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Double-layer mesh hernioplasty for repairing umbilical hernias in 10 goats*

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Abstract: Umbilical hernias in goats are uncommon and can vary in their etiology and management. Hernioplasty can be done by closing the abdominal wall with a horizontal mattress pattern using absorbable sutures. However, larger defects (hernial ring size >3 cm) generally require the use of prosthetic materials that allow for a tension-free repair. In this study, 10 young female goats with umbilical hernias and hernial ring sizes ranging from 7-10 cm in width were treated using a double-layer polypropylene mesh. An ultrasonographic examination was performed to assess healing and connective tissue production.

Key words: Umbilical hernia, polypropylene mesh, hernioplasty, ultrasonography, goat

Introduction

Umbilical hernias are fairly common in calves, foals, and pigs, but are less common in small ruminants (1-3). A recent review on abdominal hernias in small ruminants investigated the etiology, treatment, and prognostic factors of 58 clinical cases (44 sheep and 14 goats) with different hernias (inguinal, abdominal, and umbilical) (1). The study highlighted the high incidence of traumatic abdominal hernias (68.5% in sheep, and 71.4% in goats) (1). In the same study, herniorrhaphies were performed with simple absorbable sutures, although some complications were reported. Umbilical hernias were less frequent than other hernias, and the study also reported a higher incidence of postoperative complications after umbilical hernia treatment in goats (1). The literature emphasized that the incidence of recurrence is usually related to both the size of the hernial port and the preoperative lesion condition (4). The surgical management of hernias in human literature emphasizes the use of prosthetic materials in hernias larger than 3 cm to avoid recurrence (4,5). The purpose of this paper is to present our findings from 10 cases of umbilical hernias in goats treated surgically by a double-layer mesh hernioplasty. Ultrasonography was used to check the healing process during the postoperative period.

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Materials and methods

For this study, 10 Majorera goats, between 4 and 7 months (12-17 kg), with umbilical hernias were selected and referred to the University Veterinary Clinic Hospital (Figure 1). The goats underwent a preoperative examination to exclude other diseases and assess hernia reducibility and hernial ring size. Hernial ring sizes varied between 7 and 10 cm in width and 12-15 cm in length. All goats were subjected to a preoperative 24 h fasting period. Premedication was performed with butorphanol tartrate (0.2 mg/kg IM, Torbugesic®, Fort Dodge) and xylazine maleate (0.15 mg/kg IM, Xilagesic®, Calier). After the insertion of an intravenous catheter into the left jugular vein, anesthesia was induced with propofol (3 mg/kg IV, Propovet®). The animal was then intubated with an orotracheal tube and the anesthesia was maintained with oxygen and a 2%-3% isoflurane mixture. The patient was positioned in dorsal recumbency and the skin incision was made directly over the hernia. After skin and subcutaneous tissue dissection, the condition of the hernial sac and hernial ring were examined to confirm the absence of adhesions in the abdominal organs (Figure 2). The herniated viscera were repositioned in the abdominal cavity by manual taxis. Then, a 2-mm dissection was performed eccentrically around the ring between the peritoneum and tendon-muscle layer, with the aim of creating space between these 2 anatomic formations where the mesh could be easily interposed. However, 2 small incisions with Metzembaun scissors were necessary in the cranial and caudal points of the hernial ring because of the presence of physiological peritoneum-linea alba tight adhesion (Figure 3).

The hernioplasty was achieved through the use of a polypropylene mesh (Premilene® Mesh; Barcelona, Spain), with margins interposed between the parietal peritoneum and the muscle-fascial layer (transverse

Figure 2. Idem. Intraoperative aspect of umbilical hernia after skin and subcutaneous tissue incision.

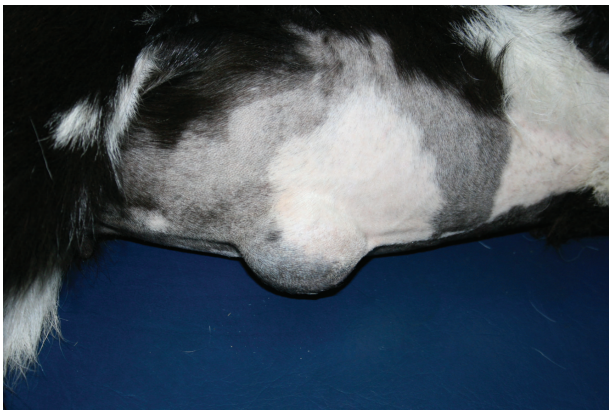

Figure 1. Five-month-old female Majorera goat. Umbilical hernia, preoperative aspect.

