

Anatomical Studies on the Testes and Epididymis of Asiatic Black Bear (*Ursus thibetanus*)

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ABSTRACT

The current study was conducted to evaluate the microscopic changes of the Asiatic black bear (*Ursus thibetanus*) testicle. The testes were collected during the castration of the oldest Rehabilitated Asiatic black bear from the Centre for Bear Rehabilitation and Rescue, Pake Tiger Reserve Forest, Arunachal Pradesh, India. After collection, the samples were processed as per standard protocol. In the present study, it was observed that the testes of the Asiatic black bear were covered by a serous layer of tunica vaginalis. The seminiferous tubules contained numerous spermatogenic cells like spermatogonia, primary spermatocytes, secondary spermatocytes, spermatids, and spermatozoa as well as Sertoli cells. The shapes of the Sertoli cells were pyramidal. Among the seminiferous tubules, interstitial cells were observed. The lumens of the epididymis were lined by pseudostratified ciliated columnar epithelium.

Keywords- Anatomy, Asiatic Black Bear, Testes.

INTRODUCTION

The asiatic black bear (*Ursus thibetanus*) is the largest forest-dwelling bear in the Himalayan region. They are also called moon bears due presence of half-moon-shaped markings in the pectus. They undergo hibernation during the winter season. They are omnivore animals. The present population of Asiatic Black Bear in India is 5000-7000. Their population is decreasing day by day due to poaching as well as human interference. The status of the

animal as per the international union for conservation of nature is vulnerable and as per the wildlife protection act, 1972 is the schedule -I animal [6]. Testes are cytotogenous glands and it is a vital organ of the male reproductive system. The testes have both exocrine (spermatozoa secretion) and endocrine secretion (hormone secretion) functions. Since there is very scanty literature on the testes of the Asiatic black bear (*Uresus thibetanus*), being a vulnerable as well as scheduled -I animal of wildlife, hence the present study was designed to establish an anatomical norm on this organ of the male reproductive system.

MATERIALS AND METHODS

The study was conducted on the two numbers testes of the Asiatic black bear (*Ursus thibetanus*). The two numbers of testes were collected during the castration of the oldest Rehab Asiatic black bear (*Uresus thibetanus*) of the Centre for Bear Rehabilitation and Rescue Centre, Pake Tiger Reserve Forest, Arunachal Pradesh, India with the standard protocol. After collection, the sample was kept in 10% formalin and then sent to the Department of Anatomy & Histology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India for anatomical study. After that, macro anatomical studies were made on it. Then the tissue of the testes was processed as per the standard technique of procedure [5]. The paraffin blocks were sectioned in Shandon Finesse microtome at 5µm thickness and the sections were stained with Mayer's Haematoxylin and Eosin staining technique for Cellular details as per the methods of [5].

ARTICLE HISTORY

11 November 2022: Received
02 March 2023: Revised
18 May 2023: Accepted
05 August 2023: Available Online

DOI:

<https://doi.org/10.61739/TBF.2023.12.2.413>

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RESULTS

Grossly, the testes of Asiatic Black bears were solid glands. It consisted of two surfaces viz., lateral and medial, and two ends i.e., upper end and lower end. The lateral surface of the testes was convex and the medial surface of the testes was flat (Fig.2). The upper end of the testes was occupied by the caput of the testes whereas the lower end of the testes was attached to the tail of the epididymis. The testes were covered by tunica vaginalis, tunica albuginea, and tunica vasculosa from outside to inwards. Mediastinum testis was observed in the center of the testes of the Asiatic Black Bear. Histologically, the testis of the Asiatic Black Bear was covered by tunica albuginea which is a solid capsule of dense irregular connective tissue. The connective tissue layer i.e., the tunica albuginea was covered by the serous layer i.e., the tunica vaginalis. The Tunica vasculosa layer was present in the deeper part of the tunica albuginea (Fig. 3). The parenchymatous part of the testes was divided into lobules by thick trabeculae or septae which were extended from the tunica albuginea. A cross-section of blood vessels was found in the trabeculae. The lobules of the testes were composed of seminiferous tubules, interstitial tissue, interstitial cells, and blood vessels. Each Seminiferous tubule was surrounded by a basement membrane along with smooth muscles. These tubules contained Sertoli cells as well as spermatogenic cells viz., spermatogonia, primary spermatocytes, secondary spermatocytes, spermatids, and spermatozoa (Fig.4). The Sertoli cells were pyramidal-shaped and they extended from basal lamina to the lumen of seminiferous tubules. The Sertoli

cells were pyramidal-shaped and they extended from the basal lamina to the lumen of seminiferous tubules. The spermatogonia were very distinct near to the basement membrane whereas the spermatids and spermatocytes were present towards the lumen of the seminiferous tubules. The mature spermatids, as well as few spermatozoa, occupied the lumen of seminiferous tubules. The lumens of the seminiferous tubules were occupied by cytoplasmic extension of spermatogenic cells. Interstitial connective tissue and abundant interstitial cells or Leydig cells along with a cross-section of blood vessels were present in interlobular space (Fig. 5 and 6). It was observed that the interstitial cells were present in clusters except for a few cells which were singly present.

