

Anatomical and Histological Study of Spleen in Giraffe

Dr. J. Violet Beulah

Department of Veterinary Anatomy, Madras Veterinary College

Abstract: *Spleen is the largest secondary immune organ in the body and is responsible for initiating immune reactions to blood borne antigens and for filtering the blood of foreign materials and old or damaged red blood cells, these functions are carried out by the two main compartments of the spleen, the white pulp and the red pulp, which are vastly different in their architecture, vascular organization and cellular composition. An 18 month old female giraffe spleen was processed for both routine and special staining techniques revealed that it has a thick capsule and few trabeculae with its pulp composed of red and white germinal centers were not distinct other details were also discussed. Morphology of these compartments were described and their variation between species were also discussed.*

Keywords: Giraffe, Spleen, Anatomy, histological study

1. Introduction

Spleen is a dark red to blue black organ located in the left cranial abdomen. It is adjacent to the greater curvature of the stomach and with in the omentum. The function of the spleen are centered on the systemic circulation. Comprised of two distinct compartments red pulp and white pulp. Red pulp is a blood filter that removes foreign material and damaged erythrocyte. Storage site of iron, erythrocyte and platelets, red pulp is composed of three three dimensional mesh work of splenic cords and venous sinuses. Splenic cords are composed of reticular fibre, reticular cells and associated macrophages. White pulp is composed of three sub-compartments the periarteriolarlymphoid sheath, the follicles and the marginal zone. Spleen is surrounded by a capsule, composed of dense fibrous tissue, elastic fibres and smooth muscle. Irregularly spaced trabeculae of smooth muscle and fibro elastic tissue emanate from the capsule into the splenic parenchyma. These trabeculae also contain blood and lymph vessels through which lymphocytes migrate to the splenic lymph nodes. The current study was aimed to describe the spleen of giraffe.

2. Materials and Methods

An 18 month old female giraffe spleen was collected, anatomical and histological study. Anatomical study was carried out by collecting the spleen in 10 percent formalin and kept for 4 study for fixation. In case of histological study small pieces of tissue of giraffe spleen were collected in 10 percent formalin, Bouin's fluid and zenker's fluid for 48 hours, 15 hours and 18 hours respectively and processed for light microscopy by paraffin of melting point 58-60 degree celcius. The paraffin blocks were sectioned to obtain 5-6

micrometer thick sections which were stained with the following routine histological stains and special staining techniques were performed to demonstrate different components of spleen.

- 1) Haematoxylin and Eosin stain for routine observation (Singh and sulochana 1997)
- 2) Gomori's method for reticulum (Luna, 1968)
- 3) Masson's Trichrome method for collagen fibres (Singh and sulochana 1997)
- 4) Periodic Acid Schiff for glycogen (singh and sulochana 1997)
- 5) Weigert's stain for elastic fibres (Luna 1968)

3. Results and Discussion

Anatomical study

Spleen of giraffe had a flat, oval disk (fig 1) in the present study but it was observed as a triangular shape as it was demonstrated by (Khalelet al., 2010) in sheep, in cow the shape of spleen was an elongated one as it was observed by (Getty 1975) spleen of giraffe has two surfaces the parietal surface which appear as convex and the visceral surface as a concave and has a hilus as it was mentioned by (Getty 1975) in ruminants and (khalel et al., 2010 and Suri et al., 2017) in sheep. There were two ends in the giraffe spleen, the base (dorsal end) which appear as narrower and thinner than the base, the borders appear thin (fig 1) as it was reported by (khalelet al., 2010) in sheep. On the surface of the fresh spleen there a white spots in the parenchyma, these are lymphoid nodules (fig 1) which are a part of white pulp. These nodules appear with the red pulp that appear as dark red tissue which is rich in blood. the colour of the giraffe spleen in section was dark red and soft as it was reported by (Suri et al., 2017) in sheep.



Figure 1: Anatomical study of spleen in Giraffe

Histological study

Spleen of giraffe has a thick capsule which is composed of a large amount of connective tissue and smooth muscle layer (fig 2)

