

MICROANATOMICAL STUDIES ON THE TESTIS OF DOMESTIC PIG (*Sus scrofa domestica*)

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Abstract: The present was undertaken to know the histological structure of testis in domestic pig. The testis was surrounded by three layered testicular capsule which consisted of tunica vaginalis, tunica albuginea and tunica vasculosa. The septula testis was thick and divided the testicular parenchyma into many testicular lobules of different shapes. Each lobule consist of three to eight different profiles of convoluted seminiferous tubules. Interstitial tissue located between the seminiferous tubules with abundant Leydig cells. Each seminiferous tubules comprised outer lamina propria and seminiferous epithelium with two different types of cell populations i.e., non proliferating Sertoli cells and highly proliferating spermatogenic cells in different stages of development. Sertoli cells were elongated cells and fewer in number than spermatogenic cells. Five to eight layers of spermatogenic cells in different stages of development were located between and at apical surfaces of Sertoli cells.

Keywords: Microanatomy, Testis, Pig, *Sus scrofa domestica*.

Introduction

The testes are compound tubular glands which exhibit both endocrine and cytogenic functions necessary for production of spermatozoa and testosterone (Hafez, 2000). In boar, the testicles are very large and are soft in texture. Their long axis is oblique, the free border being posterior. Very scanty information regarding on histology of testis in pig (Ohanian *et al.*, 1979) compared with other domestic animals. The present work has been undertaken to know the histological architecture of the testis in adult boar.

Materials and Methods

For this present study, the samples of testes were collected from fourteen adult apparently healthy pigs (*Sus scrofa domestica*) from local slaughter houses in and around Hyderabad. The tissue pieces were collected and fixed in 10% neutral buffered formalin and Bouin's solution. The fixed tissues were processed as per the methods (Luna, 1968). Paraffin sections

*Received June 28, 2016 * Published Aug 2, 2016 * www.ijset.net*

of 3-5 μm thickness were cut and subjected to standard Haematoxylin and Eosin (H & E) method, Crossman's Modification of Mallory's triple Stain, Van Gieson's method, Verhoeff's method, Wilder's method, Mallory's phosphotungstic acid haematoxylin (PTAH) method (Luna, 1968) and Toluidine blue method for mast cells (Bancroft and Gamble, 2008).

Results and Discussion

Testis of boar surrounded by the testicular capsule and was made up of dense irregular connective tissue comprising three layers viz., outer visceral layer of tunica vaginalis, middle tunica albugenia and inner tunica vasculosa (Fig. 1). Tunica vaginalis composed of outer single layer of mesothelial cells and inner connective tissue layer which blended with underlying tunica albugenia. Tunica albugenia was a compact layer with dense irregular connective tissue which consisted collagen, reticular and elastic fibres along with fibroblasts and few blood vessels (Fig. 1 and 2). These findings are in total agreement with description of testicular capsule in boar (Ohanian *et al.*, 1979); in bull (Ahmed, 2005 and Gofur *et al.*, 2008); in deer (Moonjit and Adcharatt, 2007) and in horse (Shukla *et al.*, 2013). The innermost tunica vasculosa was prominent and contained numerous blood vessels located in the deeper portion of the capsule. Such findings are in agreement with the reports of Gofur *et al.* (2008) in bull and Shukla *et al.* (2013) in horse. Conversely the tunica vasculosa was located in the middle part of the capsule in horse and boar as reported by Trautmann and Fiebiger (1952). In the present approach mast cells and Leydig cells were observed in the testicular capsule (Fig. 4) which is consistent with the results of Ohanian *et al.* (1979) and Anton *et al.* (1998) in pig.

The inner layer of testicular capsule extended as connective tissue trabeculae called as septula testis into the testicular parenchyma and divided it into many testicular lobules of different shapes consisted collagen, reticular and elastic fibres along with blood vessels, rete testis channels and straight tubules (Fig. 3). The distinct lobulation was observed in the present study which is contrary to the findings of Ahmed (2005) and Gofur *et al.* (2008) in bull and Shukla *et al.* (2013) in horse who mentioned that the connective tissue framework was not so distinct hence lobulation was inappreciable.

