



Anatomical and Histological Study of local dog Penis

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ARTICLE INFO

Received: 15.10.2016

Revised: 25.10.2016

Accepted: 30.10.2016

Publish online: 15.11.2016

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Abstract

The penis is the male organ of coition through it urine and semen go out via the penile urethra. The prepuce is an introverted fold of abdominal cavity skin that surrounds the free margin of the penis. There are scarce studies regarding

male dog genital system in Iraq. Therefore, this study intends to study the gross and histological features of the penis of the local dog. Five local adult dogs used in this study. Penis gross anatomy including the length, width, and Os – penis were evaluated. In addition, histological sections were also prepared from penis and Os –penis and stained with hematoxylin – eosin. Anatomically, the average length and width of the dog penis were 17 cm, and 2 cm respectively, while the Os – penis length was about 13 cm. The penis composed from root, body, and glans or free part, which appeared as a cone shape. Histologically, the body consist from corpus cavernosum and spongiosum while, the Os – penis was composed essentially of spongy bone. Moreover, the corpus cavernosum revealed to consist of intermediate caverns and connective tissue. The corpus spongiosum composed from large caverns. The skin of dog penis is devoid of hair as a result of absent of hair follicles. A part from retractor penis muscle was composed of smooth muscle. In conclusion, this study described the macroscopic and microscopic structures of dog penis and approved that dog penis classified as intermediate type according to the corpus cavernosum structure.

To cite this article: Alaa, H. Saadon (2016). Anatomical and Histological Study of Dog Penis. MRVSA. 5 (3), 8-14. DOI: [10.22428/mrvsa.2307-8073.2014.002184.x](https://doi.org/10.22428/mrvsa.2307-8073.2014.002184.x)

Keywords: local dog, penis, Os – penis, Anatomy, Histology.

Introduction

Testes, epididymis, vas deferens, prostate gland and penis are the components of the male reproductive system. The male and female reproductive systems function control by hormones that secreted from a variety of endocrine organs. The dog penis composed from root, body, and glans. The body of the penis is composed of two distinct corpora cavernosa, which is separated by the median septum. The cranial part of the penis has a bone Os – penis and this is regarded as a part of corpus cavernosum (Sisson and Grossmans, 1975). The root of a penis is considered as the proximal part that attaches to the pelvis. The glans penis (head of the penis) is the distal cylindrical part that includes the bulbs and the long part of the head (Peters *et al.*, 2011. Bulbus glandis is a swelling of the penis and located toward the rare end of the Os – penis. As soon as the male dog insert his penis into the bitch's vagina and begins

to thrust, the bulbuls glandis enlarges to the firm spherical shape, which leads to the so-called "coital tie ". This structure prevents the male dog and the bitch from separating immediately after ejaculation and last from 5 – 60 minutes (Correa, 2008). The blood sinuses of the corpus spongiosum are filled with blood and surrounding the urethra. Moreover, much larger blood sinuses of the corpus cavernosum were found dorsally and filled with blood. All these blind vascular channels are involved in the mechanism of erection. A very dense connective tissue wall demarcates the corpus cavernosum and septa divides it into inclosing the erectile tissue. The Os – penis is a triangular shaped bone and located dorsal to the urethra, and ventral to corpus cavernosum. Its internal space fills with bone marrow. It is composed essentially of spongy bone, on the cross section (Ownby, 2000). Review of literature revealed scarce studies regarding the macro and microscopical structure of the penis of the local dog in Iraq. Therefore, this study intends to investigate the anatomical and histological structures of a penis of the local dog in Iraq /Basra governorate.

Materials and Methods

Five male adults (1.5 years old) local dog from Basra governorate used in this study. The dogs euthanized and the penis amputated at the surgical theater. All amputated penis washed with distilled water and phosphate buffered saline. The length and width of the penis measured by the Tape Measure, in addition, the length of Os penis was also reported according to the method described by Ashdown and Pearson, (1973). The gross anatomical features of all penis described. Later on, samples from Os – penis, the body of penis, skin, and retractor penis muscle were collected and Kept in 10% phosphate-buffered formalin for 5 days. The Samples were processed with routine histological procedures and finally the sections were made from each sample and stained with hematoxylin and eosin stain. The sections examined by light microscope and images captured for all histological structures of the dog penis (Luna, 1968). This study approved by the ethical and research committee / College of veterinary medicine/ University of Basra.

