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**SOME GROSS ANATOMICAL STUDIES ON THE MORPHOLOGY
AND ARTERIAL SEGMENTATION OF THE SPLEEN OF THE LION
(Panthera Leo) IN GIZA ZOOLOGICAL GARDEN**
(With 4 Figs.)

By

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(Received at 31/12/1988)

بعض الدراسات التشريحية على مورفولوجية
التقسيم الشرياني لطحال الأسد في حديقة حيوان الجيزة

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أجريت الدراسة على طحال خمسة من الأسود البالغة جمعت من حديقة حيوان الجيزة وتم
دراسة مورفولوجية الطحال وكذا التوزيع الداخلي للشرايين المغذية له وقد أوضحت الدراسة
أن للطحال في الأسود يقترب من الشكل الهلالي أما من حيث الموضع الطبوغرافي فهو يشبه
إلى حد كبير مثيله في القطط والكلاب غير أنه أكبر حجماً . وهذا قد أوضحت دراسة التوزيع
الداخلي لشرايين الطحال في الأسود أنه يمكن تقسيم الطحال إلى قطعتين (علوية وسفلية) .

SUMMARY

The present work was conducted on five lion spleens collected from Giza Zoological Garden. The morphology of the spleen was thoroughly investigated with special references to its parameters.

The study of the intrasplenic distribution of arterial system in the spleen of lion as well as the corrosion cast revealed the presence of two splenic segments, proximal and distal.

INTRODUCTION

Despite the informations now available on the morphology and arterial segmentation of the mammalian spleen, no attention has been paid to that of the wild animals. However, in the recent years, the growing interest in Zoological Gardens created an indispensable role for Veterinarians in the field of both captive and free living wild animals. Therefore, the present work on the morphology and arterial segmentation

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of the lion spleen objectives to offer some anatomical knowledges on such vital organ which may provide a base for the study of other zoomedical sciences.

MATERIAL and METHODS

The material for the present work consisted of five lion spleens obtained from Giza Zoological Garden within two hours after killing of the animals. The topography of the spleen was investigated *in situ* before evasceration. Thenafter, the spleen was dissected and its shape, colour, consistency, weight and different parameters were studied.

For the study of the intrasplenic distribution of the splenic artery and accordingly, the splenic arterial segmentation, the splenic artery was flushed with normal saline. Four specimens were injected with gum milk latex coloured red with carmine and immersed in AFA fixative -30% of 95% ethyle alcohol, 10% formaline, 10% glacial acetic acid and 50% dist. water (DELCAMPO, et al. 1974) for three days and then bluntly dissected. The fifth specimen was injected with a solution of vinyl chloride in acetone for cast preparation.

The arterial segmentation was adopted according to GUPTA, et al. (1976 through, 1979) and the nomenclature was adopted according to the N.A.V. (1983).

RESULTS

The lion spleen (I, II) is a soft, but not friable, dark brown coloured organ. It has nearly crescentic outlines and is flattened with rounded extremities. It is about 35.5 to 42 cm. long (through its hilus), 9 to 12 cm. wide and 1.28 to 2.1 cm. thick (about its middle) and its weight varried from 330 to 520 gm.

The spleen is contained within the left hypochondriac region being joined to the great curvature of the stomach by gastro-splenic ligament.

The lion spleen has rounded proximal and distal extremities, carnio-lateral convex and caudo-medial concave greater and lesser curvatures and parietal and visceral surfaces.

The proximal extremity (I, II/1) is attached to the left kidney and the left crus of the diaphragm by the suspensory ligament. It appears slightly narrower than the distal one. Their width range from 8.2 to 8.66 cm. with an average 8.47 ± 0.087 and 8.62 to 9.69 cm. with an average 9.23 ± 0.259 respectively.

