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**Clinical Article**

# SURGICAL MANAGEMENT OF UMBILICAL HERNIA IN FOUR FOALS

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## SUMMARY

Four healthy foals with small umbilical swelling since birth were diagnosed as umbilical hernia from history and clinical examination. The hernia rings were small around 2-3 fingers diameter and contents were reducible. Closed (n=1) and open (n=3) herniorrhaphy were performed to repair the hernias under general anaesthesia using xylazine, ketamine and isoflurane and all the animals recovered without any complications or recurrence up to 6 months. A reduction in surgical time was recorded with closed herniorrhaphy technique as compared to open herniorrhaphy.

**Keywords:** Foal, Surgery, Umbilical hernia

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Umbilical hernia is a commonly encountered disease of the newborns where there is protrusion of the abdominal organ through a defect in umbilicus which is genetic or infectious in origin. The hernial contents mainly comprise of fat, omentum or segments of small intestines and herniation may be reducible or irreducible. Diagnosis is usually made on the basis of history and clinical findings. Ultrasonography is helpful in identifying the herniated tissue. Many treatment modalities are available for umbilical hernias in equines *viz.*, non-surgical (pressure bandaging, clamps) and surgical (open and closed herniorrhaphy and hernioplasty) depending upon the size and type of hernia (Orsini, 1997). The advantage of the open technique is being able to assess the contents of the hernial sac but it increases the risk of postoperative evisceration, abdominal adhesions, and peritonitis. The disadvantage of closed technique is the increased risk of suturing the intestine with the abdominal wall. Hernioplasty using prosthetic mesh is indicated in large size hernias which cannot be repaired by herniorrhaphy. Appositional and imbrication suture are preferred suture techniques for repair of hernia which can be used with absorbable as well as non-absorbable sutures. This communication describes open and closed surgical technique for repair of umbilical hernias in four foals by closing the hernial ring with cruciate sutures using absorbable sutures under general anaesthesia using xylazine, ketamine and isoflurane.

Four foals were presented with swellings in the umbilical area since birth and the size of the swelling were slowly increasing as per owner. Clinical parameters of all foals were within the normal range at the time of presentation. Examination of the umbilical areas revealed soft protruding tissue which can be reduced back in the abdomen and the hernial rings ranges from 2-3 fingers upon palpation (Fig. 1). All the swellings were diagnosed as umbilical hernia based on the history and clinical examination and surgical treatment was opted. The foals were premedicated with Xylazine (@ 1 mg/kg body weight intravenously after keeping off fed and withholding water for 12 hours prior to surgery. Ketamine @5 mg/kg body weight was administered intravenously for induction and after endotracheal intubation, the foals were maintained with 2% Isoflurane inhalant anaesthesia. The foals were restrained on dorsal recumbency, the umbilical area were shaved and prepared aseptically. An elliptical incision of about 3 cm was given at the umbilicus and the subcutaneous tissue was undermined to separate the hernia sac. After identifying the hernia ring, hernial sac was inverted into the abdomen and cruciate sutures were applied using absorbable suture material polydoxianone No. 1 without opening hernia in closed technique (n=1) (Fig. 2). In open technique (n=3), herniorrhaphy was performed after resecting the hernial sac (Fig. 3). Subcutaneous tissue was closed with PDS (No. 1) in a simple continuous suture pattern and the skin was closed with Nylon (Polyamide No. 0) in simple interrupted pattern. The foals were administered Ampicillin antibiotic @ 20 mg/kg body weight intravenous twice daily for 5 days; injection Meloxicam (Melonex®, Intas Pharmaceiticals) (5 ml) intramuscular once daily for 3 days. In the post-operative period, the surgical site was properly bandaged to prevent contamination and reduced abdominal pressure on the incision site. Antiseptic dressing was done until suture removal on 10$^{th}$ post-operative day.

