

Obstetrical Operation and Epidural Analgesia in Domestic Animals: An Overview

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Abstract

Harvesting a live calf depends upon the early intervention when getting call from owners or farm managers. Obstetrics skills are required to manage the dystocia either maternal or fetal form of dystocia. Diagnostic evaluation and treatment depends upon the condition presented to the obstetrician. Most probably obstetrician follows mutation, forced extraction, fetotomy and caesarean section. Most of the cases require mutation operation, the valid mutation operation followed by judicious traction culminate harvesting of live calf in early presented cases. The most common tools followed by the veterinarians are epidural analgesia and through lubrication of the birth canal, that may surely end in relieving of calf or fetus. The present review describes about different obstetrical operation and epidural analgesia in domestic animals.

Keywords: Epidural, mutation, forced extraction, fetotomy, caesarean section

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INTRODUCTION

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AN OVERVIEW OF OBSTETRICAL OPERATION

Mutation

Mutation is defined as those obstetrical operation by which a normal fetus or abnormal fetus is returned to a normal presentation (P₁), position (P₂) and posture (P₃) by repulsion or retropulsion, rotation, version and adjustment or extension of extremities [1].

Repulsion/Retropulsion

Repulsion/retropulsion consist of pushing or rushing the fetus out of the quadrants of maternal pelvis or birth passage into the abdominal cavity

or uterus, where sufficient space is available for correction of the maldisposition of the fetus and its extremities [1].

Procedure

Epidural analgesia indicated since repulsion frequently produces violent straining on the part of the animal. Repulsion may be accomplished by the operators arm or arm of the assistant or by the crutch repeller. If fetus is in *anterior presentation*, the crutch repeller or hand of the obstetrician is usually placed on the fetus between the shoulder region and chest region or across the chest beneath the neck region. If fetus is in *posterior presentation* hand of the obstetrician is placed in the strong perineal region over the hip of the ischial arch. Repulsion is difficult or impossible in recumbent animal resting on its sternum, as the abdominal viscera are pushing the fetus back towards the pelvis. If the animal is recumbent it should be laid on its side with its four legs extended.

Species

(i) *Sheep, goat and swine*: Repulsion performed by arm and hand; (ii) *Bitch and cat*: Repulsion performed by fingers.

Rotation

Rotation is the turning of the fetus on its long axis by which the fetus is brought into a dorsosacral position [1, 2].

Procedure

To relieve dystocia in unipara by rotation of the body of the fetus; it should be repelled cranially out of the pelvic cavity. Copious lubrication of the birth canal and fetus is necessary to make rotation of the fetus in the containing structures possible and easier without injuring the uterine or vaginal walls. In some cases rotation may require the use of detorsion rod or *Cammerer's fork*. In these cases the rod is fastened to the two limbs after lubrication of the fetus and the birth canal and by the repulsion and rotation the position is corrected.

Species

(i) *Sheep, goat and swine*: Hand is used for rotation; (ii) *Dog and Cat*: Finger is used for rotation.

Version

Version is the rotation of fetus on its transverse axis by which into an anterior longitudinal presentation or posterior longitudinal presentation [1, 2].

This is done most often in the mare in *transverse ventral presentation*. Transverse presentation is changed into either anterior or posterior longitudinal presentation. In posterior presentation delivery is easy when compared to anterior presentation.

Extension and Adjustment of the Extremities

Flexion of limbs usually result in dystocia in uniparous animal but only rarely in multiparous animal. *Three basic mechanical principles* are necessary to effect a prompt and easy correction of a flexed extremity.

1. Repulsion of the proximal portion of the extremity;
2. Lateral rotation of the middle portion of the extremity, carpus, tarsus or neck;
3. Traction on the distal portion of the extremity.

Forced Extraction

Forced extraction is defined as to take out the fetus from the dam through the birth passage by

means of the application or introduction of external force or traction by attenders.

Application of Traction Instrument to the Fetus in Anterior Presentation [1]

1. Noose of the obstetrical chain above the fetlock and place a half-hitch around the pastern.
2. Applied around the lower jaw.
3. A loop of obstetrical chain around the neck behind the head is used occasionally (This technique is dangerous to a live fetus as it may cause injury to spinal cord and vertebrae in the occipital region).
4. A loop of obstetrical chain is more commonly used around the poll, under ears and through mouth in the manner of a War-Bridle for applying traction to the hand.
5. Blunt or knobbed krey's hooks applied on orbits.
6. Make an incision in the floor of the mouth anterior to the tongue extending through the skin between the mandibles.
7. The long or short blunt hook placed between the rami of the mandible.
8. In a dead fetus the long blunt hook may be passed through the mouth into the pharynx, turned dorsally and then traction may be applied fixing the hook in bones dorsal to the pharynx.
9. The hook passed over the top fetal croup and turned ventrally to engage the posterior border of the ischium or sacro-sciatic ligament.
10. Use of forceps in dystocia in dogs.

