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Case Study

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Delivery of Hydrocephalic Fetus by Caesarean Section in Ewe

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A B S T R A C T

Caesarean section is a life-saving procedure for animals which are struggling with dystocia or unable to expel a fetus after the completion of the gestation period. A sheep weighing 50 kg was presented to our clinic, Mobile Veterinary Clinic, Jagitial with a history of straining and difficulty in parturition. Per vaginal examination revealed that the head of the fetus was swollen, a condition called as hydrocephalus fetus or hydrocephalic fetus. For this reason, the dam was unable to expel the fetus through the birth canal, so it causes dystocia. Hence, a caesarean section was performed in the left flank approach to deliver the dead hydrocephalic fetus to save the life of the dam. After the caesarean operation a course of antibiotics, and non-steroidal anti-inflammatory agents were administered for 7 days and on the day of operation intravenous fluids, and DNS was given to the sheep. The sheep responded well to the surgery and recovered normally without any complications within 14 days after the surgery. This article aims to report a case of dystocia due to a hydrocephalic fetus, which was successfully treated by Left flank caesarean section.

Introduction

Hydrocephalus is an excessive accumulation of cerebrospinal fluid (CSF) in the ventricles of the brain or the subarachnoid space (Purohit *et al.*, 2012). There are two types of hydrocephalus conditions: internal and external. Internal hydrocephalus fluid accumulates in the brain's ventricles, whereas external hydrocephalus fluid accumulates in the subarachnoid space outside of the brain (Vidya Sagar *et al.*, 2010). Generally, CSF protects, nourishes, and supports the central nervous system's functions. It is primarily produced by the choroid plexuses of the brain ventricles and the ependymal cells that form the ventricular system's lining. CSF circulates in the brain's ventricular system, subarachnoid space, and spinal cord. The cerebrospinal fluid is reabsorbed via the arachnoid

villi. An imbalance between the production and drainage of cerebrospinal fluid can result in an excessive accumulation of fluid and, as a result, the head of the fetus swells (Arthur *et al.,* 2001). Congenital factors, nutritional factors like vitamin A deficiency or infectious factors like bovine viral disease are causes of hydrocephalus and also a simple autosomal recessive gene (Chhetri *et al.,* 2018; Roberts, 1971) and an autosomal dominant gene (Leipold and Dennis, 1986) with incomplete penetrance are associated with hydrocephalus.

The symptoms of hydrocephalus include increased intracranial pressure, swelling of the head, convulsions, mental disability, and in some cases death may occur. Hydrocephalus condition is mostly seen in ewes, does, mares and sows, whereas in cows and buffaloes this condition is very rare (Long, 2001).

A hydrocephalic fetus is one of the factors for dystocia in animals because a fetus with a swollen head cannot come through the birth canal of a dam. The head of the fetus is bigger than the cervical opening, leading to difficulty in parturition or dystocia and the fetus is delivered by caesarean section or manually through excision of the fetus head followed by traction (Ravikumar *et al.,* 2013; Tripathi *et al.,* 2014).

Dystocia is defined as the condition in which a mammalian mother experiences difficulty in expelling the fetus at parturition (Youngquist *et al.,* 2007; Blood *et al.,* 2011). It can be caused by either maternal or fetal factors. Maternal factors include incomplete dilation of cervical opening (ring womb), narrow birth canal and uterine inertia, uterine torsion, vaginal prolapse, and sciatic nerve paralysis impacting the function of hind quarters (Patial *et al.,* 2014). Fetal factors include fetal malposition, feto-pelvic disproportion, fetal malformation, hydrocephalus fetus and congenital defects of the fetus.

The normal parturition process of mammals includes three stages (Noakes *et al.,* 2009; Fubini and Ducharme, 2004). In the first stage, the mother isolates itself from the herd, preparing a birth area, becoming restless and reducing food intake. Cervical dilatation will occur in this stage, at the end of this stage, abdominal contractions grow more powerful and frequent, which resulted in rupture of the first water bag/ allantoic sac.

At the beginning of the second stage frequency and force of abdominal and uterine contractions increase, it resulted in the rupture of the 2nd water bag (i.e. amniotic sac) then the fetus will be expelled within 15-30 minutes.

