

ANATOMICAL AND HISTOLOGICAL STUDY OF THE SPLEEN IN IRAQI SHEEP(Awasi sheep)

Eman M. Khalel

Department of Anatomy. College of Veterinary Medicine University of Baghdad, Baghdad,Iraq.

(Received 18 October 2010, Accepted 30Deember 2010)

Keywords: Awasi sheep, Trabeculae, lymphoid nodule.

ABSTRACT

This study were carried out on 20 healthy of spleen healthy adult Awasi sheep. The anatomical study include study of length, width Thickness, weight of 10 spleen. The average measurements were 9.93 ± 0.342 ; 6.48 ± 0.233 ; 2.48 ± 0.142 cm and 69 ± 6.663 gram respectively while the histological study include the thickness of capsule and trabeculae ,splenic white pulp diameter ,lymphoid nodule diameter were determind on 10 spleens. The average measurements were 140.5 ± 13.712 ; 82.75 ± 9.7 ; 505 ± 34.245 ; 315.25 ± 23.185 μ respectively.

The periarterial lymphatic sheath (PALS) containing One central artery that branched into 2-3 arteries.

INTRODUCTION

Sheep is an important animal as a sours of meat ,milk, wool products(1) From the important disease to affect the sheep is the blood parasite that removed and phagocytosed in the spleen (2, 3) .It is well known that, the lymphoid tissue play an important role in the defense mechanism against the microorganism.

One of the lymphoid organ is the spleen which is considered the largest lymphoid organ of immunological defense for blood invasion(4). Immunohistochemical characterization of splenic compartment has been performesd in bovine(5), in sheep(6). Detailed information about the splenic cellular composition as important for the understanding of its immunological role and for the analysis of several disease of animals(7).

MATERIALS AND METHODS

This study were carried out on 20 spleen obtained from healthy adult Awasi sheep with average age (5month-1year),for anatomical study (10)spleens were studied for length,width,thickness,weights of spleen , the weight of animals and ratio of spleen weight to body weight were recorded.

For histological study (10)spleen were fixed directly after removing from animals in 10% formalin and the specimens were prepared for paraffin sections and stained with Haematoxyline and Eosin (8).The study was achieved in the laboratory of histology at college of veterinary medicine ,Baghdad university .The histological structure of spleens studied ,thickness of capsule and trabeculae ,the splenic white pulp dimeter,lymphoid nodule dimeter, were measured under light microscopy using a micrometer eye piece.

RESULTS

This study showed that the gross anatomy of spleen in sheep appear as a triangular with rounded angles(fig 1).the average length is about (9.93 ± 0.342) cm .It is average weight about (6.48 ± 0.233) cm. Its weight about (69 ± 6.663) gram and the greatest thickness near the hilus about (2.48 ± 0.142) cm.

The spleen also have two surface ,the parietal surface which appear as convex(fig-2)and the visceral surface as aconcave surface and has a hilus(fig-3).There were two ends in the sheep spleen,the base (dorsal end)which appear as abroad and thick and ventral end that appear as anarrower and thinner than the base ,the borders appear thin (fig-1).

On the surface of acute through a fresh spleen, there are a white spots in the parenchyma,these are lymphoid nodules which are apart of white pulp.These nodules appear within the red pulp that appear within the red pulp that appear as adark red tissue which is rich in blood (fig-4).

The results of histological study revealed that the spleen of sheep as general,it have typical composition a parenchymatous is consisting of white and red splenic pulp that is enclosed by afibrous capsule and subdivided by trabecule(fig-5).

The spleen consist of amoderately thick capsule of (140.5 ± 13.712) μ and was divided into layers smooth muscle fibers inter woven with collagen and elastic

fibers, the capsule covered by mesothelium (fig-6) from the capsule the trabeculae was extended into parenchyma, so it divided it to small splenic area. These trabeculae found composed of predominantly of smooth muscle fibers that extend parallel to the longitudinal section and collagen with elastic fibers (fig-6), the average thickness of trabeculae were $(82.75 \pm 9.7) \mu$.

