

REPAIR OF LARGE HERNIA BY POLYMER GRAFT IN GOATS

M. J. Eesa*, L. M. Alkattan, and F. M. Mohammed ****

*Department of Surgery and Obstetrics, College of Veterinary Medicine,
University of Diyala, and, **University of Mosul. Iraq.

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ABSTRACT

Sixth bucks of local breed were used in this study. The animals were anesthetized with mixture of ketamine and xylazine hydrochloride. Ventral abdominal hernias were induced on the lateral ventral abdomen. One month post operation, the induced hernia was repaired with polymer grafts, which fixed by simple interrupted suture, using No. 1 silk suture material. After implantation, there was focal abscess at the operative site in two cases which resolved after evacuation and irrigation with antiseptic. The findings of the microscopic result at 30, 60 and 90 days of grafts implantation exhibited inflammatory reaction around the grafts and later at the 60 and 90 days of implantation there was fibrous tissue formation around implant graft, inflammatory reaction and fibroblast infiltration in the graft. The results indicated that biocompatibility of polymer graft with the host tissue was good with complete healing of the operative site.

أصلاح الفتوق الكبيرة بأستخدام البوليمرفي المعز

***محمد جواد عيسى , **ليث محمود القطان** وفؤاد مؤيد محمد**

*فرع الجراحة والتوليد, كلية الطب البيطري, جامعة ديالى,

** جامعة الموصل. العراق

الخلاصة

سنة من ذكور المعز المحلية البالغة استخدمت في هذه الدراسة. تم تخدير هذه الحيوانات بمزيج كيتامين / زايلازين هايدروكلورايد. تم استحداث فتوق بطنية كبيرة من الجهة الوحشية للخط الوسطاني. تم اصلاح الفتوق بعد شهر من استحداث الفتق برقع البوليمير والتي ثبتت بتقنية الخياطة المتقطعة البسيطة باستخدام خيط الحرير. بعد زرع الرقع ظهرت بؤر خمجية في موضع اجراء العملية في حالتين وقد تم علاجها بالتفريغ والتنظيف بالمطهرات.

أظهرت نتائج الفحص النسجي المجهرى خلال 30، 60، و 90 يوما بعد زرع الرقع وتكون نسيج ليفي حول الرقع المزروعة وتغلغل تفاعلات التهابية وارتشاح ارومات ليفية داخل الرقع المزروعة. هذه النتائج تدل على حصول تجانس بين الرقع المزروعة و انسجة الجسم مع التئام جيد تام لموضع العملية.

INTRODUCTION

Hernia a protrusion of an organ or many organs through natural or artificial opening under intact skin(1). Hernia classified according to location, anatomical region, and clinical condition or according to the etiology (2). Different prosthetic materials, were used for repairing large hernia such as plastic mesh, stainless steel, tantalum and polymer mesh in ruminants and horses (3, 4, 5). In a very recent investigation using lightweight large porous mesh that takes into consideration all of the recent data regarding physiology and mechanics of the abdominal wall and inguinal region (6 and 7), polypropylene mesh and grafts to repair abdominal hernias in horses sixth months after surgery, the animals were healthy. Polypropylene mesh was also implanted in the abdominal cavity of 10 ponies with satisfactory results (8).

Polypropylene is a complex synthetics material. In veterinary practice, it have many uses as addressing material put directly at the wound to enhance healing in cattle and dogs. It is composed of a single stranded polymer in a crystalline molecular structure, with high density and resistance to traction and can be sterilized through autoclaving without affecting its properties (9, 10, 11, 12). Meshes and grafts repair results in lower recurrence rate and less abdominal pain and dose not result in more complications than suture repair, suture repair of large hernia should be abandoned (15).

The aim of this study was to investigate the efficiency polymer grafts for repairing of the experimented large ventral hernia in goats.

MATERIALS AND METHODS

Sixth healthy bucks of local breed were used in this study, their age (3 ± 0.4 years), and weight (35 ± 5.0 Kg). The animals were kept in the house animals of Veterinary Medicine College, University of Mosul, pre-operation the operative animals were held of food for 24 hours and 12 hours for water. The areas from xiphoid cartilage to the pubic symphesis were prepared aseptically. Animals were anesthetized with a mixture of Ketamine hydrochloride 5 % (2mg) kg and Xylazine hydrochloride 2% (0.05) mg /kg , intravenously. Artificial ventral hernias have been done lateral to the mid line at left or right side, a straight incision about 12-15 cm long was made through the skin . The skin edge were reflected laterally to expose the abdominal muscle .The muscles were separated bluntly, then portion of these muscles were cut to create a circle ring about 8-10 cm. The skin re-stitched together via silk N0 .1, using horizontal mattress pattern. After operation all animals were given penicillin –streptomycin intramuscularly at a dose of 10,000 i.u 10 mg /kg BW, respectively for 3 consecutive days.

