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HISTOLOGY OF THE SPLEEN OF INDIGENOUS DOG (*CANIS FAMILIARIS*) OF BANGLADESH

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ABSTRACT

The present research was conducted in the Department of Anatomy and Histology, Bangladesh Agricultural University, Mtmensingh from July to December 2003 with a view to study the detail histology of the spleen of indigenous dog of Bangladesh. Tissues were collected from the different parts of the spleen from the dogs killed after proper euthanasia. The adult experimental dogs were apparently healthy and disease free. The tissues were passed through different stains (Van Gieson's and Verhoeff's, Bielschowsky's Silver and Potassium Ferrocyanide stains) for detail histological study. The present study revealed that the spleen was encircled by capsule and trabeculae with the internal structures of white pulp, red pulp and sinusoids that are nearly similar as found in cattle. The capsule was composed of collagen, elastic, reticular and smooth muscle fibers. The trabeculae originated from the hilus that usually contained major vessels but was poor in smooth muscle fibers. The white pulp had a fine meshwork of reticular connective tissue containing mainly lymphocytes of various sizes. Meshworks of fine reticular fibers were observed throughout the red pulp in the present study. Sinusoids of the spleen of indigenous dog were of different shapes and sizes and widely distributed within the red pulp and had both arterial and venous communications.

Key words: Spleen, histology, dog

INTRODUCTION

The spleen is the largest lymphatic organ in the body. It plays multidisciplinary functions. Histology of the spleen of man and different animals is found in the standard texts and literatures (Trautmann and Fiebiger, 1957; Bloom and Fawcett, 1968; Copenhaver *et al.*, 1978; Gray, 1973; Awal *et al.*, 1992). It was revealed that no such study has been performed on the spleen of our native dog. Thus the present study was carried out to investigate the histological features of the spleen of the indigenous dog of Bangladesh that may be a basis for further comparative histological study in the field of veterinary science.

MATERIALS AND METHODS

The present study was performed in the Department of Anatomy and Histology, Bangladesh Agricultural University, Mymensingh from July to December 2003 on the spleen of 16 adult and healthy indigenous dogs (*Canis familiaris*) of Bangladesh. Five pieces of tissues (about 1 cm^3 in size) representing different areas of spleen from each dog were collected immediately after the dogs were killed by euthanasia and fixed in the Buin's fluid. The tissues were then dehydrated in graded alcohol, cleared in xylene, embedded in paraffin and finally the sections were cut at 6 micron thickness using rotary microtome (Model 820, USA). The sections were then stained with Van Gieson's stain for collagen fibers, Verhoeff's stain for elastic fibers, Bielschowsky's silver method (Foot's modification) for reticular fibers (Gridley, 1960) and Modification of Mallory's Reaction or Potassium Ferrocyanide stain (Humason, 1962) for iron pigments. Detail histological study was performed using high and power light microscopy (X10 to X400).

RESULTS AND DISCUSSION

Capsule and Trabeculae

The spleen was covered by a thick fibro-muscular capsule. The outer coat of the capsule, the serosa was a visceral layer of the peritoneum that was lined by a single layer of flattened epithelium and it was loosely attached to the capsule proper. The capsule was composed of collagen, elastic, reticular and smooth muscle fibers (Fig. 1). The inner most zone was rich in elastic and smooth muscle fibers. In addition to the elastic and smooth muscle fibers, reticular fibers were also observed in the capsule. From the deeper face of the fibro-muscular coat, strand of trabeculae in the form of bands originated and extended into the splenic tissues. In the interior of the organ the trabeculae were divided into branches and formed the framework of the spleen.

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The trabeculae originated from the hilus that usually contained major vessels but was poor in smooth muscle fibers. The above mentioned histologic features of capsule and trabeculae are almost identical to the spleen of other animals as reported by Trautmann and Fiebiger (1957) in horse and ruminants, Ham and Lesson (1961) in man, Ahmed *et al.* (1987) in Black Bengal goat, Mia *et al.* (1988) in buffaloes and Awal *et al.* (1992) in indigenous cattle.

White pulp

In the present study the white pulps or the splenic corpuscles were observed as an ovoid mass of compact lymphatic tissue. The center of which was lighter zone and the deeper peripheral zone which contained one to three central arteries (Fig. 2). In higher magnification, it was also revealed that the central artery with a lumen surrounded by mainly reticular meshwork with some elastic fibers (Fig. 3). The corpuscles were scattered in the red pulp. The white pulp had a fine meshwork of reticular connective tissue containing mainly lymphocytes of various sizes. The density and arranged of reticular framework varied greatly in different parts of the spleen. The reticular fibers were coarse, more numerous and more closely arranged around the central arteries but not as developed as in cattle and at the marginal zone of the white pulp than these were in elsewhere (Fig. 2). The elastic fibers were observed in the wall of the arteries (Fig. 3), capsule and trabeculae. Occasionally the longitudinal sections of small arteries were observed around the marginal zone of the white pulp and appeared to have opened into the meshes of the red pulp. The histologic components in the white pulp that observed in this study are also similar with the reports of Trautmann and Fiebiger (1957) in horse and ruminants, Ahmed *et al.* (1987) in Black Bengal goats and Awal *et al.* (1992) in indigenous cattle.