The splenic pulp consist of red and white pulp, the red pulp found consist of sinusoid that appear irregularly distributed and meandering through the pulp cord which appear as a cellular tissue (fig-7). The white pulp made up of lymphatic tissue which distributed randomly through the splenic pulp with $(505 \pm 34.245) \mu$ in diameter appear as lymphatic nodule that appear as a spherical in shape with or without germinal center and its diameter were $(315.25 \pm 23.185) \mu$ and as periarterial Lymphatic sheath (PALS) (fig-8). The cross section of PALS contain (1) central artery (fig-8) that branched into (2-3) straight branches (fig-9).

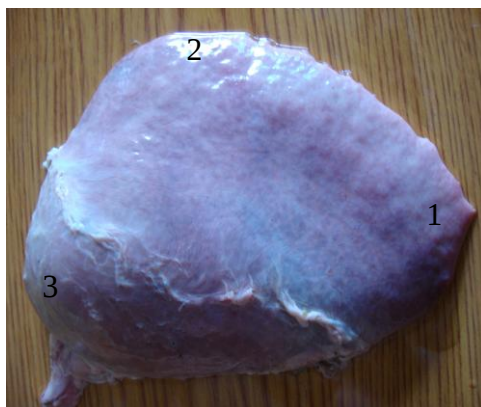


Fig1: The gross anatomy of spleen appear as a triangular with rounded angles.

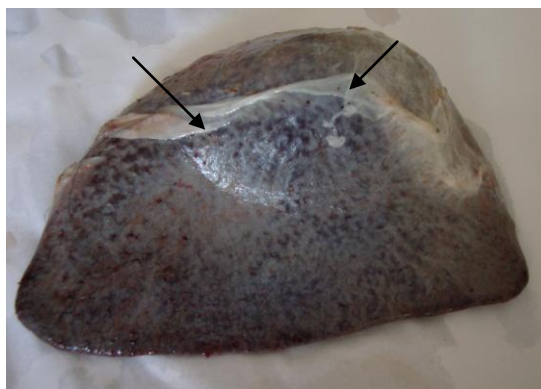


Fig-2 :The parietal surface of spleen

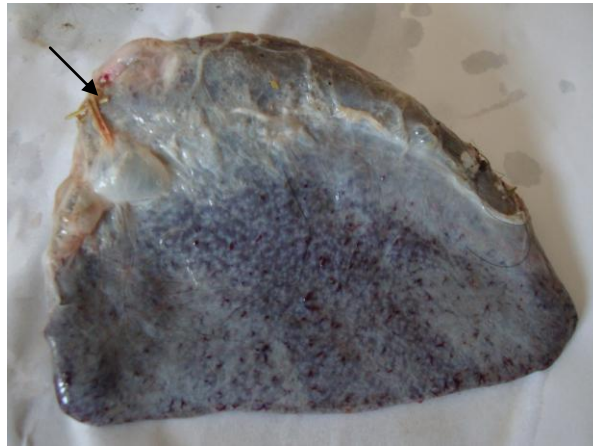


Fig 3 :The visceral surface with hilus (arrow).

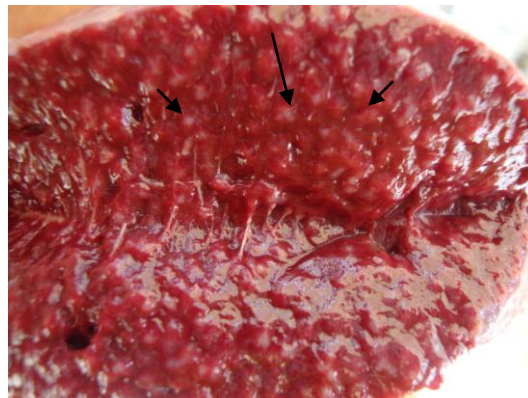


fig4:The cut surface of spleen appear the lymphoid nodules as white spots (arrow).