Animals were left one month after operation, during this period the animals were observed clinically for feeding, general condition and operative site. After one month of inducing hernia(Fig. 1), polymer graft was used for herniorrhaphy. Surgical area was prepared aseptically. Skin incision has been done over the hernial sac, until reach to the hernial ring. Hernial sac was inverted into the abdominal cavity. Then VION tissue; (polymer like structure from Kazan Company for industrial material –Russia) implant over the area about (2 cm) distance far from the edge of the ring. The graft was fixed to the muscle by simple interrupted pattern with silk No.1 (Fig 2). Horizontal mattress suture was used to close the skin. Post operative care was similar manner to mention above, animals were kept under weekly inspection to record, the condition of animals,

operation site for information, bulging, inflammatory signs or other abnormality which may be occurred. At 1, 2 and 3 months post operation; biopsies were harvested from the operative site, for histopathological examination. Preparation of section and staining with hematoxyline and eosin was carried out by the routine techniques.



Figure1: Experimental umbilicus hernia after 30 days, the diameter of hernial ring about (12-15) cm.

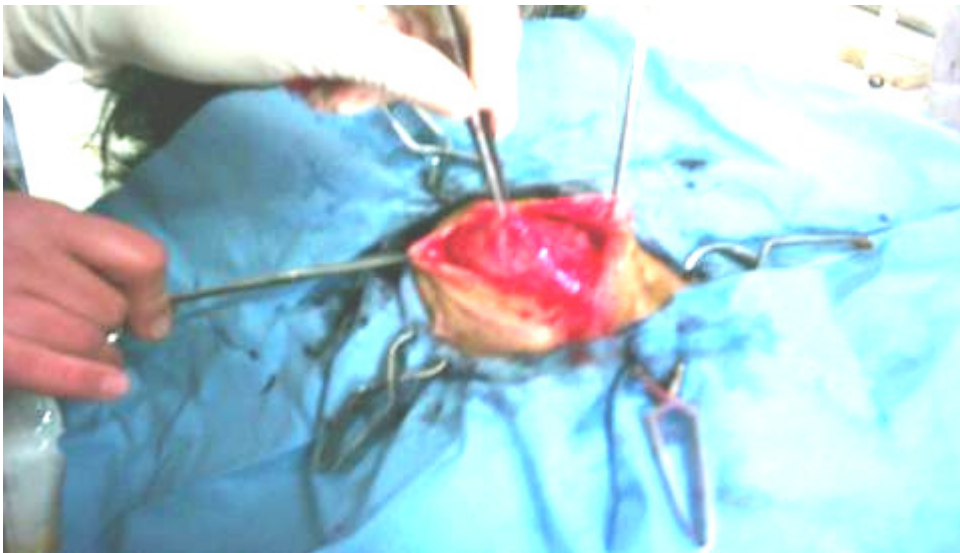


Figure 2: Shows placement of graft out side of peritoneum.

RESULTS

The clinical findings revealed redness and pain, with slight edema at the operative site 48 hours post-operation. These signs were disappeared after 4 to 5 days post-operation. Anorexia and slight increase in temperature during the first 2-3 days post-operation was record. A sac like swelling was appeared during the first week post-operation. The swelling gradually increased in size, which exhibited after two week similar to a natural hernia. This was represented by hernial ring and sac like bulging to out side of abdominal cavity. At 30 days the hernial contents were freely movable and can readily reduced into the abdominal cavity that means the contents unattached to surrounding tissues particularly the ring. The hernioplasted hernias with polymer grafts were appeared that the inflammatory reactions at the site of operation more sever, when compare with inflammatory reactions that appeared after artificially induced hernia. Also these signs were taken long time to hidden. In two cases of the repaired hernias, some focal of abscesses were appeared at the operative site, which were treated by evacuation and daily irrigation with antiseptic until complete healing. On other hand slight bulging was observed at the operative site of treated hernias, these bulging gradually subsided after two months post operation. Microscopically, at 30 days post operation, there was sever inflammatory reaction have been seen at the area of implanted graft associated with edema and sever congestion of blood vessels, sever mononuclear inflammatory cells was infiltrated around implanted material associated with proliferation of collagen fibers. At 60-90 days postoperation, granulomatous reaction occurred around the patch grafts with the presence of giant cells, as well as new capillaries have been seen associated with extensive fibrous tissue surrounded the implanted grafts (Figures 3 & 4). The mesh was stable in all animals, and had infiltrated fibroblast (Fig .5).

