REPAIR OF PREPUBIC TENDON RUPTURE IN BUFFALOES: COMPARISON OF SUTURE HERNIORRHAPHY AND NYLON MESH HERNIOPLASTY

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ABSTRACT

Prepubic tendon defects were treated surgically in six buffaloes. Animals were presented with history of swelling in caudal ventral abdominal region. Condition was diagnosed from clinical appearance, manual palpation and ultrasonographic examination. Neutrophilia (63.00±3.31%), lymphocytopenia (34.00±2.94%), elevated AST (181.00±23.84 µ/L) and ALT (94.75±21.29 µ/L) levels were the major haemato-biochemical alterations in the affected animals. Surgical management was carried out under general anesthesia in dorsal recumbency. Prepubic tendon defects were treated by suture herniorrhaphy in two and by nylon mesh hernioplasty in four animals. Animals operated by hernioplasty recovered uneventfully without any major post-operative complications. One animal, treated by suture herniorrhaphy showed recurrence of defect on 3rd post-operative day. In this animal nylon mesh hernioplasty as revision procedure was performed. Long-term follow up revealed satisfactory regain of productive and reproductive status in all the animals. It was concluded that nylon mesh hernioplasty could be a useful and economical solution in large size defects, where high-tension at the site of defect limit the application of suture herniorrhaphy.

Keywords: *Bubalus bubalis*, buffaloes, nylon mesh, herniorrhaphy, hernioplasty, prepubic tendon rupture, ultrasonography

INTRODUCTION

Body wall hernias are the abnormal protrusion of an organ or tissue through a defect in the body wall. Hernias may occur due to some accident or where a normal anatomical opening does not completely fulfill its physiological function. Prepubic hernia is a frequently occurring body wall defect in bovine, which occurs due to the rupture of the prepubic tendon, also called the cranial pubic ligament. The most common cause of prepubic hernia in large animals is blunt force trauma to the caudal abdomen, cranial to udder. It usually results from traumatic injuries e.g. kick, blow, horn thrust or falling on blunt objects (Krishnamurthy, 1995). The prepubic tendon is a flat T-shaped compound tendon that provides attachment for the gracilis, pectineal and abdominal muscles. As the abdomen bulges ventrally in ruminant, the prepubic tendon extends ventrally from the brim of the pelvis at almost right angle with the pelvic floor (Habel, 1989). Prepubic tendon is composed of crossed and uncrossed tendons of origin of the pectineus muscles, the pelvic tendons of the rectus and

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obliquus abdominis muscles, and the tendons of origin of the cranial parts of the gracilis muscles (Habel and Budras, 1992).

Prepubic hernias are one of the most difficult body wall defects in large animals. Immense tension on the site of defect due to huge volume of body viscera make the surgery a challenge and may result in high chances of recurrences during post operative period. Tension free repair of the prepubic tendon rupture is important for the success of surgical procedure. However, there is a challenge to achieve tension free healing in cases with extensive soft tissue injury and weight of body viscera (Wendy and Lanz, 2011). Different surgical techniques viz. suture herniorrhaphy and nylon mesh hernioplasty have been practiced by surgeons for the repair of different types of body wall hernias (Leber *et al*., 1998; Luijendijk *et al*., 2000; Burger *et al*., 2004; Lannitti *et al*., 2008). Large body wall defects where tension free primary reconstruction cannot be performed by suture herniorrhaphy need mesh hernioplasty. Different biomaterials have been used for the repair of body wall hernias in bovine. The requirement of large sized mesh and cost related to it are handicaps of application of commercially available synthetic mesh implants in bovine. Sterilized nylon mosquito net might serve as a cheap substitute for alloplastic mesh. The study was therefore, planned with an objective to evaluate the use of nylon mesh as a cost effective solution for the repair of prepubic tendon rupture in bovine.

MATERIALS AND METHODS

Study included six female buffaloes suffering from unilateral prepubic tendon rupture. Animals were presented with history of abnormal swelling on the ventral abdominal region cranial to the udder (Figure 1 and 2). History regarding occurrence of the disease and possible aetiology were taken. Diagnosis was made from the clinical appearance, manual palpation of the swelling in lateral and standing restraint and ultrasonographic examination. Before surgery, all the animals were kept off-fed for 24 h and off-water for 12 h.

