Some Anatomical And Ultrasonographical Studies On The Spleen And Its Arterial Segmentation In The Red Foxes *(Vulpes Vulpes)*

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ABSTRACT

This study was performed on ten adult apparently healthy red foxes collected from Abu-Rawash Area, Giza Governorate, Egypt. The animals were subjected to sagittal abdominal ultrasonography to perform the echo-pattern and dimensions of the spleen, as well as to portray the flow mapping and trace the various pulsation parameters (Peak Systolic Velocity, End Diastolic Velocity, Time Average Maximum Velocity, Pulsatility Index, Resistality Index and Systolic/ Diastolic ratio) via the 2D- Doplex Doppler technique of the intra-splenic arterial system of the spleen as well as the accessory spleen which was detected in some examined cases along the course of this study. Then after, the foxes were condemned and the gross morphology of the spleen and the recorded accessory spleen was studied. Histological examination was conducted to illustrate the microscopical structure as well as to exclude any pathological lesion in both of them. Moreover, some specimens were used to study the splenic arterial system using angiographical technique as well as latex and plastic casts. The study revealed that the spleen of the red foxes had approximately an elongated crescentic shaped appearance, with thin hyperechoic capsule, contoured homogenous granular parenchyma and enclosed sonolucent hyperechoic pulsed structures represented the blood vessels. The accessory spleen was observed grossly, in some cases, as a small elongated oval shaped flattened structure has the same colour, texture and consistency of the spleen. It was situated either on the parietal surface of the stomach at the level of the middle of the cranial border of the spleen (4-cases), or impeded in the greater omentum in-between the spleen and the stomach (3-cases). Sonographically, the accessory spleen in the former cases was detected having nearly the same echogenic character as that of the ordinary spleen, meanwhile in the latter cases it was difficult to be visualized. Microscopically, the accessory spleen had the same architecture as that of the ordinary spleen. The study of the distribution of the splenic artery revealed that the splenic parenchyma might be divided into two segments (a dorsal and a ventral) each of them could be subdivided into two sub-segments. Moreover, the recorded accessory spleen might be considered as an additional separate ventral sub-segment of the spleen.

INTRODUCTION

The Red foxes are of the most common species among foxes that recorded in Egypt. They inhabit the Nile valley from Aswan to the Mediterranean Sea *(1&2)*. The Red foxes are susceptible to all the diseases and medical problems of the dogs, in addition to the drastic stress effect resulted from the sudden changes in habitat in captive animals *(3)*.

The morphology and arterial segmentation of the mammalian spleen attracted the attentions of many investigators *(4,5&6)*. Moreover, the accessory spleen (Lien accessorius) was studied in the dogs as a result of postnatal trauma *(7)* and recorded normally in some healthy man *(8)*. Recently in veterinary practice, the splenic Ultrasonography coupled with 2D-Color Doplex Doppler technique, provides good anatomical and physiological data on the descriptive examination of the spleen and its vasculature *(9,10&11)*.

Nowadays the growing interest in wild animal's science, created an indispensable role for the veterinarians in the field of both captive and free living. So, the present work aimed to study the morphology and the arterial segmentation of the spleen, as well as spot a light on the echo-pattern and the 2D- imaging coupled with Color Doplex Doppler of such organ in the normal red fox as an important wild animal in Egypt.

The present work was conducted on ten adult apparently healthy red foxes of both sexes, ranging from 1.5 - 2 years old and of about 10-15 kg. body weight. The animals were obtained from wild animal hunters at Abu-Rawash Area, Giza Governorate, Egypt. Handling, species identification, aging and clinical examination of the foxes were adopted according to *(2&3)*, as well as the faithful guides of Dr/ Abd EL-Halim M., (Ass. Prof. of Wild life, Fac. of Vet. Med. Suez Canal Univ.).

Splenic Ultrasonography:

The foxes were caged and fasted 24 hours prior to the Ultrasonographical examination to facilitate the visualization of the spleen in its normal position. The animals were tranquilized by intramuscular injection of Ketalar® (Ketamine hydrochloride) at a dose of 20 mg/kg. B.wt.*(12)*. The mouths of the tranquilized foxes were tight, the animals were physically restrained in right lateral recumbancy and their abdominal hairs were clipped. Transducer-skin contact was achieved close to the last left rib, using an aqueous gel as coupling agent *(13&14)*. Sagittal B- mode scanning was conducted with Sony Digital Sono-ack 5500 computed sonography system (SHEFA SCAN, privet clinic- Embaba Area, Giza Governorate, Egypt) equipped with 7.5 MHZ sector transducer for studying the echo-pattern and Ultrasonic measurements of the normal spleen. Then after, 2D- Color Duplex Doppler flow mapping, spectral wave forms and the various pulsation parameters of the intra-splenic arterial system (Peak Systolic Velocity, End Diastolic Velocity, Time Average Maximum Velocity, Pulsatility Index, Resistality Index and Systolic/ Diastolic ratio) were recorded.

During the Ultrasonoic examination of some foxes (four cases), an unfamiliar additional echogenic accessory splenic like mass was recorded cranial to the middle of the cranial border of the spleen. Consequently the sonographical character and measurements as well as the Doppler flow mapping and the arterial pulsation parameters of that structure were recorded.

Morphology of the spleen:

After the performance of the ultrasonographical examination, the animals were condemned by bleeding via the common carotid artery after being anaesthetized through intra-venous injection of Thiopental Sodium® *(15)*. The left abdominal wall of each cadaver was dissected to expose the spleen and its neighborings. The shape, color, consistency and topographical relations of the spleen and the recorded accessory splenic like mass were studied in situ. Then after, their different morphometric parameters were measured physically using Vernier's scale caliper, fine threads and rulers.

In two cadavers of both sexes, the spleen and the recorded accessory splenic like structure were resected and weighed. Then after small slices represented different regions of them were fixed in 10% neutral buffered formalin and subjected to the ordinary histological technique till 5-7 micron-thick paraffin sections were prepared. These sections were stained with Harris Haematoxylin & Eosin stain *(16)* to study the histological architecture of the spleen and the accessory spleen and consequently to exclude any pathological lesion in them.