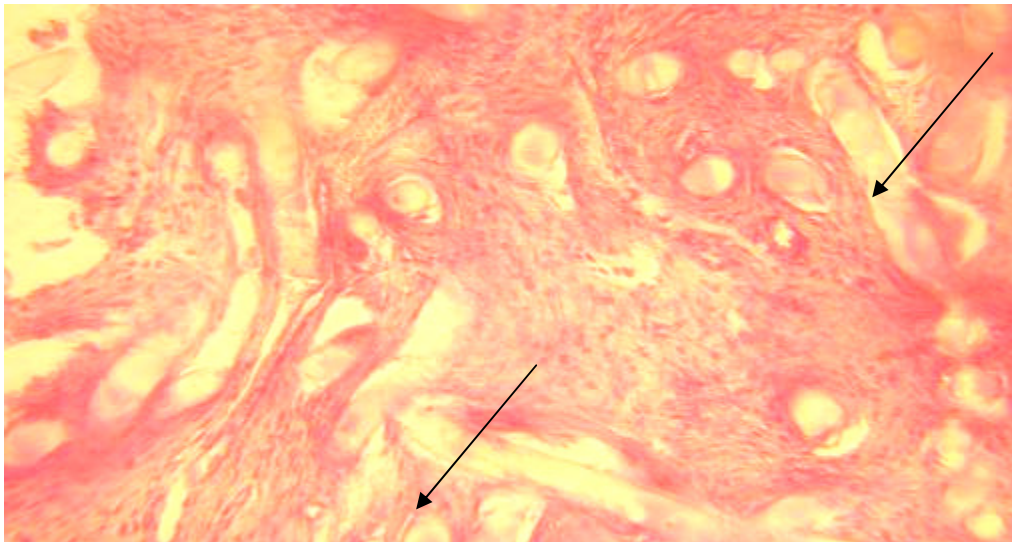


Fig.3: Histomicrograph of umbilical hernia in goats after 30 days ed, proliferation of collagen fiber and fibroblast with newly capillaries (→) H and E 400 X.

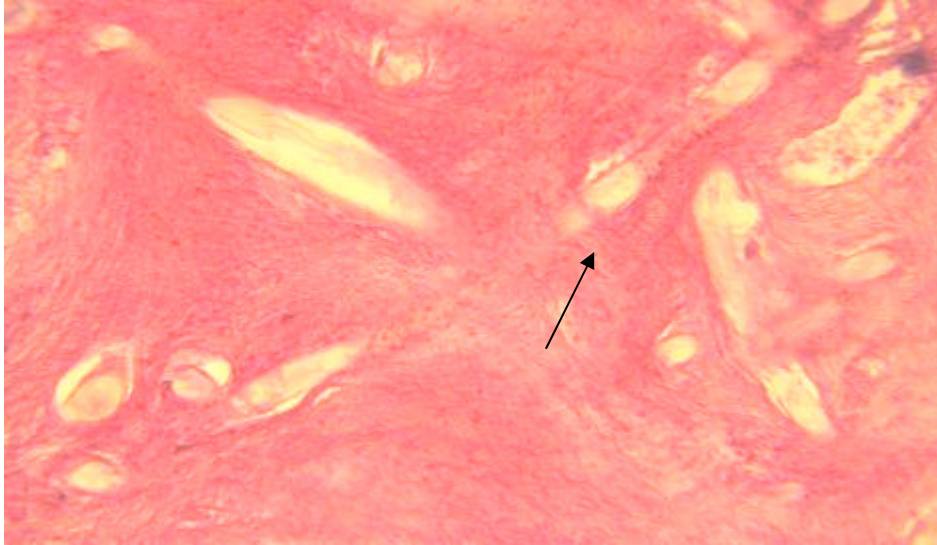


Fig.4: Histomicrograph of umbilical hernia in goats after 60 days Ed, granulation tissue in area of operation (→) H and E 400 X.

