

Dept. of Surgery,
 Fac. of Vet. Med., Assiut University,
 Head of Dept. Prof. Dr. M.H. El-Guindy.

**COMPARATIVE STUDIES BETWEEN DIFFERENT METHODS
 OF ARRESTING STUMP HAEMORRHAGE
 IN PARTIAL SPLENECTOMY IN DOG**

(With 3 Figures)

By

SAMIA. M. SELEIM
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دراسات مقارنة بين طرق مختلفة لإيقاف نزيف العقدة بعد الاستئصال
 الجزئي للطحال في الكلاب

سامية مصطفى سليم

أجريت هذه الدراسة على 18 كلباً بالغاً حيث تم إجراء استئصال جزئي للطحال ثم
 قسمت هذه الكلاب إلى ثلاثة مجاميع متساوية - في المجموعة الأولى استخدم أمعاء القطط
 والقطب المتقطعة لقفل محفظة الطحال بعد الاستئصال وأستخدم معها الجيلاتين الرغوي (الجيل
 فوم) أو حشو جزء من الترب الكبير لقفل محفظة الطحال في المجموعتين الثانية والثالثة
 على الترتيب - وبمتابعة الحالات وإعادة فحص الطحال بالعين بعد إسبوع وإسبوعين وثلاثة
 أسابيع وجد أن أحسن طريقة هي باستخدام حشو من منديل البطن باستعماله كضابط للنزيف
 ومكمل لغطاء الطحال .

SUMMARY

Eighteen normal apparently healthy adult dogs of both sexes-were used in this study. The animals were divided into 3 groups (each of 6 dogs). Under general anaesthesia (Thiopental Sodium) the spleen was exposed and some techniques for partial splenectomy were described. In the first group the splenic capsule was closed with simple interrupted sutures using 4/0 chromic catgut. In the second group, a piece of gelfoam was used. In the third group a piece of omentum was used.

Three dogs of each group were sacrificed after one, two and three week.

In the third group where the omentum was used, it was proved that the repair was greatly facilitated to a great extent.

INTRODUCTION

Partial or complete splenectomy is indicated according to McCUNN, 1953; KIRK, 1954; GOMES, 1967; DOAN, 1968; HICKMAN and WALKER, 1973; GOLDSTONE and LAWRENCE, 1978, as a treatment for splenomegaly, rupture, tumors, abscess or other surgical affection of the spleen.

SAMIA M. SELEIM

Partial splenectomy is an operation which can replace complete removal of the spleen specially when the condition is restricted to a part of it as in cases of cysts, abscesses, tumors and rupture (FOSTER and PREY, 1940; CHRISTO, 1962; DABAO and WARDEN, 1965; BODON and VORZOSA, 1967; MISK and HIFNY, 1978).

The splenic capsule consists of peritoneum overlying a 1-2 mm fibroelastic layer that contains few smooth muscle cells. The fibroelastic layer sends into the pulp numerous fibrous bands (trabeculae) that form the framework of the spleen. In dogs and cats, but not in humans, the spleen stores blood that is autotransfused when the organ contracts in response to circulating catecholamines (GOLDSTONE and LAWRENCE, 1978).

The splenic artery enters the hilus of the spleen and sends branches along the trabeculae that terminate in branches that enter the white and red pulp, white pulp consists of lymphatic tissue and lymphoid follicles containing lymphocytes plasma cells and macrophages distributed throughout a reticular network. The red pulp is made up of cords reticular cells and sinuses forming a bonycombed vascular space (WEISS, 1965; DOAN, 1968; WENBERG, 1969; GOLDSTANE and LAWRENCE, 1978).

About 2 cm. from the origin the splenic artery gives off the dorsal stem vessel to the dorsal part of the spleen, then curves ventrally and laterally to the hilus of the spleen, where it detaches the ventral stem branch, after about 7 cm. course. The splenic artery then gives to the middle stem branch to the middle part of the spleen nearly at the apex of the curve. The splenic artery continues its course as a left gastroepiploic artery which passes towards the greater curvature of the stomach within the gastrosplenic ligament (MISK and HIFNY, 1978).

The dorsal stem vessel passes towards the hilus of the dorsal half of the spleen and divides twice dichotomically resulting in four branches. Each of the four vessels however redivides into a short gastric and a very short splenic branches.

The ventral stem vessel originates from the splenic artery 7 cm. apart from the dorsal one.

The middle stem vessel is relatively small. It originates from the splenic artery where the latter curves ventrally to the greater curvature of the stomach and divides into two branches.