Umbilical cord connects the fetus with the mother during fetal life but at the time of parturition, the cord ruptures, coils and the opening in the muscle gradually

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Fig. 1. Umbilical hernia in foal with hernial ring of two fingers (Case 1)

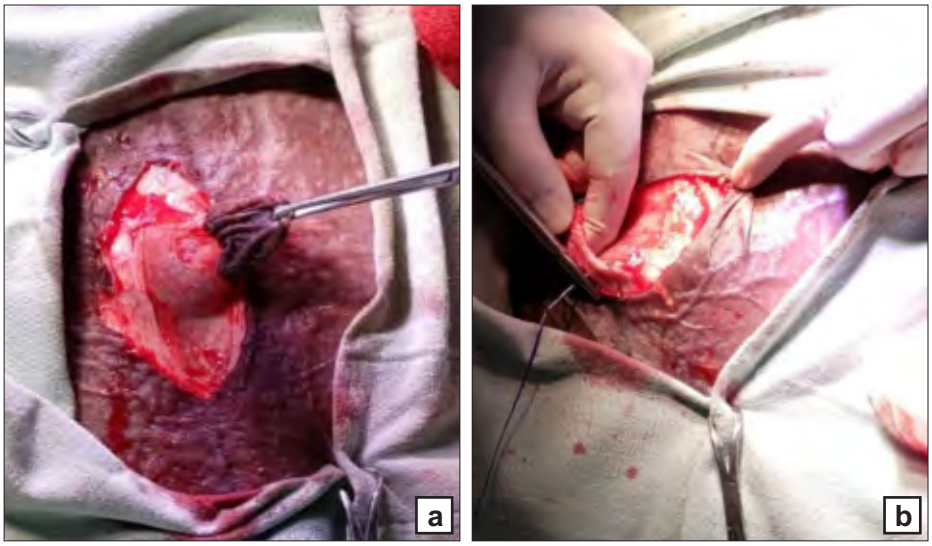


Fig. 2. **(a)** Closed herniorrhaphy (Case 4). Separation of the hernia sac and identification of hernia ring after an elliptical skin incision; **(b)** Suturing of hernia ring using cruciate sutures in closed herniorrhaphy

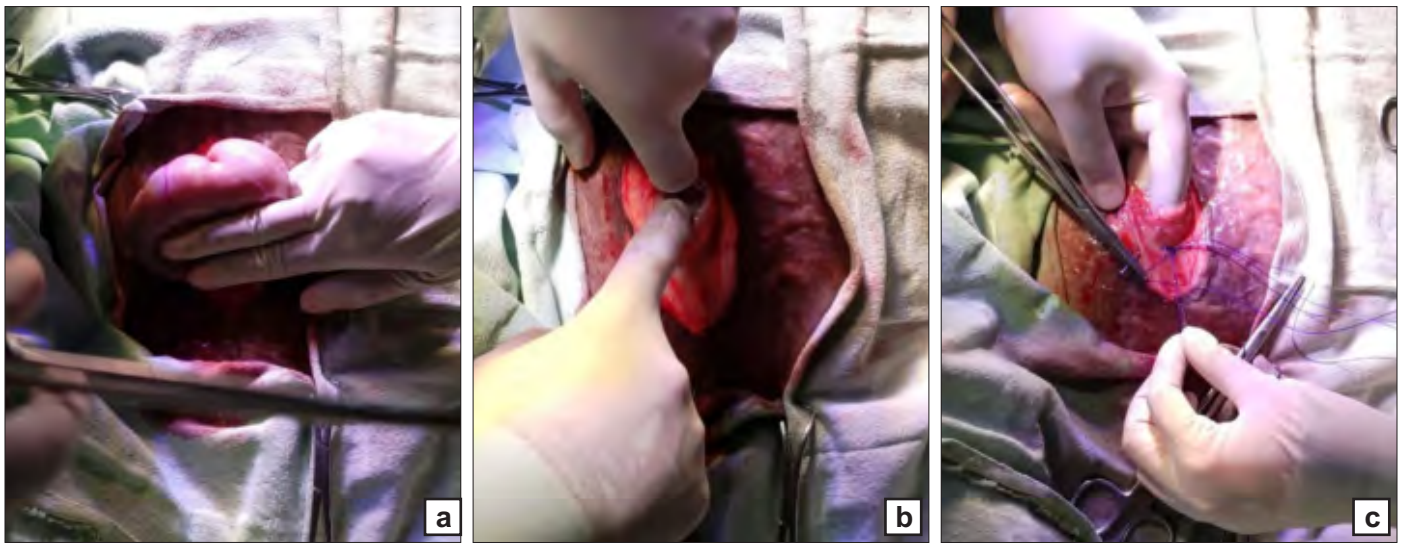


Fig. 3. **(a)** Open herniorrhaphy. (Case 2) Protrusion of intestines after incising the hernial sac; **(b)** Pushing the herniated organs in the abdomen prior to suturing the hernia ring; **(c)** Application of cruciate sutures a the hernia ring in open herniorrhaphy