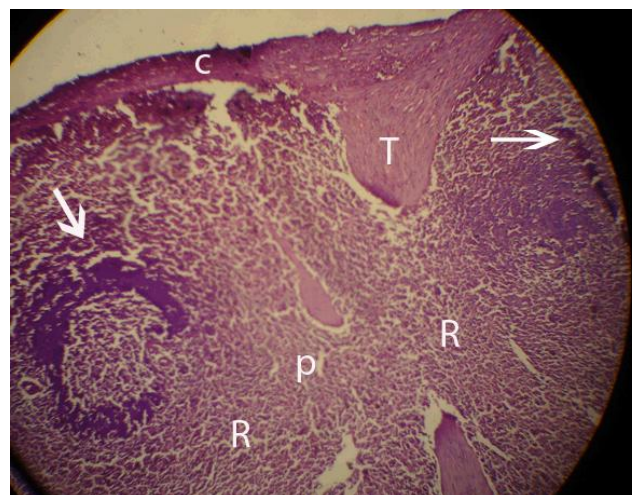


Fig5.The capsule (C) , Trabeculae (T),Splenic parenchyma (P),White pulp (arrow) ,Red pulp (R). H&E . 10x

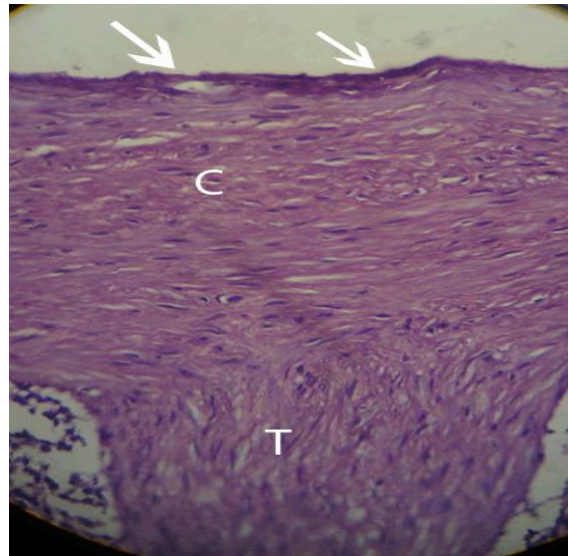


Fig6: the capsule (C) consist of smooth muscle fibers intereorn with collagen and elastic fibers.

The capsule coverd by mesolhetium, the trabecula (T) comosed of smooth muscle fiber. H&E. 10x

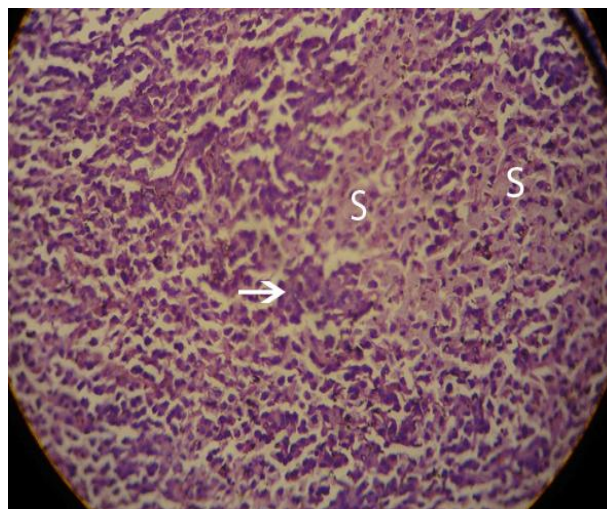


Fig7: the red pulp appear as consist of sinusoids (S) and pulp cord (arrow) . H&E. 10x