Suture herniorrhaphy in 2 animals and nylon mesh hernioplasty in 4 patients were performed as first choice procedure. In one animal following recurrence of suture herniorrhaphy, nylon mesh hernioplasty was performed as revision procedure. Surgical procedure was performed in dorsal recumbency under general anesthesia using pre-anaesthesia with *Inj.* Butorphanol 0.04 mg/kg b.wt. I/V followed by Inj. Midazolam 0.2 mg/kg b.wt. I/V and induction with Inj. Ketamine 5 mg/kg b.wt. I/V as a bolus. Endotracheal intubation was done to maintain the anaesthesia with 1 to 2% Isoflurane mixed with oxygen. After proper induction of anaesthesia, animals were positioned in dorsal recumbency for surgery. Surgical site was prepared aseptically. An oblique 12 to 16 inches skin incision was given just cranial to udder. Adhesions were broken and the abdominal viscera was repositioned back into abdominal cavity. Udder tissue was reflected backward to reveal abdominal defect and herniated intestinal loops (Figure 3).

In two animals having small hernia ring, suture herniorrhaphy was performed. Musculature surrounding the site of defect was repaired by double layer of no. 3 surgical silk by horizontal mattress suture pattern (Figure 4). In animals operated for nylon mesh hernioplasty, after approaching the defect, four layered nylon mesh of appropriate size was placed in the abdominal defect and was fixed in inlay fashion by the muscles surrounding the ring using number 5

braided polyester by horizontal mattress pattern (Figure 5). Subcutaneous tissue was sutured using Polyglactin number 2 by simple continuous pattern. Foley's catheter was fixed in subcutaneous space for drainage of the fluid. Skin was closed with silk number 2. Post-operatively, animals were prescribed broad-spectrum antibiotics for five days and analgesics for three days. Supportive bandage and dietary management were advised for one month post-operatively. Breeding was not advised for the non pregnant animals for at-least one year post-operatively to avoid the recurrence.

RESULTS AND DISCUSSION

Rupture of prepubic tendon was treated in 6 female buffaloes belonging to age group of 5 to 10 years (7.33±0.88 years). Four animals belonged to Murrah and 2 were of Nili Ravi breed. All the animals presented were having normal appetite and no other systemic illness. Three animals were pregnant varying from 3 to 5 months of gestation, while 3 were non-pregnant. Rupture in all animals was of acquired nature. Fall on blunt objects and trauma were the probable aetiology noticed by the owner. Animals were presented with history of swelling on caudo-ventral abdominal region varying from 40 to 45 days post trauma.

Body weight in the affected animals varied from 287 to 377 kg (310.37±11.67 kg). Rectal temperature (37.67±0.58°C), respiration rate (34.67±1.20 breaths/min) and heart rate (67.67±3.18 beats/min) at the time of presentation were within normal physiological limits. Haematological examination revealed neutrophilia (63.00±3.31) and lymphocytopenia (34.00±2.94) indicating stress response. Elevated AST (181.00±23.42 µ/L) and ALT (94.75±27.29 µ/L) values could be due to skeletal muscle injury. Manual palpation of animals in standing restraint or in lateral recumbency was able to detect the abdominal defect. Pre-operative ultrasonographic examination revealed presence of motile circumscribed hypoechoic structures with well-defined hyperechoic structures, along with ingesta and air suggestive of intestinal loops.

Two animals with smaller defect 7.8x9.2 and 5.6x15.3 cm and strong musculature around body wall defect were subjected to suture herniorrhaphy (Figure 4). Recurrence was observed on the third day in one animal operated by herniorrhaphy. This animal was re-operated by nylon mesh hernioplasty, as revision procedure. In four animals having ring size varying from 8.7-25.4x5.8-17.3 cm (14.35±3.26 cm × 8.53±2.54 cm), nylon mesh hernioplasty was performed. Intra-operative observations revealed weak musculature around hernial ring in all animals. Musculature was more weak in animals having large size hernial ring in 4/6 (66.6%) animals. Intestines were the herniated organ in all animals. Mild to moderate adhesion formation between hernial contents and hernial sac were observed. Nylon mesh was able to withstand the strong muscular pulls and tension due to suture application. Nylon mesh was useful because of its strength, availability in any size and cost effectiveness. Sterilized nylon mesh has been earlier used by Singh *et al*. (2012) and Kumar *et al*. (2014) for the reconstruction of large body wall defects with encouraging results.