Macroscopically the epididymis was divided into caput, corpus and cauda. It was attached with testes (Fig.2). The lining epithelium of the epididymis was pseudostratified ciliated columnar epithelium along with basal and columnar cells (Fig. 8). The lumens of the epididymis were wide (Fig. 7). The cilia of epididymis were stereocilia which help in the movement of spermatozoa. Spermatozoa were also observed in the lumen of the epididymis. The ductular epithelium is surrounded by layers of loosely arranged smooth muscles and a basement membrane.

DISCUSSIONS

Grossly, the testes of Asiatic Black bears were solid glands. It consisted of two surfaces *viz.*, lateral and medial, and two ends *i.e.*, upper end and lower end. The lateral surface of the testes was convex and the medial surface of the testes was flat (Fig.2). The upper end of the testes was occupied by the caput of the testes whereas the lower end of the testes was attached to the tail of the epididymis. The testes were covered by tunica vaginalis, tunica albuginea, and tunica vasculosa from outside to inwards. Mediastinum testis was observed in the center of the testes of the Asiatic Black Bear. These findings were in total agreement with the findings of [3] in cattle. Histologically, the testis of the Asiatic Black Bear was covered by tunica albuginea which is a solid capsule of dense irregular connective tissue. The connective tissue layer *i.e.*, the tunica albuginea was covered by the serous layer *i.e.*, the tunica vaginalis. The Tunica vasculosa layer was present in the deeper part of the tunica albuginea (Fig. 3). The parenchymatous part of the testes was divided into lobules by thick trabeculae or septae which were extended from the tunica albuginea. A cross-section of blood vessels was found in the trabeculae. These findings were in accordance with the findings of [8] in the testis of Rusa deer. The lobules of the testes were composed of seminiferous tubules, interstitial tissue, interstitial cells, and blood vessels. Each Seminiferous tubule was surrounded by a basement membrane along with smooth muscles. These tubules contained Sertoli cells as well as spermatogenic cells *viz.*, spermatogonia, primary spermatocytes, secondary spermatocytes, spermatids, and spermatozoa (Fig.4). These findings were also supported by [4] in the indigenous bull of Bangladesh. The Sertoli cells were pyramidal-shaped and they extended from the basal lamina to the lumen of seminiferous tubules, which was also reported by [7] in the testes of an indigenous male goat. The Sertoli cells were pyramidal-shaped and they extended from the basal lamina to the lumen of seminiferous tubules. The spermatogonia were very distinct near the basement membrane whereas the spermatids and spermatocytes were present towards the lumen of the seminiferous tubules. The mature spermatids, as well as a few spermatozoa, occupied the lumen of seminiferous tubules. The lumens of the seminiferous

tubules were occupied by cytoplasmic extension of spermatogenic cells. Interstitial connective tissue and abundant interstitial cells or Leydig cells along with a cross-section of blood vessels were present in interlobular space (Fig. 5 and 6). It was observed that the interstitial cells were present in clusters except for few cells which were singly present. These findings were in accordance with the findings of [1] in Pygmy hogs and [2] in the testes of Sheep.

Macroscopically the epididymis was divided into caput, corpus, and cauda. It was attached with testes (Fig.2). The lining epithelium of the epididymis was pseudostratified ciliated columnar epithelium along with basal and columnar cells (Fig. 8). The lumens of the epididymis were wide (Fig. 7). The cilia of epididymis were stereocilia which help in the movement of spermatozoa. Spermatozoa were also observed in the lumen of the epididymis. The ductular epithelium is surrounded by layers of loosely arranged smooth muscles and a basement membrane. A similar finding was reported by [9] in calves.

CONCLUSION

The testes of the Asiatic black bear were covered by a connective tissue layer (Tunica albuginea) and a blood vessel layer (Tunica vasculosa). Seminiferous tubules contained Sertoli cells, spermatogonia, spermatids, and spermatocytes. Leydig cells were found in interstitial connective tissue. The lining epithelium of epididymis was pseudostratified ciliated columnar epithelium.

ACKNOWLEDGEMENT

Dr. B. Choudhury, Deputy Director, North East, Wild life Trust of India, CWRC, Kaziranga National Park, PanbariBokakhat for a tissue sample.