Results

Gross anatomy

The orientation of the dog penis was in front of the pelvis. It was located between the thighs and composed of the root, body, and glans or free part. The root of the penis consisted of two crura attached to ischial arch and forming body of the penis. The body of penis composed of paired of corpus cavernosum separated by a septum, in addition to the Os – penis that made a part of corpus cavernosum. Moreover, the body contain corpus spongiosum and its urethra. The Os – penis revealed a groove in its ventral part for urethra passage. The body of the penis also showed a swelling named bulbuls glandis that increased during coitus for the coital tie. The medium length and width of the penis were 17 cm and 2cm respectively. Moreover, the medium length of Os – penis was 13 cm. The glans penis in dog appeared as cone shape and white in color (Figure. 1&2).

Microscopical features

The dog penis showed paired corpus cavernosum that separated by a septum. Moreover, each corpus cavernosum surrounded by dense connective tissue that called tunica albugina.

Besides, there was a connective tissue septa completely divided corpora cavernosa penis. There were spaces between tunicae albuginea and trabecular network that were arising from tunica albuginea and filled with erectile tissue. The spongy bone was the essential structure of the Os – penis (Figures. 3, 4 A& B). The erectile tissue of corpora cavernosa was lined with endothelial cells (Figure. 5, 6). The corpus spongiosum consisted of plexus of large caverns that surrounded by connective tissue and surround the urethra (Figure. 7). The skin that covers the penis of the dog showed lacking hair, and no hair follicles were seen (Figure.8). Moreover, the retractor penis muscle appeared to consist from smooth muscle (Figure.9).

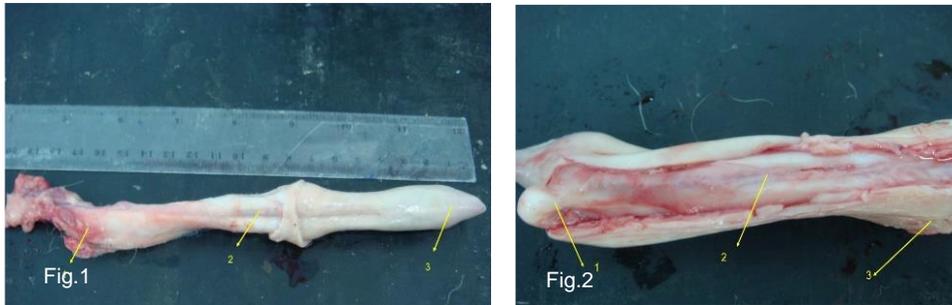


Figure (1): shows the structure of dog penis: (1) root; (2) Body; (3) Glans or free part
Figure (2): shows the: (1) Os penis; (2) urethral groove; (3) bulbul glands

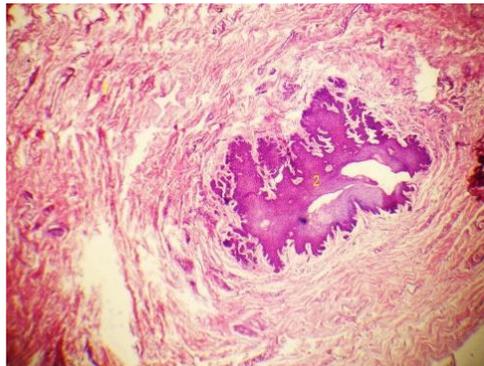


Figure (3): shows the Os – penis structure: (1) collagen fiber; (2) spongy bone (X4)

