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Umbilical hernia in ruminant calves: A review

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Abstract

The following study was conducted in 6 cases of calves having congenital hernia. In six calves 5 were female. The animals were examined physically. During examination distinct hernial ring was noticed. The hernias were classified as reducible hernias as no adhesions were noticed. The animals were subjected to herniorraphy. The animals were prepared surgically via clipping and shaving of hairs and preparing the site aseptically. The animals were sedated using Xylazine 0.03 to 0.05 mg/ Kg bodyweight. The site of operation was desensitized using 2% lignocaine hydrochloride by local infiltration. The animals were restrained in dorsal recumbency. An elliptical incision was given on the hernial ring. While giving incision care was taken not to puncture any visceral organ. After giving incision, the contents of intact peritoneum was inverted into abdominal cavity. After repositioning of the hernial ring, kelotomy was performed. After Kelotomy, the hernial ring was sutured with over-lapping mattress suture 'Vest Over Pant' using Nylon No.2. The sutures were first preplaced and then tightened from centre to periphery. The skin of hernial sac was trimmed off and the skin lateral to hernial ring was undermined and sutures were put to the skin using Nylon by simple interrupted pattern. The animals were treated post-operatively with antibiotics for 5 days and with anti-inflammatory for 3 days. The sutures were removed after 20th post-operative day. All the animals recovered uneventfully.

Keywords: Umbilical hernia, ruminant calves

1. Introduction

Hernia, a condition in which part of the organ of abdomen or pelvic either displaced or protruded with the intact peritoneal layer through a natural or pathological weak opening in the thoracic or abdominal cavity containing it with intact skin. Hernias can be either congenital or acquired. Usually occurs as solitary one or some time associated with defects from other parts of the body. The shape of hernia ring is either elongated, oval or round and size may vary from small hazel to the size of foot ball. The hernia consists of a hernial ring which is composed of abdominal muscles through which the contents of abdomen and peritoneum is passed. The other part composed of hernia sac which contains an outside sac composed of skin and inside sac composed of peritoneum. The contents of hernia are usually fat, omentum and, in some larger hernia, segments of small intestines, parts of liver and sometimes uterus and bladder.

The umbilicus in new born consists of tube like structure which connects fetal bladder to the placental sac known as urachus and remnants of umbilical vessels that transport blood from fetus to its mother. Immediately after birth, this structure gets atrophied and remnants of urachus are remained in the abdomen. The wound healed by cicatrization and represent in the umbilicus in the later part of life. The part of the body where these parts are present if remains opened causes protrusion of organs through the opening due to faulty closure of umbilical opening at birth or hypoplasia of the abdomen muscles resulting in the formation of ring in the mid-ventral part of abdomen (Tyagi and Jit Singh, 2010, Sutradhar *et al.*, 2009, Al-Sobayil and Ahmed 2007) ^[13, 11, 1]. Umbilical hernia or omphalocele is displacement of part of organs or complete organs through a defect in the abdominal wall at the region of umbilicus with skin intact. Umbilical hernia develops when the umbilical ring fails to close appropriately at birth. This can be congenital or acquired at birth. The congenital cause might be due to multiple births and shortened gestation lengths which are two important risk factors for congenital umbilical hernias in calves (Herrmann *et al.*, 2001) ^[4]. These are probably the result of a polygenic threshold character; passively involving a major gene whose expressions is mediated by breed background (Steenholdt and Hernandez. 2004) ^[10]. The frequency of umbilical hernia in the male progeny ranges from 1-21% and is consistent with the hypothesis that the enhancer is the carrier of major dominant or co-dominant gene with partial reentrance for umbilical hernias (Ron, *et al.* 2004) ^[9]. High milk production and growth rate are some of the genetic side effects which predispose to form umbilical hernias (Tangudarai and

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Vijaykumar, 2003)^[12]. Acquired umbilical hernia are noticed after few weeks of birth. Many factors predisposes for acquired umbilical hernias, like mal-handling of the animal at birth with improper manual cutting of cord rather than to break it on its own, breaking the cord too close to the body wall, more force applied during traction of fetus during parturition. Some systemic conditions like umbilical abscess, diarrhea and constipation causes increase in the abdominal pressure which results in weakening of abdominal muscles resulting in hernia. Umbilical infections are associated with risk of umbilical hernia in calves during the first 2 months of life (Steenholdt and Hernandez. 2004)^[10].