Arterial segmentation of the spleen:

The arterial segmentation of the spleen was studied in eight cadavers as follows:

a-The aorta of two cadavers was cannulated just prior to its passage through the diaphragm, legated at its caudal part, thoroughly flushed with normal saline and then injected with 60% Gum milk latex emulsion in Ammonium hydroxide, and colored red with carmine *(17)*. The specimens were preserved in 10% formalin for three days before dissection, and then the origin, course and distribution of the splenic artery were studied.

b-The rest six cadavers were eviscerated and the splenic artery was cannulated, flushed with normal saline followed by perfusion with a mixture (1:1) of Barium Sulphate and a commercial plastic material named Astrallon (Co-polymer of 70%Vinyl chloride and 30% Vinyl acetate, produced by the National Plastic Company - Giza Governorate, Egypt) according to *(18)*.

For angiographical studies, the specimens were sooner radiographed at 70Kv, 200MAs, 1/10S with FFD 60cm. For casts' preparations, the same six specimens were left in refrigerator for 48 hours to enhance polymerization of the plastic material then macerated in 50% Hydrochloric acid to remove the splenic tissue. The segmentation and the branching pattern of the splenic artery were studied in the X-ray films as well as in the prepared casts.

The pattern of the arterial segmentation was adopted according to *(19 & 4)*. Moreover, the nomenclature used along the course of this work was adopted by *(20 & 21)*.

RESULTS

The spleen of the adult normal red fox was a soft elongated crescentic organ with dark brown redish colour. It was situated within the left hypochondric region, just caudo-ventral to the left 13th rib. It was related proximally to the left crus of the diaphragm; cranially to the fundus of the stomach; caudally to the left kidney and the small intestine; laterally to the left lateral abdominal wall and medially to the loops of the small intestine (Figs.1a&1b). The weight of the spleen varied from 175.32 -180.77gm. It measured 27.31± 0.15 cm. in length and 8.21± 0.11 cm. in width and 1.56± 0.23 cm. in thickness (about its middle).

The spleen of the fox presented two extremities, two borders and two surfaces. The proximal and distal extremities were nearly rounded, and the proximal extremity was narrower than the distal one (Figs.2a, 2b&2c /1&2). The cranial border (lesser curvature of the spleen) was concave and measured 20.24± 1.11cm. in length.(Figs.2a&2c/3). It had at its middle a small splenic notch (Incisura lienis) (Figs.2a & 2c/5).This border was moulded with the greater curvature of the stomach. The caudal border (greater curvature of the spleen) was convex and related proximally to the left kidney and distally to the jejunum (Figs.2a & 2c/4). It measured about 35.27± 2.11cm. in length.

The parietal surface of the normal spleen was contiguous to the left abdominal wall; meanwhile the visceral surface related mainly to the fundus of the stomach and to some extent to the small intestine. The latter was divided by a longitudinal hilus into narrow cranial gastric (Fig. 2c/7) and wide caudal intestinal surfaces (Figs. 2b/3&2c/8). The splenic hilus (Fig. 2c/6) was represented by a longitudinal ridge laid between the gastric and intestinal surfaces. It was attached to the greater curvature of the stomach by an extensive gastrosplenic ligament (Figs.1b/ 2&2b/4).

In seven examined cases, a small elongated oval shaped flattened accessory spleen was observed (Figs.1a/2&2a/B).The position and relation of the accessory spleen was variable among the examined foxes. In four cases, the accessory spleen was situated cranial to the middle of the cranial border of the normal spleen just caudal to the sternal end of the left 12th rib (Figs.1a/2&2a/B). In other three cases, the accessory spleen was hidden in the greater omentum between the visceral surface of the spleen and the fundus of the stomach (Fig.2b). The accessory spleen had nearly the same color, texture and consistency of the normal spleen of the same animal. Its weight varied from 25.55 - 27.45gm. It was measured 3.32± 0.33 cm. in length and 1.37± 0.09 cm. in width and 0.56± 0.04 cm. in thickness (about its middle).

The accessory spleen had dorsal and ventral rounded ends and cranial and caudal convex borders of nearly same length (3.90± 0.13cm.). It presented a parietal surface related to the left abdominal wall in the former four cases or to the visceral surface of the spleen in the latter three examined animals, and a visceral one related to the stomach. The latter surface had a deep hilus above its middle (Fig.2c/a) which received the blood vessels and other structures which supplied the accessory spleen. The hilus was attached to the greater curvature of the stomach by a special fold (Fig.2c/7) derived from the gastrosplenic ligament.

Lieno-Sonography:

The sagittal B-mode Ultrasonography, caudo-ventral to the left 13th rib, portrayed the normal spleen of the adult fox as homogenous elongated crescentic shaped. The splenic contour was displayed by an echogenic line represented the capsule contoured smooth finally speckled parenchyma contained sonolucent hyperechoic pulsed structures represented the splenic vessels (Figs.3&7). The ultrasonic measurements of the spleen were 27.20± 0.11 cm. in length and 8.10± 0.21 cm. in width (about its middle).

During the Ultrasonic examination of some foxes (4 cases) a small elongated echogenic structure was imaged ventral to the costal arch, below the ventral end of the left 12th rib, and just cranial to the middle of the spleen without connection in-between. It showed thin hyperechoic capsule (Fig.3/Ca) bordered a uniform sandy parenchyma (Fig.3/Pa), and sonograhpically recorded about 3.12± 0.15 cm. in the lengths and 1.29± 0.11 cm. in the width (about its middle). It was difficulty to image that structure where it was hidden under the spleen (3 cases).

A.lienalis:

The splenic artery of the red fox arose from the celiac trunk just dorsal to the left limb of the pancreas. It detached 2-3 short pancreatic twigs before coursing ventrally on the greater omentum, in its way to the visceral surface of the spleen (Fig.4).