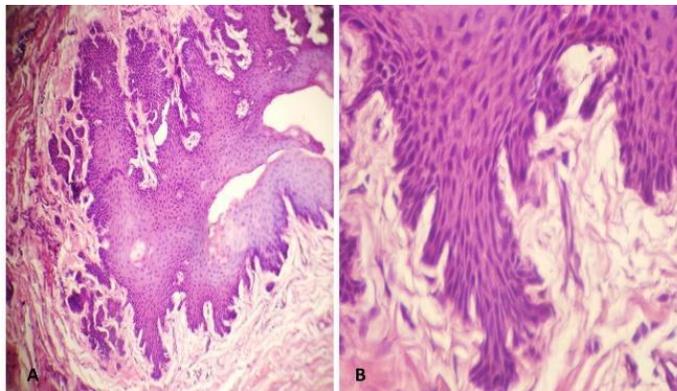


Figure (4): Shows Os penis: A) X10; B) X40

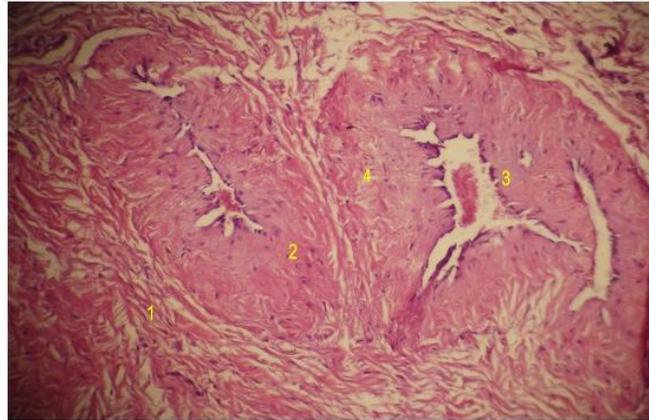


Figure (5): Shows the corpus cavernosum of the penis covered by dense connective tissue called tunica albugina (1) ,from it septa divided it into chambers erectile tissue (2) , several arterial (3) , septum (4).X10 .

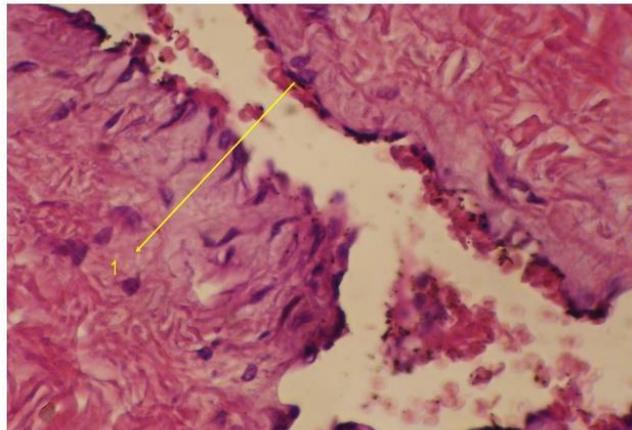


Figure (6): Shows the erectile tissue of corpus cavernosum lined by endothelial cells (1) X40

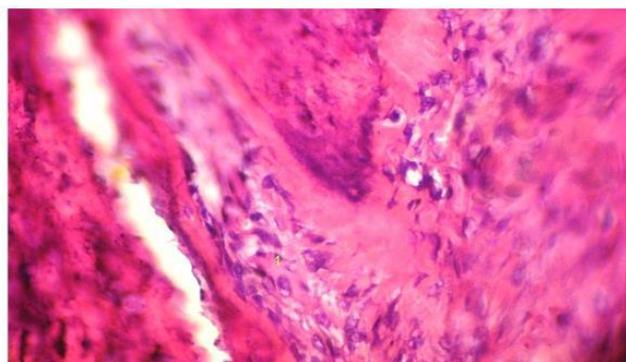


Figure (7): corpus spongiosum (1) surrounded by connective tissue

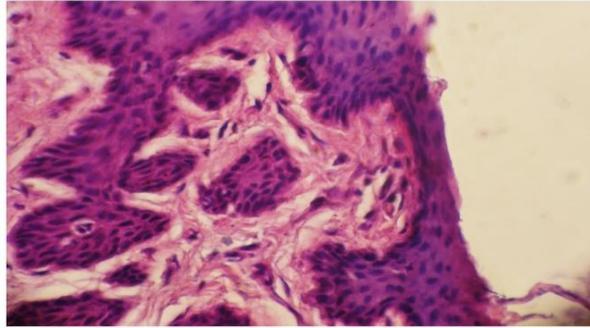


Figure (8): Shows hairless skin of the penis reveals the absence of the hair follicles

