Laparoscopic partial splenectomy by using two techniques in goats

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Accepted: 15/06/2014

Summary

The aim of this study is to evaluate the laparoscopic partial splenectomy, using horizontal interrupted mattress suture and electro-cautery techniques in goats. Sixteenth adult goats were divided into two main equal groups (A and B). Each group was additionally divided into two equal subgroups, according to follow up on 15th and 30th days postoperatively for histopathology examination. All operations were performed under general anesthesia. Physical and clinical examination were measured pre-operatively and 1st to 7th days postoperative. The results revealed that the two techniques of both groups were performed successfully and the operation time in group A was 86.125±20 min., which was longer than that in group B 62.375±10 min. There were significant (P<0.05) differences in the physical parameters in all the experimental goats. All animals gradually returned to the normal solid food intake and activity, defecation and urination after 72hrs postoperative. Laparoscopic gross pathological changes revealed adhesions between spleen, rumen, and abdominal wall which were more severe in group A as compared with group B. Histopathology examination showed that both groups were associated with collagen and fibrous tissue formation similar to capsule surrounding the site of the incision, which was more in group B than in group A, and the latter group was infiltrated with more inflammatory cells. Also group B had more lymphocyte aggregation around the central artery, in addition to that there was thickness of capsule and mature granulation tissue, but in group A there was edema, congested red pulp and immature granulation tissue.

Keywords: Partial splenectomy, Laparoscope, Electro cautery, Goats.

Introduction

Spleen in goats is considered as a reservoir of blood cells which can be mobilized by splenic contraction (1). Partial splenectomy was used instead of total splenectomy to reserve splenic function (2). In the laparoscopic spleen-preserving surgery, the complications include hemorrhage, visceral injury, infection, splenic vein thrombosis (3). Splenectomy was first described in 1910 by Sutherland but laparoscopic splenectomy was first described in 1991 by Delaitre and Maignien (4). After the dawn of the laparoscopic era, it was not very long until Delaître (5), reported the first laparoscopic splenectomy. Shortly after the first publications of laparoscopic splenectomies, experimental and then clinical laparoscopic partial resections of the spleen were reported (6). Laparoscopic partial splenectomy was performed successfully in all the experimental dogs without any obvious complication, used adrenaline with titanium clips, thermo-cautery device, compared with the open partial splenectomy (2). The aim of this study was to evaluate the laparoscopic partial splenectomy using horizontal interrupted suture and electro-cautery techniques laproscopically in goats.

Materials and Methods

Sixteenth adult healthy goats were used. The animals were kept under similar conditions of management and feeding. They were housed in farm animals, College of Veterinary Medicine, Baghdad University. The animals were made fast to 36 hours for feeding and 12 hours for water pre-operation. The ventral abdominal area from xiphoid cartilage in to pubis and laterally into the left flank as far as possible was prepared aseptically. The operations were done under general anesthesia by using xylazine hydrochloride (0.2mg /kg B.W) and ketamine hydrochloride (4mg /kg B.W).
B.W) intramuscularly and inserted endotracheal tube. The anesthetized goat was laid on right lateral recumbence, the head was risen and the body slightly changed in to the left lateral position (Trendelenburg position). The animal underwent laparoscopic partial splenectomy after inserting four ports (Fig. 1) and using pneumoperitoneum (10 mm Hg).

They were divided into two main groups: Group, A (Horizontal interrupted mattress suture): In which laparoscopic partial splenectomy was performed after the resected area was surrounded by horizontal interrupted mattress suture intracorporeally using polygalactine 910 (polygalactin 910, size 0.1, Switzerland) and cutting by successor (Fig. 2, 3 and 4) then the resected part (Fig. 5) was removed through dilation of port. In group, B (Electro-cautery): laparoscopic partial splenectomy was done using monopolar electro-cautery (coagulant and cutting

Figure, 1: The ports site for telescope and the other laparoscopic instruments, (10mm) for telescope (1), (5mm) for grasper (2), (10mm) for needle holder or electro-cautery (3) and (10mm) for scissor (4).

Figure, 2: The dissection between spleen and dorsal side of rumen.

Figure, 3: The interrupted horizontal mattress suture was applied around the splenic resected part (red arrow) in group A

Figure, 4: Cutting part of spleen by laparoscopic scissor in group A.

Figure, 5: Excised part of spleen near original spleen.

Figure, 6: Photograph of group B electro-surgery used to cutting through splenic parenchyma (arrow).
Results and Discussion

The clinical observations of experimental animals after operation were appeared active; return to normal feeding after one day and there was slight swelling at the site of incision which disappeared at 5 days post operations. This might be due to small blunt incision with slight tissue trauma. This coincides with (7). There were significant (P<0.05) differences in the physical parameters in all the experimental goats. This fact revealed that, this laparoscopic partial splenectomy cause mild changes on the physical condition of animals. The macroscopic findings show adhesion between spleen, rumen and abdominal wall. The percentage of this adhesion was more in group A compared with group B (Fig. 7 and 8). This might be rough manipulation during application of horizontal mattress suture. The mean time for the operation period was 86.125±20 min. in group A, while in group B was 62.375±10 min. This fact indicated that the application of horizontal interrupted mattress suture consumed longer time; intracorporeal suture was needed high skill to donestitches.