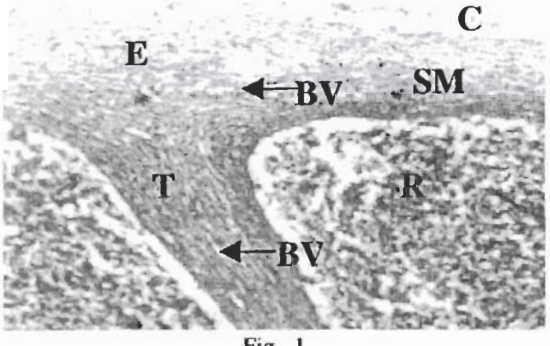

Fig. 1

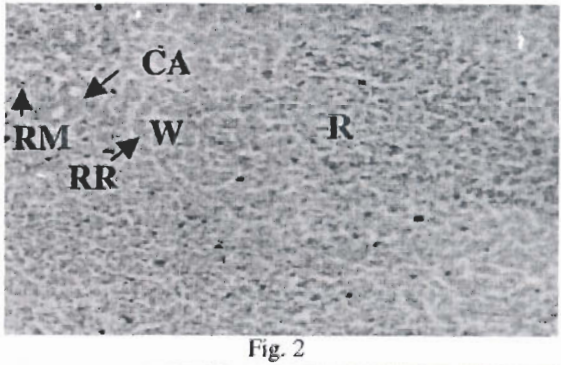

Fig. 2

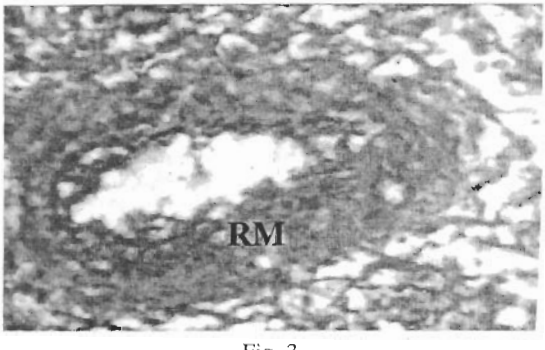

Fig. 3

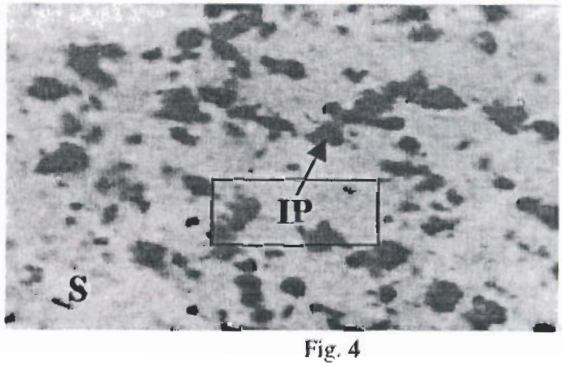

Fig. 4

Fig. 1. Section of spleen of indigenous dog showing collagen fibers of the capsule (C), elastic fibers (E), trabeculae (T), red pulp (R), smooth muscles (SM) and blood vessels (BV) in the capsule and trabeculae (Van Gieson's and Verhoeff's stain X 100).

Fig. 2. Section of spleen of indigenous dog showing ring of reticular fibers (RR) around the white pulp (W), reticular mesh (RM) in the white pulp around the central arteries (CA), red pulp (R) and sinuses (Bielschowsky's Silver stain X 100).

Fig. 3. Section of spleen of indigenous dog showing central artery with a lumen surrounded by mainly reticular meshwork (RM) with some elastic fibers (Bielschowsky's Silver Stain X 400).

Fig. 4. Section of spleen of indigenous dog showing iron pigments (IP) in the red pulp with sinus (S) (Potassium Ferrocyanide stain X 400).

Red pulp

The red pulp occupied the spaces between the white pulp and the trabeculae (Fig. 1 & 2). Meshworks of fine reticular fibers were observed throughout the red pulp in the present study. The reticular framework was composed of reticular fibers and the processes of the reticular cells. In the meshes of reticular erythrocytes, leukocytes and plasma cells were seen. Large number of phagocytic cells of wandering and fixed types were found to have been engorged with the worn out blood cells. Presence of iron pigments (Fig. 4) in the meshes of red pulp has also been described by Trautmann and Fiebiger (1957) in horse and ruminants, Ahmed *et al.* (1987) in Black Bengal goats and Awal *et al.* (1992) in cattle.

Sinusoids

Sinusoids of the spleen of indigenous dog were of different shapes and sizes and widely distributed within the red pulp and had both arterial and venous communications (Fig. 2 & 4). The lining cells of the sinusoids had an elongated nucleus bulged towards the lumen. These cells were active phagocytes and were noticed to have engulfed foreign bodies. Such activities of these cells were also noted by different authors (Trautmann and Fiebiger, 1957; Ham and Lesson, 1961; Leeson and Leeson, 1967; Awal *et al.*, 1992) in the domestic animals and man.

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