. diagnosis
2. To determine the nature & severity of structural changes.
3. To investigate on underlying biochemical defect i.e. measurement of heavy metal accumulations, measurement of certain vitamin levels & their precursors.
4. Histochemical determination of certain inherited disorders like copper toxicosis.

SURGICAL SITE:
1. Cattle –
   The site is between 11th & 12th ribs, 15-20 cm from the dorsal midline according to animal’s age & size. When the 14th rib is present, the site is in the 3rd last intercostal space.
2. Calves -
   In calves the point of insertion is between 11th & 12th ribs at a point in line with transverse process of the lumbar vertebrae.

CONTROL & ANAESTHETIC TECHNIQUE:

The animal is restrained against a gate or fence with the right side facing the operator. The sites & deeper structures are infiltrated with 2% Xylocaine.

Instrument used is trocar & canula.

SURGICAL PROCEDURE:
1. The skin is incised about 12mm (1/2”) parallel to the ribs.
2. The trocar & canula is introduced through the intercostal muscles and peritoneum until the liver is reached.
3. Negative pressure is induced and the care is collected. Care should be 2-4cm long to weigh about 0.25-0.5 gm.

POST OPERATIVE CARE:
→ Regular ASD of the area.
→ Systemic hemostats.
IV. OCCULAR PARACENTESIS

INDICATIONS:
Intraocular filariasis

SITE OF OPERATION: Limbus of the eye

SPECIAL EQUIPMENT: -
Bard-parker blade size 15 or 5 cm long, 15 gauze needles with glass syringes, eyelid retractor.

CONTROL & ANAESTHESIA:
The animal is controlled in recumbent position after proper tranquilization/sedation keeping the affect eye upper most. Anaesthesia is obtained by auriculo-palpebral and retro-bulbar nerve blocks & topical application of surface anaesthetic.

SURGICAL TECHNIQUE:
1. The incision is made at 6 o’clock or 12 o’clock position on the limbus with a No.15 BP blade after retracting the eyelids.
2. The parasite tries to escape along with the aqueous humour & comes outside.
3. Alternatively after retracting the eyelids a 15 gauze, 5cm long needle mounted on a 2ml glass syringe is introduced into the anterior chamber at the dorso-medial position on the limbus.
   1. The level of needle is maneuvered in different directions and as the parasite, trespasses the level, it is immediately aspirated.

POST OPERATIVE CARE:
1. It is advisable to inject hydrocortisone acetate into the affected anterior chamber.
2. Cortisone-neomycin ophthalmic ointment for topical application.
3. Cornea generally clears in 2 to 3 months.

V. ANTHROCENTESIS

INDICATIONS:
1. For diagnosis of affections of joints e.g. arthritis, synovitis etc.
2. For removal of infected synovia from affected joint.
3. For collection of fresh synovia for treatment of infected joint from healthy joints.
TECHNIQUE:

1. The affected joint is palpated for the intraarticular space & the site is prepared.
2. The skin over the depression is punctured and Xylocaine is infiltrated at the site.
   Thereafter a 18 gauze needle (2.5 cm) is inserted into the cavity & the fluid is aspirated.

REMARKS:

1. Extreme sterile conditions using sterile instruments is to be practiced.
2. Infiltration of antibiotic into the joint after withdrawal of synovia is also recommended to prevent contamination from shin.
TECHNIQUES FOR OBTAINING CEREBROSPINAL FLUID

INDICATIONS:

1. For evaluation of disease of CNS and response to treatment.

ANAESTHETIC CONTROL:-

Tranquilization

TECHNIQUE:

BOVINE-

CSF in case is removed either by sub-occipital or lumbar puncture. Site is between the dorsal process of the last lumbar vertebrae and the anterior end of the median sacral crest.

1. Before puncturing, the area is clipped, shaved & disinfected.
2. 5 inch, 14-16 gauze needle with stylet is used.
3. Sub-arachnoid space is punctured to fluid is with drawn in a sterile syringe.

HORSES-

SITE:

Sub-occipital puncture between atlas & axis.

CANINE:

At cisterna magna at the atlanto-occipital articulation.
LAPAROTOMY (COELIOTOMY) IN CANINE

INDICATIONS:
- Gastronomy
- Enterotomy/ Enterectomy
- Cystotomy/ Cystorrhaphy
- Nephrectomy
- Spleenectomy
- Hysterotomy/hysterectomy
- Ovariohysterectomy
- Oopherectomy
- Exploratory purposes

SITE OF OPERATION:
Ventral Midline incision – (Cranial or caudal)
  The incision is given on linea alba.
Para-median incision - (Right/Left and cranial/ caudal)
Para-rectal incision - (-do-)  
Para-costal incision - (Left/Right)
  The incision is parallel to last rib.
Flank incision                (Right/Left and vertical/oblique)
  The incision is given on the hollow of the flank.

SURGICAL ANATOMY:
The abdominal cavity is limited anteriorly by the diaphragm and posteriorly by the pelvic inlet. The lateral wall is formed any three abdominal muscles namely obliques abdominis externus, obliques abdominis internus and transverse abdominis. The ventral wall is formed by rectus abdominis and aponeurosis of all the abdominal muscles. The dorsal wall is limited by lumber vertebrae and their transverse processes.

The external obliques abdominis is the most superficial and originates from middle portion of third to twelfth ribs and also from the entire lumber area of thoracolumbar fascia. It courses mainly caudoventrally and inserts on the linea-alba and prepubic tendon by its aponeurotic portions. The caudal most portion of this muscle thickens and form inguinal ligament.

The fibres of obliques abdominis internus are cranoventral that is at the right angle to that of obliques abdominis externus. This muscle originates from the thoraco-lumber fascia and the cranial iliac spine. It inserts along the costal arch to the lateral border of rectus abdominis.

The transverse abdominis is the deepest of all the abdominal muscles and lies just out side the transverse fascia. It originates from the medial side of costal arch as cranial as the xiphoid cartilage and the transverses thoracic. Its
lumber part originates from thoraco-lumber fascia. Its fibers course transversely to attach to an aponeurosis, which passes deep to the rectus abdominis to join linea-alba. The rectus abdominis lies longitudinally arising by broad flat tendon over the sternal costal cartilage and insert on the prepubic tendon. The transverse fascia covers the inner most surface of these abdominal muscles. The parietal peritoneum lies beneath it. The nerve supply to the abdominal wall is by the various branches of thirteenth thoracic, first, second and third lumber spinal nerves. The blood supply to the abdominal wall is through:
1. Cranial & caudal epigastric vessels.
2. External pudic artery
3. Deep circumflex iliac artery
4. Cranial abdominal artery
5. Lumber arteries

SPECIAL INSTRUMENTS:
Self-retaining abdominal retraction is required some times.

ANAESTHETIC TECHNIQUE:
General anesthesia

CONTROL:
1. Lateral recumbency for flank and paracostal incisions
2. Dorsal recumbency for ventral abdominal incisions

SURGICAL PROCEDURE:
A 4-12cm long incision as per need is made in the skin at the proposed site. In case of ventral midline incision, a nick on linea-alba in centre is made and with the help of a groove director and scissors. The incision is increased up to required length.
In case of other incisions, the muscles are bluntly dissected and the peritoneum is entered similar to linea-alba. After completion of the desired work, the peritoneum and transverse abdominis muscles may be sutured together with absorbable sutured in the simple continuous pattern. The other muscles are also sutured like wise but separately.
In case of mid-lime incision, the peritoneum and linea-alba is sutured together likewise.
Now subcutaneous sutures are placed and then the skin is sutured with interrupted horizontal mattress or simple interrupted non-absorbable sutures.

POST OPERATIVE CARE:
Routine ASD and antibiotic therapy
Soft & restricted diet for about 15 days
Prevention of self mutilation
Restricted movement for 15 days
ENTERECTOMY AND ENTEROANASTOMOSIS IN DOG

INDICATIONS:
Intestinal foreign bodies
Intestinal Intussusception
Intestinal Volvulus
Intestinal Torsion
Intestinal Strangulation
Intestinal Neoplasm
Intestinal Gangrene
Intestinal Perforating wounds

SITE OF OPERATION:
1. Caudal ventral midline incision
2. Right flank incision

SURGICAL ANATOMY:
The intestinal wall is composed of serosa, muscularis, sub mucosa and mucosa. In which sub-mucosa is most dense and have more suture-holding capability. The small intestine of an average sized adult dog is about 4 meters long. It is clearly divided into a fixed and a mesenteric part. The fixed part, termed as duodenum, is the shortest portion, which starts at the pylorus and passes caudally and dorsally. Near the pelvis it turns medially and passes cranially along the medial side of left kidney, bends ventrally to join jejunum.

The mesenteric part is arbitrarily divided into jejunum and ileum which are suspended by a double fold of peritoneum termed as mesentery. The jejunum, which is the longest part of small intestine, is composed of six to eight coils which take up the space between the stomach and liver on one side and the pelvic inlet on the other. The difference between jejunum and ileum is not discernible grossly although there are distinct differences in the mucosa of dog. The large intestine averages about 60-70 cms and composed of caecum, colon and rectum.