Choice for non-surgical treatment of small and non-complicated hernias in animals include bandages for abdominal support which can be placed for 2-4 weeks, hernia clamps or bands, continuous irritation of hernia ring everyday by digital manipulation and by injections of irritants around the hernia ring. In case, where the hernias are large and are with umbilical infections of umbilical remnants, which are non reducible and which have adhesions of hernial sac contents and which cannot be resolved through non surgical treatment, then these hernias are subjected to correction through surgical treatment. Many of the small hernias which are about the size of 1 cm will usually resolve spontaneously. However, large defects are unlikely to resolve without any surgical intervention. Hernias which are about the size of 3-4 cm often get resolved within first 3-4 months of life. However large hernias which often get enlarged along with the growth proportion of animals gets more pendulous, requires surgery which is done based on the value of the animal, likelihood of intestines getting strangulated and failure of hernia to resolve spontaneously.

The recommended surgical procedure is hernioraphy, which usually involves removal of hernial sac, evaluation of hernial contents and removal of internal umbilical remnants and direct opposition of incised margins of hernia. In animals where the hernial ring is large often requires prosthetic mesh to oppose the abdominal walls. Although very few hernias requires abdominal mesh. The usage of mesh is not recommended in hernias with umbilical infection.

2. Treatment

Pre-operatively, the animals are kept off feed and off water for 24 hours and 12 hours respectively. The animals are usually administered with electrolyte solutions and adequate fluid therapy to correct any dehydration and acid base imbalances. The animals are restrained in dorsal recumbency and liberal operative area is shaved and prepared for surgery (Fig. 1). Injection Xylazine @0.03 mg to 0.05 mg per kg B.Wt diluted with about 1 ml of distill water was administered intramuscularly. Under local anesthesia using lignocaine hydrochloride, an adequate elliptical incision was made through the skin on each side of the swelling. Two curved incisions were made on either side of the scar which usually present on the ventral aspect of the hernia. These incisions were connected anteriorly and posteriorly. The hernial sac was grasped using allis tissue forceps and the inner hernial sac was separated from the outer hernial sac using blunt dissection. The skin between the two elliptical incisions was dissected from the hernia scar and discarded (Fig. 2). The skin lateral to the incision was then undermined to expose the hernial ring (Fig. 3). The contents along with the intact peritoneum were inverted inside the abdominal cavity. After separation of the inner hernial sac from the outer one and after

reduction of the content, the hernia sac was reduced to the abdominal cavity and then the hernial ring was closed. When the hernial ring was too large and the peritoneum was ruptured, then a rubber balloon was used to retain the intestine in its place until closure of hernial ring was completed. Also, when the hernial ring was too large, a disc of inert material can be used to give support to the friable tissue or used to bridge tissue gaps that cannot be eliminated by suturing alone. The sac is freed from the ring by blunt dissection and intact sac is repositioned in to the abdominal cavity. If the hernia contents cannot be returned into the abdominal cavity due to large voluminous hernial contents and small hernial ring then the ring should be enlarged before the contents are reduced into the abdominal cavity. If the adhesions are severe, it may be necessary to open the sac. After the adhesions are broken, the herniated contents are repositioned in the abdominal cavity. The sac is then sutured or removed and dissected prior to closing the ring. Kelotomy was performed and the circular hernial ring is converted into an oval shape for smooth closure by incising the ring caudally and cranially with 'V' shaped incisions. Where the ring is small, kelotomy is not necessary, the ring was the closed by placing a series of overlapping mattress (Vest- Over-Pant) sutures through its edges using Nylon No.2 suture material (Fig. 4). After all the suture have been inserted, the ends of the suture are pulled in opposite direction, tightened and sutured starting from centre towards the end of the commissure (Fig. 5). The exposed edges of the ring are anchored with the abdominal wall using a simple continuous/ lockstitch/ simple interrupted suture pattern. The skin flaps are opposed by vertical mattress sutures using nylon no. 1. Antibiotics should be administered for 3 to 5 days. The cutaneous sutures are removed on 10th to 12th day post surgery. Post-operatively, a controlled exercise and a less bulky diet for about a week is recommended for about a week to prevent excessive strain on the suture line. In case of a large sized hernia, excessive tension on the suture line may be avoided by making incisions through the fascia of the rectus abdominus muscle. Bilateral parallel incisions are made just away from the suture line to avoid recurrence of hernia by relieving tension on the primary suture line. Alternatively, hernioplasty may be done. If some degree of infection is present initially or adhesions are extensive



Fig 1: Pre-operatively operative site prepared surgically.



