

Cesarean section in domestic farm and pet animals

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Cesarean section (Hysterotomy, Celiotomy)

- One of the oldest surgical procedures The term appears to be derived from the Greek term *caeso matris utera* meaning cutting the mothers uterus.

Risk factors

Heifers age less than 2 years

Prolonged gestation

Higher age of cows

Peidmont Sire

Previous cesarean section

Maternal indications

- Immature heifers
- Pelvic fractures, deformities
- Cervical dilation failure
- Uncorrectable uterine torsion
- Uterine tears
- Double muscling in beef breeds such as Charolais, Limousin, Belgian Blue

Fetal indications

- Absolute fetal oversize
- High value calf such as embryo transfer
- Uncorrectable fetal maldispositions
- Fetal defects such as fetal dropsical conditions, monsters, conjoined twins.
- Recovery of gnotobiotic calves

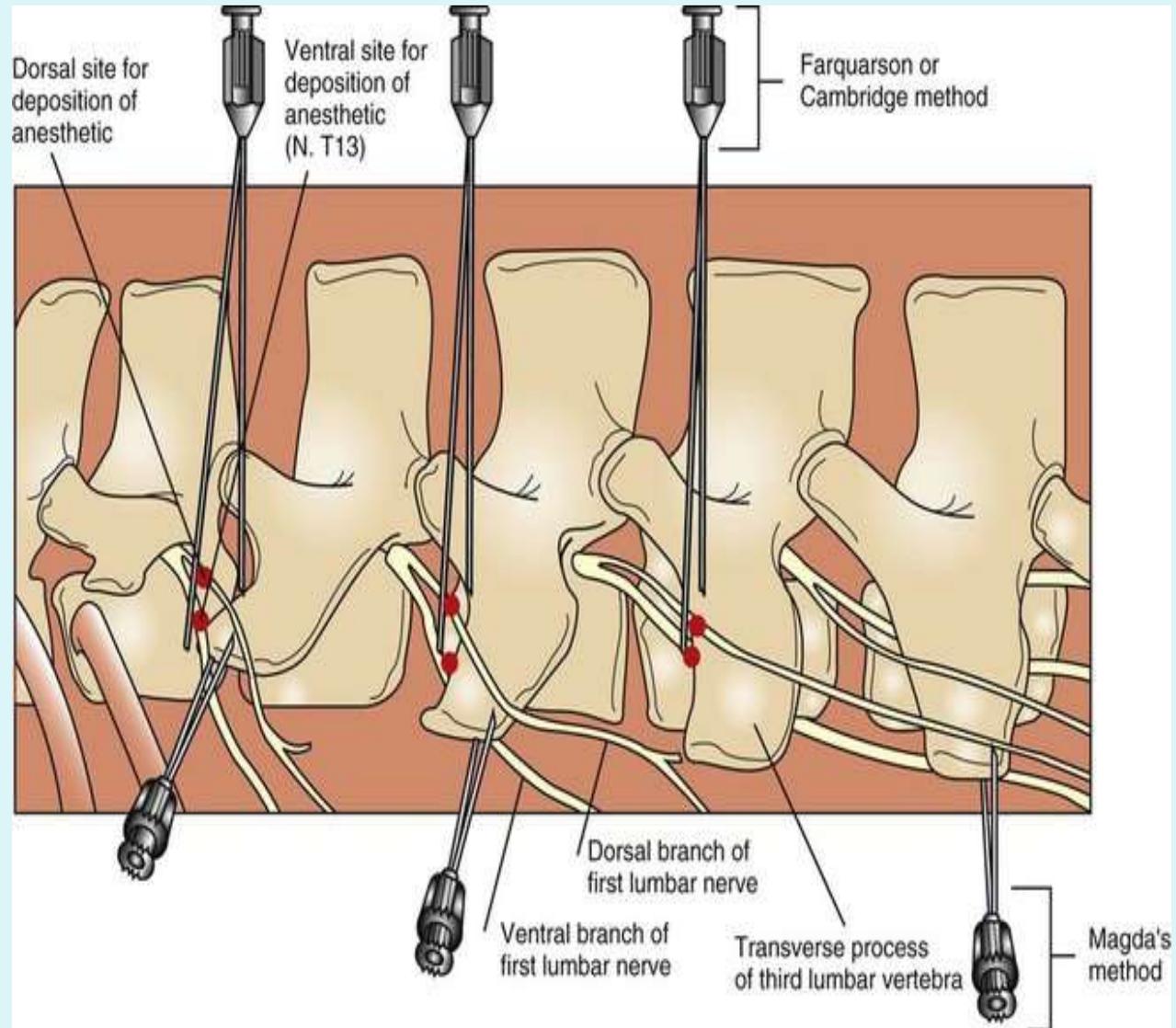
Restraint Depends on operative site

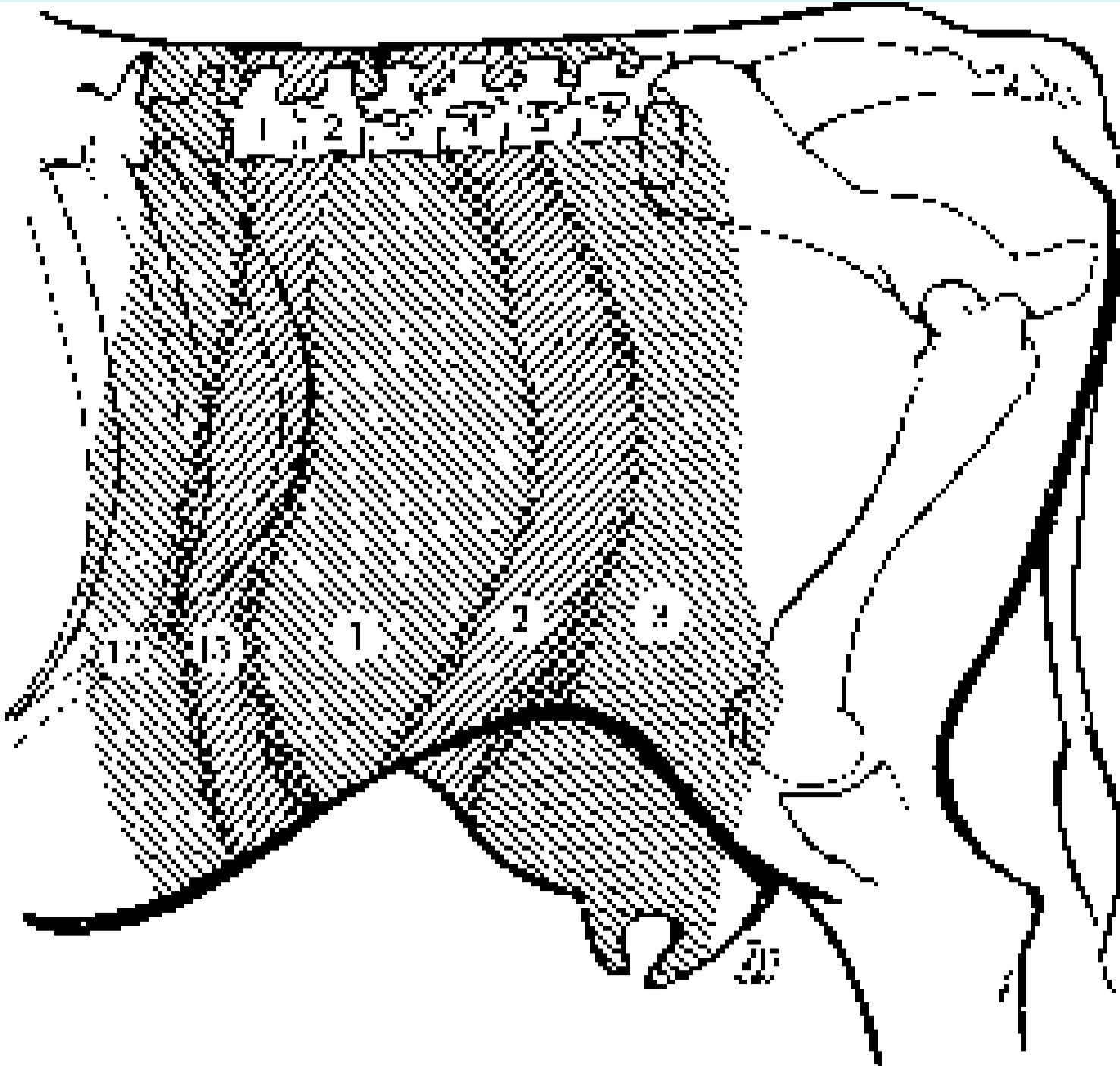
- Standing in a chute -- flank laparotomy
- Ventral recumbency—Midline
- Right or left dorsal recumbency—Paramedian, lower flank, oblique ventro-lateral

Anesthesia

- General anesthesia or heavy sedation with xylazine (0.03 to 0.1 mg/kg IV) is indicated for exceptional cases
- Paravertebral nerve block (Last thoracic and 1st 3 spinal nerves)
- Provides good anesthesia and relaxation but induces marked hyperemia in muscle layers and greater degree of hemorrhage
- Inverted L block
- Epidural anesthesia

