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### الاستئصال الجزئي للطحال في الحمير

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تم استئصال ٣/١ الطحال في ١٦ حمار • وللوصول للطحال استئصل جزء من الضلع رقم ١٧ في ١٠ حيوانات وفي الحالات الستة الباقية كان الطحال متضخما فتم استئصال جزء من الضلع الثامن عشر بالإضافة للضلع السابع عشر • هذا ولم يصاحب الاستئصال الجزئي للطحال تغيرات جوهرية في عدد كرات الدم الحمراء وكذلك في قيمة الهيماتوكريت •

ولقد أوضحت الدراسات الهستوباثولوجية أن جرح الطحال الذي تمت خياطته قد التئم بواسطة نسيج ضام والذي حل تدريجيا محل التركز الذي حدث في بعض اجزاء من الجرح وبعد أربعة أسابيع وضع أن الجرح قد التئم تماما ولم تتأثر خلايا باقى الطحال بالعملية اطلاقا مع وجود التصاقات قوية بين بقية الطحال والغشاء البروتيني والشرب •

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## **PARTIAL SPLENECTOMY IN DONKEYS**

(With One Table & 7 Figures)

By

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### **SUMMARY**

Partial splenectomy (1/3) was performed in 16 donkeys, after resection of 17th rib (10 cases) and 17th and 18th rib (6 cases). Non-significant changes in total R.B.Cs. count and haematocrite value while significant increase in total W.B.Cs. were recorded.

Histopathological studies showed that the sutured spleen healed by granulation tissue that replaced gradually the necrotic foci which appeared during the first two weeks of the experiment. After four weeks, healing was complete and strong adhesions between the spleen, omentum and the peritoneum were noted.

### **INTRODUCTION**

Total experimental splenectomy had been successfully performed in donkeys. The operation was said to be indicated for reticuloendothelial alteration for blood parasite studies. Clinical application for this technique appeared quite limited as in cases of neoplasm, rupture, torsion and hypersplenism (TANTAWY, BOLBOL and SAMY, 1981; EL ZOMOR, 1985 and RIGG, REINERTSON and BUTTRICK, 1987). It was well known that splenectomy was associated with increased susceptibility to infection 540 times greater than usual (COLN *et al.*, 1983). However, because of the complications of infection, attempts were undertaken to repair rather than to remove injured spleens. Various surgical techniques had been described for repairing injured spleen including suturing (EL-MOTTALIB *et al.*, 1980), ligation of the splenic arteries (CONTI, 1980) and applying local haemostatic agents (MORGENSTERN, 1977 and COLN *et al.*, 1983).

The aim of the present work was to evaluate the effectiveness of suturing lacerated spleen after partial splenectomy. At the same time, the haematological changes that might take place post-operatively as well as the histopathological changes occurring at the suture line besides the physiological changes at the rest of spleen were recorded.

### **MATERIAL and METHODS**

Sixteen donkeys of 150-250 Kg body weight and 5-8 years old were subjected to partial splenectomy under the effect of Rompun-Saffan combination anaesthesia (GOHAR *et al.*, 1988). Rompun<sup>+</sup> was administered i.v. at a dose rate of 0.2 mg/Kg.b.wt. and Saffan<sup>++</sup> at a dose rate of 4 mg/Kg b wt. Each animal was casted on its right side before administration of anaesthesia and the left thoraco-abdominal wall was prepared for aseptic surgery.

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+ : Rompun, product of Bayer, Germany.

++ : Saffan, product of glaxovet Int, England.

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One bold cutaneous incision of 20-25 cm in length was made over the 17<sup>th</sup> rib from 5 cm dorsal to the margin of the ilicostalis muscle to the costochondral junction. The periosteum was incised and reflected and the rib was then cut dorsally using embryotomy saw and tracted ventrally from the cartilage. The spleen was exteriorized following the technique of EL ZOMOR (1985). Splenic vessels supply in the lower third were double ligated and severed inbetween. The spleen was then cut removing the lower third. The protruded portion of the splenic tissue was then pressed intracapsular by fingers to leave appropriate edges of the capsule to be sutured and tightly closed using simple continuous suture by cat gut No. 1 (Fig. 1). The peritoneum and abdominal muscles were sutured using chromic cat gut No. 1. Finally the skin was closed as usual. In 6 cases, the spleen was enlarged so that it required resection of the 18<sup>th</sup> rib in combination with the 17<sup>th</sup> one.

Blood samples were collected from the jugular vein at one week interval till the end of the experiment to study any changes in either the erythrocytic or leucocytic count together with the haematocrite value.

Three animals were sacrificed at the same intervals. Macroscopic examination of the spleen remnant was recorded. Specimens from the suture line and the surrounding areas were taken for histopathological examination. Sections from each specimen were sliced at 4 U thickness and stained by Harris hematoxylin and eosin (HARRIS, 1898).

## RESULTS

All operated donkeys tolerated the anaesthetic regimen and the operation as well. Pneumothorax had not been encountered in any case.

Table (1) shows the haematological findings throughout the experiment. There was insignificant decrease in total R.B.Cs. count and haematocrite value during the experiment, while the total W.B.Cs. count was significantly increased throughout the experimental period.

