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

S K. Das, M. S. Ali, M. N. Islam and M. A. Awas

Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-72122, Bangladesh

ABSTRACT

The present study was conducted in the Department of Anatomy and Histology, Bangladesh Agricultural University, Mymensingh from July to December 2003 with a view to study the histology of the spleen of indigenous dog of Bangladesh. Tissues were embedded 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 fixed through different stages (Van Gieson’s and Verhoeff’s, Renshaw’s Silver and Polysporin Peroxydes stains) for histological study. The present study revealed that the spleen was, encircled by capsule and trabeculae with the innermost structure of white pulp, red pulp and sinusoids are nearly similar in form and colour. The capsule was composed of collagen, elastic, reticulum and smooth muscle fibers. The trabeculae originated from the hilus due mostly contained major vessels but was poor in smooth muscle fibres. The white pulp had a fine network of reticular connective tissue containing mainly lymphocytes at various sizes. Mechanism of fine reticular fibers were observed throughout the red pulp in the present study. Sinusoids of the spleen indigenous dog were of different shapes and sizes and widely distributed within the red pulp and not both smooth and veined communications.

Key words: Spleen, histology, dog

INTRODUCTION

The spleen is the largest lymphoid organ in the body. It plays multidisciplinary functions. Histology of the spleen of man and different animals is found in the standard texts and literature (Tazgournin and Fehgler, 1957; Bloom and Fawcett, 1968; Copenhaver et al., 1978; Gray, 1973; Awas 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 15 adult and healthy indigenous dogs (Canis Familiaris) of Bangladesh. Five pieces of tissues (about 1 cm² in size) representing different areas of spleen from each dog were collected immediately after the dogs were killed by euthanasia and fixed in the fixie’s fluid. The tissues were then dehydrated in graded alcohol, cleared in xylene, embedded in paraffin and finally the sections were cut at 6 microm thick 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, Renshaw’s silver method (Font’s modification) for reticular fiber (Grudzina, 1960) and Modification of Mallory’s reaction or Polysporin Peroxydes stain (Hewson, 1962) for iron pigments. Detailed histological study was performed using high and power light microscopy (X10 to X400).

RESULTS AND DISCUSSION

Capsule and Trabeculae

The spleen not covered by a thick fibrous muscular capsule. The outer coat of the capsule, the areola was a visceral layer of the peritoneum that was lined by a single layer of flattened epithelium and it was loosely staped in 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 dense face of the fibrous 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.
The trabecular originated from the hilum that usually contained major vessels but was poor in smooth muscle fibers. The above mentioned histologic features of capsule and trabecular are almost identical to the spleen of other animals as reported by Traumlmann and Fichtiger (1957) in horse and oxen. Hani and Lession (1963) in man. Ahmed et al. (1987) in Black Bengal goat. Mia et al. (1968) 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 at the red pulp. The white pulp had a fine meshwork of reticular connective tissue containing mainly lymphocytes of various sizes. The density and arrangement 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 those were in elsewhere (Fig. 2). The elastic fibers were observed in the wall of the arteries (Fig. 3), capsule and trabecular. 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 histiocytic components in the white pulp that observed in this study are also similar with the reports of Traummann and Fichtiger (1957) in horse and oxen. Ahmed et al. (1987) in Black Bengal goat and Awal et al. (1992) in indigenous cattle.

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

Fig. 2. Section of spleen of indigenous dog showing cap of reticular fibers (RR) around the white pulp (W), reticular mesh (RM) in the white pulp around the central arteries (CA) and pulp (R) and sinuses (thiolskow'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 (Bdelskow's Silver Stain X 400).

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

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 reticuloendothelial cells, 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 granules (Fig. 4) in the meshes of red pulp has also been described by Straussmann and Fieehger (1957) in horse and buffaloes. 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 Fieehger, 1957; Jam and Lesson, 1951; Lesson and Lesson, 1967; Awal et al., 1992) in the domestic animals and man.

REFERENCES