One animal operated by suture herniorrhaphy procedure showed recurrence of the defect on 3rd post-operative day. For which it was operated by hernioplasty as a revision procedure (Figure 6). High tension due to body organs and weak musculature are the major challenges following suture herniorrhaphy. Even after satisfactory reconstruction of the defect chances

Figure 1. Six years old buffalo having caudo-ventral abdominal swelling due to Pre-pubic tendon rupture.

Figure 2. Four years old buffalo having ventral abdominal swelling in Prepubic tendon region.

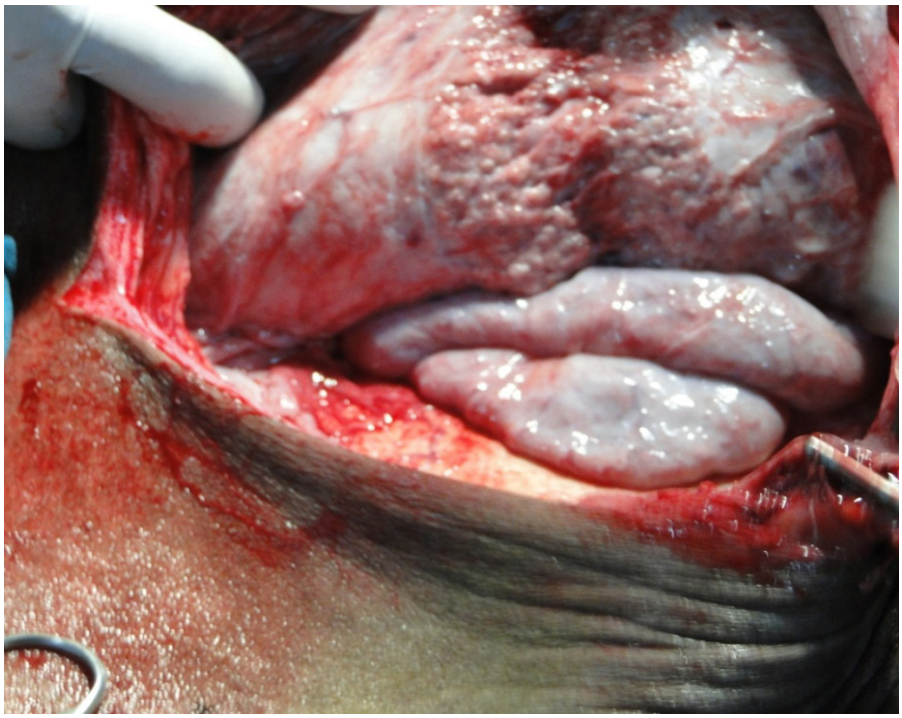

Figure 3. Reflection of udder tissue backward to reveal abdominal defect and herniated intestinal loops.

