



Differences in the microscopic appearance of thymus of male and female pig

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Abstract

As a preliminary work the macroscopic and microscopic study of thymus of male and female pig was carried out. Two male and two female pigs weighing 80 ± 10 kgs were used. The thymus of these animals was procured in the slaughter house where it is sacrificed for edible purpose. Thymus was a large bilobed structure situated in the superior mediastinum. Tissue from the thymus was processed and stained with H&E. Lobules were observed. Cortex and medulla could be differentiated. The difference between the histological appearance of male and female thymus is observed. In the female the lobules are highly vascular and Hassall's corpuscles are either absent or only one is seen. In the male 2-3 Hassall's corpuscles are seen in the lobules. There by showing some sex difference.

Keywords:

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Introduction

By the end of the 19th century and in the first part of this century thymus morphology had been largely studied not only in the man [Hammer J.A. 1905 et al] but also in all classes of vertebrates [Hammer J.A. 1921] and still the histopathological components have been under debate [Salkind J

(1915); Marine D (1933); Bargmann.W (1943)]. Embryologically thymus gland is derived from the ventral wing of 3rd pharyngeal pouch endoderm and from surrounding mesenchyme [Gail Pearse (2006)]. During its embryogenesis thymus along with the inferior parathyroid showing the same pharyngeal pouch and origin migrate caudally. Thymus is primary central lymphoid organ and key regulator of cell mediated immunity of the body, which is found to grow first and considerably immediately after birth in response to post natal antigen stimulation and the demand for large number of mature T cells. Genetic factors also influence the age of onset rate and magnitude of thymus dependent immunological function. Thymus is a bilobed lymphoid mass which comprises of cortex and medulla. At the 8th week of gestation two lobes unite in the mid line and basophilic stem cells and thymocytes come to lie between the epithelial reticular cells [Ajitha R K et al (2006)].

The thymus is the principal site of T cell development and therefore is of central importance within the immune system: congenital athymia results in profound immunodeficiency, while perturbed thymic function can lead to autoimmunity. Although highly active in early life, the thymus undergoes premature involution, such that *de novo* T cell development diminishes significantly with age and sex. This has implications for immune function in the aging population, and in clinical procedures such as bone marrow and solid organ transplantation. The success of such strategies is likely to depend on a detailed knowledge. The present study aim is to observe whether any difference in the thymus gland of male and female pigs using Micro-Anatomical technique stained by Haematoxylin and Eosin.

Materials and methods

The present study included 4 pigs (2 males and 2 females) hybrid pigs (combination of Low Weight Axial and Desi) of age (SD 8±1 months) weighing about (S D 90±10 Kilograms) sacrificed at the Slaughter house. The slaughtered pigs were free from infectious disease since these meats were used for edible purpose. Pigs were slaughtered under the guidance of veterinary physician using captive bolt stunning method. After preliminary cleaning works an incision is put on the ventral aspect of the trunk which exposes thoracic, abdominal and pelvic cavities. Thymus gland was located near ventral aspect of base of the heart. Once the gland is identified it is removed and transferred to 10% formalin. Later the specimens were processed. Blocks were prepared and section thickness of 6µm thickness was cut using rotatory microtome. Each section was stained with Haematoxylin & Eosin stain (H&E), and studied under low power and high power. Parameters like gross appearance, histological findings like capsule, sub-capsular level, cortex, Cortico-medullary junction (CMJ), and medullary areas were studied in detail.

Observation

In the thymus of the male pig the lobules presented secondary lobulations (Fig:1) and that of the female showed simple lobules (Fig:2).