The splenic artery was bifurcated, about 2-3 cm. dorsal to the spleen, into dorsal and ventral segmental arteries and consequently the former was redivided into two dorsal sub-segmental branches (Figs.5&6). The ventral segmental artery gave the left gastroepiploic artery (Figs.5&6/b), which continued on the gastrosplenic ligament to the greater curvature of the stomach, then divided into two ventral sub-segmental branches (Fig.6/C&D). In three out of the studied specimens, the two ventral sub-segmental branches originated independently from the parent splenic artery (Fig.5). In the rest examined cases (seven cases) where an additional accessory spleen was recorded; the ventral segmental artery gave a short branch that entered the hilus of that structure and ramified inside its parenchyma (Fig.4/ I & Fig.6/E).

The two dorsal sub-segmental branches detached a group of short gastric arteries, then pierced the splenic hilus proximal to the splenic notch and ramified within the proximal half of the spleen. Similarly the two ventral sub-segmental branches gave group of short gastric arteries then pierced the splenic hilus distal to the splenic notch to ramify inside the ventral half of the spleen.

Weak anastomoses were observed in-between the tributaries of the sub-segmental arteries. The vascular plane of the studied specimens was perpendicular to the long axis of the spleen (Figs.5&6).

The 2-D Color Doplex Doppler study of the normal red fox's spleen traced the intrasplenic vessels as pulsed echogenic cords, without anastomosis in-between. The Spectral Wave Doppler portrayed the spectral wave's forms of the intra-splenic arteries as positive waves, meanwhile those of intra-splenic veins appeared as inverted or negative waves (Fig.7). The mean values of the pulsation parameters (Peak Systolic Velocity, End Diastolic Velocity, Time Average Maximum Velocity, Pulsatility Index, Resistality Index and Systolic/ Diastolic ratio) of the intra-splenic arteries in mm/s±S.D recorded 0.24± 0.08, 0.14± 0.04, 0.26± 0.07, 0.39± 0.11, 0.78± 0.07 and 1.62± 0.23 mm/s respectively.

In the four cases where an accessory spleen was detected sonographically cranial to the middle of the spleen, the 2-D Color Doppler portrayed the vasculature of its parenchyma as pulsed echogenic cords (Fig.8). The mean values of the pulsation parameters of its intra-parenchymal arteries of the accessory spleen (Peak Systolic Velocity, End Diastolic Velocity, Time Average Maximum Velocity, Pulsatility Index, Resistality Index and Systolic/ Diastolic ratio) were about 0.27± 0.05 mm/s, 0.16± 0.02mm/s mm/s, 0.18± 0.04 mm/s, 0.60± 0.10mm/s, 0.70± 0.08 mm/s and 1.60± 0.12 mm/s respectively.

The micromorphological examination of the spleen and the accessory spleen of the red fox revealed that the histological structure of both was similar. The parenchyma of them showed lymphoid tissue in nodular pattern with diffused inter-follicular mature lymphoid cells. It was surrounded by a distinct fibrous capsule which sent several trabeculae dividing the splenic parenchyma into several locculi occupied by red and white pulps and contained splenic blood vessels (Figs.9a&9b). No neoplastic or inflammatory cells were observed in both the spleen and the accessory spleen and their blood vessels were free from plaques and/ or arteriosclerosis.

Legends of figures:

Fig.1a: A photograph of the left abdominal cavity of an adult normal red fox, showing the normal topography of the spleen(1)and that of the recorded accessory spleen(2). Notice the left 13th rib (3).

Fig.1b: A higher magnification of Fig.1a, taken after removal of the accessory spleen.
1- lien (Facies paritalis).
2- Omentum majus.
3- Costa XIII (sinister).
4- Ren sinister.
5- Jejenum.

Fig.2a: A photomacrograph of the spleen (A), accessory spleen (B) and stomach (6) (parietal surface) of an adult red fox.
A- lien (Facies paritalis).
1- Extremitas dorsalis.

2- Extremitas ventralis.
3- Margo cranialis.
4- Margo caudalis.
5- Incisura lienis.
6- Gaster.

Fig.2b: A photomacrograph of the stomach and spleen (visceral surface) of a normal red fox, showing the connection of the spleen with the stomach via the gastrosplenic ligament. Notice the accessory spleen (8) and its connection with the stomach through special fold (7) derived from the gastrosplenic ligament.
1- Extremitas dorsalis.
2- Extremitas ventralis.
3- lien (Facies intestinalis).
4- Lig. gastrolienale.
5- Aa. gastricae breves.
6- Gaster.

Fig.2c: A photomacrograph showing the visceral surfaces of a resected spleen and that of the accessory spleen (B). Notice the hilus (a) of the latter.
A- lien (Facies visceralis).
1- Extremitas dorsalis.
2- Extremitas ventralis.
3- Margo cranialis (curvature minor).
4- Margo caudalis (curvature major).
5- Incisura lienis.
6- Hilus lienis.
7- Facies gastrica de Facies visceralis.
8- Facies intestinalis de Facies visceralis.

Fig.3: A sagittal trans-abdominal ultrasonograhpical image of an adult normal red fox, portraying the echogenisity of the splenic parenchyma (P) and splenic capsule (C). Notice also the parenchyma (Pa) and capsule (Ca) of the recorded accessory splenic mass.

Fig.4: A photograph of dissected left side of the abdominal cavity of an adult red fox, showing the celiac artery injected with Gum milk latex colored red. Notice the main arterial supply, of the spleen (1) and that of the accessory spleen (6).

(The greater omentum was partially removed and the spleen was stretched and twisted).
1- lien
2- Gaster.
3- Pancreas.
4- Jejenum.
5- Diaphragma.
A- Aorta abdominalis.
B- A. celiaca.
C- A. lienalis.
D- R. pancreatici de A. lienalis.
E- A. segmentalis dorsalis de A. lienalis.
F- A. segmentalis ventralis de A. lienalis. (Notice its side branch (I) to the accessory spleen (6)).
G- Rr. subsegmentalis ventralis de A. segmentalis ventralis.
H- A. gastroepiplocia sinistra.