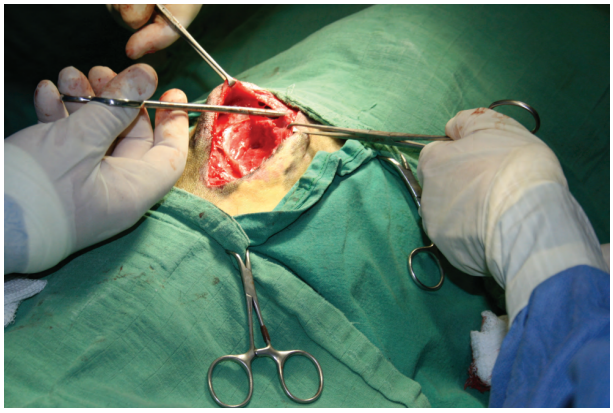

Figure 3. Idem. Small incision in the cranial point of the hernial ring.

fascia). The mesh was folded into 2 layers and sutured to the abdominal muscle layer and the fascia, 5 mm along the hernial circumference. The suture was performed using a single U suture of polyglycolic acid (Safil® 0, Braun). Single stitches were preset and held with mosquito forceps. Once all of the single sutures were positioned, they were tied (Figure 4). Subcutaneous tissue and skin were routinely sutured; during the subcutaneous closing, the suture also involved the mesh to avoid the creation of dead space. The excess of distended skin was left because it would shrink to its original anatomic dimensions and position postoperatively. In the postoperative period, an antibiotic and antiinflammatory treatment was administered for 8 days. The healing process was clinically and ultrasonographically evaluated; an ultrasonography was performed weekly during the first month and monthly for 6 months after surgery.

Results

The umbilical hernia was successfully reduced in all 10 goats. The mesh application was easy to perform and resulted in no complications, except for a mild postoperative edema. The ultrasonography always proved the stability and correct positioning of the polypropylene mesh, and verified the local inflammatory edema and its resolution. The mesh ultrasonographically appeared as a thin hyperechoic line of about 2 mm in thickness, followed by an attenuation of the ultrasound beam, sometimes with the creation of ultrasound artifacts. Echography also confirmed the presence of a mild postoperative edema in all cases during the first week after surgery (Figures 5 and 6). The edema reduced daily, until a complete resolution in all patients between 15 and 30 days after surgery (Figures 7 and 8). In all cases, the mesh never lost stability, nor was there the presence of infection or abscesses. The use of absorbable suture materials provided no complications, and reducing the absorbable suture holding seemed

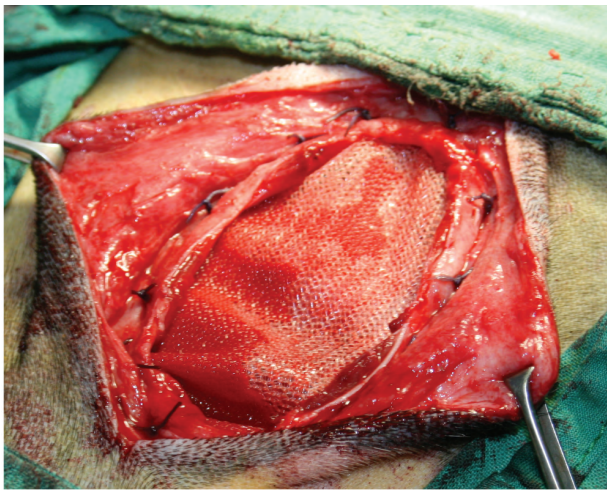

Figure 4. Idem. Intraoperative image of polypropylene mesh sutured between the parietal peritoneum and abdominal wall along the hernial ring circumference.