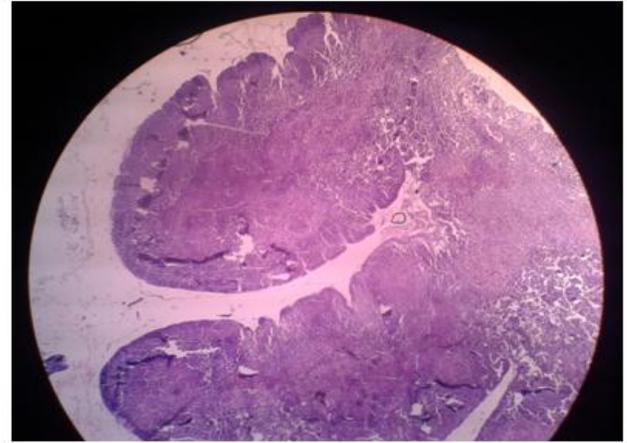


Fig: 1-The thymus of the male pig showed the secondary lobulations

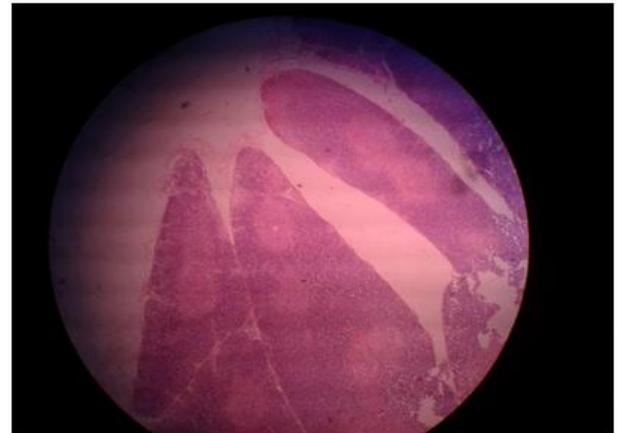


Fig: 2-The thymus of female showed simple lobules

Interlobular septae were thin and less vascular in male pig (Fig: 3) that of female pig showed thick and highly vascularization (Fig: 4). Medulla occupies a larger area of the lobule in male pig (Fig: 5), in female pig medulla was seen as a small isolated island in the lobule (Fig: 6). The medulla of the lobules contained 2-4 Hassall's corpuscles in male pig (Fig: 7) that of female pig showed hardly one Hassall's corpuscle and was highly vascular. (Fig: 8).

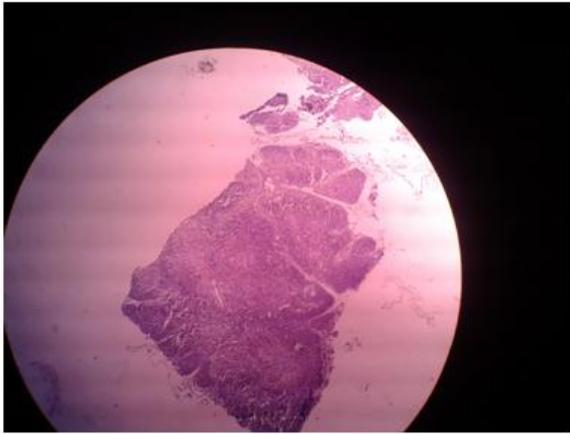


Fig: 3-Interlobular septae were thin & lesser vascular in male pig

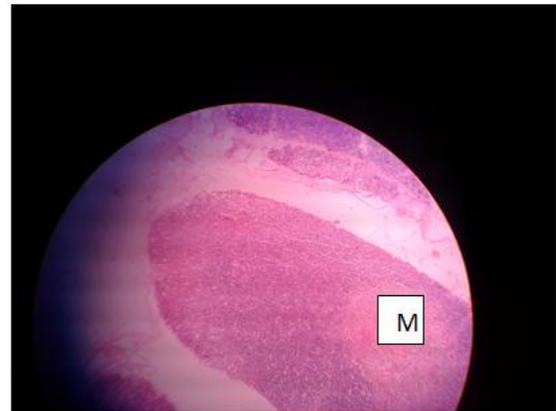


Fig: 6-Medulla forms small lobe of isolated island in the lobule in the female pig