In dogs caecum exist only as a blind end diverticulum of the proximal portion of colon. The colon is attached to the sub-lumber region by mesentery ‘the mesocolon’. The colon has three parts; ascending, transverse and descending part. The ascending part passes cranial along the medial surface of cranial part of duodenum until it reaches pyloric part of stomach, here it turns to the left and crosses the median plane forming transverse colon. The last part of the descending colon passes caudally along the medial border of the left kidney to join rectum.
The nerve supplies to the intestines are from vagus and celiac plexus. The blood supplies are from the branches of celiac and anterior mesenteric arteries.

SPECIAL INSTRUMENTS:
Crushing intestinal clamps
Non-crushing (Such as doyen) intestinal clamps.

ANAESTHETIC TECHNIQUE:
General anesthesia

CONTROL:
Dorsal recumbency for ventral midline incision
Left recumbency for right flank incision

SURGICAL PROCEDURE:
(The intestinal anastomosis can be performed either with the end-to-end, side-to-side or side to end anastomosis techniques; however only the most commonly performed end-to-end technique is being described here).
The laparotomy is performed and the affected part of the intestine is identified and exteriorized.

The abdominal wound is packed off with moistened sterile towel or surgical drape to isolate the exteriorized portion of intestine.
The mesenteric vessels supplying to the affected area are isolated and ligated.
The arcadial vessels within the mesenteric fat along the intestine are also isolated and ligated.
Within minutes the entire section of the intestine bounded by these vessels become cyanotic.

It is imperative that a short segment of the normal intestine on either side of the affected area is included in the resection scheme.
Crushing clamps (or straight long artery forceps) are now placed at approximately 60° angles to the long axis of the intestine just inside the arcadial ligatures.

The ingesta are gently milked away from the crushing clamps for a distance of about 3-5 cms and a non-crushing is placed over the intestine.
The non-crushing clamps should not obstruct blood flow in the arcadial vessel supplying to the end of intestine.
An assistant should gently hold all these four clamps.

Now the intestine is excised with a sharp scalpel along the outside edge of the crushing clamp without cutting the arcadial ligature. The mesentery is also resected with fine scissors and the whole stump is discarded.
The cut ends of the intestine are gently moped clean with moist gauze and are held together.
The outwardly rolled mucosal collar around the transected ends is also resected to ensure that the individual layers of the intestine are accurately apposed.

The anastomosis is carried out using atraumatic thumb forceps and swedged-on taper-end needle with 3-0 or 4-0 polyglycolic acid or polyglactin-910 sutures (silk can also be used in case of non-availability of these sutures). Two simple interrupted sutures are first placed including all layers on mesenteric and anti-mesenteric border of cut ends.

Now the intestine is apposed with 10-16 simple interrupted through and through sutures placed 2-3 mm apart and 2-3 mm from cut ends. The sutures can be pulled down until they crush through serosa, and muscularis so that these are tightened in dense submucosa.

The intestinal anastomosis can also be performed with many other suture patterns such as simple continuous, continuous Cushing/Lambert, Gambee patterns, Parker-Ker patterns. However, the above-described technique is the simplest.

Now anastomosis site is inspected for any leakage by milking the ingesta gently through the apposed part after removing the non-crushing intestinal clamps. Additional interrupted sutures may be applied if needed.

Now the mesenteric defect is also closed with absorbable sutures using interrupted pattern.

The intestinal is now gently cleaned with moist gauges and reposed back into abdomen. The laparotomy wound is closed routinely.

**POST OPERATIVE CARE:**
Routine antibiotic therapy
Multiple foods should be given for 15 days

**REMARKS:**
The surgeon and assistant should wear two sets of surgical gloves at the start of operation. One upper set may be removed after anastomosis is complete. This minimizes contamination.
If gross abdominal contamination occurs, then abdominal lavage with two to three cycles of irrigation and suction with 250 to 1000 ml of NSS or lactated ringer’s solution should be employed.
The oral feeding should be started within 24 hours post-surgery in order to minimize the chances of paralytic ileus.
CYSTOTOMY IN DOG

INDICATIONS:
Cystic calculi
Cystic neoplasm

SITE OF OPERATION:
Caudal ventral mid-line incision in females
Caudal paramedic incision in males

SURGICAL ANATOMY:
Urinary bladder lies on the ventral abdominal floor cranial to the pubis. Neck of the bladder lies in the pelvic cavity and is the only part not covered by the peritoneum. Two lateral ligaments one on each side and a single ventral median ligament keep the bladder in position. The ureters open on the dorsal caudal aspect of bladder.
The sphincter of bladder is supplied by pudendal nerve. The blood supply to the bladder is by the branches of internal pubic arteries.

SPECIAL INSTRUMENTS:
Suction pump

ANAESTHETIC TECHNIQUE:
General anaesthesia

CONTROL:
Dorsal recumbency

SURGICAL PROCEDURE:
After performing laparotomy, the urinary bladder is exteriorized and the abdominal wound is packed with moistened surgical towels or drapes.
A stay suture on the apex of bladder involving only up to submucosa or muscularis is applies to facilitate the manipulation.
The 2-3 cms long cystotomy incision is made on the dorsal aspect of bladder between the major blood vessels and away from the ureters (in case of cystic neoplasm, the incision has been given around the neoplasm).
The urine is removed by suction and calculi are removed with forceps (or with a smooth edged gall bladder spoon)
In case of males, a catheter is passed from the external urethral opening by an assistant and the calculi, if any, is back flushed into bladder from where these are removed.
In case of females, the catheter is passed from the bladder into the urethra and flushed until all urethral calculi are removed and the catheter can be passed freely.

The cystotomy incision is then closed in 2 to 3 layers using swedged-on atraumatic needle with 3-0 to 4-0 absorbable suture material. The first layer of horizontal mattress is used to close mucosa and the subsequent layer/s is/are applied by continuous inversion sutures (Cushing/Lambert) to close remaining layers. The stay suture is removed. The laparotomy incision is closed routinely.

**POST OPERATIVE CARE:**
Urinary antiseptics and alkalizers should be used for few days post-operatively.

**REMARKS:**
Intravenous fluid therapy in pre-operative period is quite beneficial. Evacuation of all urine from bladder by a urinary catheter before operation is not recommended as the collapsed bladder may be difficult to exteriorize in larger breeds.

While closing mucosa no knot should be placed to lie in the bladder lumen as it may act as a nidus for further cumuli deposition. Culture sensitivity test is a must. It should be done for the culture taken directly from the bladder mucosa.
EXTIRPATION OF ANAL SACS IN DOG  
(ANAL SACCULECTOMY)

INDICATIONS:
- Recurrent episodes of anal sac impaction
- Ineffective medical therapy in recurrent anal sac infection
- Anal sac abscessation with or without fistulous tract
- Anal sac gland adeno-carcinoma.

SITE OF OPERATION:
Linear incision (about 2cm long) lateral to the anal orifice.

SURGICAL ANATOMY:
The two anal sacs are situated on either side of anal opening between the external sphincter muscle and the rectal wall (Approximately at 4 & 8 0’clock position). The function of anal sacs is not clearly understood, however but it is thought of provide peculiar scent/odors to faeces perhaps to mark the territories. The normal secretion is a slightly granular, brownish serous or viscid fluid, which comes out by the action of external anal sphincter muscle.

SPECIAL INSTRUMENTS:
1. General anaesthesia
2. Local infiltration along with tranquilizers
3. Epidural analgesia

CONTROL:
Ventral recumbency with hind parts raised

SURGICAL PROCEDURE:
The anus is packed off with sterile gauge to minimizes the contamination at the site
The duct opening of one of the anal sacs is identified just under the anal orifice and a mosquito haemostate is pushed into the sac.
The incision is made on the hairless skins of the perineal region over this distended area bounded by the haemostate in the sac.
The sac is now grasped with forceps and is dissected sharply as well as bluntly by the curved metzemaum scissors from the surrounding tissue.
The neck of the sac should be carefully dissected so that external sphincter muscle is not damaged.
The duct is identified, isolated, ligated and transected.
The sub cutaneous tissue and the skin are sutured in the routine manner.
The other anal sac is now removed in the same manner.
POST OPERATIVE CARE:
- Routine antibiotic therapy
- Prevention of self-mutilation by applying Elizabethan collar
- Stool softness and soft diet for at least 10 days.

REMARKS:

The anal sac may be filled with paraffin wax. Indian ink or simply distilled water before operation to outline the margins. Anal gland adenocarcinoma is a malignant neoplasm of the gland that surrounds the sac. It is locally invasive and metastases to distant sites. Therefore adjunctive therapy is must.

Inadvertent incomplete removal of anal sacs may result into chronic fistula formation; therefore the sac should be examined to ensure that removal is complete.

The dissection should be limited to the surface of anal sacs as accidental damage to pudendal branch may lead to fecal incontinence.

In addition to that the excessive trauma in and around the external anal sphincter muscle may cause tenesmus.
CASTRATION IN DOG
(Orchiectomy, Testectomy, Sterilization, Neutering)

INDICATION:
Aggressive behavior of the dog
Neoplastic growth
Sever blunt penetrating or crushing injuries of testis
Chronic orchitis
To remove the source of androgenic/estrogenic hormones which act as mediators for the development of benign prostatic hypertrophy, perineal adenoma and perineal hernia.
Enlarged prostate and perineal hernia
Prevention of breeding nuisance.