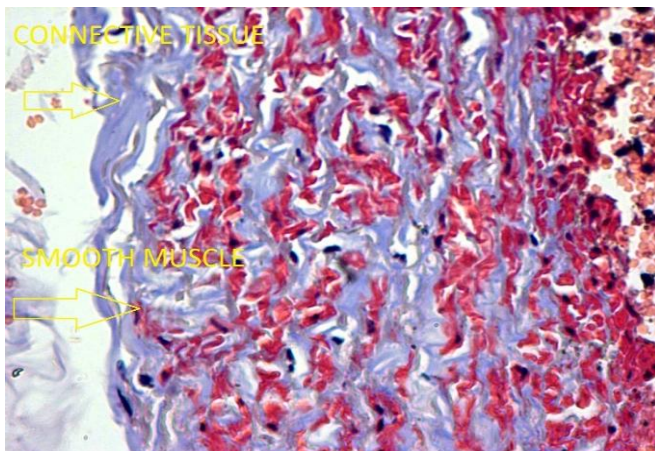


Figure 2: Masson's Trichrome 40 X

but it contains not abundant elastic fibres (fig 3) as it was reported by (Zidan et al., 2000) in camel and in sheep the splenic capsule is moderately thick (khalel et al. 2010) Horse capsule consist of an outer thick connective tissue and an inner thinner smooth muscle layer (Brown and Dellman 1976)

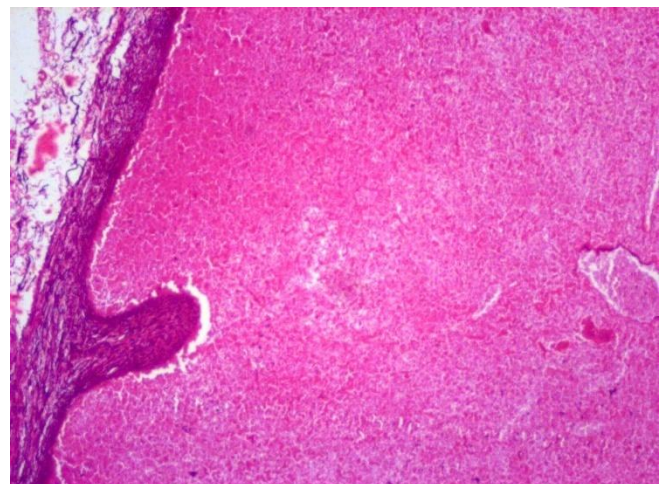


Figure 3: Weigert's 4X

it has a typical composition a parenchymatous consisting of white and red splenic pulp (fig4) that is enclosed by a fibrous capsule and subdivided by trabeculae as it was reported by (khalel et al., 2010) Camelspleen is composed of splenic pulp to clearly demarcated outer layer consists of predominant connective tissue including collagenous, elastic and reticular fibres with some smooth muscles cells, inner layer was composed predominantly of smooth muscle supported by reticular , collagen and elastic fibres (Cesta 2006 and Zidan et al., 2000)

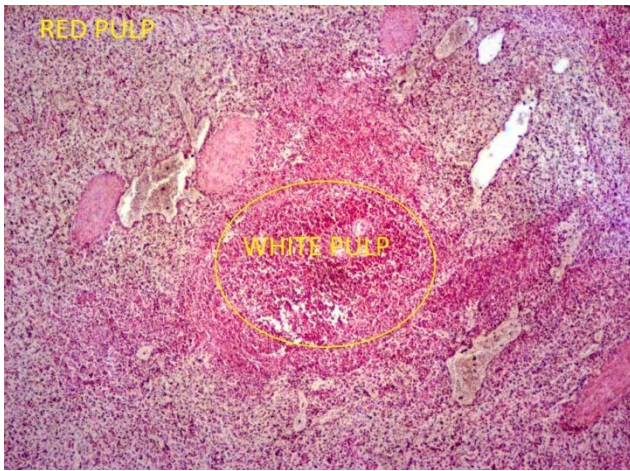


Figure 4: Periodic Acid Schiff 4X

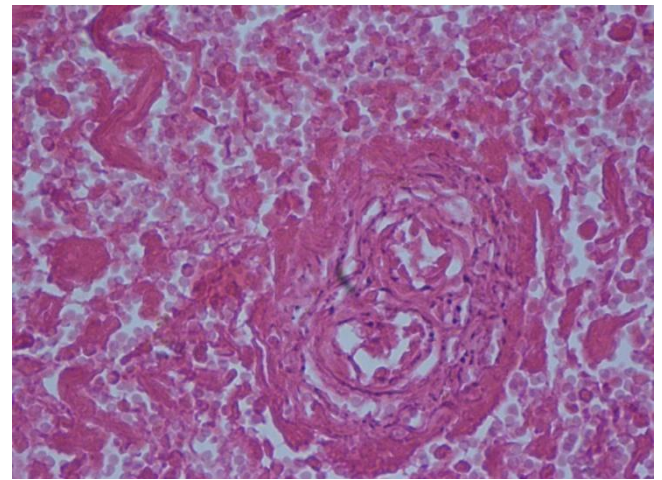


Figure 6: Weigert's 40 X

Splenic trabeculae is small (fig 5) and the smooth muscle contained in the trabeculae is few as it was reported by (Suri et al., 2017) in sheep these trabeculae found composed of predominantly of smooth muscle fibres that extend parallel to the longitudinal section and collagen with elastic fibres (fig 5) as it was observed by (Suri et al., 2017) in sheep.