Application of Traction Instrument to the Fetus in Posterior Presentation

1. Traction may be applied to the fetal pastern or above the hock by the use of obstetrical chains.
2. In sheep and swine snares may be fastened around the hind legs.
3. Dog and cats snares or gauze around the hind legs or grasping the hocks with sponge forceps.

Indication for Forced Traction [1]

1. Uterine inertia.
2. After mutation has corrected the cause for dystocia.
3. Fetus is relatively too large to be expelled through the birth canal.

4. It is used in many cases of primipara with a small birth canal.
5. It may be used when birth canal is compressed by tumours/fat/pathological conditions.
6. It may be indicated in posterior presentation of fetus to hasten delivery and prevent the death of the fetus when umbilical cord is compressed between the fetal abdominal wall and brim of the pelvis.
7. Forced extraction may occasionally be used to save time or in order to avoid fetotomy or caesarean section where working conditions are extremely poor.
8. Dystocia due to emphysema fetus.
9. In many fetotomy operations forced extraction is used as an aid.
10. In canine, when one or two fetuses are present and secondary uterine inertia has set in. The pup become cyanotic and must be delivered immediately.

Fetotomy

Fetotomy is defined as those obstetrical operations performed on the fetus or embryo for the purpose of reducing its size from their parts either by its division or removal of certain of its parts. (i) Partial fetotomy—mostly performed; (ii) Total fetotomy—Not mostly performed [1, 3]. Total fetotomy can be divided into two categories, (i) Subcutaneous fetotomy; and (ii) Percutaneous fetotomy.

Subcutaneous Fetotomy

Parts or joints of the fetus are dissected/cuted out from within its skin. Fetal parts are removed while leaving the fetal skin intact to protect the genital tract and to serve as a point of traction, thus reducing the fetal bulk.

Percutaneous Fetotomy

Fetal part to be sectioned is directly accessible at joint level including skin.

Indication for Fetotomy

1. Shoulder lock, hip lock condition.
2. Fetal maldisposition that cannot be corrected by manipulative means.
3. Feto-maternal pelvic disproportion (FMD).
4. Fetus becomes stuck during *per vaginal* delivery.
5. During C-section when the dead fetus is either too large to be removed from the uterus in the normal way.

6. Deformed-malposition or monsters which cannot be corrected.
7. Incomplete dilation of cervix.

Point to be Considered During Fetotomy

1. Fetus must to be dead.
2. Accessibility of the fetus *per* vaginally.
3. Moderately-sized dead fetus; if more than that put for C-section directly.
4. Lateral deviation of the head cannot be corrected manually through pervaginum.
5. Birth canal in sufficient dilation to gain easy access to the base of the fetal head or neck for fetotomy is indicated.
6. The cervix is only partially (two or three finger) dilated—introduction of fetotomes are difficult-put for C-section.

Caesarean Section

Caesarean section is an option for treating dystocia that is commonly employed when the guidelines for extraction indicate that vaginal delivery would be unsafe for dam or fetus and fetotomy is not a viable alternative because the fetus is alive or there is inadequate room to place the fetotomes [2].

Table 1: Indication for caesarean section [2].

Maternal factors/dystocia	Fetal factors/dystocia
Irreducible uterine torsion	Fetal abnormalities (hydrocephalus, fetal ascites, anasarca, cleft palate)
Hydroallantois/Hydroamnion	Fetal monsters
Narrow pelvis/Pelvic fracture	Fetal maldisposition
Incomplete cervical dilation (ICD)	Fetal
Extra-uterine pregnancy	oversize/emphysema
Uterine inertia	Mummified fetus
Uterine rupture	Macerated fetus
Urinary bladder carcinoma	
Irreducible prolapse mass	
Bicornual pregnancy in equine	

Indications [2]

Preoperative Preparation

Preoperative preparation includes assessment of hematological and blood chemistry values and administration of sufficient fluid replacements, antibiotics and corticosteroids as per the requirements.

Operative Site for Caesarean Section

1. Left paralumbar fossa;
2. Lower left flank;
3. Right flank;
4. Left paramedian (lateral and parallel to milk vein);

Epidural Analgesia in Domestic Animals

It is a multiple spinal nerve block in which, by means of single injection of local anaesthetic solution into the epidural space, the coccygeal and posterior sacral nerves are affected, thus producing the anaesthesia of the anus, perineum, vulva and vagina. Area to be sensitized: (i) anus, (ii) perineum, (iii) vulva, (iv) vagina.