In the third stage, fetal membranes are expelled within 4-6 hours of parturition (Brounts *et al.,* 2004; Menzies and Bailey, 1997). Not all parturitions proceed normally. But one problem that sometimes plagues the mother is dystocia.

Dystocia occurs when the first and/or second stages of parturition are delayed (Purohit,2006; Fubini & Ducharme, 2004). Dystocia is more common in large ruminants compared to small ruminants like sheep and goats. The global prevalence of dystocia in small ruminants is minimal (<5 %) (Brounts *et al.,* 2004; Purohit, 2006; Sharma, 2014; Bhattacharya *et al.,* 2015).

In sheep and goats in winter, however, more cases of dystocia are seen in primiparous females (Bhattacharya *et al.,* 2015). In these ruminants, incomplete dilation of the cervix, feto-pelvic disparity, fetal emphysema, fetal monsters, multiple fetuses, and fetal malpresentation were the most common causes of dystocia that necessitated a caesarean section.

Caesarean section, life-saving surgery for animals, is a major surgery. In case of dystocia, the operation should be performed as soon as possible. If the fetus is still alive, an early caesarean can save both of their lives. Even if the fetus is dead, the surgery should be performed to save the dam's life, to minimize dam suffering and to avoid economic losses to farmers.

Case history and clinical observations

A sheep on its third parity was presented to our clinic, Mobile Veterinary Clinic, Jagitial. According to the farmer history, it was straining and experiencing difficulty in parturition from last 6 hours, she had normal parturitions in earlier lambings. General clinical examination revealed that the 50kg ewe was dull, depressed, straining, having ruptured the water bags and showing difficulty in parturition. The dam's physical parameters (rectal temperature, pulse rate and respiration rate) were in the normal range.

Per vaginal examination revealed that the cervix of the dam was completely opened and fetus was in anterior longitudinal presentation, the absence of suckling reflex indicated that the fetus was dead, the head of the fetus was swollen. So it was diagnosed as hydrocephalic fetus. So this hydrocephalic fetal condition leads to dystocia. As the large head of the fetus could not pass through the birth canal of the dam, so it was decided to deliver the fetus through the caesarean section.

Materials and Methods

The surgical site was prepared by shaving and washed with soap and cleaned the operation site with surgical spirit. Later ewe was restrained on its right lateral recumbent position, local anaesthesia of 2% Lignocaine hydrochloride @12 ml subcutaneously was given in inverted L block 2- 3 inches below the transverse process of lumbar vertebrae and in the middle of the left para lumbar region. Sterilized drapes were used to cover the incision site.

A long incision about 14 to 15 cm at the center of para lumbar area 2-3 inches below the lumbar vertebral transverse process over the skin, then moping was done by using the mops at the incision site. Later, abdominal muscles and peritoneum were incised by holding the muscle edges with allies forceps. Then pushed omentum cranially to expose gravid uterus. After that uterine horn was grasped by holding the hind legs of the fetus and uterus was lifted outside the abdominal incision. After making nick on the uterine muscle on the grasped fetal hind leg area and uterine muscles were held with allies forceps to avoid the accidental slipping and leakage of fetal fluid into abdominal cavity and later uterine horn incision was extended with scissors in longitudinal direction on uterine horn about 5- 6 inches length along its greater curvature between rows of caruncles, to facilitate easy removal of fetus from the uterus without causing irregular laceration of the uterus. Another assistant pulled out the fetus from the uterus by holding its two hind legs. The fetus head swollen because the cerebrospinal fluid accumulates in the brain's ventricles this condition is regarded as internal hydrocephalus and fetus was dead (Fig.1). Fetal membranes were very hard to remove, so it left in the uterus.

The uterine incision and abdominal muscle incisions were rinsed with normal saline to remove the fetal fluids contamination and blood clots. The uterine incision was sutured by using chromic catgut No.1, in a double layer of Inverted Cushing suture pattern (Fig.2).