SITE OF OPERATION:
1. Pre-scrotal site: 3 cm long incision on the midline in front of the scrotum.
2. Scrotal site:
   A. Longitudinal incision on the ventral aspect of scrotum lateral & parallel to median raphe on either side.
   B. Similar incision on one scrotum to remove testes of that side and then a second incision (through the first) on the mediastinum testes to remove the other testicle.

SURGICAL ANATOMY:
The testes are contained into two distinct sacs inside the scrotum. These sacs are attached together by scrotal septum also known as mediastinum testes. The wall of the scrotum is composed of skin, tunica dartos, spermatic fascia and Tunica vaginalis parietalis. The tunica vaginalis is the peritoneal invagination that envelops the spermatic cord, the testes and the epididymis. The epididymis is attached to the dorsal lateral aspect of two testes, the head of epididymis pointing interiorly. The tail of epididymis is continuing to ductus deferens which is contained in spermatic cord. The spermatic cord infact has two distinct bundles namely anterior vascular bundle and posterior avascular bundle which contain the testicular artery, testicular vein (which joins the pampiniform plexus), testicular plexuses of autonomic nerves, lymphatic vessels and the ductus deferens respectively. The ductus deferens passes through the vaginal ring and within the abdominal cavity it terminates at the prostate gland by looping caudally and medially around each ureter.

The nerve supply to testes is through the spermatic nerves, which are derived from the renal and mesenteric plexus. The branches of second and third lumber spinal nerves supply the scrotum. The blood supply is by
spermatic vessels to the testes and branches of external pudic vessels to the scrotum.

**SPECIAL INSTRUMENTS:**
None

**ANAESTHETIC TECHNIQUES:**
General anaesthesia

**CONTROL:**
Dorsal recumbency

**SURGICAL PROCEDURE:**
One testis is pushed forward (in case of pre-scrotal incision) or toward (in case of scrotal incision) and is held in position by left index finger and thumb and about 2-3 cms long incision is made in the skin. The testicle is continuously pushed outwards and gentle incisions are made in the subcutaneous fascia till shiny white tunica vaginalis is visible. The testicle is now squeezed out and can be removed by any of the following methods:

1. **Open methods:**
   An incision is given in the tunica vaginalis longitudinally over the spermatic cord. The anterior and posterior bundles of spermatic cord are identified. The testicular artery and vein are ligated with a non-absorbable suture proximal to the pampiniform plexuses. One end of the ligature is left long and held with an artery forceps. The ductus deferens may be ligated separately and cut with a scissors. An artery forceps is now placed distal to the ligature in testicular vessels and the cord is cut between then. The testicle is now removed out along with artery forceps. The hemorrhage is checked carefully and only then the ligature end is cut short and the stump is allowed to recede in vaginal ring.

2. **Closed method:**
   No incision is given in tunica vaginalis. It is ligated as such closed to the vaginal ring and is transected taking similar care for any hemorrhage as described in open method. The contra lateral testicle may be similarly removed after pushing it through the same incision (by making an additional incision in scrotal septum) or by making another incision in the contra lateral sac of scrotum or in case of pre-scrotal incision by incising only the contra lateral spermatic fascia. In cases of prescrotal incision, the skin wound is closed routinely, however in cases of scrotal incisions, these may be left open.

**POST OPERATIVE CARE:**
Routine ASD and antibiotic therapy
Prevention of self mutilation
REMARKS:
The skin of the scrotum is very sensitive, bleeds heavily and swells postoperatively, therefore routine castration in dogs are preferred by presacrotal incisions. The incision on scrotal septum also increases the chance of postoperative scrotal haematoma, therefore testicle should be semoned without incising mediastinum raphae preferably. Open method of castration ensure the proper ligations of vascular bundle and is therefore preferred in large and giant breeds of dogs. However, it has the disadvantage of opening of the cavity of vaginal tunic, which communicates proximally with the main peritoneal cavity. Extreme care should be taken while placing a ligature around testicular vessels. There should be transfixed so that ligature may not slip. Proper haemostasis is must. It is very difficult to locate the spermatic cord stump once it is cut and retract towards the external inguinal ring.
OVARIOHYSTRECTOMY IN BITCH

The operation involves the surgical removal of the ovaries and uterus.

INDICATIONS:
1. Prevention of estrus and problem associated with bloody discharge, attraction of male dogs, accidental mating, pregnancy and unwanted puppies.
2. Treatment of metritis, pyometra, endometrial hyperplasia (CPC), neoplasia, injury, neglected dystocia and congenital abnormalities.
3. Hyperplasia and neoplasia of mammary gland.

AGE AND TIME:
1. Though operation can be done at almost any age and at any phase of reproductive cycle but it is best performed either before puberty or during anoestrus. Some prefer to wait until the animal has passed through one heat period.
2. Six to eight months of age is generally considered best.
3. The surgery may be most hazardous during estrus or pregnancy and in old obese female.
4. Most favourable time to spay a mature bitch is 3 to 4 months after estrus. After whelping, the operation should be done about 6-8 weeks, as soon as the puppies have weaned and lactation has ceased.

SURGICAL SITE:
Ventral midline abdominal incision, beginning over the umbilicus and extending caudally for 6-8 cms.

SURGICAL ANATOMY:
Ovaries lie close to the caudal pole of the corresponding kidney, ventral to the 4th lumber vertebra, and half way between last rib and the crest of the ilium. The ovary is completely enclosed by the bursa and is attached to cranial end of the uterine horn by ovarian ligament continuous with it is suspensory ligament of ovary. Ovaries receive the blood supply through ovarian artery and vein. The uterus has a very short body and extremely long narrow horns. Broad ligament is attached to the anterior part of vagina.

PREPARATION, CONTROL AND ANAESTHESIA:
Food is withheld for at least 8-12 hours before the operation. The animal is controlled in dorsal recumbency. The operation table may be slightly tilted so as to allow the abdominal viscera to move forward. After proper premedication, the general anaesthesia is achieved by using parenteral or inhalant anaesthetic. After the animal has been anaesthetized, the urinary
bladder is expressed and the ventral wall of the abdomen is prepared for surgery.

**SURGICAL TECHNIQUE :**
1. A 6-8 cm long midline incision is made on the ventral aspect of the abdomen beginning over the umbilicus and extended caudally.
2. Skin, Subcutaneous tissue, linea alba, falciform ligament and peritoneum are incised.
3. An ovariecctomy hook or index finger can be passed to locate the uterine horn by taking the urinary bladder as landmark. Uterus is withdrawn and followed to the ovary.
4. No definite sequence is required for excising the ovaries and uterus, but it is convenient to remove the left ovary then right ovary and finally the body of uterus.
5. The ovarian bursa is clamped across by artery forceps. The ovary is grasped between thumb and index finger and withdrawn for ligation. The suspensory ligament of the ovary is ruptured by traction and ovary is withdrawn from the abdomen.
6. Application of three artery forceps facilities the ligature procedure for ovarian pedicle. A double ligature with chromic catgut size 1-0 is used to ligate ovarian pedicle. The attachment between the ligature and the ovary is then severed. The severed stump should be checked carefully for haemorrhage before returning to the abdomen.
7. After removing one ovary, the other ovary is located and removed in the similar manner. The broad ligament is then severed.
8. The body of the uterus is withdrawn from the abdomen. The uterine vessels are ligated on each side and cut. Transfixation double ligature is used to encompass the entire cervix. The uterus is severed just cranial to the ligatures.
9. Uterine stump is checked carefully for haemorrhage and returned into the abdomen. Care should be taken to remove as much uterine body as possible.
10. Abdominal incision is closed in the usual manner.

**POST OPERATIVE CARE :**
1) The operative site should be checked for swelling or discharge.
2) Operative incision should be dressed with betadine.
3) The patient should receive antibiotics and analgesics for seven and three days respectively.
4) Exercise should be restricted for 10-12 days.
5) Liquid diet should be given for the first 63 days and the patient should be observed for proper urination and defecation.
6) Cutaneous sutures should be removed after 8-10 days of operation or after complete healing.
LAPAROTOMY IN BOVINE

INDICATIONS:
Rumenotomy
Enterotomy/Enterectomy
Spleenectomy
Cystotomy/Cystorrhaphy
Abomasopexy
Hysterectomy (Cesarean section)
Exploratory purposes

SITE OF OPERATION:
It may be one of the following depending upon the purpose of opening the abdomen and the topography of the organ(s) to be manipulated:
1. Incision through ventral abdominal wall
   A. Median incision (Cranial or caudal)
   B. Para-median incision (Cranial or caudal)
   C. Para-rectal incision (Cranial or caudal)
   D. Trans-rectal incision (Cranial or caudal)
2. Incisions through para-lumber fossa (3.5 cms ventral to transverse process of lumbar vertebra)
   A. Mid upper flank incision
   B. Upper paracostal incision
   C. Caudal upper flank incision
3. Incision medial/parallel to thigh
   A. Lower flank incision
   B. Ventrolateral incision

SURGICAL ANATOMY:
After incising skin the following structures may be encountered in different sites of operation —
Superficial fascial layer
Abdominal tunic
External oblique abdominal muscle
Internal oblique abdominal muscle
Nerves and blood vessels on the deep face of internal oblique abdominal muscle
Rectus abdominal muscle
Cranial and caudal deep epigastric blood vessels (on the inner face of rectus abdominal muscles)
Transverse abdominal muscle
Transverse fascia
Parietal peritoneum

The external oblique abdominal muscle is the most extensive of all the abdominal muscles. Its fibers are mostly directed ventral & caudal but which in the area of Para lumbar fossa are horizontal. It is originated from the caudal border and lateral surface of the last eight ribs over the intercostal muscle. It is inserted by means of aponeurotic tissue on the tuber-coxae, pre pubic tendon and linea-alba.