Paravertebral nerve block



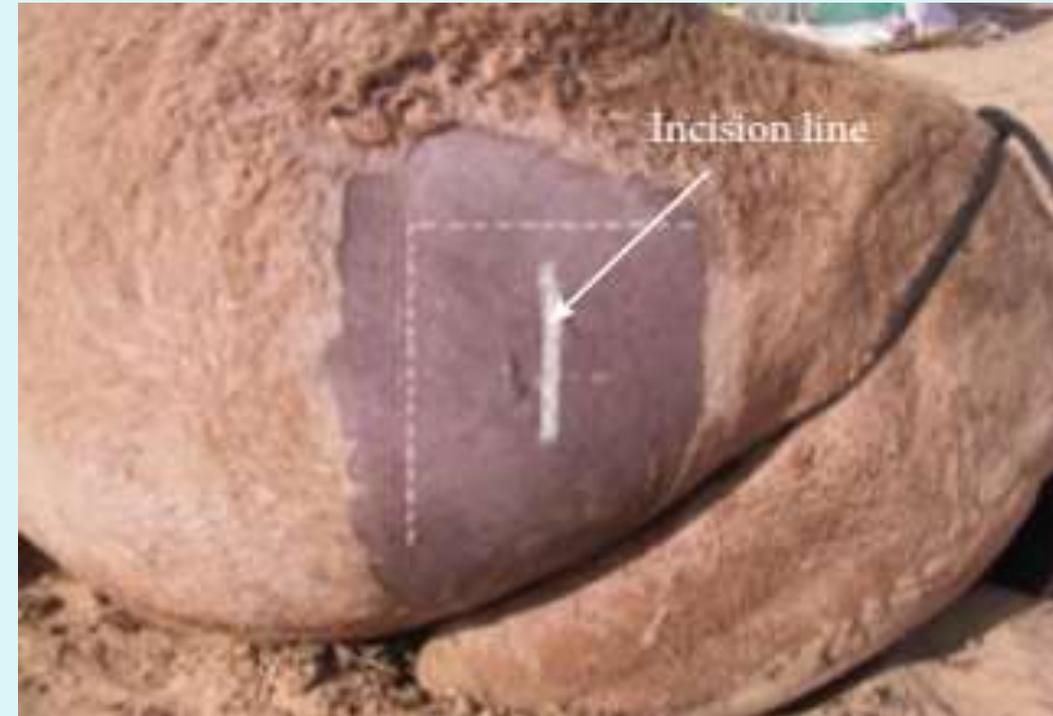
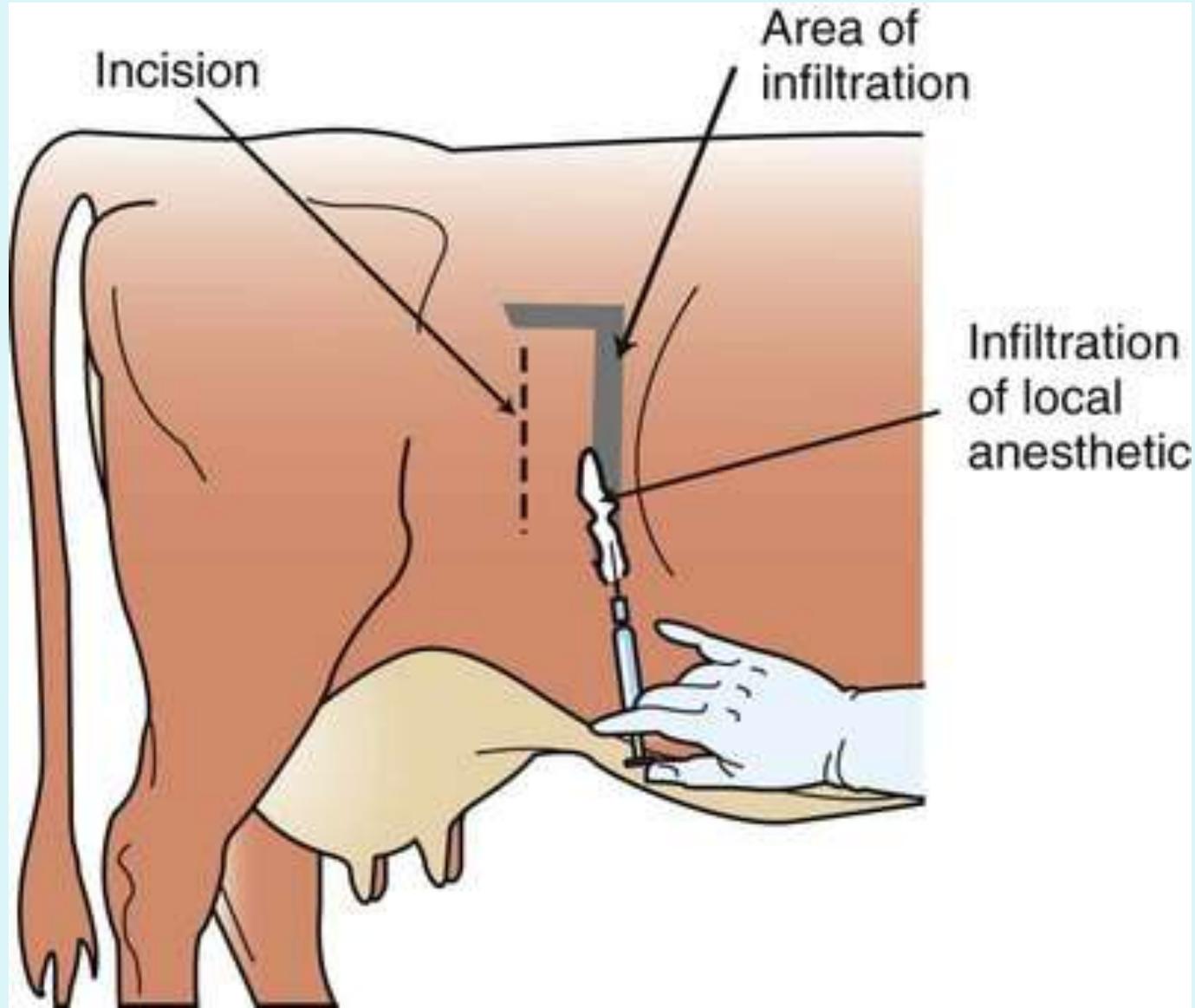