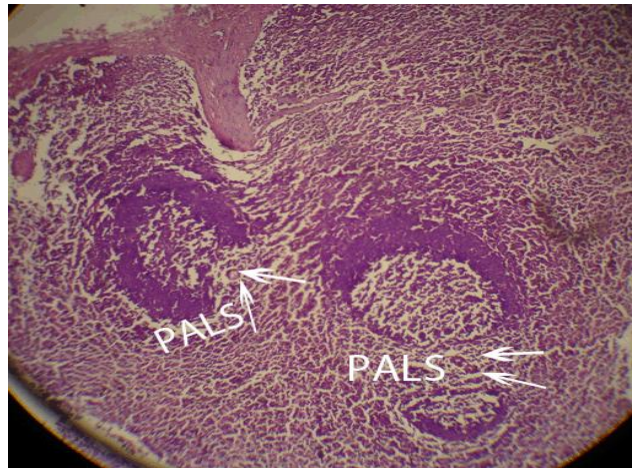


Fig8: The white pulp appear as a lymphatic nodule with central artery (arrows).
Surrounded by lymphatic sheath (PALS) .
H&E. 10x

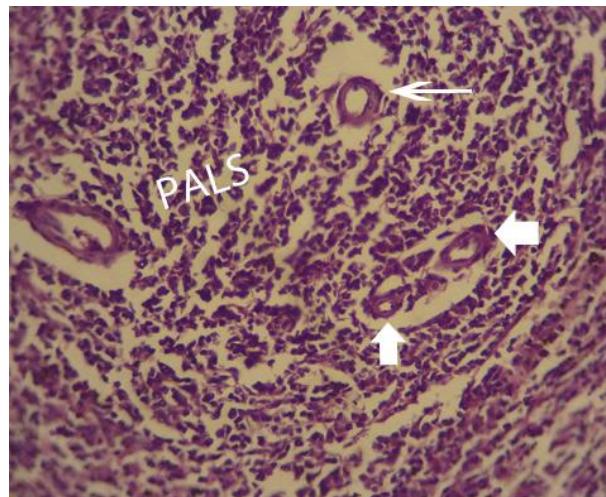


Fig9: The central artery (arrow) that branched into 2-3 arteries (arrow head)
PALS : Periarterial Sheath.
H&E. 10x

DISCUSSION

The present study found that the gross anatomy of spleen in sheep similar to the observation of (9) which observed that the shape of spleen in sheep appear a triangular organ with rounded angles and thin borders with two surfaces but different to that of cow that appear as elongated organ and both extremities being thin, rounded and similar in size (9). This study showed that the length and width are relatively similar to the observation of (9).

The weight of spleen in this study observed less than the observation of (9). This may be due to the contraction of spleen during bleeding may cause loose of blood and become lighter.

In the histological study of this study found that the capsule of the sheep is moderately thick and composed of smooth muscle fibers with collagenous and elastic fibers, and its covered by mesothelial cells (10) found that in cow the capsule has 2-3 layers of smooth muscle cells are oriented perpendicular to each other. In horse the capsule consist of an outer thick connective tissue and an inner thinner thinner Smooth muscle layer (11).

The capsule of spleen in the camel is thick and composed of dense fibrous tissue, elastic fibers and smooth muscle and the outer most layer of the splenic capsule is composed of mesotheliumd cells (12;13) observed that the camel spleen is composed of and it was a thick capsule and it was divided the splenic pulp to aclearly demarcated outer layer consist of predominant connective tissue including collagenous, elastic and reticular fibers with few smooth muscle cells, the inner layer was composed predominantly of smooth muscle supported by reticular collagen and elastic fibers. the thickness of capsule, trabeculae and concentration of smooth muscle are very important agents to make strong contraction when the body need the blood and the smooth muscle concentration may play arole In the immune ed (14).

The red pulp found consist of sinusoid and pulpcord similar to the observation of (13). The white Pulp appear as composed of lymphoid nodules and PALS, this agree with (13) in spleen of camel.

The diameter of white pulp less than that of camel observed by (15) this may be due to that the camel has aunique Structure of spleen (13).