closes. But defective closure of the umbilical muscles after birth may leads to umbilical hernia or septicemia. Umbilical hernia is a very common congenital defect in horses and may involve a recessive gene. Other umbilical affections like patent urachus or abscessation may occur singly or in combination with hernia. All the four cases had history of swelling at umbilicus since birth suggesting the genetic etiology and without any associated infection. Markel *et al.* (1987) reported the frequency of umbilical hernias in foals to be 0.5 to 2%. The incidence of umbilical hernia is twice in females as compared to males, which raises the possibility that this defect is sex-linked or involves a sex-linked factor (Freeman and Spencer, 1991) but in present study only one animal was female and three were males.

Though ultrasonography is a valuable diagnostic tool for assessing hernia contents, none of the four cases were assessed ultrasonographically and diagnosis was solely made from history and clinical findings as simple reducible hernias. Ultrasonography may help in visualization of hernia contents and intra-abdominal structure not accessible to deep external manual palpation. In an uncomplicated hernia, the intestinal loops present normal motility and a normal appearance of the wall. Sonographic examination of umbilical hernia by Magri (2018) reveals the presence of a portion of the intestine with a hypoechoic and thick wall, loss of layering and no detectable movement. As per Markel *et al.* (1987), the ileum is the most frequently involved portion of intestine in enterocutaneous fistulas and other complications of umbilical hernias. Umbilical

hernias are usually small and resolve spontaneously but herniorrhaphy is necessary for small hernias which do not resolve in 6 to 12 months. All the four cases presented were 3-9 months old foals with umbilical hernia which did not resolved spontaneously. Early recognition of umbilical hernia, its predisposing factors, use of appropriate diagnostic support and proper treatment of umbilical hernias yields a good prognosis (Kawcak and Stashak, 1995).

Umbilical hernias in equines were treated with bandages, clamps or surgery (herniorrhaphy/ hernioplasty) depending on the size of the hernia and type of the hernia (Orsini, 1997). Sometimes, belly bandaging has been advised in few days old animals when the hernia is very small but is considered an ineffective technique by Tulleners (1991). Hernial clamps were used by some researchers but it carries the risk of serious complication like colic. All four foals were surgically managed with open herniorrhaphy (n=3) and closed herniorrhaphy (n=1). In open technique as the hernia sac is incised, bowel loops and peritoneal fluid were visible near the normal structures of the umbilical stump. In a study on 13 horses with strangulated umbilical hernias by Markel *et al.* (1987), open reduction technique was used where incarcerated tissue included omentum (1 horse), jejunum (5), ileum (4), cecum (1), and ventral colon (2). Several approaches are used for primary closure using vest-over-pants method, vertical mattress, and appositional closure for small hernia rings up to 3 cm diameter (Rings and Anderson, 2009). In all four foals, cruciate sutures were applied to close the hernia ring using absorbable sutures (PDS). Additional care was taken in suturing the hernia ring in closed technique to prevent suturing the content to the ring. The surgical time recorded was more in open technique (around 33 minutes) as compared to closed technique (20 minutes). Kelmer and Schumacher (2008) also used absorbable, interrupted, inverted, cruciate sutures for repair of abdominal incisional hernias in over 40 horses after inverting the hernial sac into the peritoneal cavity. Freeman *et al.* (1988) opined that complications of umbilical hernia are rare but if developed, they are insidious. They reported complication rate of 8.8% in association with umbilical defect. Riley *et al.* (1996) reported 19% complication rate in both herniorrhaphy and clamping for treatment of uncomplicated hernias. In the current cases, no post-operative complications were encountered in both the open and closed technique and the wound healed normally. No recurrence of the hernias was recorded up to 6 months. In a study by Bibek *et al.* (2009) in calves, open technique was found to cause 21% complication while less complication in closed technique (5%).

This report communicates the successful surgical management of umbilical hernia in four foals by closed and open herniorrhaphy using cruciate suture pattern and observed that closed technique results in less surgical time.

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