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Inverted 'L' Block



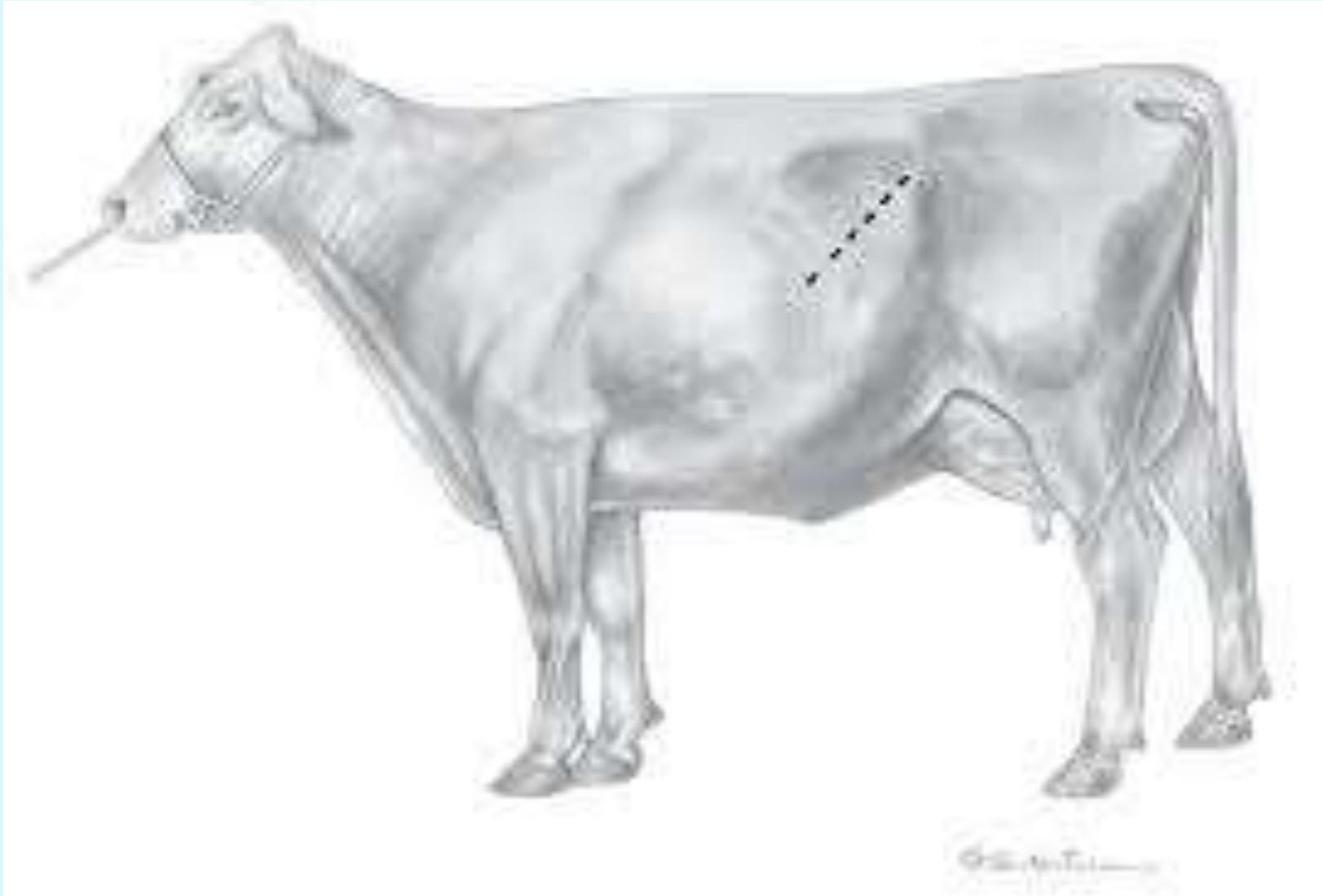
Pre-operative considerations

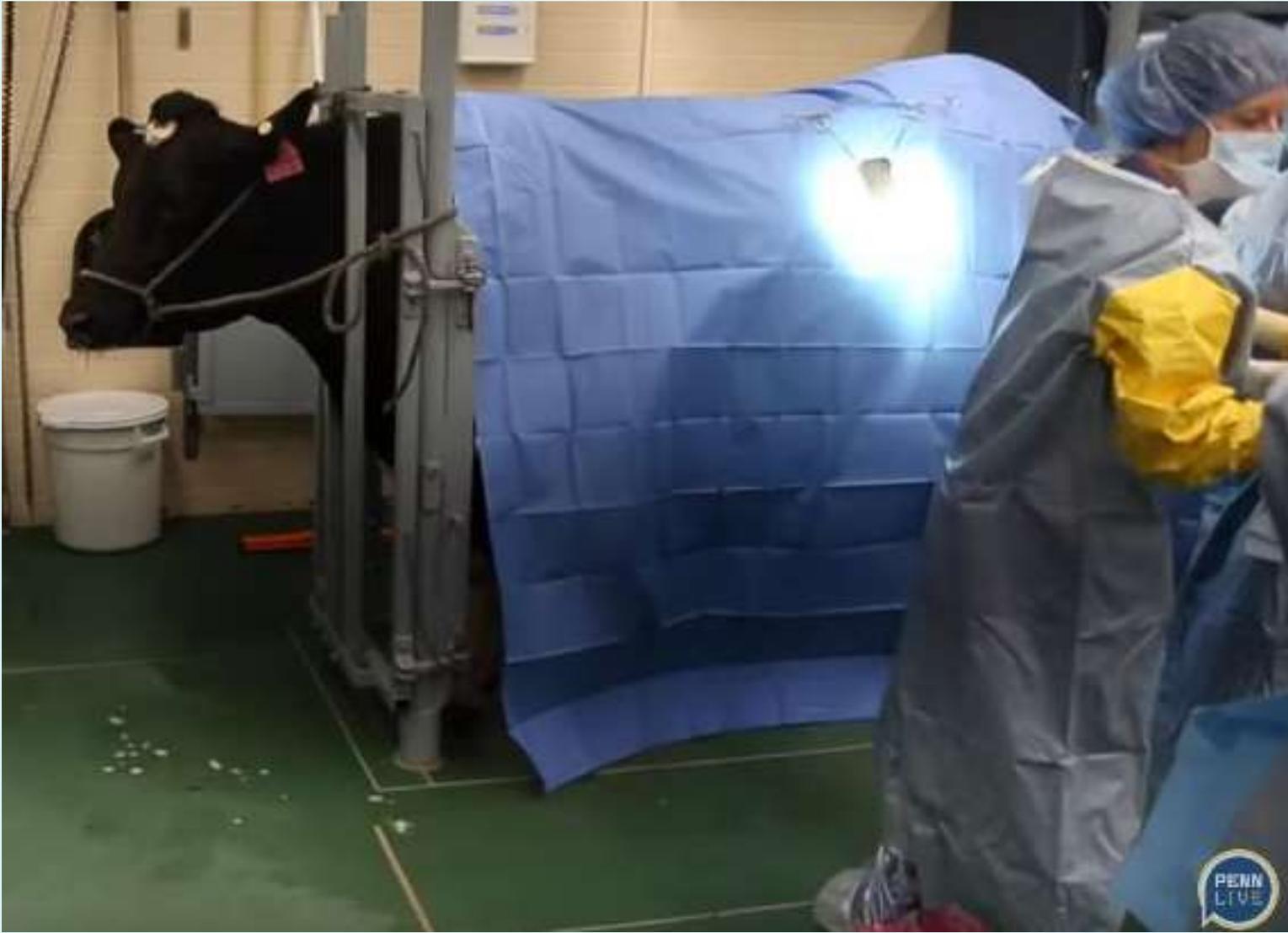
- Fasting not possible in emergency operations but possible in elective cesarean sections.
- Animals restrained in recumbency may develop ruminal tympany and regurgitate ruminal fluid during the operation.
- Sufficient fluid replacement and antibiotics or other appropriate therapy should be given to stabilize the condition of the patient