Fig.5: A photoograph of splenic arterial angiograph of an adult red fox, showing a normal branching pattern of the splenic artery. (in-vitro)

1- A. lienalis.
2- A. segmentalis dorsalis de A. lienalis.
A&B- Rr. subsegmentalis dorsalis de A. segmentalis dorsalis.
C&D- Rr. subsegmentalis ventralis de A. lienalis.
a- Aa. lienalis de Rr. Subsegmentalis.
b- A. gastroepiplocia sinistra.
c- Aa. gastricae breves.

Fig.6: A photomacrograph of a corrosion cast of a normal red fox's spleen, showing a mode of distribution of the splenic artery. Notice the artery (E) supplied the accessory spleen.

1- A. lienalis.
2- A. segmentalis dorsalis de A. lienalis.
A&B- Rr. subsegmentalis dorsalis de A. segmentalis dorsalis.
3- A. segmentalis ventralis de A. lienalis.
C&D- Rr. subsegmentalis ventralis de A. segmentalis ventralis.
a- Rr. lienales de Rr. Subsegmentalis.
b- A. gastroepiplocia sinistra.

Fig.7: In-vivo Color Duplex Doppler of the splenic parenchyma (P)of a normal red fox , portraying its intra- splenic arteries (A) and veins (V). Notice the positive wave form of the arteries, and the negative or inverted form of the veins.

Fig.8: In-vivo Color Duplex Doppler of the parenchyma (P) of the accessory spleen, showing its vasculature (arteries (A) and veins (V)). Notice the positive spectral wave form of the arteries.

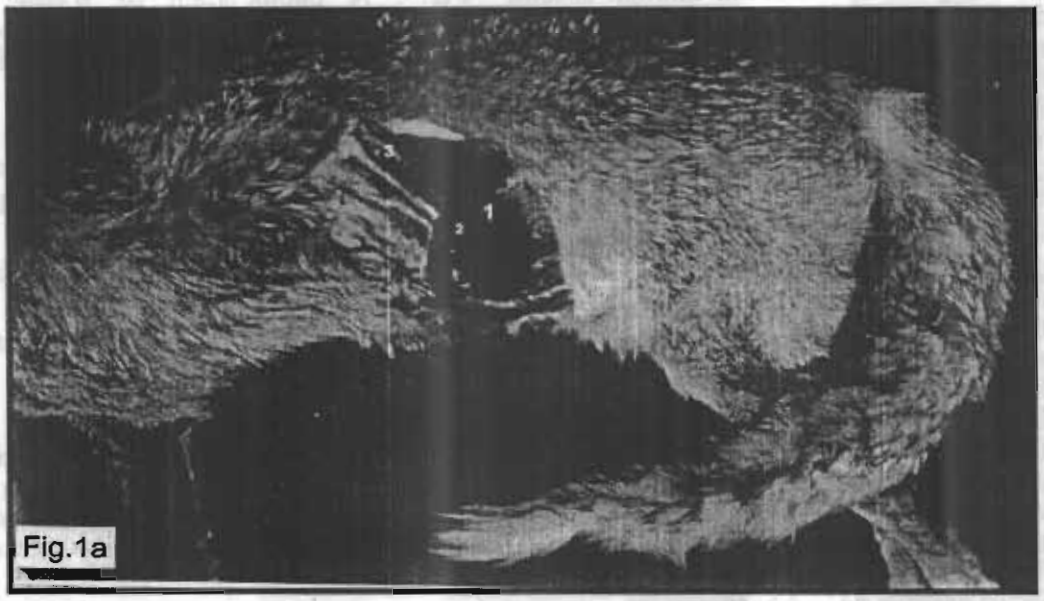
Fig.9a: A photomicrograph of the accessory spleen of a normal red fox, showing its architecture. Capsule (1), White pulp (2), Red

pulp (3), Splenic trabeculae (4) and the central arteriole (5) of the white pulp. (H x.&E., X100).

Fig.9b: A photomicrograph of the spleen of an adult red fox showing its normal structure free from neoplastic or inflammatory lesions. Notice that the intrasplenic blood vessels were free from plaques and/ or arteriosclerosis (H x.&E., X100).

1- Capsula lienis.
2- Pulpa lienis alba.
3- Pulpa lienis rubra.
4- Trabeculae lienis.
5- Arteriolae lienales.

Notice that Figs.9a&9b portrayed the spleen and the accessory spleen having nearly the same histological structure without marked differences in-between.