**Table (1):** R.B.Cs. count, total W.B.Cs. count and the haematocrite value throughout the experiment.

	R.B.Cs. 10/cmm	Haematocrite value%	W.B.Cs. 10/cmm
1 Week after operation	5.93±0.41	31.72±0.48	9.52±0.28
2 Weeks after operation	5.65±0.41	31.98±0.84	9.84±0.32**
3 Weeks after operation	5.68±0.22	31.98±0.74	10.38±0.28**
4 Weeks after operation	5.72±0.28	32.12±0.88	10.60±0.24**
Befor operation	5.82±0.33	32.98±0.92	9.84±0.34

\* expressed as mean and standard error.

\*\* P < 0.01

The splenic wound showed apparent good healing two weeks post-operatively, however, some pieces of non-absorbed cat gut sutures were still in situ. After 4 weeks, there were very strong adhesions between the suture line, the parietal layer of the peritoneum and the omentum (Fig. 2). Non of the cases showed any noticeable infection.

The histopathological study of the sutured splenic wound showed granulation tissue formation overlying the splenic capsule along the course of the operation (Fig. 3, 4 and 6). Two weeks post-operatively, mononuclear leucocytic inflammatory cells and erythrocytes infiltrated locally the healed tissues (Fig. 4). Focal areas of splenic tissue underneath the capsule

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were found losing their normal infiltrated by dead neutrophils (Fig. 5). Other splenic areas looked histologically normal. Adipoblasts were penetrating the granulation tissue at the 2<sup>nd</sup> and 3<sup>rd</sup> weeks (Fig. 6), however, they disappeared on the 4<sup>th</sup> week. Mononuclear leucocytic inflammatory cells were observed in diffuse manner inbetween the adipose cells (Fig 6 and 7).

### DISCUSSION

In the present work the surgical technique applied for splenectomy on right recumbent position proved to be efficient and passed without any difficulty to exteriorize the spleen and locate the splenic vessels. This could be attributed to the action of the used anaesthetic regimen which minimized straining resulting in reduced intraabdominal pressure which facilitated the intestinal manoeuvres during the said operation. However, TANTAWY *et al.* (1981) preferred to carry on total splenectomy in donkeys in standing position.

From the obtained results, it was quite clear that partial resection of the 17<sup>th</sup> rib provided an easy access to the spleen and its vessels, a finding which coincided with that reported by DENNING and BROCKLESBY (1965) and TANTAWY *et al.* (1981). When the spleen was abnormally enlarged, partial resection of the 18<sup>th</sup> rib in addition to the 17<sup>th</sup> one resulted in better exposure of the organ. EL ZOMOR (1985) recommended the same procedure in recumbent position. However, RIGG; REINERTSON and BUTTRICK (1987) resected the 16<sup>th</sup> rib and incised the diaphragm to reach good exposure of the splenic vessels and attachments. In the meantime, pneumothorax which was reported by DENNING and BROCKLESBY (1965) as a common complication was not met with in the present work.

The results showed that there was insignificant decrease in R.B.Cs. count and haematocrite value. This meant that the function of the spleen was not disturbed by partial splenectomy. However, PEACOCK and MANTON (1963) and ELENS *et al.* (1964) mentioned that total splenectomy should be followed by various degree of drop in R.B.Cs. count and haematocrite value because of the role of spleen in the formation of R.B.Cs. Moreover, the authors recorded a significant increase in total W.B.Cs., a result that agreed with IBRAHI *et al.* (1980) after total splenectomy in sheep and EL ZOMOR (1985) in donkeys.

Histopathological findings showed that the sutured area was filled by granulation tissue overlying a thickened fibrous tissue capsule from the first week of the experiment and persisted till the end of work. This finding was parallel to the observations of NORMAN and CHEVILLE (1983) concerning with healing of the surgical wound. Moreover, liquifaction and haemosiderosis were observed early at the 2<sup>nd</sup> week in the underlying area of granulation tissue along the splenic pulp. JONES and HUNT (1983) attributed such changes to the autolysis and heterolysis of the dead cells.

At the second week, newly formed granulation tissue was found penetrated by surrounding adipose cells, mononuclear leucocytic inflammatory cells and erythrocytes as a defence mechanism from the animal body against the surgical interference. The results of histopathological examination of splenic area faraway from the area of surgical interference showed no pathological changes from the beginning.

In conclusion, surgical trials for performing partial splenectomy, whenever indicated, could be successfully carried out in equines. Quite clear, the size and lobulation of the organ in such species paved way to the easiness of the mentioned surgical procedure.

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## LEGEND OF FIGURES

- Fig. (1): Suturing of the splenic capsule using simple continuous sutures and cat gut No. 0.
- Fig. (2): Apparent good healing of the splenic wound and the adhesions between the capsule and the omentum. 4 weeks after operation.
- Fig. (3): Granulation tissue formation overlying the splenic capsule. One week post-operatively H & E X 40.
- Fig. (4): Area of granulation tissue infiltrated by leucocytic inflammatory cells and erythrocytes. 2 weeks after operation H & E X 100.
- Fig. (5): One of the focal areas that showed liquifactive necrosis underneath the splenic capsule, 2 weeks post-operatively H & E X 100.
- Fig. (6): Granulation tissue infiltrated with adipoblastic cells and leucocytic inflammatory cells. 3 weeks post-operatively. H & E X 40.
- Fig. (7): Adipoblastic cell penetration, mononuclear leucocytic inflammatory infiltration and extravasated erythrocytes in the area of granulation tissue. 2 weeks post-operatively H & E X 100.