Fig 2: Elliptical incisions on both side of ring and removal of hernial sac.



Fig 5: Hernial ring closed with nylon with overlapping mattress (Vest Over Pant).

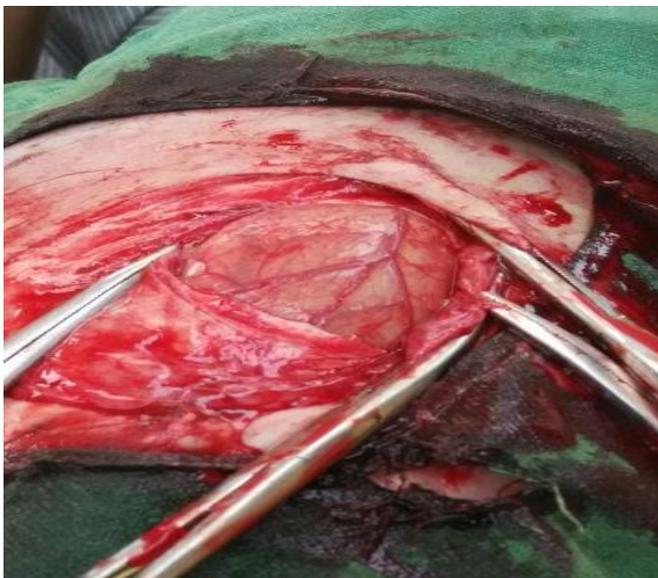


Fig 3: Exposure of hernial ring.



Fig 4: No.2 Nylon sutures placed serially in Vest over Pant fashion to overlap the edges of the hernia.

3. Results and Discussion

In Calves, umbilical hernia is the most common form of hernia which can occur in any breed and is more frequent in females than males (Steenholdt, 2004, Sutradhar *et al.*, 2009 and Tyagi and Jit Singh 2010) ^[10, 11, 13]. The overall incidence of congenital hernia was 1.8% (Tangudarai and Vijay kumar, 2013) ^[12]. The prevalence of an open hernial ring in the first week of life can vary between 18-24% (Dennis and Liepold, 1968) ^[2]. Horney *et al.*, 1984 ^[5] and Pugh (2002) ^[7] reported that the umbilical hernia occurred at an average age of 6- 7 weeks after birth. Sutradhar *et al.*, 2009 ^[11] stated that the incidence of hernia was highest (20.84%) at 5 weeks of age.

Umbilical hernia is classified as external hernia and is usually manifested by as an external swelling which varies in shape and size and must be differentially diagnosed from other swellings such as abscess, cellulitis, heamatoma, cyst and neoplasm. The hernial sac is formed by the skin, fibrous tissue and peritoneum. The contents are usually fat and omentum. The larger hernia sac may contain loops of small intestine, sometime a portion of abomasums or greater omentum (Haskell, 2008) ^[6]. Umbilical remnant is common in calves and can be a risk factor for the development of umbilical hernia. These infections may cause weakening of the abdominal wall or hindering the closure of umbilicus resulting in hernia formation. Calves that are born via C-section are vulnerable for umbilical infections and umbilical hernias. The risk will be much more greater if the umbilical vessels are cut rather than allowed to break as the calf is delivered. Other causes of umbilical swelling in the umbilical region include umbilical abscess, infection of external umbilical cord remnants, urethral rupture in males, cellulitis and hematoma. Palpation of the umbilical region in lateral and dorsal recumbency is helpful in defining reducibility and in identifying any enlarged internal remnants. The external palpation of umbilical region will define the hernia ring, the size of the hernia, the reducibility of hernia and possibility of the contents. In uncomplicated cases, the hernial ring should be completely reducible and have a discrete circumferential hernia ring.