About 300 to 400 ml of Normal saline and 100 ml metronidazole injectable fluids were poured into the peritoneum to avoid adhesions of visceral organs. Using chromic catgut No.2, the peritoneum was sutured in a simple continuous pattern. Abdominal muscles were sutured with Polyglycolic acid suture material with a simple continuous and interrupted pattern. Skin incision sutured with silk suture material (non-absorbable) in Ford interlocking suture pattern (Fig.3). Then antiseptic dressing was done to the surgical wound. After the surgery the animal was able to get up on its own (Fig.4) with no signs of internal or external bleeding, walking normally and drank water. Post-operative treatment was given by inj. Calcium borogluconate @ 450 mlIV, inj.DNS @ 500 ml IV and the antibiotic - Triax S3 (Ceftriaxone and Sulbactam) @ 5mg/kg B. wt. BID, IM for 7 days, non-steroidal anti-inflammatory agent-inj. Melonex (Meloxicam) @ 0.2 mg/kg B. wt. IM for 3 days (Dasari *et al.*, 2021)

and inj. Rumeric (B-complex and amino acids) @ 2ml IM for 3 days. Antiseptic dressing of surgical wound was done daily by applying oint. Lorexane BID for 10 days. To facilitate uterine involution inj. Syntocinon (Oxytocin) 20IU were given IV immediately after IV fluids administration and on subsequent days.

Replanta powder was given 20 gm per day orally. The placenta was expelled within 12 hours after surgery. Skin Sutures of surgical wounds were removed 14 days after surgery. The animal completely recovered within 14 days without showing any complications.

Results and Discussion

Hydrocephalus is a dropsical condition of excessive accumulation of fluid in the ventricular or subarachnoid space characterized by marked enlargement of the cranium (Noakes *et al.,* 2009).

The hydrocephalic fetus is either born dead or died soon after birth. Our case of an internal hydrocephalic fetus caused dystocia treated by caesarean section followed by a course of antibiotics and non-steroidal anti-inflammatory drugs.

The animal responded well to these medications. The animal completely recovered within 2 weeks without any complications. Administration of non-steroidal anti-inflammatory drugs and antibiotics, as well as tetanus toxoids were given to the animal before caesarean section to ensure effective results (Fubini and Ducharme, 2004; Kumar *et al.,* 2013; Fubini *et al.,* 2002).

Sterilized surgical instruments, gentle tissue handling, proper suture materials and patterns and correct infolding of the uterine incision to prevent leakage and also helps to reduce the detrimental adhesions.

These adhesions have a negative impact on the ewe's future reproductive efficiency. Aseptic surgical technique will save the lives of dam and fetus, ensure the dam's reproductive efficiency and avoid post-operative complications such as peritonitis, seroma formation, retained placenta, metritis, endometritis, skin suture dehiscence, subcutaneous emphysema, adhesions, and mastitis.

There are different approaches are there for caesarean section in small ruminants. However, most of the surgeons prefer the left paralumbar or left flank approach during caesarean section because abdominal wall closure is easy.

Casting, restraint, and local anaesthetics should enable for the surgical approach, fetal extraction, and uterine closure in recumbent procedures. Most of the cases after removing of the fetus the uterus may slipped from surgeon's hands.

To avoid this problem apply one stay suture on uterus with non-absorbable suture material hold it until suturing the uterus or gently hold the uterus with two Allies forceps. While making incision on uterus, care must be taken to avoid contaminating the peritoneal cavity with uterine contents, which could lead to peritonitis.

After cleaning the uterine incision and abdominal muscle incisions with normal saline, pour the antibiotic powder like Dicrysticin-DS, which provide an antibacterial cover to prevent secondary bacterial infection (Dasari and Maramulla, 2021; Dasari *et al.,* 2021). Failure to care for animals after the surgery can result in complications such as pus in the skin sutures due to dung or other dusting particles or pain in the incised area. So, it is essential to provide post-operative care by following the daily antiseptic dressing and administering antibiotics and anti-inflammatory medication along with a hygiene environment for the animal.

In conclusion, Caesarean section is the most significant and life-saving method for dystocia that cannot be relieved by manually. If the surgery could be conducted early enough, it could deliver a live fetus as well as save the life of the dam, both reducing death, suffering of animals and economic loss for farmers.

Fig.1 Hydrocephalic fetus

Fig.2 Suturing the uterus in Inverted Cushing suture pattern

Fig.3 Ford interlocking sutures were applied to the skin

Fig.4 Animal was standing after the surgery

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