Operative sites

- **Flank laparotomy**- Left and right Incision in the middle of paralumbar fossa 3-5 cm ventral to transverse process of lumbar vertebrae
- **Lower flank laparotomy** 10-15 cm ventral to transverse process
- **Midline** (linea alba)
- **Paramedian** Between linea alba and subcutaneous abdominal vein extending just behind the umbilicus to the udder. Care should be taken to avoid incising caudal deep epigastric artery

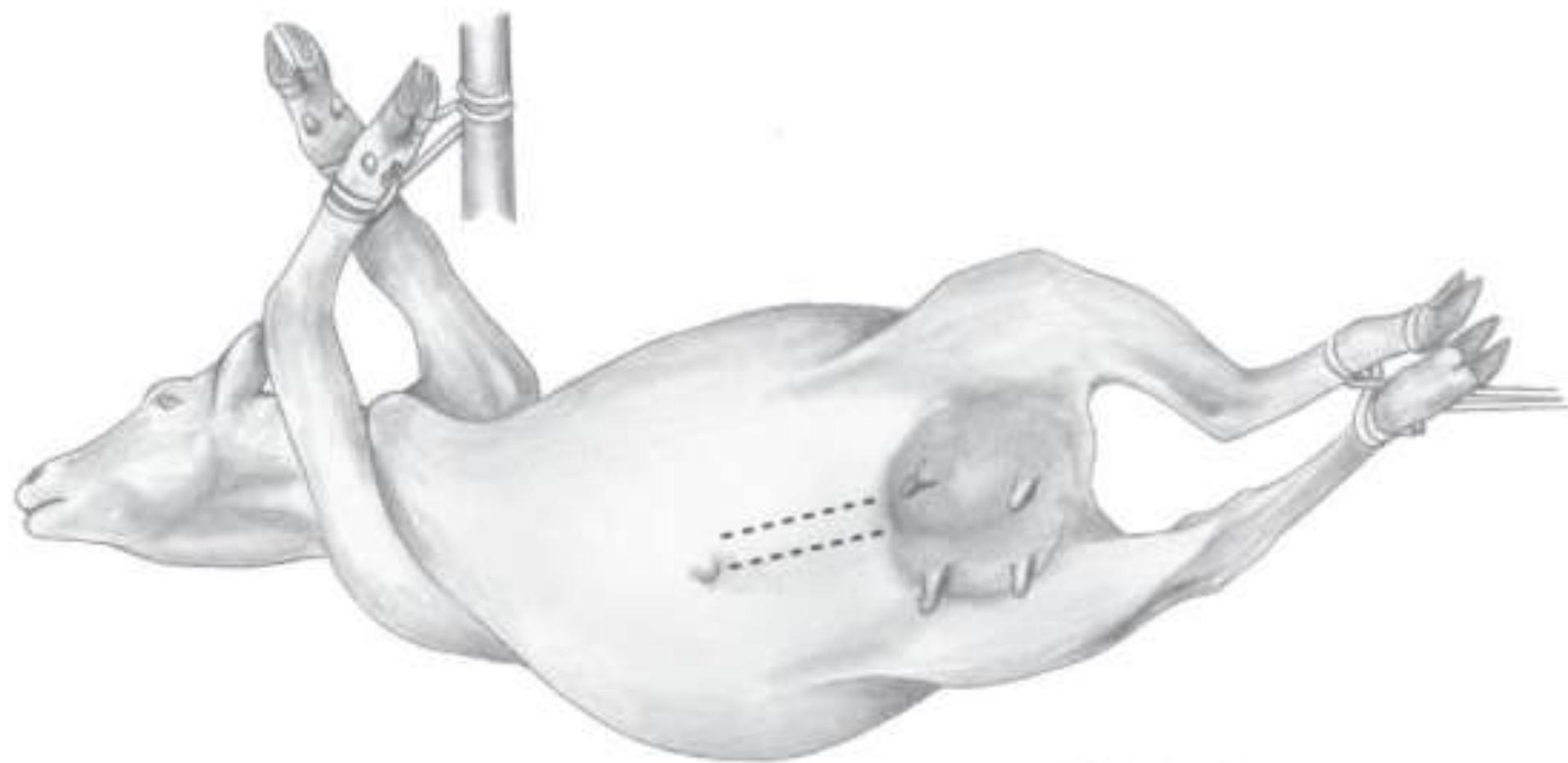
Flank laparotomy





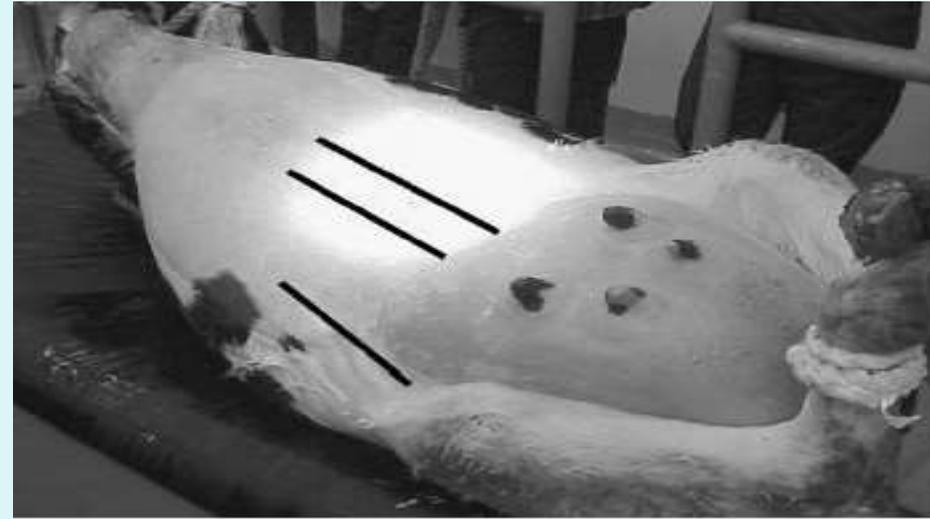








Standing left paralumbar celiotomy.
The placement of the incision is indicated by the dashed line.