Splenic pulp consist of red and white pulp (fig 4) as it was observed by (Brown and Dellmann 1967) in ruminants. Red pulp found consists of sinusoids (fig 7) that appear irregularly distributed.

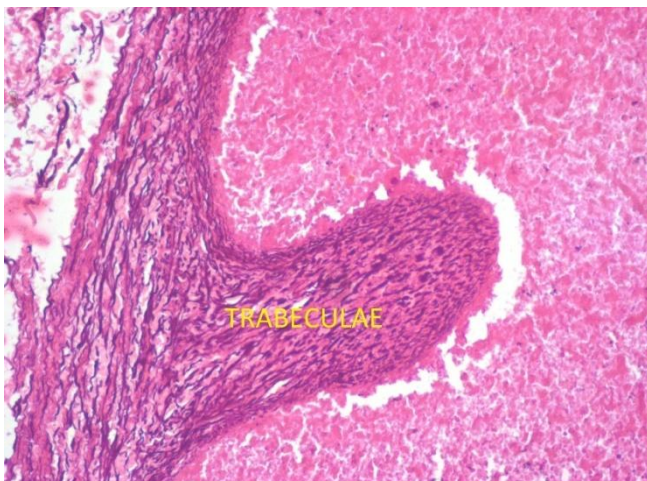


Figure 5: Weigert's 10 X

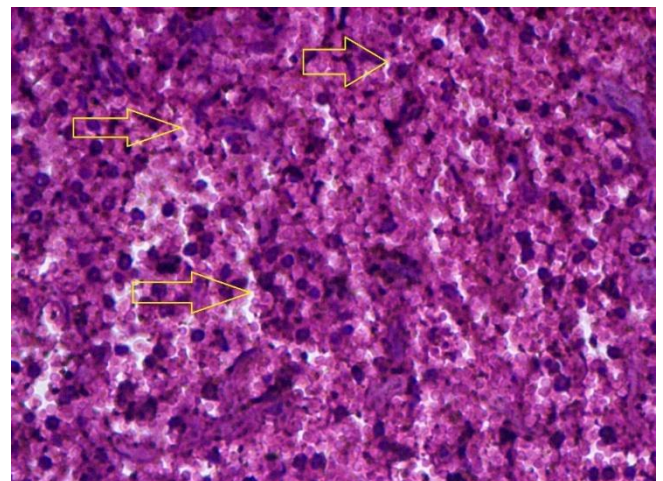


Figure 7: Red pulp, Sinusoids

There are trabecular arteries and trabecular veins, and the elastic fibres are underdeveloped, the spleen nodules are small and the germinal centre is not obvious (fig 6) the lymphatic sheath around the arteries is more developed, and the surrounding lymphatic tissues are thicker and the arteries are thinner (fig 6) as it was observed by (suri et al., 2017) in sheep.

Haematoxylin and Eosin 40 X

White pulp is made of lymphatic tissue which is distributed randomly throughout the splenic pulp (fig 8) as it was reported by (Brown and Dellmann 1967)

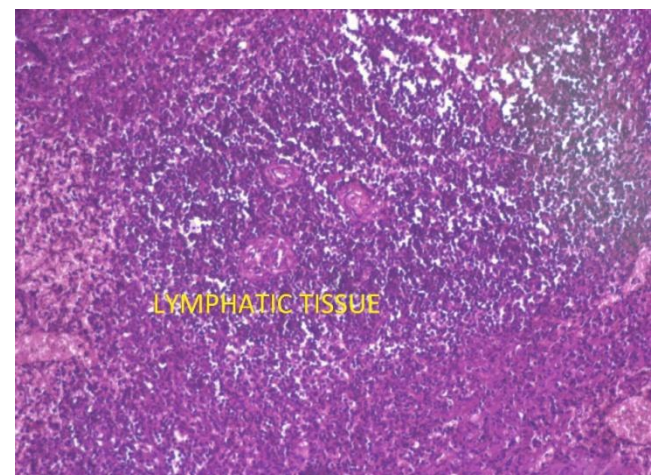


Figure 8: White pulp
Haematoxylin and Eosin 40 X

4. Conclusion

The study concluded that the spleen of giraffe, was similar to that of small ruminants in both anatomical and histological structures.

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