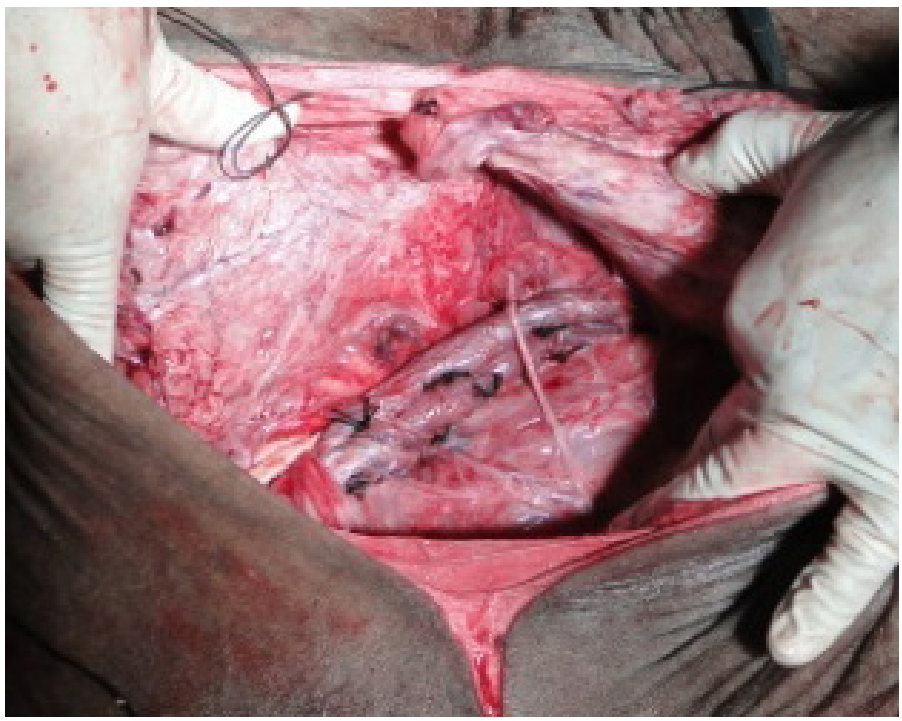

Figure 4. Repair of PPT rupture by suture herniorrhaphy procedure by surgical silk.

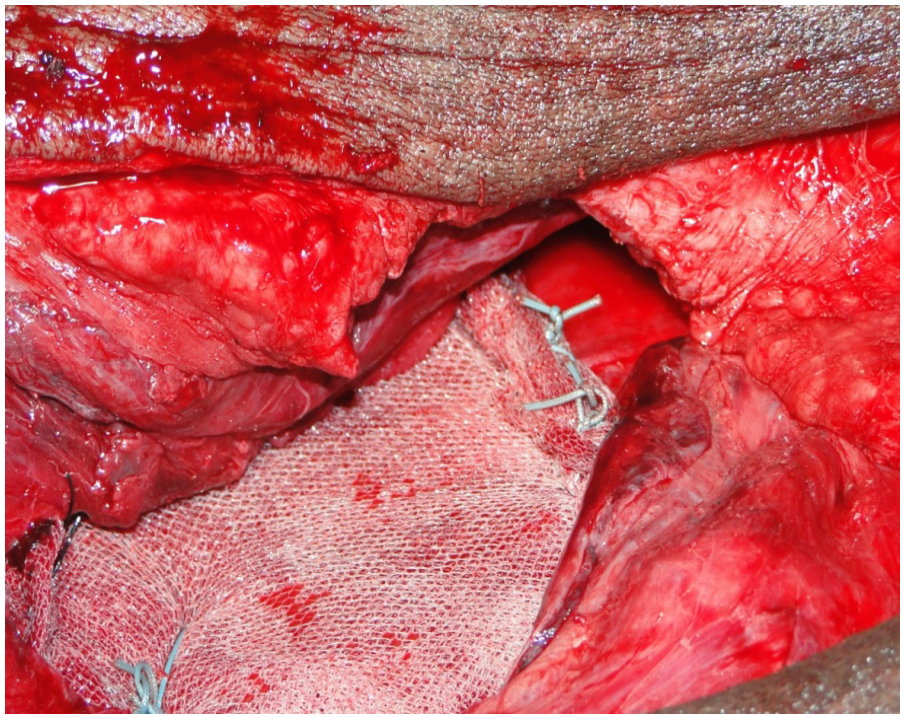

Figure 5. Placement of Nylon mesh by inlay fashion in animals with big defects operated by mesh hernioplasty.