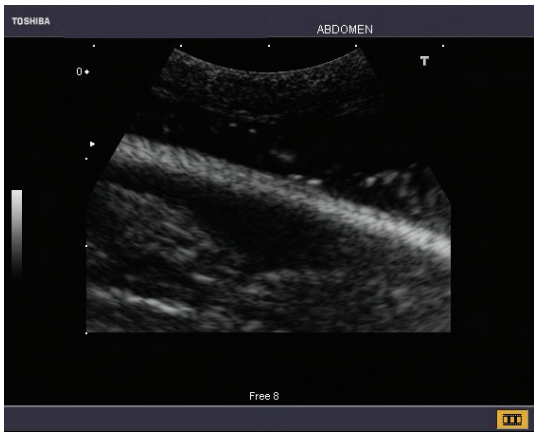

Figure 5. Ultrasound examination 1 day after surgery. The polypropylene mesh appeared as a double hyperechoic line with the anechoic aspect of the postoperative edema.

Figure 6. Ultrasound examination 7 days after surgery. It is possible to observe a reduction in the postoperative edema and correct position of the hyperechoic mesh.

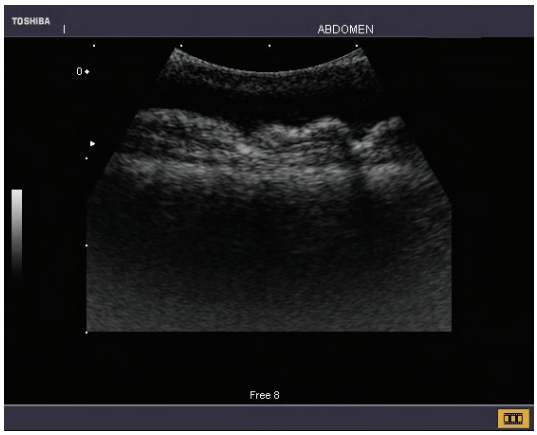

Figure 7. Ultrasound examination 14 days after surgery. It is possible to observe the almost complete resolution of the edema and presence of granulation tissue of the mesh.

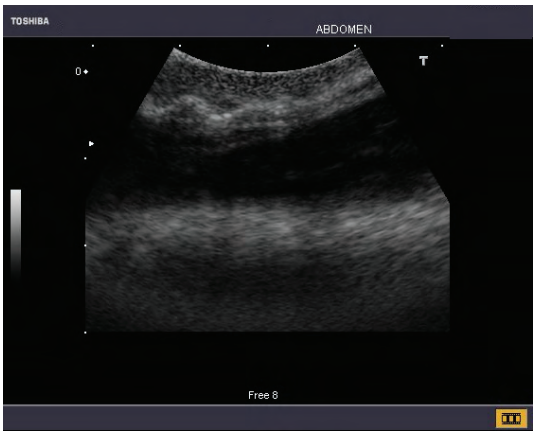

Figure 8. Ultrasound examination 60 days after surgery. It is possible to observe that the mesh is completely filled by fibrous tissue with no inflammatory edema.

unremarkable for the strong fibroblastic capacity of the polypropylene mesh. The mesh stability was confirmed 6 months after surgery, when 2 goats fell pregnant and labour occurred without complications. Ultrasonography also made it possible to monitor the status of the abdominal viscera near the mesh to exclude the formation of any adhesions.

Discussion

The umbilical opening in goats should close a few days after birth (1). No-closure might be due to either congenital etiology or other acquired factors that can break or obstruct this closure, such as umbilical inflammation and/or abscesses (1). The reported age range in the study by Al-Sobayil and Ahmed in 2007 (3 months to 1.5 years) is different from that reported in our study (4-7 months) (1). Our subjects were younger; therefore, the disease was observed early by the owner, reducing the incidences of adhesion complications reported in previous cases. Moreover, Al-Sobayil and Ahmed (1) reported surgical complications (abscesses and recurrence) that, considering the young age of the 2 goats, may be due to previous surgeries for omphalitis. In our clinical cases, the young age of the subjects allowed us to diagnose a congenital form because history, clinical examination, and intraoperative evaluation excluded any signs of infection or injury. The hernial ring size was wide in our cases (7-10 cm in width). Al-Sobayil and Ahmed (1) reported that umbilical hernias of the same size were reduced by using a horizontal mattress pattern and absorbable sutures, although this resulted in minor complications (abscesses) and 1 case of recurrence. We used a polypropylene mesh folded into a double layer and sutured to the muscle by single absorbable sutures. Literature on human surgery emphasizes the use of prosthetic materials for hernioplasty when the hernial opening exceeds 3 cm in diameter (4,5). In our opinion, the same value could also be considered valid in young goats, because no complications have been reported with simple herniorrhaphy in smaller hernias (1). Avoiding recurrence is important for goats because the ruralness of this species rarely permits a correct and long-term postoperative follow-up. The biocompatibility of polypropylene mesh, its ability to provide good resistance to tensile forces applied by the muscular structures, and the pressure by abdominal viscera is well described in the literature. However, polypropylene tends to sag excessively and making adjustments for adequate tension can be difficult. Therefore, we chose to suture the mesh in a double-layer pattern according to the methods reported by other authors (2,3). It also represents an excellent tool to support granulation tissue, and later, tendon-like tissue. In addition, the mesh has a good adhesive capacity with surrounding