Table 2: Indication for epidural analgesia
 [1,2].

E	Episiotomy (A surgical incision made on the vulva to widen the vulva for pervaginal delivery of fetus).
P	<ul style="list-style-type: none"> Prevent the abdominal straining while handling of obstetrical cases. Prepartum vaginal or vaginocervical prolapse (VCP). Postpartum total uterine prolapse (TUP). Pneumovagina condition.
I	Incomplete cervical dilation (ICD) cases manual dilation of cervix with CMC solution or cervicotomy for reliving obstructed fetus.
D	Dystocia handling (by obstetrical operation such as, mutation operation, forced extraction, fetotomy, caesarean section).
U	Uterine rupture, vaginal or vulval rupture closure.
R	Removal of RFM manually, reconstruction of the vulva.
A	Assessing the uterus through vaginal incision (Colpotomy) for reliving mummified or macerated fetus.
L	L- Lignocaine (2%) is used to induce the epidural analgesia in domestic animals.

Indication

Procedure for Epidural Analgesia

- In large animals—site of epidural analgesia most commonly practiced was first coccygeal intervertebral space (Co1-Co2) and the sacro-coccygeal space (S5-Co1).
- The technique is considered easy to perform in standing animals and require no special equipment.
- The site of injection can be identified by moving the tail up and down in a pump-like manner.
- The site in the dorsal midline is clipped and aseptically prepared using a disinfectant solution. An 18-Gauge needle, 5 cm long is used to penetrate the intervertebral space. The needle is usually directed slightly in a cranial direction (10^0 from the vertical) and advanced slowly. A lack of resistance or popping sensation usually indicates that the epidural space is entered.

- Correct placement of the needle can be checked by the hanging drop technique which can be performed by placing few drops of lidocaine into the needle hub during insertion is observed to be aspirated under the effect of the negative pressure in the epidural space.
- Slowly infuse the local anaesthetic agent into the epidural space. Analgesic effect retains upto 30–150 min.

How to confirm analgesia set or not:

- Limping of tail;
- Cessation of straining reflex;
- Pricking of tail with needle reveals no pain.

Classification of Epidural Analgesia

Based on the volume of analgesic injected, epidural anaesthesia can be classified into caudal (low dose or low volume) epidural, and cranial (high dose or high volume) epidural.

Low dose or caudal epidural anaesthesia—it is the most commonly used technique and it requires the injection of a small volume of the drug. This technique desensitizes the caudal sacral nerves within the spinal canal. The motor functions of the hind limbs are not affected. The most common areas that are desensitized by low volume epidural analgesia that includes tail of the animal, vagina, vulva, anus, rectum and urethra.

High dose epidural anaesthesia—the volume of the analgesia injected to be relatively large and obviously analgesia is extended further cranially. Analgesia may reach up to the diaphragm resulting in some degree of cardiopulmonary compromise. In addition, the motor functions of the hind limbs will be affected resulting in ataxia and recumbency in some animals. This technique is less frequently used.

Precaution During Administration of Epidural Analgesia

- Should be aseptic.
- Slow administration of analgesia.
- Volume of drug does not exceed the calculated dose.
- Monitor the temperament of the animal.
- Check whether the needle in epidural space while administration of medication.

Commonly Used Drugs for Epidural Analgesia

Lidocaine (lignocaine), bupivacaine, ropivacaine, xylazine, medetomidine, romifidine, ketamine, tramadol, and neostigmine.

Table 3: Site of administration of epidural analgesia [2].

Species [2]	Space	Needle size	Volume (ml) (Lignocaine)
Cow and Buffalo	Sacrococcygeal Intercoccygeal	18 Gauge, 5 cm long.	Heifer and small cow: 5 ml Large cow: 7–10 ml.
Horse	Intercoccygeal space is preferable (In aged animal Sacro-coccygeal, Thick muscle and space gets ossified and filled with fat)	18 Gauge, 4–8 cm long.	6–8 ml in a light hunter type mare weighing 450 kg.
Sheep and Goat	Sacrococcygeal, Intercoccygeal	20 Gauge, 3.5 cm.	2–3 ml
Pig	Lumbosacral space	18 Gauge, 10–15 cm	1 ml per 4.5 kg b.wt (not exceed more than 4–5 ml)
Dog and Cat	Lumbosacral space	22 or 24 Gauge 3–5 cm	1 ml per 4.5 kg b.wt (not exceed more than 4–5 ml)

CONCLUSION

The present overview explained all aspects of obstetrical operation in domestic animals. Epidural analgesia in different domestic animal is described. Surgical procedure is explained in flow diagram model.

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