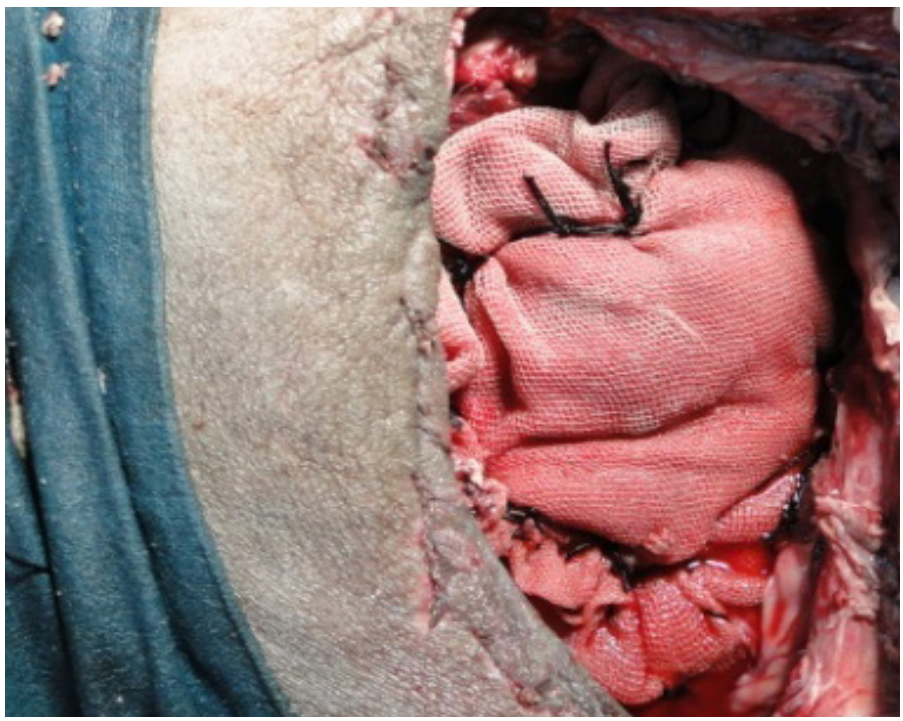

Figure 6. Correction nylon mesh hernioplasty for the treatment of PPT defect earlier operated by Suture herniorrhaphy.

Figure 7. Closure of skin incision in animal operated for PPT rupture. Severe bruising marks are seen on the affected body part.

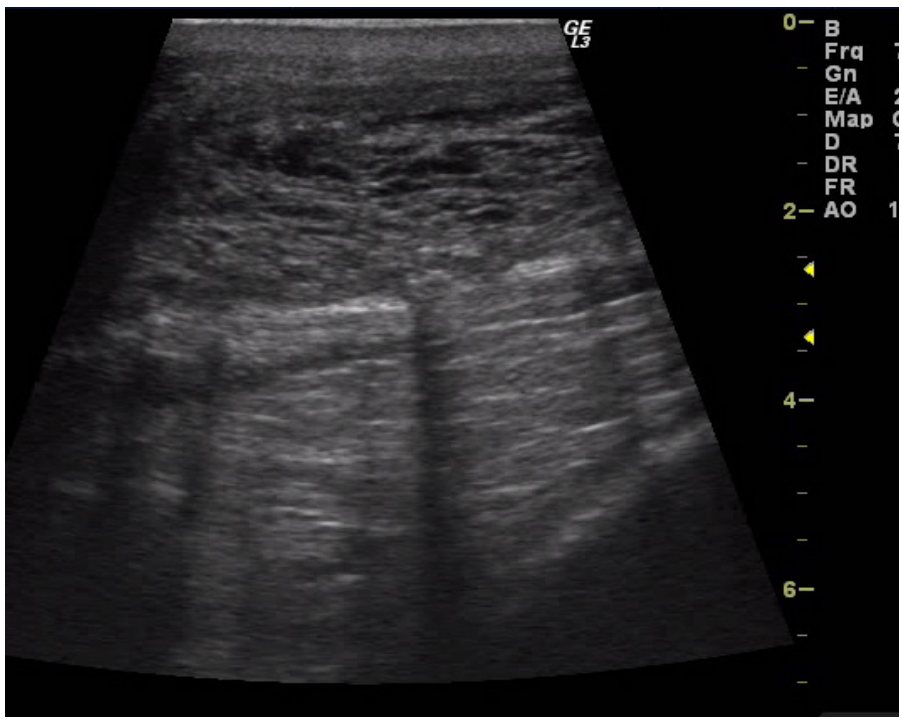

Figure 8. Ultrasonograph at 15th postoperative day showing intact body wall. Acoustic shadow showing suture tract of polyester suture material, white shadow indicates placement of nylon mesh.