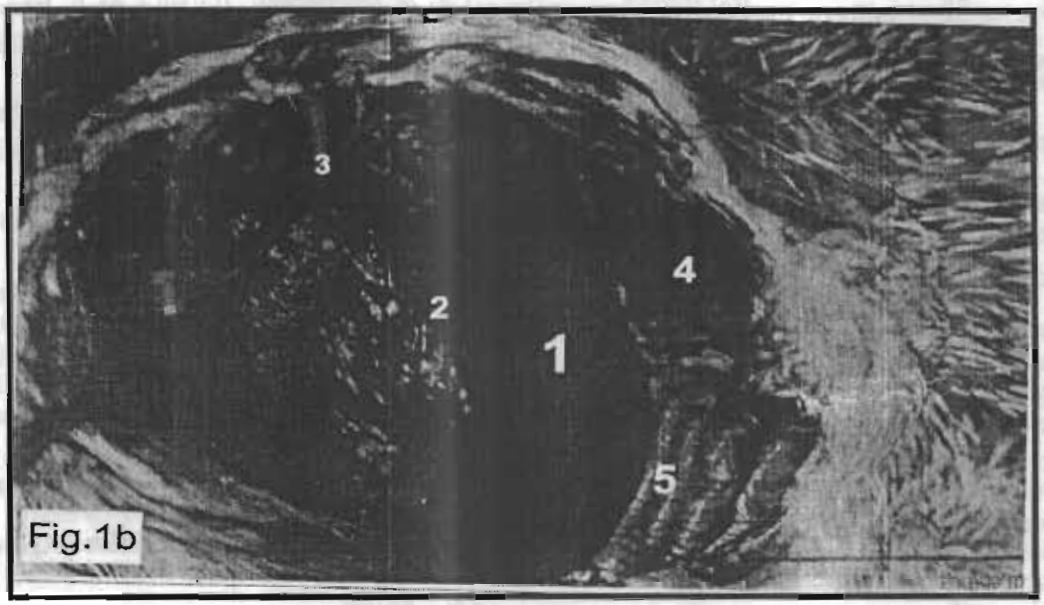


Fig.2a

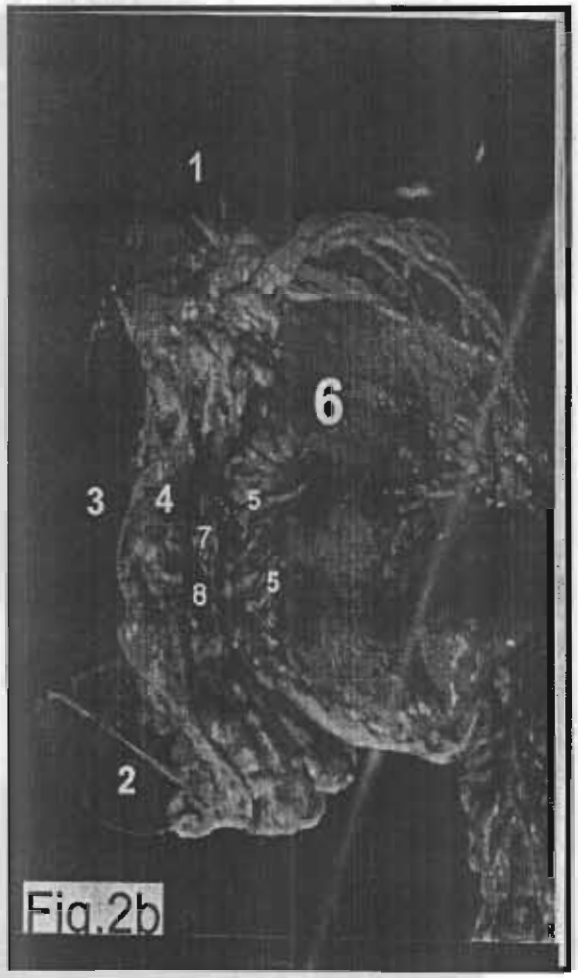


Fig.2b

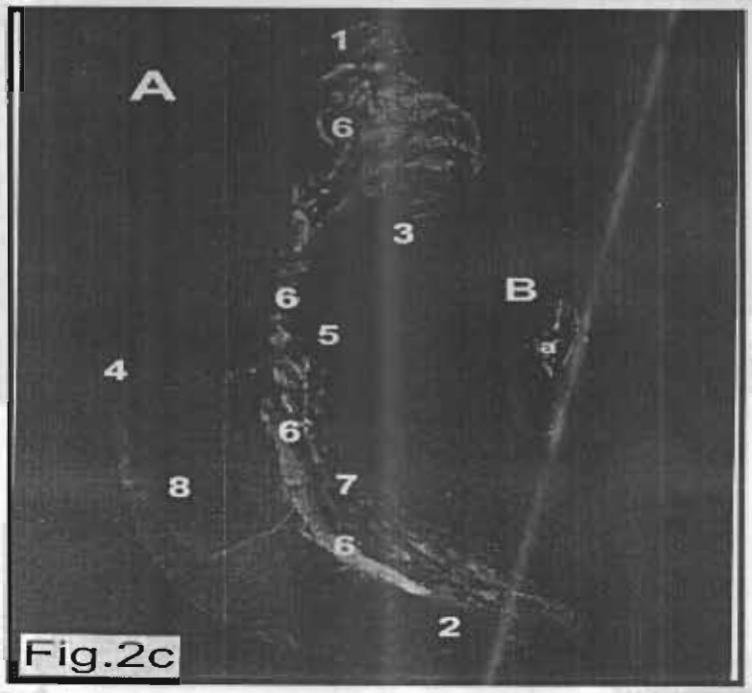


Fig.2c


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Fig.3

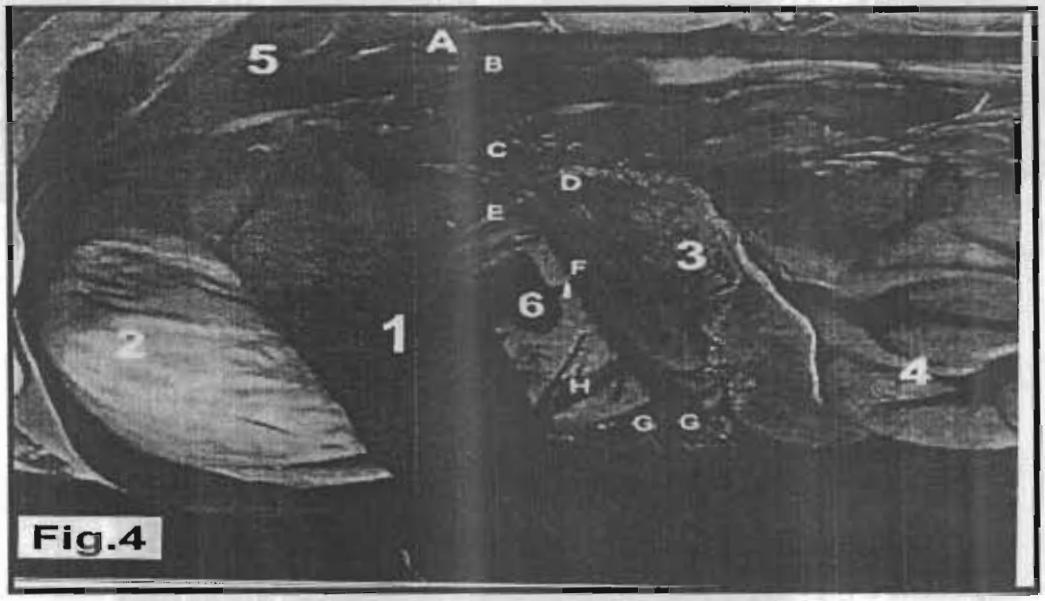
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Fig.4