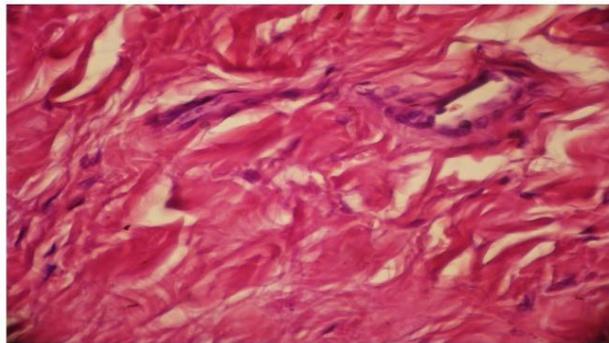


Figure (9): Shows the penis retractor smooth muscle

Discussion

The results of the gross anatomy showed that the penis of the dog located between the thighs. Moreover, it was orientated in front of the pelvis. It divided into three parts that had a different length: root, body, and glans. These observations are in agreement with the previous anatomical study on the penis of the dog (Sisson and Grossmans, 1975). However, the result of this study is incompatible in the measurement of the length of the penis. The median length of the penis of the local dog in Iraq that reported in the current study was 17 cm, while 10 cm length was reported by Sisson and Grossmans, (1975). The Os – penis appeared as part of corpus cavernosum with 13 cm length in the local dog, while its length was 10 cm in the previous study (Sisson and Grossmans, 1975). This study also approved that the anatomical structure of the penis of the dog differs from the penis of other domestic animal such as ox , boar, ram and have sigmoid flexure that increases the length the of the penis during erection. Moreover, it resembles the penis of the horse that doesn't have sigmoid flexure as mentioned by (Ynskjén, 2009). Moreover, the difference in the anatomical structure of the penis is related to the kind of penis (Wensing, 2010). The penis of the dog also differs from the penis of porcupine that has 5cm length, while the Os- penis length is 4 cm. In addition, the glans penis is black in color (Atalar and Ceribasi, 2006). The histological study approved that the Os – penis of the dog composed essentially of spongy bone. This result agrees with a previous study (Ownby, 2000). However, this result is incompatible with others (Atalar and Ceribasi, 2006) that found Os – penis of porcupine consist from outer section compact bone and an inner section spongy bone.

Moreover, it also disagrees with (Yildiz *et al.*, 2010) that reported the normal histological section for mice Os – penis consist of compact bone.

The result of this study revealed that the corpus cavernosum erectile tissue covered by endothelial cells and this result agree with (Atalar and Ceribasi, 2006). However, Murakami, (1987) and Nickel *et al.*, (1981) reported the corpus cavernosum of cat and in mice studded with small cornified papillae that consider as a secondary sex. The histology of the penis of dog reported in this study revealed cone shape glans penis and the Os – penis form part of corpus cavernosum as part of erectile components of penis. These observations are incompatible with Parkash *et al.*, (2008), who study the penis of the monkey. Parkash *et al.*, (2008) reported that the penis of monkey consists of the following structure: triangular button – shaped glans penis, corpus cavernosum and spongiosum forms erectile components of penis. Moreover, the Os – penis forms non erectile components. The penis of the stallion is classified as a vascular penis because of prominence of caverns in the corpus cavernosum , in ruminant and boar the caverns less extensive and connective tissue prevails thus distinguish as a fibroelastic, however, in dog and cat are intermediate (Dellmann and Brown, 1976). This classification agrees with the results of the current study, where intermediate caverns and connective tissue in corpus cavernosum of dog were observed. In addition the corpus spongiosum composed of large caverns, and this results agree with previous study in dog (Dellmann and Brown, 1976).

The results of the histology of the skin that cover the penis of the dog revealed devoid of hair and absences of the hair follicles. This results agree with Dellmann and Brown, (1976) study in dog and boar. The retractor penis muscle consists of smooth muscle fiber, this agrees with the result of Fisher, (2005) study in the dog. Fisher, (2005), found that retractor muscle fibers arise from sphincter ani – muscle and non – striated smooth muscle.

In conclusion, this study described the anatomical and histological structures of the penis of the local dog in Iraq. The results also showed the differences between the penis of dog and other animals.

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