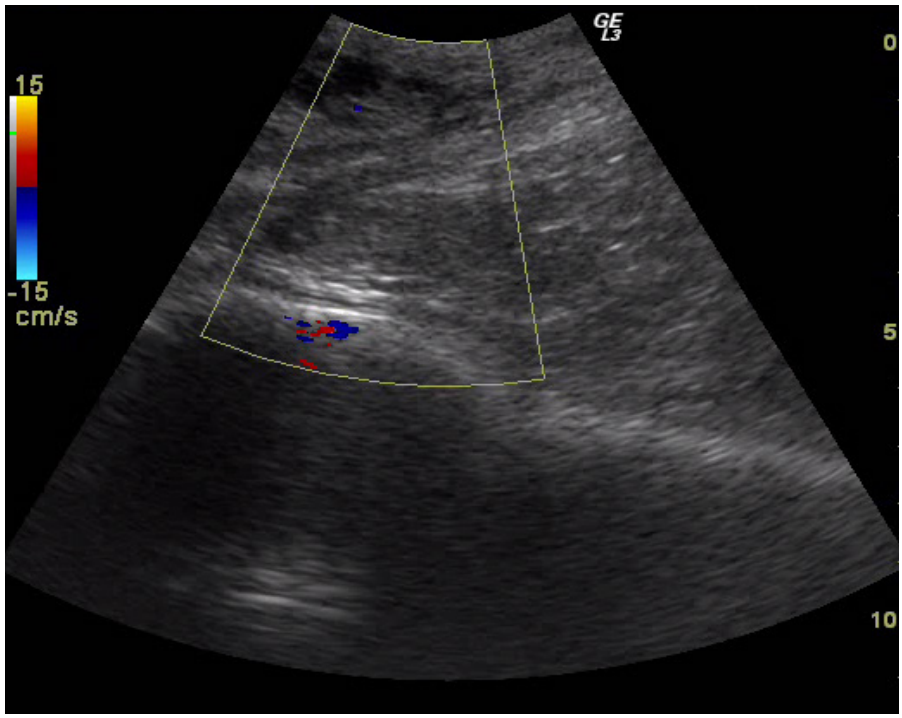

Figure 9. Ultrasonograph at 15th postoperative day showing hyperechoic lining indicating nylon mesh and neovascularization at the site of healing.

of recurrence are always present. Second animal operated by herniorrhaphy recovered satisfactorily. All the animals treated by nylon mesh recovered uneventfully with no major complications. Seroma formation at the site of repair was the most common observation during postoperative period. Application of Foley's catheter was useful for draining the fluid (Figure 7). Wilhelm *et al.* (2007) reported similar results in goats subjected to nylon mesh implantation on the rectus abdominis muscle and found no complications and recurrence of the defect.

Post operative, ultrasonographic examination revealed subcutaneous oedema in five animals with proper muscle apposition. Presence of hyper echoic tissue between muscular walls and hypoechoic cavitations suggested seroma formation (Figure 8). Colour Doppler ultrasonography at 15 day post-operative interval showed neovascularization and angiogenesis in the repaired hernial rent suggestive of wound healing (Figure 9). Intact abdominal wall was visible in all the patients with successful repair of hernia. Ultrasonographically, mesh appeared as a thin hyper-echoic line. Ultrasonography was found useful to monitor the status of the abdominal viscera near the mesh, exudate formation and presence of adhesions. The buildup of musculature around the site of mesh was satisfactory. Vilar *et al.* (2011) have reported similar ultrasonographic features during healing process following mesh hernioplasty procedure. No infection or abscess formation was observed during follow-up period. During long-term follow up for one year, it was observed that three animals that were in their early stage of pregnancy calved.

CONCLUSION

Being comparatively simple procedure suture herniorrhaphy may be performed for small defects of prepubic tendon rupture. However, chances of recurrence are always present. Hernioplasty using nylon mesh is good and cost effective technique of repair of prepubic tendon defects where large ring size and tension at suture line limits the use of suture herniorrhaphy procedures.

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