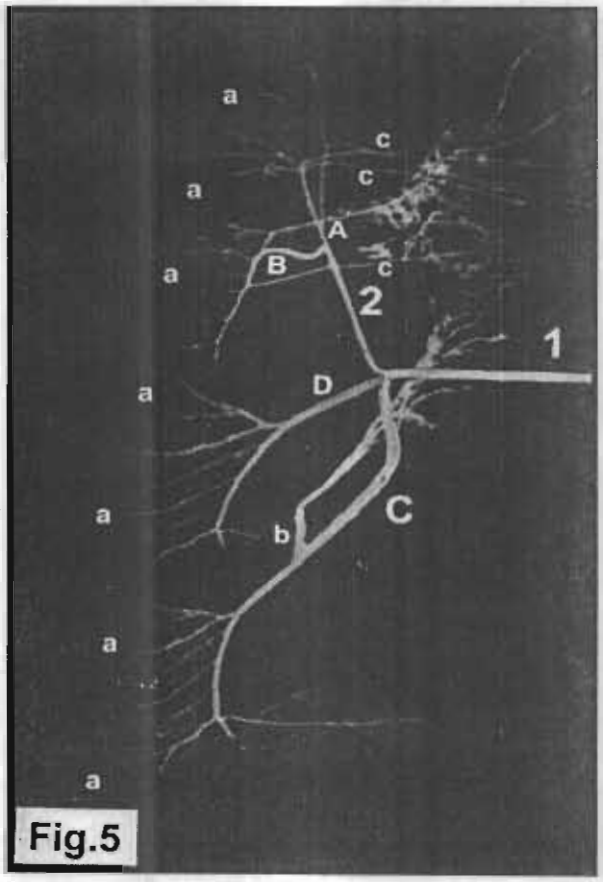


Fig.5

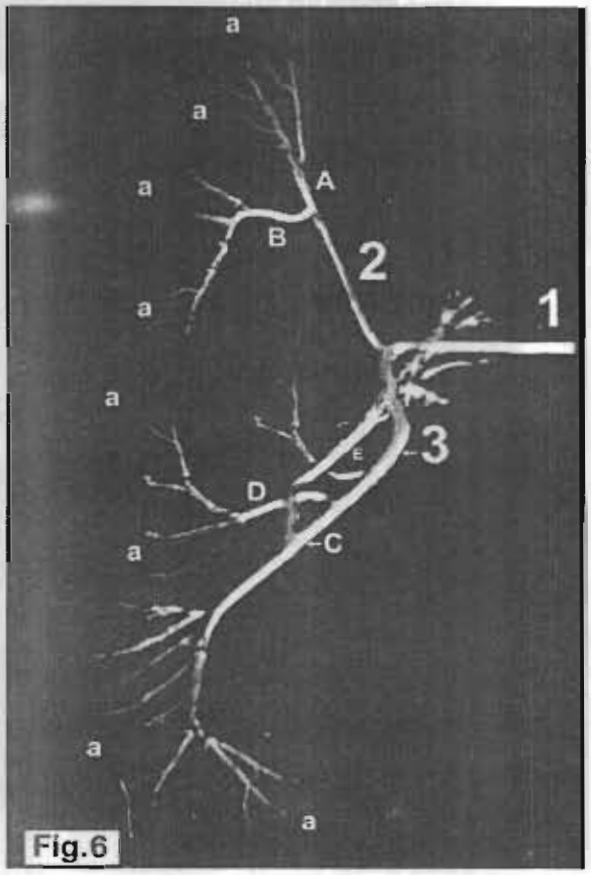
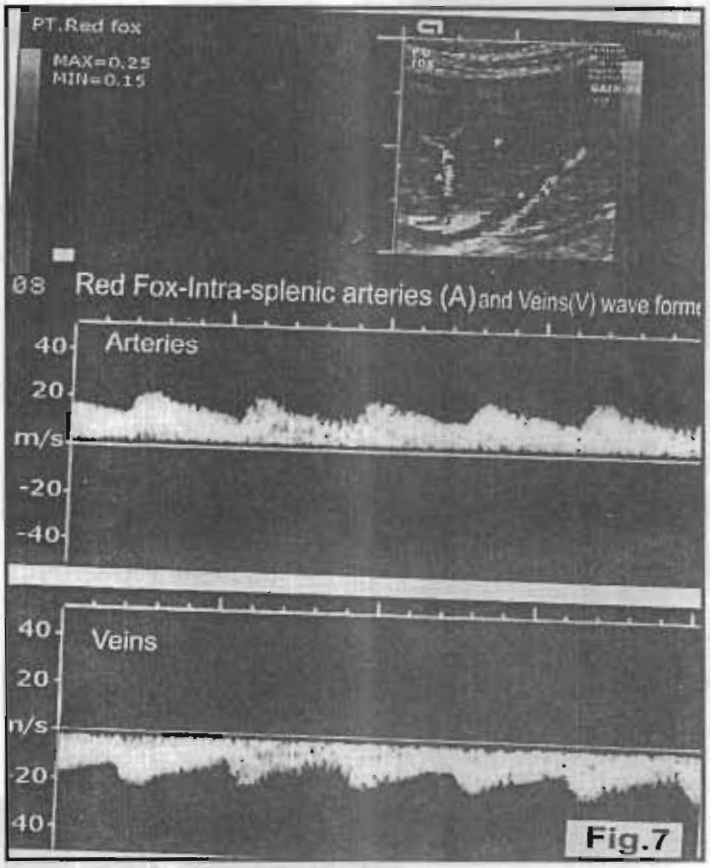