The gastroepiploic artery, the direct continuation of the splenic artery, passes in the gastrosplenic ligament towards the greater curvature of the stomach and parallel to it (MILLER, CHRISTENSEN and EVAN, 1964; EVANS and DEL AHUNTA, 1971; GETH, 1975; WILKENS, 1976; MISK and HIFNY, 1978).

The aim of the present work is to evaluate the different methods of arresting stump haemorrhage in partial splenectomy in dog.

PARTIAL SPLENECTOMY IN DOG

MATERIAL and METHODS

Eighteen normal apparently healthy adult dogs of both sexes were used in this study. They were divided into 3 groups each of 6 dog.

The animals were premedicated with chlorpromazine hydrochloride in a dose of 1 mg/Kg b.Wt. followed by intravenous injection of general anaesthesia using thiopental sodium (Nesdonal, Specia-Paris) until the main reflexes were abolished. Laparotomy was performed at the linea alba and the incision extends from the xyphoid cartilage to the umbilicus.

Partial splenectomy at the apex of the spleen in a length of 4-6 cm. was performed. Ligation of the splenic blood vessels supplied the area which will cut at or near their origin shortens the time of the operation and prevents the commonly observed haemorrhage in cases of partial splenectomy. The splenic vessels are doubly ligated and cut in between.

In the first group, the splenic capsule was closed with simple interrupted sutures using atraumatic 4/0 chromic catgut.

In the second group a piece of gelfoam was packed after grooving the partially splenectomized animal. Then the capsule was sutured by 4/0 chromic catgut.

In the third group the previous technique was performed and instead of using the gelfoam, a fine part of the omentum was used to be inserted inside the gap and the capsule was sutured as before.

The operation was completed by suturing the abdominal wall as usual. Skin sutures were removed 7 days following the operation. Three weeks. Exposure of the site of healing of each technique was carried on and the spleen was examined macroscopically to confirm the most suitable technique for partial splenectomy.

RESULTS

There was no postoperative complications and no signs of internal haemorrhage in all cases of partial splenectomy.

The time of operation ranged from 20-30 minutes. Examining the sutured stump revealed sound healing. The degree of healing varied from technique to another.

In the first group where the splenic capsule was sutured with interrupted atraumatic 4/0 chromic catgut, the suture line appeared as a linear scar and the suture material was observed in the first week and started to disappear in some of them by the third week. By the third week the site of repair was found to be completely sealed by the adherent omentum (Fig. 1).

The second group where gelfoam was used in the repair, the findings at the first week did not differ from the first group except for remains of the gelfoam, three weeks later, the findings showed complete absorption of the gelfoam and complete replacement with connective tissue that reinforced the capsular healing (Fig.2).

SAMIA M. SELEIM

In the third group where a patch of omentum was included in between the edges of wound at the site of partial splenectomy, it facilitated the repair to a great extent, the omentum was till fixed to the site of operation till the third week and complete healing of the splenic capsule (Fig. 3). Omental patch proved to be the superior over all other methods.

Complete haemostasis and repair was achieved by using the omentum as pressure haemostatic and to compensate the defect of the splenic capsule.



Fig. 1



Fig. 2



Fig. 3

PARTIAL SPLENECTOMY IN DOG

DISCUSSION

An improved technique for partial splenectomy was tried to preserve such an important organ. Preserving spleens saves the patient the risk of unavailable complications of complete removal of spleen especially in children who are unable to overcome infections (ELLIS and SMITH, 1966; ERICKSON and BURGERT, 1983; RAVRY, MALDONADO and VELEZ-GARCIA, 1972; WALKER, 1976).

Suture of injured spleens in humans was advised by BURREINGTON (1977) and SLIM, NAJWA, NAJJAR and HENRY (1979); they claimed good results.

The results of the present study correspond nearly to the results obtained by HODAM, 1970; STEPHENSON and MECHLIN, 1972; STEELE and TIM, 1975; MISK and HIFNY, 1978; ANDERSEN and VIDEBEAK, 1979, who stated that partial splenectomy is an easy operation in which the time of operation ranges from 20-30 minutes in addition there was no postoperative complication and no signs of internal haemorrhage.

The trials of experimental preservation of traumatized spleen in animals were in agreement with that mentioned by CHRISTO, 1962; MORGENSTERN, DICKMAN and SHORE, 1966; FITZER, 1976. BODON and VERZOSA, 1967 advised the use of gelfoam followed by suturing the splenic injury.

ORDA *et al.*, 1974; BURREINGTON, 1977, considered peritoneal patches as the most useful method for adhesions and haemostasis followed by suturing the injured spleen.

SLIM *et al.*, 1979 supported our findings of making use of the omentum and gelfoam.

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SAMIA M. SELEIM

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