The fibers of internal oblique abdominal muscles are mostly directed ventral, cranial and medial. The muscle originates from the coxal tuber and deep lumber fascia. It inserts on the caudal border of last fib, the pre-pubic tendon and linea-alba.

The transverses abdominal muscle originates from the deep lumber fascia and thus indirectly to the first five lumber transverse processes and the medial surface of the false ribs. It inserts on the linea-alba. The direction of its fibers is transverse. Therefore, this muscle forms a muscular sheet on the deep face of oblique internal abdominal & rectus abdominal muscle.

The rectus abdominal muscle is confined to the ventral abdominal wall. It extends from the sternum to the pubis. It originates from ventral and lateral surfaces of the sternum as cranial as third or fourth costal cartilage. It inserts on pre pubic tendon.

The nerve supply to the abdominal area is through-
Lateral and ventral branches of last thoracic (T_{13})
Ventral branches of L_1 & L_2
Lateral cutaneous femoral nerve formed by fibers of L_3 & L_4.

The blood supply to abdominal wall is through
Costo abdominal vessels
Branches of lumber vessels
Deep circumflex iliac
Cranial & caudal epigastric vessels.

SPECIAL INSTRUMENTS:
None

ANAESTHETIC TECHNIQUE:
1. General anaesthesia
2. Para-vertebral analgesia
3. Field block by inverted L
4. Linear infiltration

CONTROL:
1. Standing position for incisions through paralumbar fossa
2. Lateral recumbency for incisions in lower flank
3. Dorsal recumbency for incisions through ventral abdominal wall
SURGICAL PROCEDURE:
A 10-25 cm long incision depending upon the need for available spaces for manoeuvrability is made in the skin at the proposed operation site wherever practicable. A grid-iron technique should be used to dissect the underlying muscles if present along the direction of their fibers. Otherwise, the underlying muscles or linea-alba may be incised along the direction of skin incision. A groove director is then passed through the small cut in the peritoneum and the incision is enlarged using scissors.

After the desired work, the abdominal layer may be closed in different layers. If gridiron technique is used, the peritoneum and transverse abdominis may be sutured together with absorbable sutures. The other muscles are sutured separately with absorbable 2-3 number sutures.

Then the skin sutured with simple interrupted or horizontal or cross mattress non-absorbable sutures. If the muscles are directly incised, then the whole abdominal muscles may be sutured in only three layers viz peritoneum and transverse abdominis, interval and external oblique muscles and the skin. In median incisions where peritoneum is adhered to the linea-alba, these two can be sutured together with interrupted sutures or lock stick pattern. Then subcutaneous and skin sutures should be applied preferably with non-absorbable sutures.

POST OPERATIVE CARE:
Routine ASD & antibiotic therapy
If the incision is made in ventral abdomen the animal should be fed with easily digestible food and in less quantity for about two weeks.

REMARKS:
In larger animals such as buffaloes, the incision on ventral aspect of abdomen should be avoided if possible.
When the two oblique muscles are quite thick, these should be sutured separately & preferable by interrupted sutures.
RUMENOTOMY IN BOVINE

INDICATIONS:
Severe or persistent ruminal impaction
Severe frothy bloat
Removal of phytobazoars, trichobazoars or any other foreign bodies from rumen or reticulum.
Removal of ruminal contents prior to surgical repair of diaphragmatic hernia.
Exploratory purposes.

SITE OF OPERATION:
1. Left mid paralumber fossa
2. Left cranial paralumber fossa near to last rib (in cases of larger animals or in cases where reticulum has to be approached).

SURGICAL ANATOMY:
The rumen occupies almost whole left half and some ventral right half of abdominal cavity. The rumen extends from 7th-8th intercostal space to pelvic inlet. The rumen is opened through its dorsal sac. The structures to be divided in rumenotomy include skin subcutaneous fascia, external oblique muscle, internal oblique muscle, transverse abdominal muscle, peritoneum and the ruminal wall.

The nerve supply to the left paralumber fossa is mainly by thirteenth thoracic, first and second lumber spinal nerves. The third lumber spinal nerve also supplies a small cutaneous branch in the caudal aspect of paralumber fossa.

The blood supply to the site is by phrenico- abdominal and deep circumflex-iliac vessels. However, no major vessel is located at the site of incision.

SPECIAL INSTRUMENTS:
Rumenotomy set (Weingarth set or Mc’limtoch set)
Suction pump
Hose pipe
Siphoning tube (with a diameter of at least 3” to 4”)

ANAESTHETIC TECHNIQUE:
1. Para-vertebral nerve block
2. Inverted ‘L’ regional nerve block
3. Local linear nerve block
SURGICAL PROCEDURE:
An 18-20 cms long vertical skin incision starting about 3-4 cms below the transverse process of the lumber vertebral is made. The abdominal muscles and peritoneum are also incised corresponding to the skin incision.

The Weingarths ring is now fixed to the abdominal wall with the help of screw fixed at dorsal aspect of incisional wound. The rumen is now exteriorized and fixed in the Weingarths set with the help of two strong tissue forceps placed at dorsal and ventral aspect at least 12 cms apart. The forceps are now hooked tightly into the frame (ring) of rumenotomy set. Thick gauze should always be used to cover the grasping edges of the tissue forceps before applying then on rumen to minimize trauma.

In case of non-availability of rumenotomy set, the rumen can be fixed temporarily to the skin edges by through & through mattress sutures applied dorsally and ventrally. Now abdominal wound is packed tightly by surgical shrouds all around the exteriorized rumen to prevent entry of ruminal contents in to the abdominal cavity during its removal later.

The exposed part of the rumen is now incised for about 8-10 cms and rumen hooks are applied into the cut edges and hooked into ring. About 6-10 such hooks are applied to the exposed rumen. After finishing the required job the ruminal cut edge are thoroughly cleaned after removal of hooks and sutured by a double row of continuous Lamberts and Cushing using absorbable suture material.

The wound is again cleaned. The shrouds are also discarded and fresh sterilized shrouds are used to drape the animal. The abdominal wound is sutured in a routine manner.

POST OPERATIVE CARE:
The animal should be kept on light diet for about two weeks post surgery.

REMARKS:
-The instruments, which get contaminated during removal of ruminal contents, should be discarded immediately.
-The surgeon should scrub his hands freshly to close incisional wound.
-The ruminal hooks should be counted before and after their application to avoid inadvertent leaving of any of those into the rumen in case of accidental dropping.
URETHROTOMY IN BOVINES

INDICATIONS:
Obstructive urethral calculi

SITE OF OPERATION:
1. Post scrotal site: About 3 inches behind the scrotum along the median line. This is used for removal of calculi at the sigmoid flexure.
2. Sub ischial site: About 7-8 inches behind the scrotum along the median line. It is used for removal of calculi lodged in sub-ischial area.
3. Ischial site: About two inches below the ischial arch downwards along the median line. It is used to remove calculi closed to ischial arch.

SURGICAL ANATOMY:
The urethra of an adult bullock/bull is over a meter long and about one quarter of its length is taken up for the formation of ‘S’ shaped sigmoid flexure which present caudally and dorsally to the scrotum.

The urethra is made of two parts, the pelvic and extra pelvic part. The pelvic part is about 10-12 cms long and is of small uniform caliber. The urethral lumen is kinked and narrow at the ischial arch. At the ischial arch the urethra passes between the bulbourethral glands, which open into the urethra under a fold of mucous membrane, and forms a blind pouch of about 1 cm deep on the dorsal wall of urethra. The extra pelvic part of urethra passes between the two crura of penis and runs along the groove on the ventral surface. It passes through the glans penis at the end and opens via external urethral orifice. The lumen of the extra pelvic part of urethra decreases gradually towards the external urethral orifice. The nerve supply to the various muscles of the penis is through the dorsal nerve of penis. This nerve is a branch of pudendal nerve, which arises from ventral branch of third sacral nerve mainly.

The blood supply comes from the branches of internal pubic artery.

SPECIAL INSTRUMENT:
A hard polyethylene catheter of 2.0/2.5 or 3.0 mm diameter

ANAESTHETIC TECHNIQUE:
Linear infiltration of local analgesia
CONTROL:
1. For post scrotal and sub ischial site: Right lateral recumbency with left hind limb tied anteriorly.
2. For ischial site: Standing position with tail tied towards one side.

SURGICAL PROCEDURE:
A 6 cm long skin incision is given at the proposed site. The subcutaneous tissue and fascia is bluntly dissected to expose the two retractor penis muscles lying on either side of penis. The muscles are bluntly dissected longitudinally to expose the penis.

The penis is now levered out of the skin incision with the help of a curved artery forceps. However, it cannot be taken out from ischial and sub ischial sites.

The urethra is palpated on the ventral aspect of this penis. The urethra is thoroughly examined to palpate the obstructing urolith. A nick or small longitudinal incision is given over this calculi, which is then pressed out or retrieved by a forceps. A suitable sized sterilized polyethylene catheter is now passed up the urethra to the urinary bladder. The other end is now passed out of the external urethral opening.