The greater curvature (I, II/3) is convex and parallel to the greater curvature of the stomach for its most proximal part. Distally, it inclines inwards leaving a considerable gastric area. Its length ranges from 50 to 56 cm. with an average 59.5 ± 1.199 . The concave lesser curvature (I, II/4) lies caudo-medially and presents a well distinct umbilical splenic notch (I, II/5) slightly proximal to its middle. Its length is from 28 to 36 cm. with an average 30.3 ± 1.462 .

The parietal surface of the lions spleen makes contact with the diaphragm, costal arch as well as the abdominal wall; meanwhile the visceral surface is related

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mainly to the visceral surface of the stomach and to some extent to the small intestine. It is divided by the longitudinal hilus (II/H) into a wide outer gastric and a narrower inner intestinal areas. The hilus is represented by a longitudinal ridge extending from the proximal end up to slightly proximal to the distal end of the visceral surface. It is attached to the greater curvature of the stomach by a wide gastrosplenic ligament.

ARTERIAL SUPPLY and SEGMENTATION

The splenic artery (III/1) leaves the celiac artery, crosses the substance of the pancreas, to which it detaches 2 to 3 small twigs and then sweeps within the gastrosplenic omentum where it gives off the left gastro-epiploic artery and then continues towards the spleen. Five to seven cm. before approaching the splenic hilus, the splenic artery divides into a proximal and distal divisions (Segmental arteries). Each of the latter subdivides into two subsegmental rami. In two out of the examined spleens, the two proximal subdivisions were emanated independently from the parent splenic artery (III, IV/2,3). The proximal two rami pierce the hilus of the spleen proximal to the splenic notch and distribute into the area from the proximal end to the level of the splenic notch. Their side branches show weak anastomoses. The distal two rami (III, IV/5,6) pierce the spleen distal to the splenic notch and ramify into the area from the level of the notch to the distal end of the organ. Moreover, they show weak anastomoses between their ramuli. In all the examined cases, the vascular plane is perpendicular to the longitudinal axis of the spleen.

It is observed that, none of the examined specimens showed anastomoses between the branches of the proximal and distal primary (segmental) divisions. Accordingly, it is postulated that the lion's spleen is organized off two major unequal segments—proximal small segment and a distal larger one (IV/A,B). Consequently, and due to the weakness of arterial anastomoses established within the splenic segments, each segment may be subdivided into two subsequents, each of which has its own subsegmental vessels.

DISCUSSION

The basic form of the lion's spleen is dissimilar to that of the domestic animals, even those allied species. It appeared neither dumbbell-shaped like that of the dog (EVANS and CHRISTENSEN, 1979; DYCE, *et al.* 1987) nor curved elongated of the cat (GETTY, 1975). On the other hand, the incisura lienis described on the medial border of the spleen, resembles that of the dog (DYCE, *et al.* 1987).

The study under investigation confirms the conclusion of CLAUSEN (1958); GUTIERREZ-CUBILLOS (1969) and GUPTA, *et al.* (1976) in the human and GUPTA, *et al.* (1978 b) in the dog, that the mammalian spleen is generally segmented. Moreover, GUPTA, *et al.* (1979) attributed the variation in the topography of the splenic arterial segments in the different species to the position of the splenic hilum. In this connection, the study under discussion demonstrated that the lion's spleen comprises

two arterial segments—proximal and distal—each of which has its own vessel. A result which may pave the way to partial splenectomy in such an animal.

The weak anastomoses established in the present work, between the subsegmental splenic vessels makes the subdivision of the lion's spleen into four independent segments possible. However, DYCE, et al. (1987) in the dog and cat declared that the splenic artery divides into branches that vascularize splenic compartments which are normally independent although they do communicate.

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 - 2- Extremitas distalis.
 - 3- Margo cranio-lateralis (curvature major).
 - 4- Margo caudo-medialis (curvature minor).
 - 5- Incisura lienis.
 - 6- Gaster.
 - 7- Hilus lienis.
- Fig. (III):** A corrosion cast of a lion spleen showing the intrasplenic distribution of the splenic artery.