Fig.1: Photograph showing the Asiatic Black Bear in the enclosure.

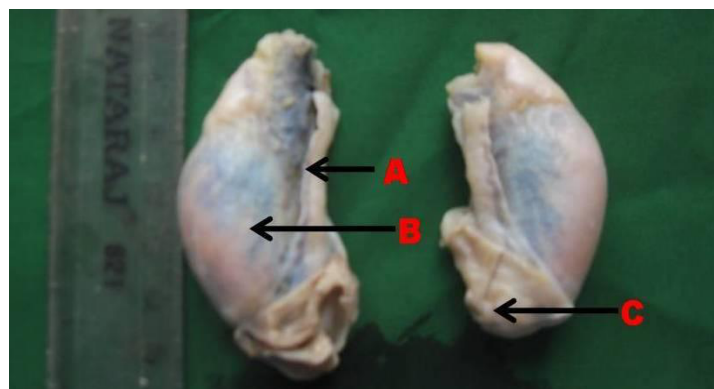


Fig. 2: Photograph showing the Corpus (A) of Epididymis, Tunica albuginea (B) and Cauda (C) of the epididymis

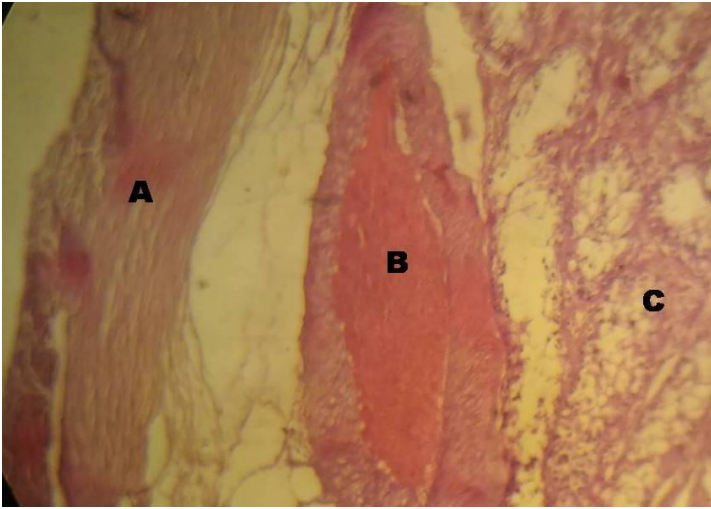


Fig. 3: Photomicrograph showing the Tunica albuginea layer (A), Tunica vasculosa layer (B) and cross-section seminiferous tubules of testes. H&E, X10

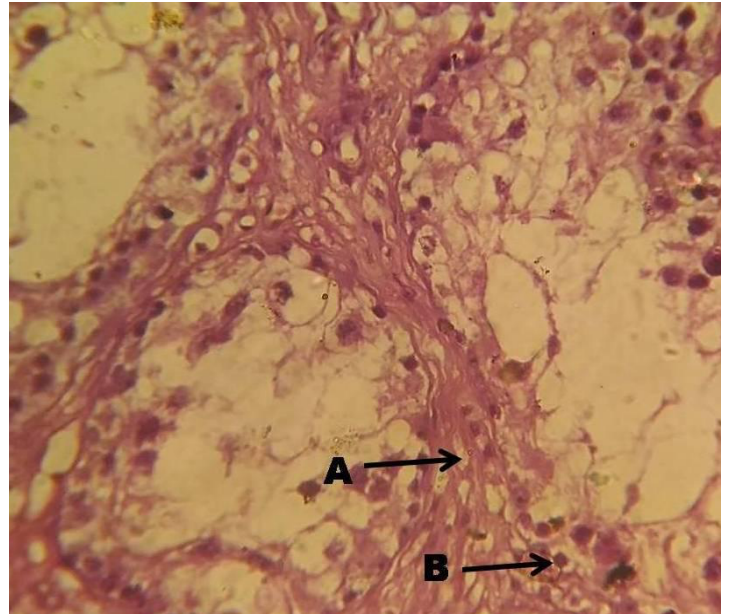


Fig.6: Photomicrograph showing the interstitial connective tissue (A) and Leydig Cell (B) of Testes. H & Ex40.