دراسة تشريحية ونسجية لطحال الاغنام العراقية (العواسية)

ايمان موسى خليل

فرع التشريح ، كلية الطب البيطري ، جامعة بغداد ، بغداد، العراق.

الخلاصة

اجريت هذه الدراسة على 0 عينة طحال اخذت من اغنام بالغة نوع عواسي. تضمنت الدراسة التشريحية طول وعرض وسمك ووزن 10 عينات طحال وكان معدل القياسات 0.233 ± 6.48 ، 0.342 ± 9.93 ، $142. \pm 2.48$ سم، 6.663 ± 69 غم على التوالي بينما الدراسة النسيجية تضمنت سمك محفظة الطحال، سمك الحواجز الطحالية ، قطر اللب الابيض للطحال وقطر العقيدات اللمفية وكانت معدل القياسات 23.185 ± 315.25 ، 34.245 ± 505 ، 9.7 ± 13.712 ، 82.75 ± 140.5 ، مايكرو على التوالي ، والغلاف اللمفي يحيط بشريان مركزي واحد والذي يتفرع 2-3 شرايين.

REFERENCES

- 1-Holocomb,G.B(1994).A small-scale agricultural alternative : Dairy and meat goats:USDA.Cooperative state research service.The office for small-scale agriculture,Washington.
- 2-Schnizer,B.Sodeman,T.Mead,M and Contacos.P(1972).Pitting Function of the spleen in malaria:Ultrastructural Observation .Science 177:175-184.
- 3-Chen,L and Weiss,L(1973).The role of the sinus wall in the Passage of the erythrocytes through the spleen.Blood 41,529-537.
- 4-Pabst,R.(1993).Anatomische and physiologische voraussetzungen zur erhaltung der postoperativen Milzerhaltenden Eingriffen .Chirurgische Gastro Enterologic 9:19-22.
- 5-Keresztes,G.,Takacs,L.,Vilmos,P.,Kuruch,E and Ando,I(1996) .Monoclonal antibodies detecting components of The bovine immune system in formaldehyde- fixed paraffin-embeded tissue specimens.Vet.Immunol.Immunopathol.52:383-392.
- 6-Gupta,V.,McConnell,I.Dalzied.R and Hopkins,J.(1998).Two B Cell subpopulations have distinct.recirculation Characteristics.Eur.J.Immunol.28:1597-1603.
- 7-Ngeranwa,J.Gathumbi,P.Mutiga,E and Agumbah,G(1993).Pathogenesis of trypanosome(brucei)evensi in Small east African goats.Res.vet.Sci 54:283-289.

- 8-Luna,I.G.(1968).Manual of histology staining method of the Armed force institute of pathology 3rd ed . MC Grow-Hill book company.Newyork.
- 9-Getty,R(1975).The Anatomy of domestic animals 5th - Ed.philadelphia tornt.USA.P768-707).
- 10-Bacha,W.,and Linda,M.(2000).Color atlas of veterinary Histology .2nd ed.
- 11-Brown,E and Dellman ,H.(1976).lymphatic system.In Textbook of veterinary Histology .pp.161-184.Philadelphia :Lea and Febiger.
- 12-Cesta,M.(2006).Normal structure ,function and histology Of spleen Toxical.Pathol.34:455-465.
- 13-Zidan, M.,Kassem,A,Dougbae,E,Elghazzawi,M,Abdel Aziz And Pabst R (2000).The spleen of one humped Camel(*Camelus dromedaries*)has a unique Histological structure .J.Anat .196:425-432.
- 14-Pinkus.G.Warhol.J Oconnor G,Etheridge and Eujiwarea, (1986).Immunohisto – chemical localization of Smooth muscle myosin in human spleen lymph Node and other lymphoid tissue unique staining Patterns in spleen ,white pulp and sinusesoid follicules and certain vasculature ,with ultrastructural correlation with American.J.Pathol. 1. 123:440-53