tissues; therefore, a nonabsorbable material is unnecessary when suturing it, thereby reducing the amount of foreign material in the body. The margin of safety provided by this material for treating umbilical hernias can compensate for the higher costs compared with traditional surgery, because it can reduce the incidence of recurrence, as reported in other animal species (horses and dogs) and humans (2-4,6-8).

Ultrasonography is effective for monitoring surgical techniques in the postoperative period (8). The ultrasound examination allows for the identification of the mesh, monitoring the postoperative edema until complete resolution, and excluding any failure of the suture between the mesh and the muscle-fascial layer. An interesting retrospective article in human medicine in 2004, from a study of 31 patients with inguinal hernias treated using polypropylene mesh, compared 2 imaging techniques, ultrasonography and CT (computed tomography), in postoperative monitoring (7). The results showed the effectiveness of ultrasonography in the evaluation of the prosthesis in all patients examined. In that article, the CT scan failed to identify the mesh in 6 out of 8 clinical cases. The authors attributed this error to the reduced mesh size and characteristics of the mesh radiation density, which was similar to that of fat, thereby making it difficult to identify in obese patients (7).

Conclusion

The umbilical hernia is a rare disease in goats, probably because less attention is given to this species in the surgical field. As with other species, hernioplasty in goats needs careful consideration, especially when the size of the hernial port exceeds 3 cm. In these clinical cases, the polypropylene mesh has improved the effectiveness of hernioplasty, and ultrasonography has aided lesion evaluation and postoperative monitoring.

References

1. Al-Sobayil, F.A., Ahmed, A.F.: Surgical treatment for different forms of hernias in sheep and goats. J. Vet. Sci, 2007; 8: 185-191.
2. Kawcak, C.E., Stashak, T.S.: Predisposing factors, diagnosis, and management of large abdominal wall defects in horses and cattle. J. Am. Vet. Med. Assoc, 1995; 206: 607-611.
3. Vilar, J.M., Doreste, F, Spinella, G, Valentini, S: Double-layer mesh hernioplasty for repair of incisional hernias in 15 horses. J. Equine Vet. Sci, 2009; 29: 172-176.
4. Guidelines of The Society for Surgery of the Alimentary Tract (SSAT) J. Gastrointest. Surg, 2004; 8: 369-370
5. Venclauskas, L., Silanskaite, J., Kiudelis, M.: Umbilical hernia: factors indicative of recurrence. Medicina (Kaunas), 2008; 44: 855-859.
6. Wilhelm, T.J., Freudenberg, S., Jonas, E., Grobholz, R., Post, S., Kyamanywa P: Sterilized mosquito net versus commercial mesh for hernia repair. An experimental study in goats in Mbarara/Uganda. Eur. Surg. Res, 2007; 39: 312-317.
7. Crespi, G., Giannetta, E., Mariani, F., Floris, F., Pretolesi, F., Marino, P.: Imaging delle complicanze locali precoci dopo ernioplastica inguinale con rete protesica (Imaging of early postoperative complications after polypropylene mesh repair of inguinal hernia). La radiologia Medica, 2004; 108: 107-115.
8. Negrini, S., Spinella, G., Valentini, S., Fedrigo, M.: Utilizzo della tecnica ecografica per la valutazione pre e post-operatoria delle ernie nel cane (Pre and post-operativily ultrasonographic evaluation of canine hernias). Proceedings of VIII Congress S.I.C.V., 2001; 92-7.