The locations for the midline (top line), right paramedian (middle line) and right low oblique or paramammary approaches (bottom line)



The proper positioning of the cow and incision site for the ventrolateral celiotomy



● The position of the oblique flank incision

- Oblique ventrolateral-Above the arcus cruralis in front of stifle and extending cranioventrally in a oblique direction.
- Paramammary approach
- Disadvantages of recumbent approaches include increased surgical time, increased risk of intra-operative hemorrhage, post-operative seroma formation and in incisional herniations.

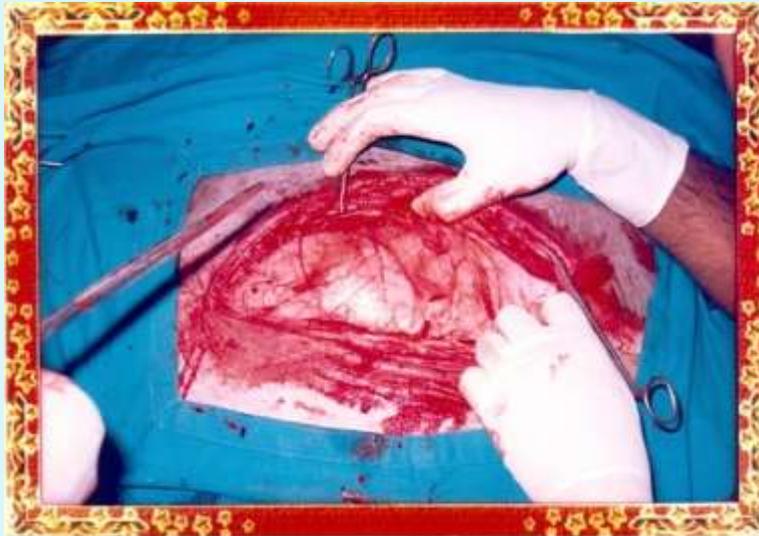
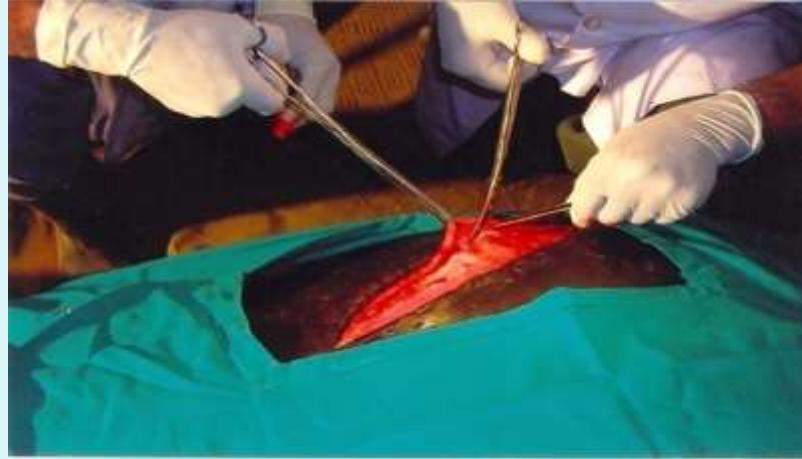
Surgical Technique