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- 1 A' Lienalis.
- 2,3 Rr. Subsegmentales proximales.
- 4 A. Segmentalis distalis.
- 5,6 Rr. Subsegmentales de A. segmentalis distalis.

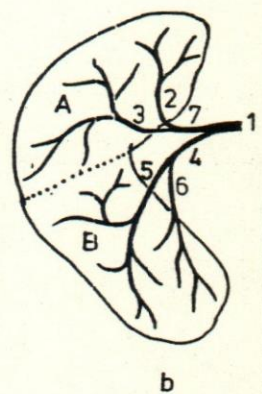
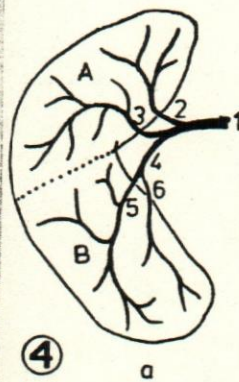
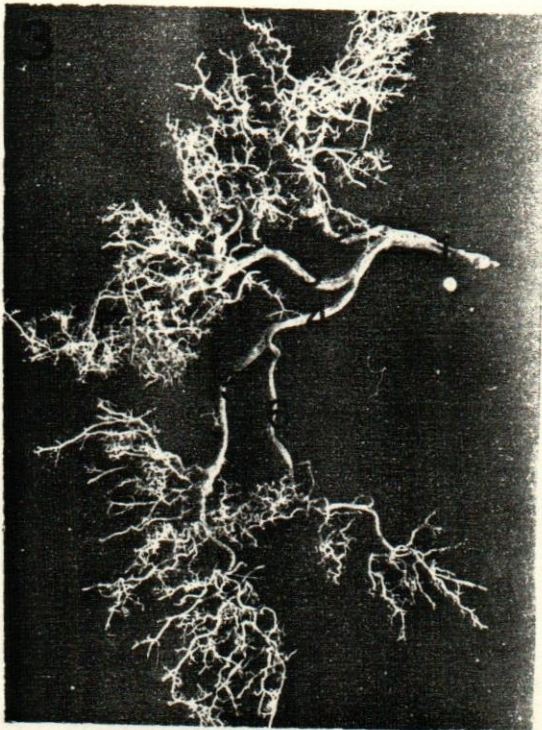
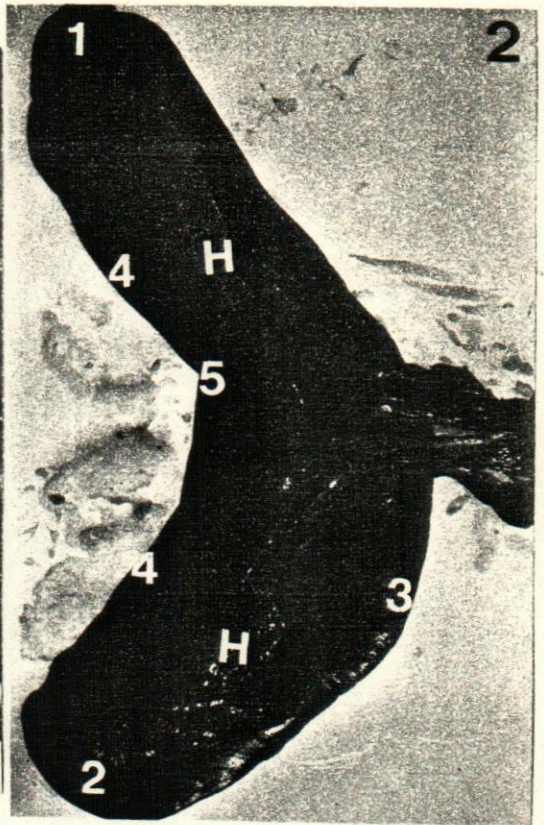
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- 1 A. Lienalis.
- 2,3 Rr. Subsegmentales de A. segmentalis proximalis.
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- 5 - Splenic vein.
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- 7 - Splenic artery.



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b