Size of the hernia depends upon the extent of umbilical defect and the quantity of herniated contents in calves (Pugh, 2002, Horney *et al.*, 1984, Rings 1995, Steenholdt and Thernandez.

2004) [7, 5, 8, 10]. Oval herniated ring can be palpated without any pain if the hernia contents are reducible, however presence of adhesions prevent reduction. When it is reducible hernia the hernia ring can be palpated easily, and when it is incarcerated, the hernial ring cannot be palpated easily as it will be impossible to reduce the hernial contents. Hernial contents seldom get strangulated with symptoms of pain and intestinal obstruction (Tyagi and Jit Singh, 2010) [13]. Many calves can live without any problem with umbilical hernia, however there will be chance of risk that a segment of intestine get slipped into the hernial opening and become strangulated which creates a surgical emergency as it will constrict the blood vessels, which hinders blood supply to the tissues. In Strangulated hernia along with the swelling, symptoms of pain, fever and obstruction of bowel can be witnessed. Umbilical hernia can be treated either through Conservative techniques or by surgical methods. Animals with uncomplicated hernia usually can grow normally without any abnormal findings associated when examined physically and with laboratory findings and which do not show any gastro intestinal dysfunctions. Animals with strangulation of abdominal contents may have non-reducible hernias and can be depressed, dehydrated and anorectic.

Infection of the umbilical such as umbilical abscess, Pervous urachus may end up with umbilical hernia. Conservative treatment is suitable only for small reducible hernias. Reducible umbilical hernias which usually contain a part of intestine or omentum often respond to belly bandages and clamps. Belly bandages not only reduce the hernia, also allows the hernial ring to close by cicatrization (Tyagi and Jit Singh, 2010) [13]. Radical surgery is indicated when the hernia is large and non-reducible.

Proper positioning of animal is important to facilitate reduction of hernial contents and herniorraphy. Reduction of large hernial contents may be easier with the animal in lateral or dorsal recumbency (Edmondson, 2008 and Sutradhar *et al.*, 2009) [3, 11]. Local regional anaesthesia is most desirable procedure in many situation. In this study, local or regional anaesthesia with 2% Lignocaine was used and was found to be safe and effective. However with little Xylazine sedation provides good restraint with lesser struggling of animals, smooth manipulations of the contents, easy reduction and suturing of hernial ring.

Radiography such as plain and contrast may be helpful in identifying the hernial contents. Exploratory puncture may be done to ascertain the nature of contents of swelling (Tyagi and Jit Singh, 2010) [13]. Ultrasonographic investigation may help to detect or rule out the infection status of contents of hernia which may help to clarify the extent to which the internal umbilical structures are infected and swelled. It also helps to determine which viscera are present in hernia and also aids in the determination of best therapeutic measure for umbilical hernia.

Most of the umbilical hernia which are about 1 cm in size may show up to one month and resolve spontaneously. However, bigger defects are not likely to resolve without any surgical intervention. Non surgical management options for small, uncomplicated hernia in young animals include abdominal bandage support placed for 2- 4 weeks, hernia clamps or bands, daily irritation around the hernial ring. Many times these are neglected for financial reasons and in convenience. Therefore, surgery based on the value of animal and the likelihood of intestine getting strangulated and failure of hernia to resolve on its own. Surgical correction is the

treatment of choice in large hernias, hernias with umbilical content infections, irreducible hernia, and hernia with adhesion of the abdominal contents to the hernial sac. If the hernial contents are small intestine, then it should be repaired surgically as early as possible to prevent strangulation of intestine.

The prognosis for uncomplicated hernia repaired surgically is good to excellent. Keeping off feed and off water of the surgical patient for 24 hours and 12 hours respectively will not only facilitate early healing of defect, also decreases the likelihood of wound dehiscence. Post-operatively, for 2 – 4 weeks the animals movement should be restricted and should be confined to stall feeding to prevent any wound dehiscence. Operative site should be monitored for discharges or infection. Inflammatory swelling and hernial swelling will usually present for 4 to 5 day and should be decreased in successive days. Sudden swelling indicates signs of wound dehiscence and should be treated accordingly. Infected umbilical hernias have higher incidence of wound dehiscence, incisional hernia and sometime leads to peritonitis. However with proper surgical technique, the prognosis is still favourable.

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