At 15th days postoperative in group A: The histopathology examination showed congested blood vessels with fibrin deposition in incision area, in other section irregular collagen fiber and congested blood vessels with inflammatory cells in there lumen (Fig. 9). This fibrin network deposition occurrence may be due to the body consideration of the suturing foreign body. Inflammatory cells may be due to decrease of blood supply in adjacent area of incision as a result of injury. The same result was concluded by (2 and 8). Sever congestion of red pulp, necrosis of lymphocyte and inflammatory cells infiltration), this might be due to the inflammatory cells release enzymes to destruction tissues, therefore the increased damaging tissues caused more increased release of lysosomes enzyme and appeared the debris. This note was mentioned by (9 and 10).

In other sections, the spleen showed increase thickness of capsular region, with granulation tissue (Fig. 10). This may be due to the beginning of repair stage, this phenomena was described by (11), also it might be the effect of suture materials in adjacent area, this agrees with (12 and 13).
connective tissue, aggregation of lymphocyte and edema in the incision area. However, small white and red pulp started formation in the necrotic area in the incision with congestion of blood vessels (Fig. 11). Small white pulp started formation (regeneration), this leads to suggestion of starting the mitosis of this tissue, this phenomena was mentioned by (11) and this lead to result that the spleen have capable to regeneration.

At 15th day postoperative in group B: The histopathology examination showed that congestion of red pulp in area adjacent to incision, however in other sections the lesion characterized by mononuclear cell infiltration and aggregation of lymphocyte (Fig. 12), also mononuclear cells infiltration with fibrin deposition (Fig. 13). At 30th day postoperative,
it showed the main lesion characterized by monocular cell infiltration with lymphocyte aggregation around blood vessels in the incision area (Fig. 14). This means beginning of healing of operative site (regeneration) this agrees with (14). The spleen showed mature granulation tissue characterized by congestion blood vessels with inflammatory cells in their lumen particularly lymphocyte in addition to regular collagen fiber produced by fibroblast. Other sections showed aggregation of lymphocytes around central artery (regeneration) in the incision (Fig. 15).

The thickness of capsular region of the spleen may be due to proliferation of connective tissue, congested of blood vessels and infiltration of inflammatory cells, in addition to congestion in the red pulp together with lymphocyte infiltration. This may be due to collagen occurrence, this means that the inflammatory process in ending phase, because the presence of myofibroblasts in the wound site which indicated that the wound is in the mature phase, this result coincides with other authors like (15).

References


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الخلاصة
هدفت الدراسة إلى تقييم إزالة الطحال جزئيا بجراحة المنظار في المعز استعمال خياطة المنجد المتقطع المتواز ومقارنتها مع الأداة الكاوية. استعملت في هذه الدراسة ١٦ من المعز البالغة. قسمت عشوائياً وتعادلًا إلى مجموعتين أ و ب، تم استعمال تقنية خياطة المنجد المتقطع المتواز (ب) بينما استعملت تقنية الأداة الكاوية في المجموعة (أ). وقعت كل مجموعة إلى مجموعتين فرعتين بشكل احتمال على فترة بعد العملية (١٥ و٣٠) يوم. تم قياس التغيرات الفسيولوجية والسريرية قبل العملية وفترة اسبوع بعد العملية في كل المجموعتين. أظهرت نتائج ناجحة لإزالة الطحال جزئياً في كلا المجموعتين، ولكنها أظهرت اقل وقتاً في المجموعة (ب).

استغرقت عملية الجراحة في المجموعة (أ) (١٠±٨٥) دقيقة، والتي كانت أطول من وقتها في المجموعة (ب) حيث بلغت (٦٢٥±٠٨) دقيقة، والتي كان يتفاوت متواليتها في وقتي في المجموعتين، (١٠±٨٥). واظهرت الدراسة وجود فروقات معنوية في معدل القياسات الفسيولوجية (P<0.05) بين المجموعتين.

عادت الحيوانات تدريجيا إلى تناول الطعام المعتاد وبشهية طبيعية، وكذلك تبول وتغوط طبيعي بعد ٢٢ ساعة بعد العملية. من خلال الفحوصات السيريرية، أظهرت النتائج السيطرة الفاعلة للอาการ المرضي ووجود التهاب جزء الصدر من الكلاب، وتشكل الخفيش من جسه وحفر البطن من جهة أخرى في المجموعة (أ). أظهرت الدراسات فائدة أكبر، كما أنها أكثر تعقيدا عند تقنيات الأداة الكاوية بالمجامع (ب).

بينما أظهرت النتائج السيطرة الفاعلة للอาการ المرضي ووجود التهاب جزء الصدر، وتشكل الخفيش من جسه وحفر البطن من جهة أخرى في المجموعة (أ). أظهرت الدراسات فائدة أكبر، كما أنها أكثر تعقيدا عند تقنيات الأداة الكاوية بالمجامع (ب).

الكلمات المفتاحية: إزالة الطحال جزئيا، المنظار، الأداة الكاوية، المعز.