Fig.6


PT.Red fox
MAX=0.25
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08 Red Fox-Intra-splenic arteries (A) and Veins(V) wave forme
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Fig.7

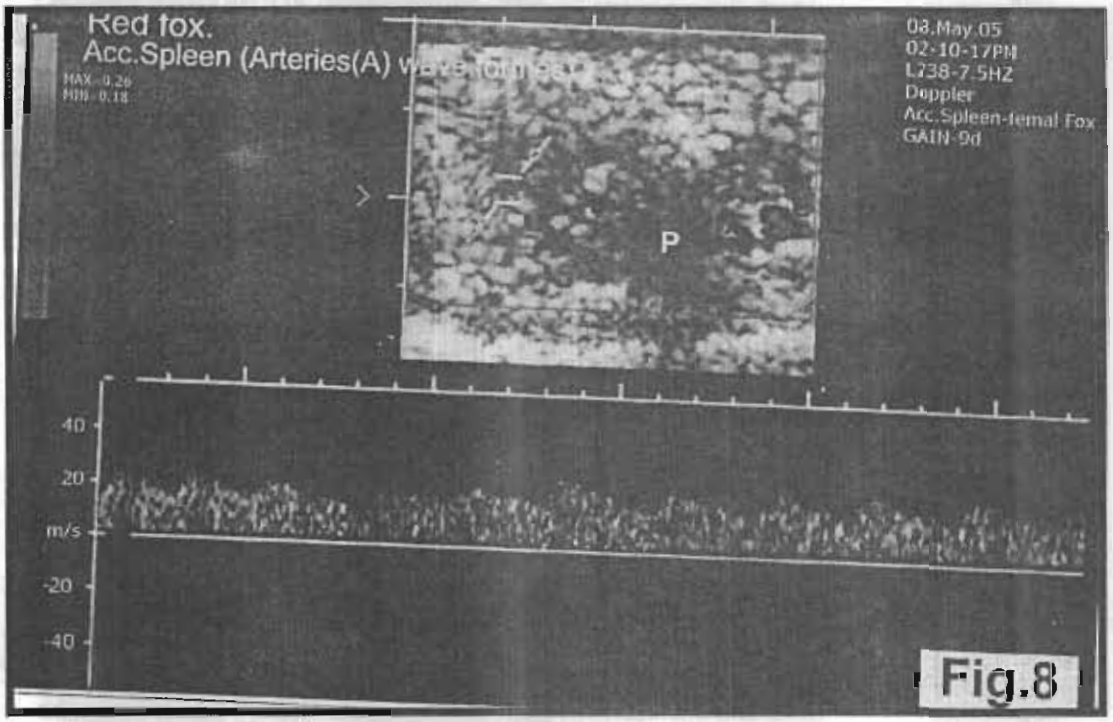
Red fox.
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Fig.8


Fig.9a

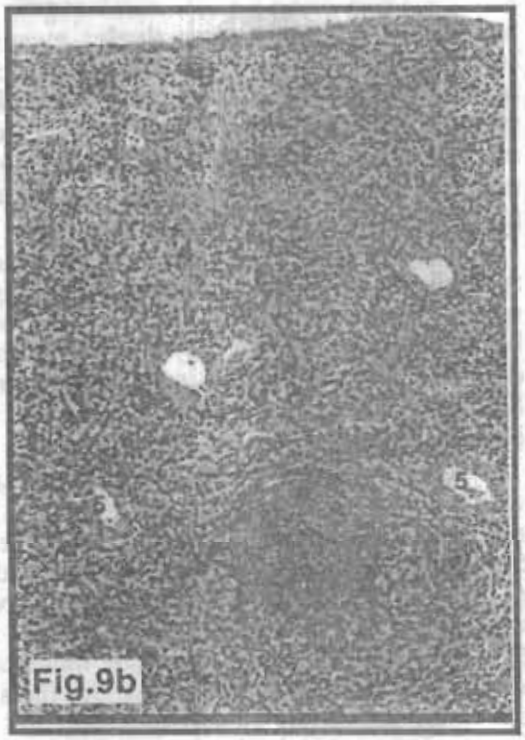
Fig.9b

DISCUSSION

The present study revealed that the spleen of the adult normal red fox had an elongated crescentic shape, dissimilar to that of the domestic animals even those of the allied carnivores. It was described as curved elongated in the cat *(22)*, dumbbell- shape in the dog *(23,6&24)* and triangular in outline in the wild African fennec *(25)*.

The accessory spleen which was observed during the present investigation as a small elongated oval shaped structure, similar to the normal spleen in colour, texture consistency and structure, and was situated either cranial to the spleen or impeded in the greater omentum in-between the spleen and the stomach. Similar results were observed in pig *(22)* as the accessory spleen was recorded hidden in the gastrosplenic ligament. Meanwhile an accessory spleen was observed in the dog *(7)*, as a result of postnatal trauma.

In human *(26&8)*, the accessory spleen was recorded hidden in the omentum of 3o% of the normal population. On agreement with that mentioned in man *(27)*, the accessory spleen in the current investigation was asymptomatic, discovered incidentally during the ultrasonic examination and should not be confused with the splenic tumors. In this respect in the man *(28)*, it was hypothesized that the accessory spleen was originated as a congenital ectopic splenic tissue during the embryonic period and acted just like the normal spleen.

The present work declared that, fastening of the foxes prior to the Ultrasonographical examination facilitated the visualization of the spleen in its normal position. The recorded echo-texture of the spleen and that of the accessory splenic like mass was in a line with that was descried in dog *(29)* and in Baboon monkey *(14)*, as the spleen was bordered by a smooth echogenic line representing the fibrous nature of the capsule, while the parenchyma seemed to be homogenous granular attributed to its vascular nature and trabeculae inside. Similar with that recorded in dog *(30&11)*, it was difficult to differentiate sonographically between the white and red pulps of the fox's spleen. In this connection, the congested spleen of the dog *(11)* was portrayed possessed a hyperechoic parenchyma, meanwhile in dogs suffered from multicentric lymphoma the spleen showed blotchy echo-texture.