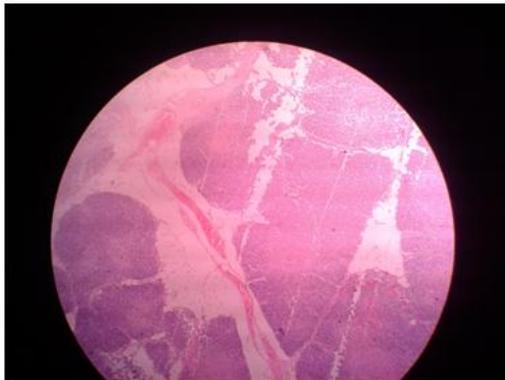


Fig: 4-Interlobular septae were thick & highly vascular in female pig

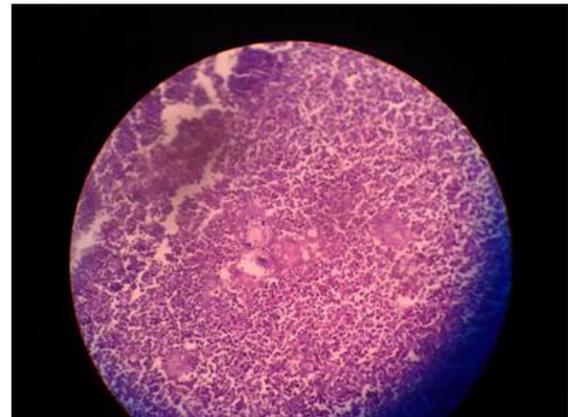


Fig: 7-The medulla of the lobules contained Hassall's Corpuscles in the male pig

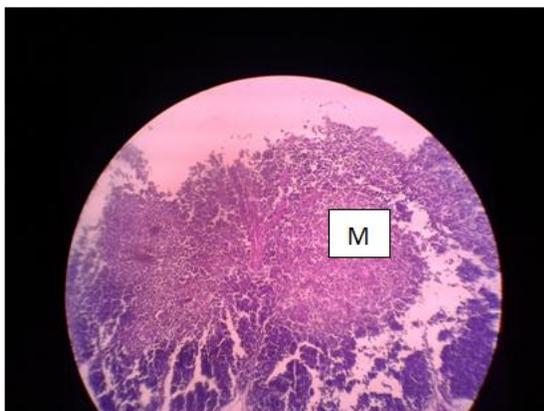


Fig: 5- Medulla occupies a larger area the lobule in male pig

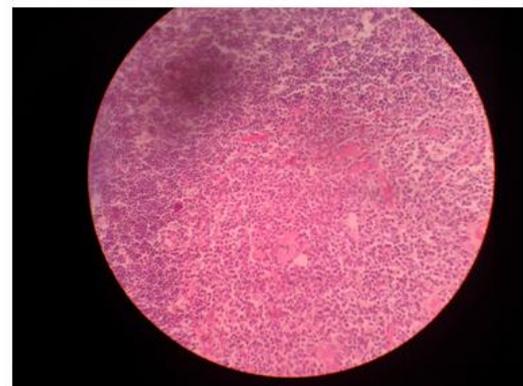


Fig: 8-Medulla was highly vascular and 2-4 hardly showed one Hassall's corpuscle in female pig

Discussion

Recent advances show vascularized thymic lobe transplantation in Swine permitting the transplanted thymus to function immediately after revascularization (Tyan ML 1977) & (Mackall CL 1997). Thymus of female pig is highly vascular. Vascularity is seen in the interlobular septae as well as in the medulla of the lobule. Perhaps, more suitable for transplant. It is also been shown that aged involuted thymus can be rejuvenated when transplanted as vascularized thymic lobes into juvenile Swine recipients.

Surgical castration and chemical castration using Luteinizing Hormone-Releasing Hormone (LHRH) have been shown to have a profound rejuvenating affect on the thymus in rodent models and more recently humans [Oner H et al (2002); Azad N et al (1998); Aspinall R et al (2000); Kappler JW et al (1987); Sutherland JS et al (2005)]. There is definite evidence of histological appearance of thymus in male and female pigs.

Conclusion

The presence of less number of Hassall's corpuscles and high vascularity perhaps shows the delay in the ageing process and the protective immune mechanism in female pigs.

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