The incision of urethra may be left open if the catheter is snugly fitting otherwise it may be sutured with a swaged-on atraumatic needle with 3-0 absorbable sutures. The exteriorized part of penis is pushed back and the skin wound is sutured in a routine manner. The catheter is now transfixied with prepuce and left in site for a few days.

POST OPERATIVE CARE:
Routine ASD & antibiotic therapy
The inducting catheter is removed after 10 days

REMARKS:
The post scrotal site is the easiest site to approach a larger length of urethra.
At urethrotomy sites higher than post scrotal site, haemorrhage is usually more extensive.
Any effort to catheterize the urethra forcefully with a metallic catheter (such as clutch wire) must be avoided as they induce extensive damage to the urethral lining, which becomes prone to infection.
If the urinary bladder of the animal is found full and enlarged prior to operation the bladder should be emptied by per-rectal catheterization before casting the animal for urethrotomy.
RESECTION OF RECTUM IN ANIMALS

INDICATIONS:

1. Irreparable rectal tear
2. Prolapsed of rectum (reposition & retention not possible)
3. Recto vaginal fistula.
4. Rectal fistula and perforating injuries.
5. Necrosis & gangrene of rectum
6. Thromboembolism, infarction and strangulation.

SURGICAL ANATOMY:

The rectum is app. 30 cm long in an adult horse and extends from the pelvic inlet to the anus. The peritoneal past is attached dorsally by the mesorectum, which is the continuation of the mesocolon. The retroperitoneal part of the rectum forms a dilatation called the rectal ampulla, which has thick longitudinal muscle bundles. The anal canal is 5 cm long.

ANAESTHETIC CONTROL & TECHNIQUE:

For rectal resection in large animals low epidural anaesthesia is used. In small animals general or epidural anaesthesia is used.

SURGICAL PROCEDURE:

i) The rectum is pulled posteriorly as much as possible and a series of 5-7 interrupted sutures using chromic catgut size 0 or 1 with full curved atraumatic needle are inserted around the circumference of the bowel.
ii) After putting the sutures the prolapsed portion of the bowel is removed with an incision through the tissues about 1.5 cm posterior to the sutures.
iii) The rectal mucosa, muscularis and serosal layers should be sutured with series of interrupted sutures. The remainder of the bowel will retract pulling the suture anterior to the sphincter.
iv) All large bleeding vessels should be ligated.
POST-OPERATIVE CARE:

1. The patient as far as possible should be given analgesia & frequent epidural blocks to prevent straining in first 5 days after the operation.
2. The patient should be kept on easily digestible green fodder.
3. Anal area should be lubricated with sterile vaseline or lignocaine jelly mixed in an antibiotic ointment namely sofradex. A course of antibiotic is preferred after the operation. Careful digital removal of faeces from rectum can also be tried.

REMARKS:

1. A temporary suture may be tied taking healthy portion of rectum in it with the skin around anal sphincter, so as to prevent quick retaining of prolapsed mass inside the cavity, as it can pose difficulty in suturing of cut portion. These sutures are removed after completion of procedure.
SPLEENECTOMY IN ANIMALS

SITE OF OPERATION:
1. Cranial mid ventral/left paramedian/left paracostal incision in dogs.
2. Anterior flank incision parallel to last rib in case of large animals (ruminants).

TOPOGRAPHIC ANATOMY:

A. CANINES-
1. The spleen is present in the left hypogastric region alongside greater curvature of stomach.
2. It extends from the anterior ends of kidney (left) below the left crus of diaphragm to the middle of the caudal border of the left rib cage.
3. Gastro-splenic omentum attaches it to the stomach.
4. Splenic artery from celiac artery supplies blood to spleen whereas splenic vein drains blood to gastrosplenic vein.
5. The nerve supply to the spleen is from celiac plexus and vagus.

B. RUMINANTS-
1. The spleen is present alongside the left surface of rumen.
2. The dorsal extremity of spleen lies under the dorsal ends of last two ribs and is attached to left crus of diaphragm.
3. The ventral extremity is free and mainly lies opposite the 8th and 9th rib, about 6 inches above the sternal end. The hilus is small and is situated on dorsal third of visceral surface at anterior border.

INDICATIONS:
1. Neoplasm, rupture, torsion, abscess, infarction of spleen.
2. Spleenomegaly

CONTROL AND ANAESTHESIA:
1. Supine position in dogs under general anaesthesia
2. Right lateral recumbency or standing position in ruminant and the anaesthesia is achieved by paravertebral block/local infiltration after proper sedation/ tranquilization.
SURGICAL TECHNIQUE:

CANINES-
1. Make an 8-12 inch long incision through the abdominal wall at proposed site. Following laparotomy exteriorize the spleen.
2. Inject 1-2 ml of epinephrine (1:1000) into splenic artery after putting a loose ligature and immediately ligate the artery. Cut the artery between two ligatures.
3. The splenic vessels are doubly ligated individually and cut in between ligature. After ligating and cutting all the vessels, the spleen is removed.
4. Close the abdominal wound in routine manner.

RUMINANTS-
1. Perform laparotomy, parallel to last rib.
2. Carefully remove the attachments of spleen from rumen leaving the spleen attached to the hilus.
3. Ligate and transfix the splenic vessels at hilus after clamping the vessels with hemostats.
4. The vessels are then severed. Ensure that there is no bleeding from ligated vessels the spleen is carefully removed.
5. Close the laparotomy wound in routine manner.

POST OPERATIVE CARE:
1. Provide fluid therapy in case of excessive blood loss. If possible blood transfusion may be done.
2. Parental antibiotics for 3-5 days.
3. Proper hygiene of surgical wound.
4. Sutures removed after 8-10 days.

IMPORTANT CONSIDERATIONS:
1. Use of epinephrine is contraindicated in neoplasm and abscess of spleen.
2. Proper ligation and transfixation should be ensured.
3. Gentle handling of spleen to avoid its rupture.
END TO END ANASTOMOSIS OF INTESTINE IN BOVINE

INDICATIONS:
1) Intestinal foreign body leading to necrosis of intestine.
2) Intussuception.
3) Volvulus
4) Strangulation
5) Torsion
6) Neoplasm
7) Gangrene.

SITE OF OPERATION:
Right flank incision.

CONTROL AND ANAESTHESIA:
In bovine, the right flank laparotomy can be undertaken by controlling the animal in standing position in trevis or in left lateral recumbent position. Analgesia at the operative site can be achieved with local anaesthetic by using paravertebral or inverted ‘L’ blocks.

OPERATIVE TECHNIQUE:
1) The affected part of the intestine is located, identified and exteriorized through the laparotomy incision.
2) The mesenteric vessels of the part are doubly ligated.
3) Intestinal contents are milked away and intestinal clamps are placed.
4) The intestine is transected between the crushing and non crushing clamps, taking care to avoid the ligated vessels and the affected segment of the intestine is removed.
5) While anastomosing the intestine, care should be taken to avoid any gap due to unequal diameter of the lumen of two segments.
In large animal surgery, single layer inverting, everting and end on pattern or schmieden techniques are mostly used for anastomosis of the intestine.

A) INVERTING TECHNIQUE:
1) In this technique, the first suture is placed at the mesenteric border of the each segment and tied within the intestinal lumen.
2) Continuous connell sutures are then inserted to oppose cut edges of the intestine.
3) Two separate strands of suture material are used on each side of the intestine to meet at anti-mesenteric border.
4) Sutures are placed approximately 3 mm apart and 3 to 5 mm from cut ends of intestine.
5) The knots should be tied outside the lumen. This results serosa to serosa apposition.

B) EVERTING TECHNIQUE:
The everting technique employs interrupted horizontal mattress sutures to evert the mucosa of intestine. The sutures begin at the mesenteric end as with inverting pattern described earlier. The healing occurs by mucosa to mucosa apposition.

C) END ON TECHNIQUE (Gambee’s pattern):
In this technique a simple interrupted suture, penetrates the lumen and passes through a small segment of the mucosa and submucosa on the same side. The suture then penetrates through the submucosa and mucosa towards the lumen of the other side and finally penetrates all the layers to come out at serosal surface. The knot is fixed outside the lumen.

D) SCHMIEDEN TECHNIQUE:
This technique is frequently used in clinical cases, results in serosa to mucosa apposition of the cut ends of the intestine. The suturing begins at the mesentric border and meet at the antimesenteric border. The knot is tied outside the lumen.
After completion of the anastomosis, the intestinal clamps are removed and patency of the lumen at the anastomotic site is checked. The defect in the mesentric is closed and the segment is rinsed in normal saline and replaced in the abdominal cavity. The abdominal wound is closed in a routine manner.

POST-OPERATIVE CARE:
1) Adequate and appropriate fluid therapy, antibiotics and analgesics should be administered for the first 4-5 days.
2) Animal should be kept on liquid and/or soft diet for 3-4 days.
3) Restore the normal gastro-intestinal motility and check infection at the operative site.
4) The cutaneous wound should receive adequate care till the sutures are removed on 8-10 days.
EXAMINATION OF BODY CONFORMATION

Lameness is an indication of a structure or functional disorder in one or more limbs manifested during progression or in the standing position. One of the predisposing factors of lameness is body conformation especially of limbs.

The conformation is defined as the form or outline of an animal. It includes relationship of form to function. For normal balance the horse’s body is divided into three equal parts of visually drawing/vertical line.