- Shaving and scrubbing with soap and water followed by scrubbing with savlon. Then disinfect with Chlorhexidine, povidone or isopropyl alcohol.
- Apply a shroud on the operative site and fix it with clamps
- Skin incision using a scalpel followed by separation of subcutaneous tissue by blunt dissection.
- Incision of muscles ligating major vessels
- Incise the peritoneum (Glistening white)
- The omental fat and rumen are deflected to one side

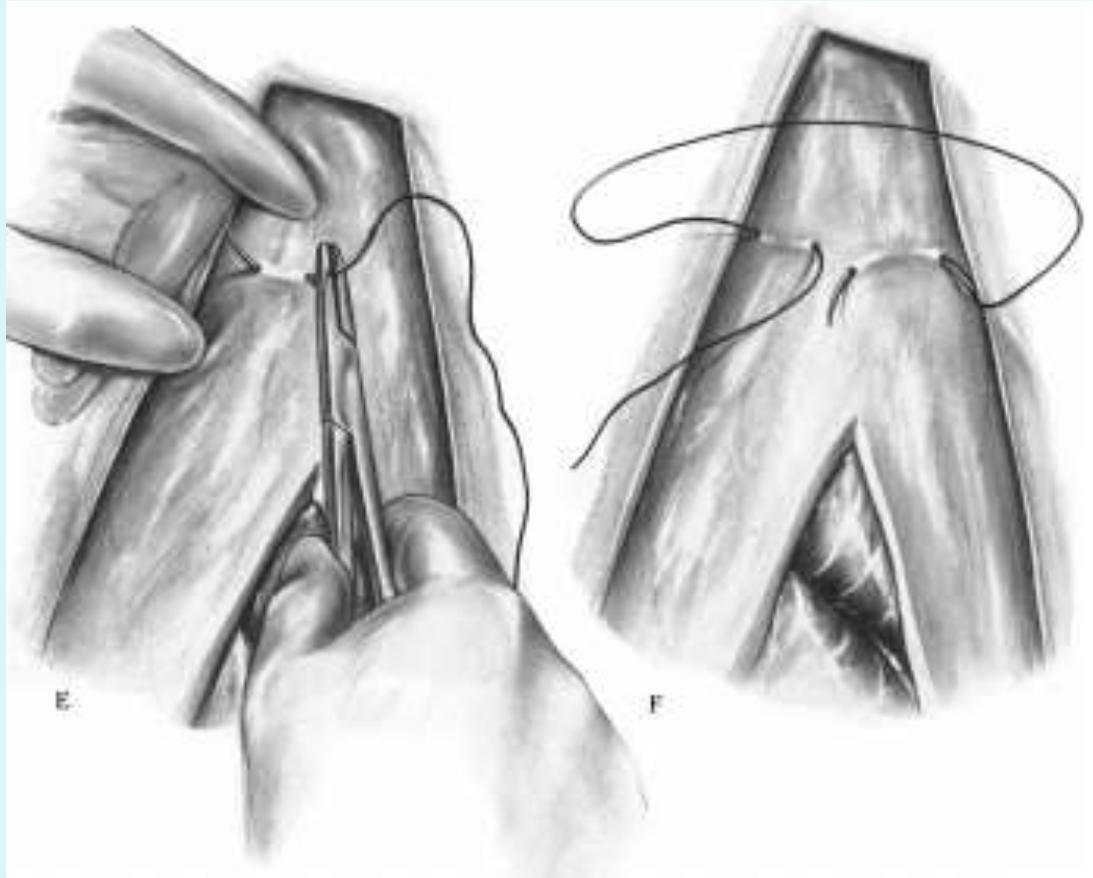
- The uterus is held by an extremity and brought to the incision site and packed with sterile drapes.
- Incise the uterus over the greater curvature avoiding cotyledons and blood vessels.
- The calf is removed and the umbilical cord is clamped and cut. The placenta should be removed if possible. The uterus is washed with normal saline.
- Surgeons must change the gloves and suture the uterus using 2 or 3 chromic catgut and continuous inverting 1 or 2 layers of sutures such as Utrecht, Lembert or Cushing suture.

- The uterus is washed with saline, the blood clots are removed and uterus is replaced back in to the abdominal cavity.
- The surgeon should change gloves after replacement of uterus.
- The peritoneum and transversus muscle are closed by chromic catgut using simple continuous sutures.
- The internal and external oblique abdominal muscles are sutured. To avoid dead space the suture layers should be periodically tacked down to the preceding layer of suture
- The skin is sutured using simple interrupted or ford interlocking sutures utilizing silk and a sterile gauze must be tied over the skin suture to minimize external contamination.