The testicular parenchyma in boar consisted many convoluted seminiferous tubules separated by interstitial tissue (Fig. 4). The interstitial tissue filled up the interstitial spaces and contained numerous interstitial endocrine cells of testis *i.e.*, Leydig cells, nerve fibres, blood and lymph vessels which were also reported in bull (Gofur *et al.*, 2008), in ram (Kishore *et al.*, 2007b) and in horse (Shukla *et al.*, 2013).

In boar, testicular interstitium contained abundant Leydig cells arranged in large clusters between seminiferous tubules and located in close vicinity to the arteriole and capillaries. Leydig cells were polygonal cells characterized by granular cytoplasm and spherical nucleus with one or two eccentrically placed nucleoli (Fig. 3). These findings are in total agreement with reports were made by Ahmed (2005), Kishore *et al.* (2007b) in ram, Gofur *et al.* (2008) in bull and Shukla *et al.* (2013) in horse.

Each seminiferous tubule comprised outer lamina propria and seminiferous epithelium (Fig. 5). Different profiles of convoluted seminiferous tubules were lined by multilayered germinal epithelium consisting spermatogenic and sustentacular cells (Fig. 6). The lamina propria of seminiferous tubules was made up of a basal lamina which had unevenly distributed collagen and reticular fibres and peritubular or myoid cells. Our findings are in accordance with the earlier reports of Ahmed (2005) and Gofur *et al.* (2008) in bull, Egger *et al.* (2009) in dog and Shukla *et al.* (2013) in horse.

Seminiferous tubules consist of a basal layer of Sertoli or sustentacular cells and multilayered highly proliferating spermatogenic cells in different stages of development. Spermatogonia were located at the periphery of the seminiferous tubules and were cuboidal shaped cells with large, darkly stained nucleus. The primary spermatocytes were largest among spermatogenic cells with biggest densely stained nucleus and the smaller secondary spermatocytes were rarely observed. The round spermatids were smallest among spermatogenic series with large central spherical nucleus. Elongated spermatids presented oval nucleus and were located towards the lumen. Sertoli cells were fewer tall columnar cells sandwiched between spermatogenic cells which were arranged radially from basal lamina to lumen of seminiferous tubule (Fig. 6). These observations are in concurrence with findings of Trautmann and Fiebiger (1952) in domestic animals and Ahmed (2005) and Gofur *et al.* (2008) in bull, Moonjit and Adcharatt (2007) in deer, Kishore *et al.* (2011) in ram and Shukla *et al.* (2013) in horse.

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Illustrations

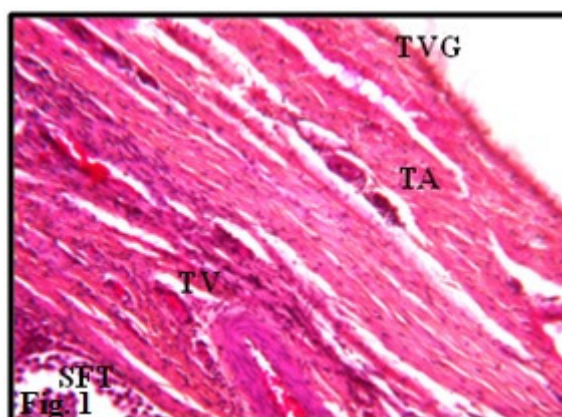


Fig. 1: Photomicrograph of testis showing testicular capsule with tunica vaginalis (TVG), tunica albugenia (TA), tunica vasculosa (TV), Seminiferous tubule (SFT)
Haematoxylin and Eosin X 40



Fig. 2: Photomicrograph of testis showing testicular capsule (C) and testicular septa (TS) made up of reticular fibres (RF), Seminiferous tubules (SFT).
Wilder's reticular stain X 100