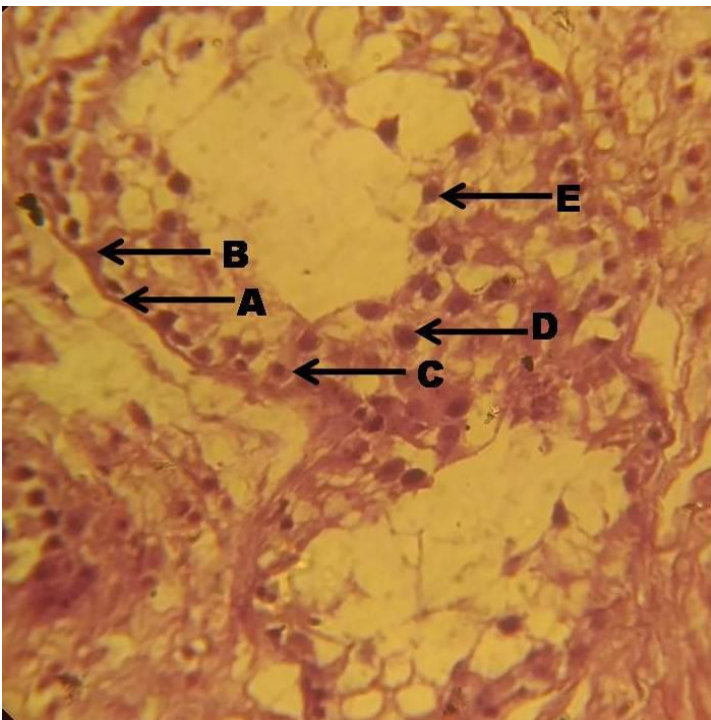


Fig.4: Photomicrograph showing the basement membrane (A), Sertoli cell (B), spermatogonia ©, primary spermatocytes (D) and spermatid (E) of testes. H & Ex40

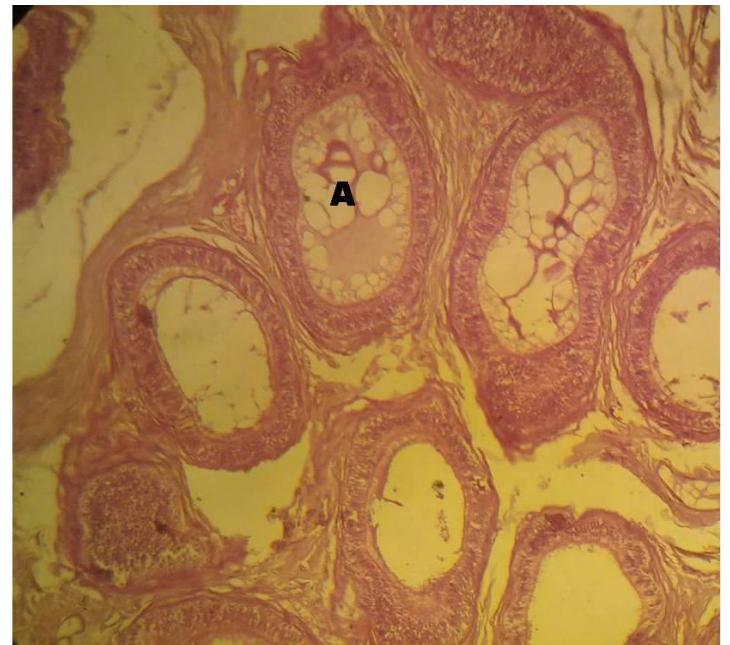


Fig.7: Photomicrograph showing the lumen of seminiferous tubules (A) of the epididymis. H & Ex10

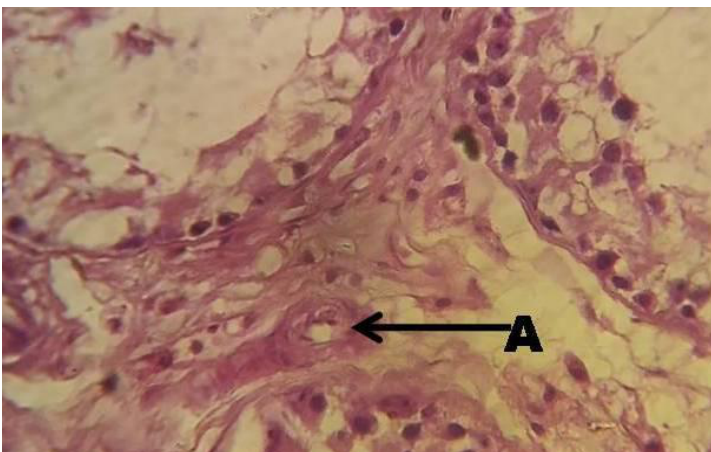


Fig.5: Photomicrograph showing the cross-section of blood vessels (A) in interstitial connective tissue. H & Ex40



Fig.8: Photomicrograph showing the pseudostratified ciliated columnar epithelium (A) and smooth muscle (B) of Epididymis. H&E x40

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