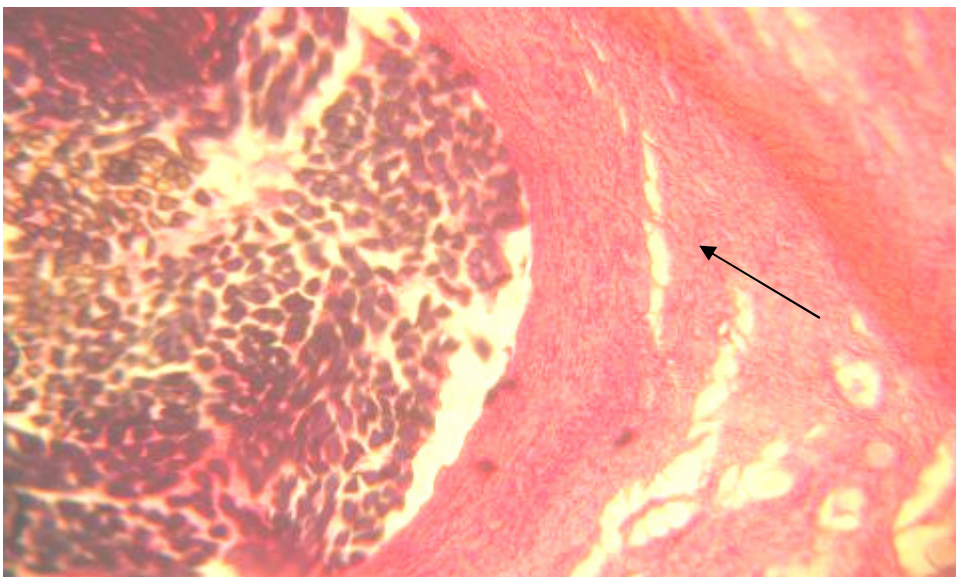


Fig.5: Histomicrograph of umbilical hernia in goats after 90 days Ed, showed bundles of collagen fiber around the remain graft infiltrated by mononuclear inflammatory cells (→) H and E 400 X.

DISCUSSION

Large circular hernias of the abdominal wall are difficult to repair. The technique for their repair must be effective to make the area strong, resist pressure and did not affect the normal function of the abdominal cavity. Prosthetic grafts, meshes or tissue were used in treatments of large hernia. Polymer grafts or mesh as the prosthetic material was used for repair of the large hernia. This tissue was chosen because of its easy to handle and made from an inert, single-stranded, flexible material, easily to cut by scissor and can be sterilized by autoclaving, adjusted to the physiological requirement of the abdominal wall, permit a proper

tissue integration and highly resistant to traction. These observations were agreement with other workers (7 and 9).

In two cases of experimental animals, there was a localized focal abscess at the site of implanted grafts. This might be due to contamination of the operative site during sternal recumbence at dirty area or may be due to entrance of suppurative microorganisms through pore of skin threat. This infection was responded to treatment with evacuation and daily irrigation with antiseptic solution. This conditions have been led delay healing operative site when compared with other cases .The results of this study indicated that the using of polymer graft in a closed method, without opening the hernial sac have been minimized complications. But this technique was required good experience to avoid grasping the internal organ during fixation of graft with abdominal muscle by simple interrupted pattern. This observation was carried with (13), whom said that the treatment of hernia without opening of peritoneum associated with miner complication. We believed that the closed method, which was used in this study for fixation the graft not recommended in cases of irreducible hernia, may be due to occurrence of strangulation or necrosis of protruded organ. In addition to difficulty to palpate the ring and fixation graft with it.

The pathohistological examination at the 30 days post implantation of the polymer grafts was revealed that the inflammatory reaction around the implanted grafts, associated with edema, sever congestion of blood vessels, with proliferation of collagen fibers. The proliferation of collagen fibers around and its infiltration into the graft described as the biocompatibility between body tissue and implant graft to form a firm zone toward resistant pressure and tension. While at the 60 and 90 days post implantation the results revealed extensive fibrous tissue formation around the graft, in addition to that there was infiltrated fibroblast with in the graft .The phenomenon improved good supporting to the zone of implantation and coalition with body tissue (4 and 14).

The conclusion of this study indicated that the polymer graft was good for reconstruction of large hernias with miner complications if used with closed method in reducible hernia.

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