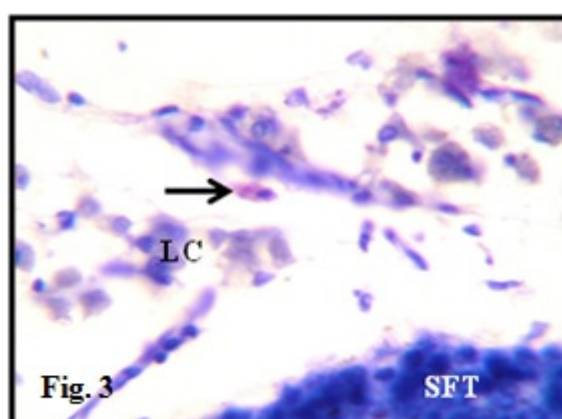


Fig. 3: Photomicrograph of testis showing mast cells (black arrow) in the interstitial tissue, Leydig cells (LC) and Seminiferous tubules (SFT).
Toluidine Blue method X 1000

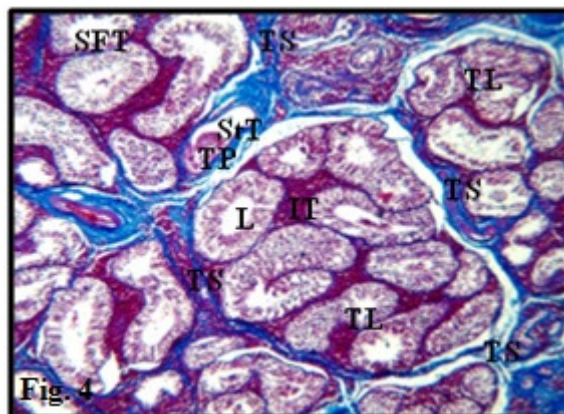


Fig. 4: Photomicrograph of testis showing distinct testicular lobules (TL) with Seminiferous tubules (SFT) and testicular septa (TS), Interstitial tissue (IT), Straight tubule (S_TT), Terminal plug (TP)
Crossman's modification of Mallory's triple stain X 60

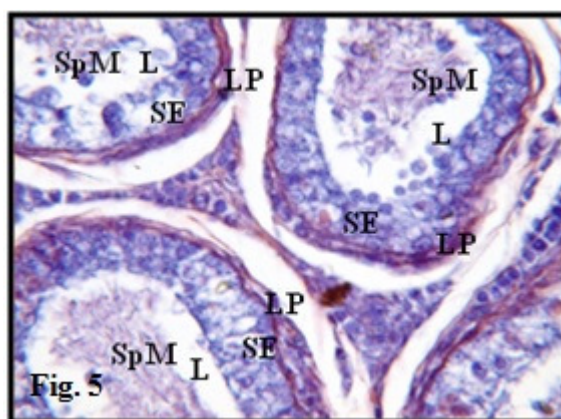


Fig. 5: Photomicrograph of testis showing seminiferous tubules with Lamina propria (LP), Seminiferous epithelium (SE) and sperm mass (SpM) is in the lumen (L). Mallory's Phosphotungstic Acid Haematoxylin method X100

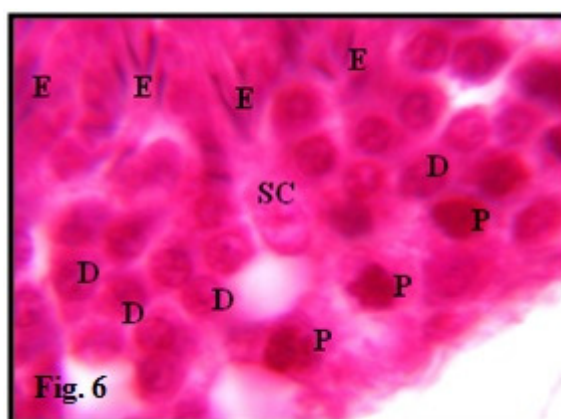


Fig. 6: Photomicrograph of testis showing elongated spermatids (E), primary spermatocytes (D and P) and Sertoli cells (SC)
Haematoxylin and Eosin X 1000