1. Line from point of elbow to whither.
2. Line from tuber coxae to the cranial aspect of stifle.

The above two line should assume perpendicular relationship to the ground surface.

3. Line from point of shoulder to the center of stifle should assume a relatively parallel relationship to the ground surface.
4. From top, a line between whither down through center of back roughly divides the body into two separate halves.

A horse’s body should be pleasing and in balance with the limbs.

Some of the body conformations noticed are as under:

1. Body taller at croup than whither
2. Long backed horses
3. Short backed horses.

However body conformation does not affect locomotion as commonly as limbs conformation.

LIMBS CONFORMATION:

A. Forelimbs

Normally both the forelimbs should be straight in cranial view. A line from point of the shoulder should bisect the limb and the toes should point straight forward. The distance between fore feet should be same as distance between bases of limbs.
FAULTS IN CONFORMATION OF FORE LIMBS:

1. Base narrow
2. Base wide
   Base narrow toe in
3. Toe in/pigeon toe
   Base wide toe in
   Base narrow toe out
4. Toe out/splay foot
   Base wide toe out
5. Plaiting
6. Calf knees/sheep knees
7. Bucked knees/ goat knees/knee sprung
8. Knock knees/ carpus valgus/ knee narrow
9. Bow legs/ carpus Vagus/ Bandy legs
10. Offset or bench knees
11. Tied in knees
12. Cut out under the knees
13. Standing under in front
14. Camped in front
15. Short upright pastern
16. Long upright pastern
17. Long sloping pastern

B. Hind limbs

Normally a line dropped from the point of tuber ischii should divide the limb into equal parts when viewed from posterior.
FAULTS IN HIND LIMB CONFORMATION:

1. Base narrow
2. Base wide
3. Sickle hock
4. Straight behind
5. Standing under behind
6. Camped behind

DETECTION OF LAMENESS:

A. ANAMNESIS

1. Acute/chronic lameness
2. Hot/cold lameness
3. Possible cause
4. Stumbling
5. Recent shoeing
6. Any treatment adopted.

B. CLINICAL EXAMINATION:

1. Visual examination
   a. At rest:  i. Position of horse: Any deviation from normal
                ii. Type of conformation
                iii. Resting of toe on ground
                iv. Shifting of weight on limbs
   b. At exercise  i. Incoordination in movements of limbs during
                    walk/trot/canter or gallop on hard surface.
                    ii. Movement of head & neck during exercise.
                    iii. Landing on the part of foot.
                    iv. Limb contacts (Brushing, cross firing etc.)
Visual examination at exercise helps in grading the lameness I, II, III or IV.

I. No lameness in walk but present in trot.

II. Lameness in walk but no variation in head movements (seen during trot).

III. Lameness in walk and trot.

IV. No weight bearing lameness.

2. Examination by palpation and manipulation for painful lessons.

3. Radiography

4. Thermography

5. Angiography

6. Cinematography

7. Electro goniometry

8. Bone scintigraphy

9. Arthroscopy

10. Local anaesthesia/nerve blocks

11. CT scan and MRI

12. Exploratory arthrotomy

13. Biochemical profile/synovial fluid analysis

14. Biopsy

15. Culture/antibiotic sensitivity test of synovia
MEDIAL PATELLAR DESMOTOMY IN BOVINE

INDICATIONS: Recurrent upward fixation of patella with locking.

SURGICAL ANATOMY:
The patella is a large sesamoid bone which develops in the tendon of quadriceps femoris muscle. It is connected to the femur by collateral ligaments and to the cranial tibial tuberosity by patellar ligaments. The patellar ligaments, medial, middle and lateral, are the continuations of the fibrous bands of the quadriceps muscle to the cranial tibial tuberosity. The middle patellar ligament is thick and strong as compared to other two ligaments. The medial patellar ligament is widely separated from the middle patellar ligament at both the ends. The lateral patellar ligament is flat and lies close to the middle ligament at both the extremities.

SITE OF OPERATION:
In the medial aspect of stifle joint where medial patellar ligament inserts into the inner aspect of the anterior tibial tuberosity.

CONTROL AND ANESTHESIA:
1. The animal is controlled in lateral recumbency with the affected limb towards the ground and the upper unaffected hind limb is drawn forward and tied with the fore legs.
2. Affected hind leg which lies downward is dragged backward and is tied with a piece of bamboo in order to expose the stifle joint and to tense the patellar ligaments.
3. Analgesia is achieved by local anaesthetic using linear infiltration at the operative site and site is prepared for aseptic surgery.

SURGICAL TECHNIQUE:
Medial patellar desmotomy to correct upward fixation of patellar in bovine can be performed by two methods:
a) Open Method.
b) Closed Method.

A. OPEN METHOD:
1. A small skin incision of about 3 cm in length is made directly over the medial ligament, starting immediately in front of the medial tibial tuberosity, towards the cranial tibial tuberosity.
2. The fascia is dissected to expose the glistening medial patellar ligament. In buffaloes, the fascial layers are thick and highly engorged with blood vessels.

3. The ligament is exteriorized by passing a curved scissors or tenaculum flat wise under the ligament. The ligament is then sectioned near its insertion using a knife.

4. The wound is explored with index finger and undivided fibers of the ligament are severed completely by scissors.

5. The cutaneous wound is closed by three or four simple interrupted or mattress sutures by using black braided silk No.3.

NOTE:

Protrusion of the adipose tissue through the gap created by the cut ends of the ligament, cessation of crunching sound and immediate relief of the characteristic jerky flexions during progression are indications of a successful medial patellar desmotomy.

B. CLOSED METHOD:

1. A stab incision is made into the skin with B.P. blade immediately in front of the medial tibial tuberosity.

2. A pointed knife or Hey groove knife is passed flat wise with its tip fixed in the ‘V’ shaped groove between the middle and medial patellar ligaments. The sharp edge of the blade is directed towards ligament.

3. The ligament is then transected by withdrawing the knife towards the operator and the scalpel is taken out.

4. Few drops of betadine are poured at the operated site.

POST-OPERATIVE CARE:

1. The animal should not used for hard work for 8-10 days.

2. The antiseptic dressing of the surgical wound is done with tincture iodine or betadine for one week.

3. Skin sutures should be removed on 7th or 8th post-operative day.
APPLICATION OF PLASTER CAST

INDICATIONS:
- Closed fractures of long bones distal to stifle and elbow
- Severe sprain or strain of ligaments of joints distal to stifle and elbow

SITE:
The plaster cast should be applied all around the affected part including at least one joint above & one joint below the affected part. For better immobilization of the affected bone, full limb cast extending as far above to the stifle or the elbow joint should be applied.

SPECIAL REQUIREMENTS:
- Plaster of Paris impregnated gauge rolls of various sizes (3”, 4”, 6”)
- Small tub (full of Luke warm water)

ANAESTHETIC TECHNIQUE:
1. General anesthesia particularly for non-cooperating small animals.
2. Deep sedation
3. Epidural analgesia for application of POP in hind limb of large animals.

CONTROL:
2. Lateral recumbency with the affected limb uppermost in most of the cases.
3. Lateral recumbency with the affected limb downward for repair of radius-ulna and metacarpal fracture repair in dogs.
4. Dorsal recumbency with the affected limb suspended alone the patient’s body for immobilization of radius ulna fracture in dogs.

PROCEDURE:
- The hair of the intended area for P.O.P. application is trimmed short.
- The affected limb including the foot is cleared and dried

- In cases of large animals, two holes and drilled in the hoof anteriorly and a long wire is passed through it. This wire is held by an assistant exerting a slow, steady and constant pull to facilitate reduction at the fracture site.

- In case of small animals adhesive tape stirr-up is applied over the dorsal and palmer/planter surfaces of foot. This stirr-up is held by an assistant to provide traction.

- A bandage (or rope in case of large animal) loop is applied in groin or axilla and the counter traction is provided by an assistant in an opposite direction to the that of traction.

- Talcum powder or Boric acid powder is liberally sprinkled over the intended area for POP application.

- The fracture is now reduced by traction, counter traction and/or by toggling.

- The limb is kept as such in the position of reduced fracture.

- One to two layers of cotton bandages are now applied over the whole area and then moderately thick cotton padding is done over that. Extra padding is done over bony prominences.

- The POP bandage is now immersed in lukewarm water till bubbles stop coming from the bandage. The bandage is gently squeezed and is applied over the cotton padding with a moderate pressure.

- The bandage is generally applied from lower most part to upwards. The first two to three turns are applied at exactly the same area whereas subsequent turns overlap the preceding turn by one half of its width.

- Each layer is smoothened with hands and also by moistened cotton by an assistant. This provides a good bond of POP with the preceding layer.

- One by one other POP bandages are similarly applied till adequate thickness of POP cast is achieved.

- At the knee & hock joint the plaster is applied in the figure of eight fashion to prevent breakage of POP just below these joints.

- The plaster cast is kept moist through out its application.

- When the application of the cast is complete, the surface of the cast is rubbed with hand to provide a smooth & hard coating.

- The traction & counter traction bandages are removed.