Cesarean section: cattle and buffalo via oblique ventro-lateral approach The animal placed in dorsal recumbency, skin incision, subcutaneous dissection, the peritoneum is exposed, the uterus is exposed and taken out



Inverting uterine suture



Post-Operative Care

- Cleaning of operative site with spirit for 3-5 days
- Fluid therapy for 3-5 days in poor condition cows
- Cows with an emphysematous fetus must be given imidazole derivatives.
- Antibiotics for 3-5 days
- Anti-inflammatory drugs for 2-3 days
- Cows operated with ventral surgical approaches require stall rest for 6 weeks

Complications

- Peritonitis
- Seroma formation
- Suture dehiscence
- Hernia
- Metritis/Retained placenta
- Anorexia

Cesarean section in sheep and goat

Similar to cattle except that only 0.5-1.0% lidocaine should be used by dilution of 2% solution as accidental infusion leads to convulsions

Cesarean section in the sow

Approaches include ventral flank and sub-lumbar

Anaesthesia: Halothane (**Landrace breed** is susceptible so do not use in this breed) + nitrous oxide and oxygen after IV administration of thiopentone (150-200 mg/Kg IV)

Premedication

Diazepam (0.5-1.0 mg/Kg IM)

IV anesthetics

IM azaperone (2mg/Kg) and IV metomidate (2mg/Kg) with local infiltration

Ketamine (15-20 mg/Kg IV + diazepam (0.5-1.0 mg/Kg)

Xylazine 2.2 mg/Kg IM however, IV anaesthetics are known to cause hind limb paralysis.

Cesarean section in the mare

Serious and dangerous in the absence of facility

Foal suffers anoxia within 1-2 h of second stage of labor due to dehiscence of allantochorion

Indications

Transverse presentation

When other measure have failed

Vulvo-vaginal trauma

Pelvic fracture

Anesthesia

Methohexitone sodium 5 mg/Kg or thiopentone (10 mg/Kg) followed by inhalation anesthesia using halothane and oxygen

Currently

xylazine 0.25 – 0.5 mg/Kg IV or 0.5-1.0 mg/Kg are used as preanaesthetic followed by guaifenesin 5-10%, ketamine 1.5-2.0 mg/Kg IV and inhalation anaesthesia using isoflurane or sevoflurane gas anaesthesia at many places. 15-20 ml of bupivacaine at the site locally

Sites Midline (Preferred), Flank and Ventral

Marcenac incision is a lower abdominal incision that extends from a point posterior to last rib to a point in front of the fold of the flank and uses local infiltration anesthesia instead of general anesthesia.

The uterine incision leads to profuse bleeding and hence double rows of sutures should be used. Postoperative abdominal pain and subcutaneous edema may be seen. Oxytocin can also induce colic.

Oxytetracycline should be avoided as it precipitates salmonellosis. If laminitis develops uterine lavage should be considered and antiallergics should be given.



Cesarean section in the bitch

- Cesarean section should be performed before the dystocia affected bitch fatigues or distress occurs in the pups.
- Prompt intervention is necessary for minimizing fetal death.
- Bitches that have been in prolonged labor, those with a uterus containing dead or decaying fetuses or a friable uterus, or those showing signs of endotoxemia or septicemia should have caesarean sections. The toxic bitch requires supportive fluid and antibiotic therapy prior to, during and following surgery.

General Aesthetic Protocols

Protocol 1

1. Premedicate with atropine (0.04 mg/kg IM)
2. Induce with diazepam (0.2 mg/kg IV) and thiopental (8-12 mg/kg IV); intubate
3. Maintain with isofluorane or halothane

Protocol 2

1. Induce with ketamine (5-10 mg/kg IV) and diazepam (0.2 mg/kg IV); intubate
2. Maintain with isofluorane or halothane

Protocol 3

1. Premedicate with atropine (0.04 mg/kg IM)
2. Induce with diazepam (0.2 mg/kg IV) and oxymorphone (0.05-1.0 mg/kg IV); intubate
3. Maintain with isofluorane or halothane

Protocol 4

1. Premedicate with atropine (0.04 mg/kg IM) or glycopyrrolate (0.011 mg/kg IM)
2. Induce with oxymorphone (0.1 mg/kg IV) and intubate gently; if bitch resists intubation, add thiopental (4-8 mg/kg IV)
3. Maintain with methoxyflurane (1% early; decrease to less than 0.3% if possible and add 50% nitrous oxide)

Protocol 5

1. Premedicate with atropine (0.04 mg/kg IM) or glycopyrrolate (0.011 mg/kg IM)
2. Administer oxygen 3-5 minutes by mask prior to induction
3. Induce with one of the following:
 - Thiamylal sodium (6-8 mg/kg IV)
 - Thiopental sodium (6-8 mg/kg IV)
 - Methohexital sodium (5 mg/ kg IV)
 - Droperidol-fentanyl (1 mg/20-30 kg IV)
 - Diazepam (0.2-0.5 mg/kg IV) with ketamine HCl (4-8 mg/ kg IV)
 - Acepromazine (0.1 mg/kg IM or IV, not to exceed 4 mg) with oxymorphone (0.11 mg/kg IV)
4. Intubate; maintain with isoflurane, halothane, enflurane or methoxyflurane

- Regional Aesthetic Protocol
- 1. Premedicate with atropine (0.04 mg/kg IM)
- 2. Administer bupivacaine (1 ml/3.5 kg) epidurally
- 3. Administer oxymorphone (0.1 mg/kg IV)

- Anesthetic protocols have also utilized administration of atropine (0.04 mg/kg BW, S.C) immediately followed with xylazine+ketamine (1 mg/kg BW+10 mg/kg BW, I.M) along with diazepam (0.5 mg/kg BW, I.V). However, xylazine is considered to be fetotoxic.

Cesarean section in the camel

Done in sitting position

Flank and ventrolateral approaches are used. Care should be taken in flank approach when incising the peritoneum to avoid accidental cut on the spleen.

Xylazine and local infiltration anaesthesia is used.

The dose of xylazine suggested for camels is 0.25 mg/Kg IV

Post-operative skin healing is delayed and hernias and seroma formation is common



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