The present study declared that the gross measurements of the length and width of the adult fox's spleens were 27.31± 0.15 cm.

and 8.21± 0.11 cm. respectively; meanwhile sonographically it recorded 27.20± 0.11 cm. in length and 8.10± 0.21 cm. in width. Those results confirmed the recorded conclusion in man *(31)*, that the lienosonogram measurements were nearly equal to the actual gross measurements of the spleen.

The current study demonstrated that the splenic artery was divided prior reaching the splenic hilus into dorsal and ventral segmental branches, and consequently each of them re-divided into two sub- segmental arteries. Similar results were recorded in man *(18)*, buffalo*(32)*, dog *(23)* and lion *(5)*.

The present study revealed that there were weak anastomoses between the sub-segmental branches of the splenic artery. Similar results were recorded in dog and cat *(24)*. In this connection, the current work established the recorded conclusion in man *(33&34)* and in dog *(19)* that the mammalian spleen was generally segmented. So, the study under investigation postulated that the red fox's spleen comprised two arterial segments (a dorsal and a ventral), that makes the partial splenectomy is possible. On the contrary in buffalo calves (35), the spleen could not being segmented.

Concerning the arterial supply of the accessory spleen, the current investigation showed that it received a branch from the ventral segmental artery of the splenic artery. So the accessory spleen might be considered as an additional separate ventral sub-segment of the spleen that should be taken in consideration during splenectomy. In this respect, it was declared in man (27) that the acute rapture of the accessory spleen might lead to partial splenectomy.

The 2D- Color Doplex Doppler technique imaged the intra-splenic vessels of the normal fasted red foxes as pulsed echogenic cords and the blood flow inside them was detected. On the other hand, in dog *(29)* it was difficult to portray the intrasplenic vessels as a result of the superimposed intestinal gases. So, fastening of the animals in the current study was essential.

The recorded normal vascular parameters (Peak Systolic Velocity, End Diastolic Velocity, Time Average Maximum Velocity, Pulsatility Index, Resistality Index and Systolic/ Diastolic ratio) of the spleen and the recorded accessory splenic like structure, provide a good picture for the blood flow inside their parenchymae. That was in agreement with that recorded in man *(36)*, as the B-mode ultrasonography coupled with Color Doppler technique might be considered as a good tool for detection the size and echo-texture of the spleen, as well as portraying the blood flow inside the intrasplenic vessels to exclude occlusion of the ipsilateral main stem that help in clinical diagnosis of the spleen.

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الملخص العربي

بعض الدراسات التشريحية و بالموجات فوق الصوتية على الطحال و تقسيمه الشرياني في الثعالب الحمراء

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أجريت الدراسة الراهنة على عشرة من الثعالب الحمراء البالغة و السليمة صحيا والتي تم الحصول عليها من منطقة أبو رواش بمحافظة الجيزة. تم إجراء مسح صوتي سهمي للبطن لدراسة النموذج الطبيعي للصدى الصوتي للطحال وكذا مقاساته. وقد استخدمت تباعا تقنية الموجات فوق الصوتية ثنائية الأبعاد لإيضاح تدفق الدم داخل الطحال وكذا قياس قمة السرعة الانقباضية، نهاية السرعة الأنبساطية، المتوسط الزمني لسرعة تدفق الدم ، الدليل النبضي ، دليل المقاومة والمعدل الانقباضي الانبساطي للشرايين داخل حشوة الطحال. و أثناء فحص بعض الثعالب أتضح وجود جسم إضافي شبيه للطحال من حيث نمط بعث صدى الموجات فوق الصوتية، و من ثم تم فحصة بالموجات فوق الصوتية ، وتحديد أبعاده ،بالإضافة ألي إيضاح معدل تدفق الدم و كذا نبض الشرايين بداخلة. تلي ذلك دراسة مورفولوجية كل من الطحال و الجسم الإضافي شبيه الطحال ظاهريا وكذا مجهريا لوصف مظهرهم الطبيعي واستبعاد أي ظواهر مرضية في كل منهما. هذا وتم أيضا دراسة الشرايين المغذية الطحال و الجسم الإضافي شبيه الطحال باستخدام الأشعة السينية الملونة وكذا القوالب البلاستيكية التأكلية و المطاطية (لأتكس).

أوضحت الدراسة أن الطحال الطبيعي في الثعالب الحمراء له شكل هلالي مستطيل ، محاط بحافظة رقيقة لها قدرة كبيرة على بعث صدى الموجات فوق الصوتية تغلف حشوة حبيبية متجانسة تحوى تراكيب تنبض و لها القدرة على انعكاس صدى الموجات فوق الصوتية والتي تمثل الأوعية الدموية لحشوة الطحال. ولقد لوحظ أثناء الدراسة في سبعة من الثعالب، وجود جسم صغير بيضاوي الشكل له طبيعة و نسيج الطحال ، يسهل وصفة بالموجات فوق الصوتية في أربع ثعالب، ذلك لوجوده أمام منتصف التقوس الصغير للطحال الطبيعي و يشبهه أيضا في قدرته على بعث صدى الموجات فوق الصوتية. أما في الثلاثة حيوانات الأخرى، فلقد أتضح ظاهريا وجود الجسم الإضافي شبيه الطحال بين الطحال و المعدة مما يحول دون فحصة بالموجات فوق الصوتية. هذا وقد تبين من دراسة التوزيع الداخلي لشرايين الطحال في الثعالب الحمراء، أنة يمكن تقسيم الطحال إلى جزئين (علوية و سفلية) تحوى كل منهما على قسمين ثانويين. ومن ثم فأنة يمكن اعتبار الجسم الإضافي شبيه الطحال، كقسم ثانوي إضافي منفصل يتبع القطعة السفلية للطحال. هذا وقد نوقشت النتائج التي تم الحصول عليها مع مثيلتها في الحيوانات الأخرى وكذا الإنسان.