- The animal is kept in cast position until plaster hardens. Usually one hour for thinner cast and four to five hours for thicker cast are required for adequate hardening.
POST OPERATIVE CARE:

- Restricted movements for first few days as the plaster may take 36-48 hours to get completely hard.
- Thereafter also only limited movement of the animal should be allowed throughout the period of application.
- Antibiotic therapy
- Prevention of self-mutilation.
- The animal is examined closely for first few days for any development of pressure sore. If the cast is too tight, it should be removed & reapplied.
- Periodic radiographs to examine the fracture healing process should be taken preferably every fifteen days.
- After radiographic evidence of fracture healing the cast is removed approximately in about 4-6 weeks in young animals and in 8-10 weeks older and larger animals.

REMARKS:

- In large animals, hoof is not included in POP cast, whereas in small animals only two central toes of the fingers are kept outside the POP cast.
- If the water in which the POP bandages are being immured is too hot, the cast will set too rapidly and will not allow time to constitute a good cast in a one solid unit. However, too cold water causes delay in setting time thus prolonging the period of restraint of the animal.
- POP cast should be used only for those closed fractures, which can be reduced optimally. The fractures with unmanageable overriding are better treated by other means.
- If POP cast is to be used for open fracture, a window in the cast has to be made for antiseptic dressing (ASD) and proper evaluation of the wound.
- For larger and heavier animals, the bamboo, PVC or aluminum splints usually placed on dorsal and planter aspects can reinforce the cast. However, additional POP bandages are required with the concomitant use of these splints.
- The cast should not be too tight. The rule of thumb is that one finger should go under the upper margin of cast easily.
- In heavy animals, the cast should be periodically checked for development of any crack. Usually it becomes necessary to replace the POP cast after two weeks in such animals.
- The adult large animals (+300 Kg) require about 8-12 six inches rolls for full limb cast with splints.
The small animals may need just 3-6 three to four inches POP rolls.

PRACTICAL-20

APPLICATION OF HANGING PIN CAST

INDICATIONS:
Closed fractures of tibia and radius and ulna in large heavy animals where plaster cast alone cannot provide adequate stability because of the heavy musculature in the proximal area.

SITE:
Same as for limb plaster cast.

SPECIAL INSTRUMENTS:

i) Electric heavy-duty bone drill, Steinmann pins of different diameters, pin cutter, rasps and pin bender.

ii) All equipments and things required for plaster cast application.

ANAESTHETIC TECHNIQUE:

1. General anaesthesia
2. Epidural analgesia may be employed for procedure in hind limbs.

CONTROL:
Lateral recumbency with the affected limb upwards.

PROCEDURE:

- The proximal tibial area is prepared as for aseptic surgery.
- A sufficiently thick Steinmann pin is driven through a nick in the skin of lateral aspect of proximal tibial or radius ulna region. The pin is introduced into all layers of tissue into the bone and out from the fan cortex through all layers of soft tissue to the out side of skin in the medial aspect.
- The drill is removed and the pin is cut after leaving about two three inches or either side of limb.
- The haemorrhage is controlled and cut ends of the pin are rasped smooth.

- A thick gauze piece impregnated with an antiseptic solution is placed over the area from where the pin is introduced and exited.

- The fracture is now reduced and plaster of Paris bandages are applied all over the limb as routinely. The bandages should involve the Steinmann pin in it. The pin now will not let these bandages slip over the thick muscles of the surrounding area.

**POST OPERATIVE CARE:**

Same as for routine plaster cast application.

**REMARKS:**

- Extreme care should be taken while introducing Steinmann pin. Any major vessel should be avoided. There should not be wobbling in the pin during its introduction as this would create much bigger hole in the bone and may create a fracture itself.

- The direction of pin should be perpendicular to the long axis of bone and it should pass through the bone at middle.

- The placement of pin should be sufficiently away from the articular surface as well as from the fracture site.
APPLICATION OF K-NAILS IN CALVES

INDICATIONS:
Management of long bone fracture of humerus, femur, radius and tibia.

SPECIAL EQUIPMENTS:
K-nails of appropriate size and diameter, suitable drills, guide wire, bone holding forceps and other instruments required for fracture repair of long bones.

CONTROLL AND ANAESTHESIA
Lateral recumbency with affected limb on upper side. Local/regional anaesthesia under proper sedation.

SURGICAL TECHNIQUE:
1. Expose the fractured bone depending upon the bone involved.
2. Reduction of bone fragments is done.
3. Drill the proximal fragment through medullary cavity at dorsal aspect to come out through cortex and skin.
4. Intramedullary nail of appropriate size is inserted into medullary cavity with the help of guide wire.
5. Guide the nails into medullary cavity of distal fragment so as to fix it into epiphysis.
6. The exposed part of K nail is cut.
7. The skin wound is closed in routine manner.

POST OPERATIVE CARE
1. System antibiotics and analgesics.
2. Antiseptic dressing, till sutures are removed.
3. Sutures are removed after 8-10 days.

PRECAUTION:
To prevent rotation, modified Thomas splint can be applied.
INTRAMEDULLARY PINNING OF FEMUR IN DOG

INDICATIONS:
Management of femur fracture by open reduction.

SITE OF OPERATION:
Craniolateral incision, extending from slightly caudal to the greater trochanter to the lateral condyle of the femur.

CONTROL AND ANAESTHESIA:
Animal is positioned in lateral recumbency with the affected limb up and general anaesthesia is administered after proper premedication. The femoral area is prepared for aseptic surgery.

SURGICAL ANATOMY:
The femoral bone is covered and supported by the two major muscles, vastus lateralis and biceps femoris. The superficial fascia and the tensor fascia lata covers these two muscles.

OPERATIVE TECHNIQUE:
1) The femoral diaphysis and metaphysis is approached through a craniolateral skin incision made on the lateral aspect, extending from slightly caudal to the greater trochanter to the lateral condyle of the femur.

2) The subcutaneous tissue and superficial fascia are incised directly under the skin incision.

3) Fascia later is incised to the entire length of the skin incision along the cranial border of the biceps femoris muscle aponeurosis.

4) Biceps femoris and vastus lateralis are reflected caudally and cranially respectively after excising the inter-muscular septum between these muscles to expose the shaft of femur.

5) After locating the site of fracture, the proximal bone fragment is elevated and an intramedullary pin which almost fills the diameter of the medullary canal is inserted into the proximal fragment and the pin is withdrawn through the skin after making stab incision at the trochanteric fossa.

6) The fracture is reduced and the proximal and distal bone fragments are aligned and the pin is then inserted in the distal
7) After accomplishing the open reduction, the muscles are apposed and the fascia later is sutured and finally the skin is sutured in routine manner.

8) The skin around the protruding pin at trochanteric fossa is depressed and the pin is cut as short as possible to buried subcutaneously. A simple interrupted suture is applied on the skin to close the hole.

POST-OPERATIVE CARE:

1) A course of antibiotics and analgesics should be administered for 5-7 days.

2) Exercise should be limited for 3-4 weeks period.

3) If necessary, limb should be immobilized by application of modified thomas splint.

4) Careful clinical and radiographic evaluation of fracture healing process should be done.

5) Skin sutures should be removed 8-10th post-operative day.

6) Intra-medullary pin should be removed after complete fracture healing as evidenced by clinical and radiographic evaluation.
DIGITAL FLEXOR TENOTOMY IN BOVINE

INDICATIONS:

Contraction of superficial / deep digital flexor tendons (Knuckling) or deformity due to partial or permanent flexion of the fetlock or interphalangeal articulations.

SITE OF OPERATION:

Outer aspect of the limb at the level of lateral border of tendon in the midway point of metatarsal region or at the inner aspect of the limb on the anterior border of the tendon about 1 cm below the middle of metacarpus.

SURGICAL ANATOMY:

In cattle, the superficial digital flexor divides into two bellies, superficial and deep, terminating on tendons at the distal part of the forearm. The superficial tendon joins the deep tendon about the middle of metacarpus. The conjoined tendon bifurcates, and passing under the two digital annular ligaments, they are inserted into the volar surfaces of 2\textsuperscript{nd} phalanges by three slips. The deep digital flexor divides near the distal end of the metacarpus into two branches, which are inserted into the volar surface of the 3\textsuperscript{rd} phalanx.

NOTE:

1) In some cases, the flexion deformity improves spontaneously.
2) In mild cases, treatment is not required because daily normal walking exercise is sufficient to stretch the tendons.
3) In other cases, affected joint has to be kept in forced extension by splint or a plaster cast.
4) Radiography of the affected joint should be done prior to tenotomy to rule the evidence that the tendons are involved or the bones are affected.

5) Tenotomy should be performed if the contraction of tendon or deformity can not be corrected by stretching the limb under general anaesthesia or \(\left(\text{2}\text{nd}\right) / \left(\text{3}\text{rd}\right)\) points mentioned above fails.

**CONTROL AND ANAESTHESIA:**

The animal is selected controlled in lateral recumbency with the affected limb lower most. The operative site is prepared for aseptic surgery. The site of operation is infiltrated by linear infiltration using 2% lignocaine hydrochloride to obtain local analgesia.

**SURGICAL TECHNIQUE:**

1) A 2cm long skin incision is made on the medial aspect of the limb between the two flexor tendons.

2) A mid metacarpal or metatarsal site is preferred since it lacks the synovial sheath.

3) The subcutaneous tissues are separated by blunt dissection, and the blood vessels are identified and retracted.

4) A small tenotome or curved knife is pushed between the two tendons.

5) Both the tendons are identified and separated by blunt dissection.

6) The affected tendon is transected while forcibly extending the fetlock joint.

7) The skin wound is then sutured routinely.

8) The limb should be put under the plaster cast just below carpers tarsus.

**Z-TENOTOMY:**

This technique is used for lengthening of the tendon for correction of the contracted tendons. A longitudinal incision is made in the centre of the exposed tendon. At each end of the incision, a transverse incision is made but in apposition direction. The ends are then sutured. The skit incision is closed and plaster cast is applied on the limb.

**POST-OPERATIVE CARE:**

1) A course of antibiotic is desirable, if infection is suspected.
2) The plaster cast should be kept for 3 to 4 weeks.
3) Skin sutures should be removed 8 to 10 days after operation and plaster cast is reapplied.
4) Following removal of plaster cast at 3rd or 4th week, the physiotherapy for the treated limb should be suggested.

PRACTICAL-24                                                    Date__________

AMPUTATION OF DIGIT (CLAW) IN BOVINE

INDICATIONS:
1. Irreparable injury.
2. Foul-in the foot of the digit
3. Gangrenous dermatitis

SURGICAL ANATOMY:
The three bones of digit are
1. Os- suffragins as first phalanx
2. Os-corona as second phalanx
3. Os-pedis third phalanx

The respective interphalangeal joints are
1. The suffragine-coronal (first interphalangeal joint)
2. The corono-pedal (second interphalangeal joint)

**ANAESTHESIA & CONTROL**

— Planter retro block
— Intravenous retrograde anesthesia
— General anesthesia

**SURGICAL SITE**

1. Through the corono-pedal joint, leaving the coronary band intact
2. Through the lower third of the os-suffragins

**SURGICAL TECHNIQUE**

A tourniquet is applied above to knee to control bleeding.

**TECHNIQUE I**

For amputation through the second interphalangeal joint:

1. The wall of the hoof is pared, leaving only a thin layer of horn.
2. A horizontal incision over the thinned hoof, close to and below the coronary band, cutting through the horny tissue and sensitive laminae, is made, and the interphalangeal joint is reached.
3. Disarticulate through the joint and confine the amputating digit.

**TECHNIQUE II: -**

Amputation through the lower third of the first phalanx, above the first interphalangeal joint:
1. The skin is incised horizontally above the coronary band & another vertical incision on the lateral aspect of the pastern is made to join it, so as to raise two skin flaps & expose the lower portion of the first phalanx.

2. The first phalanx is cut horizontally with a saw and the amputation is completed.

   After amputation the digit by any one of the above 2 methods, the tourniquet is removed 2 further haemorrhage is controlled by ligating the bleeding vessels & by gauze packing. The skin flaps are sutured and a bandage is applied.

   The sutures are partially removed to remove the gauze packing the next day and afterwards the wound is treated on general principles.
AMPUTATION OF FORE LIMB

INDICATIONS:
1. Severe trauma or mangling of the body part
2. End stage osteomyelitis
3. Gangrene
4. Neoplasia
5. Total loss of neurological function results in limb dysfunction.

ANAESTHESIA AND CONTROL:
General anesthesia, recumbent state

The pectoral limb is amputated using one of two specific techniques, fore quarter amputation, which includes scapulolectomy or a scapulohumeral disarticulation.

1. The animal is placed in lateral recumbency with the affected leg uppermost, resting on a sand bag. The distal extremity of leg is draped.

2. A semi circular skin incision is made on the lateral aspect of the limb extending from the line through the middle of the humerus down to the elbow joint. The leg is then abducted and the incision joined by corresponding incision on the medial aspect.

3. The skin flap is reflected on the lateral aspect to expose the long and lateral heads of the triceps brachii muscle, the brachiocephalicus muscle and the cephalic vein, which is ligated.

4. The common tendon of insertion of the triceps brachii is severed and the muscle mass reflected proximally to expose the brachialis muscle where it curves around the lower third of the humerus and the superficial radial nerve, which is severed proximally.

5. The brachialis and brachiocephalicus muscles are severed and reflected to expose the lateral aspect of the shaft of the humerus.

6. The animal is turned over and the skin flap on the medial aspect reflected to expose the biceps brachii muscle, the brachial artery and vein which are ligated and the ulnar nerve, which is severed proximally.

7. The biceps brachia muscle is severed just proximal to where it divides to be inserted on to the ulna and is rejected.
8. The leg can now be amputated by sawing through the shaft of the humerus using a hacksaw blade or giggly wire saw.

9. The ends of the severed muscles are sutured together with interrupted chronic catgut sutures to form a protective muscle pad over the stump of the humerus. The brachialis & biceps brachii muscles are first sutured together over the stump & then the brachio cephalicus and triceps brachii muscles.

10. After the ends of the muscles have been sutured together, care must be taken to ensure that their edges are also co-apted.

11. The skin flaps are co-apted with interrupted mattress sutures using mono-filament nylon and the edge of the wound protected by over sewing a gauze pad.
AMPUTATION OF HIND LIMB

The pelvic limb is amputated using one of two specific techniques:

I) COXO-FEMORAL DISARTICULATION

II) MID-DIAPHYSEAL FEMORAL AMPUTATION-

There is no inherent advantage in one technique over the other, however the mid shaft technique may be considered more cosmetically acceptable by the owners of male dogs because it will cover the genitals.

SURGICAL TECHNIQUE

I) The leg is draped & positioned.

2. A semi circular skin incision is made on the lateral aspect of the leg, extending from a line through the lower third of the thigh down to stifle joint. The leg is then abducted and the incision joined by a corresponding incision on the medial aspect.

3. THE skin flap is reflected on the lateral aspect to expose the sartorius, quadriceps femoris, biceps femoris muscles and the fascia lata.

4. The fascia lata is incised along the length of the attachment to the biceps femoris muscle.

5. The quadriceps femoris & biceps femoris muscles are separated by blunt direction to expose the lateral aspect of femur.

6. The tendon of insertion of the quadriceps femoris muscle and the anterior belly of the sartorius muscle are severed proximal to the patella & reflected to exposes the lateral aspect of the femur and the distal posterior femoral artery, which is ligated.

7. The aponeurosis of insertion of the biceps femoris is incised transversely and the muscle reflected to expose the popliteal artery, the sciatic nerve and the abductor, semimembranosus and semitendinosus muscle. The popliteal artery is ligated and the sciatic nerve divided proximally.

8. The animal is turned over and the skin flap on the medial aspect reflected to expose the posterior belly of the sartorius and the gracillus muscle. These muscles are severed and reflected to expose the femoral artery and vein, which are ligated, and saphenous nerve which is divided proximally.

9. Also exposed are the semi membranosus and semi tendinosus muscles, which are severed together which the underlying abductor muscle to expose completely the shaft of the femur.
10. The leg can now be amputated by sawing through the shaft of femur using alacusane blade and the operation completed in the manner described for coapting an amputated front leg.

REMARKS

1. The limb should be removed as near to the trunk as possible.

2. Hemostasis is critical; replace fluid or blood lost during the surgery.

3. Strive for speed in the surgery to prevent excessive haemorrhage & soft tissue drying.

4. Never ligate large arteries & vein together because an arterio-venous fistula may develop.

5. Be certain that animals general condition can tolerate such a traumatic procedure.

6. Never amputate a limb in the face of thoracic metastasis, unless the pain is excessive.
AMPUTATION OF TAIL

INDICATIONS:
1. To improve the appearance of the animal
2. Injury as neoplasm of the tail
3. Tail gangrene

SURGICAL ANATOMY:
1. The skeletal framework of tail is made up of coccygeal vertebrae of which number varies with species to species.
2. The paired muscles of the tail are enclosed in the strong coccygeal fascia, which is loosely attached at the root of the tail.
3. Sacro-coccygeal dorsalis muscles lie on either side of the dorso-median aspect of the tail.
4. Sacro-coccygeus lateralis muscles lie immediately lateral to dorsalis.
5. Sacro-coccygeus ventralis lies on the ventral aspect of the sacrum and coccy.
6. Inter transversalis caudae consists of muscles bundles and lies on the lateral aspect of the tail between sacro-coccygeus lateralis & ventralis.
7. The blood supply to the tail is though the middle and lateral coccygeal arteries and nerve supply by coccygeal nerves.

SITE OF OPERATION

Above the injury or seat of infection at the intervertebral articulation.

ANESTHESIA & CONTROL:
1. Large animal is controlled in standing or in recumbent position & small animal on the operation table in recumbent position.
2. Anaesthesia is achieved by infiltrating local anaesthetic solution subcutaneously encircling the tail above the site of operation or by posterior epidural anesthesia.
3. In uncontrollable animal sedative as tranquilizers may be required.
SURGICAL TECHNIQUE:

1. Tourniquet should be applied on the back of the tail.

2. Two ‘V’ shaped flaps one on dorsal and the other on ventral side are made at the site of operation after palpating the articulation.

3. Prominent vessels at the lateral and ventral aspect are identified and ligated proximal and distal to the proposed site of amputation.

4. Intervertebral space is located by blunt dissection and the joint is disarticulated with the help of BP blade. The distal portion of the tail is then removed.

5. Skin flaps are united by simple interrupted or interrupted mattress sutures.

POST-OPERATIVE CARE:

1. Sutures are removed 7-8 days after surgery or after complete healing

2. Daily antiseptic dressing is to be done.