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MORPHOLOGY OF THE ACCESSORY SEX GLANDS AND THEIR ARTERIAL VASCULARIZATION IN NEW ZELLAND RABITS

İbrahim KÜRTÜL* Özcan ÖZGEL* Nejdet DURSUN* Emine Ü. BOZKURT*

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Summary: In the present study, morphology of the accessory sex glands and their vascularization in New Zelland rabbits were examined. The male rabbits in deep anaesthesia were gently killed by bleeding, the colored latex was injected, and the cadavers were waited in water for 1-2 days. Accessory sex glands and their vessels were dissected and their photograps were taken. By dissection, morphologic features of the glands and the vessels were revealed. The glands are supplied by mainly by the prostatic artery arising from the umblical artery. Also some very thin branches from the artery of the penis have been shown supplying the caudal part of the bulbourethral gland.

Key Words: New Zelland rabbit, accessory sex gland, vascularization.

Yeni Zelanda Tavşanlarında Erkek Eklenti Bezlerinin Morfolojisi ve Arteriyel Vaskularizasyonu

Özet: Bu çalışmada Yeni Zelanda tavşanlarında erkek eklenti bezlerinin morfolojisi ve arteriyel kanlanmasının ortaya çıkarılması amaçlanmıştır. Derin anestezi altında kanları boşaltılarak uyutulan erkek tavşanlar renklendirilmiş latex verilerek 1-2 gün soğuk suda bekletildi. Erkek eklenti bezleri ve damarlar diseke edilerek fotoğrafları alındı. Diseksiyon sonucunda erkek eklenti bezlerinin morfolojik özellikleri ortaya kondu. Bu bezlerin vaskularizasyonunun a. umblicalis'in vermiş olduğu a. prostatica tarafından sağlandığı ortaya kondu. Ayrıca a. penis'ten ayrılan çok küçük dalların da gl. bulbourethralis'in caudal kısmının kanlanmasına katıldığı tespit edildi.

Anahtar Sözcükler: Yeni Zelanda tavşanı, erkek eklenti bezi, vaskularizasyon.

INTRODUCTION

In male mammals, accessory sex glands, glandulae genitales accessoria (gl. vesicularis, gl. prostatae and gl. bulbourethralis) are located craniocaudally at the begining of the urethra. In different shape and construction, they provide optimum live condition, enhance the capability of the fertilization, movement, and contribute to the color and motility, of the spematozoa. Morpholgy of the glands in several species such as dog[1-5], Guine pig[6], rabbit[7], ferret[8] and rat[9-13] has been documented in morphometric and experimental studies.

The location and morphological appearances of the accessory sex glands of the domestic rabbit (Oryctolagus cuniculus) have been extensively documented. They are five different glands located cranio-caudally on the urethra; gl. vesicularis, proprostata, prostata, paraprostata, and gl. bulbourethralis. Gl. vesicularis seen in vesicular nature is placed on the dorsal surface of the cervix of the bladder. Ducts of the gland empty their content into the urethra. Proprostata (vesicular part of the prostata) is oval and gri in color, is veiled by the ampulla of the ductus deferens and the gl. vesicularis[7]. Constructed by the two lobes, proprostata has several small ducts opening separately into the urethra.

Several morphological and experimental studies have been conducted to search the etiology of the prostate cancer, to develop different surgical techniques for operation, and to

* Department of Anatomy, Faculty of the Veterinary Medicine, Ankara University, Ankara-TURKEY

Kafkas Univ. Vet. Med. J.
2001, 7(1): 95-99

construct a model, on several animals such as dog[1-4,14-17], Guine pig[6], rabbit[7], ferret[8,18], and rat[19]. Prostate of the dog has been especially vastly studied since the topography of that resembels that of the human being. Most of the studies have dealt with the physiologic and pathologic hypertrophy of the gland[1,15,20]. Since very important in the surgery, arterial vascularization of the gland has been especially focused on by the researches.

Likewise, several studies have documented vascularization of the accessory sex glands and their origins in the variety of animals [1,2,6,10,15,21]. The glands are usually supplied by the prostatic and the medial rectal arteries both arisen from the internal pudendal artery. A few studies have also mentioned the additional vascularization of the glands via the urethral and the bulbi penis arteries both left the penis artery [4,21].

Although studies on the accessory sex glands in rabbits have been performed, special studies on the arterial vascularization of the prostate in detail is thought to be limited[7]. Hence, New Zelland rabit was choosen as model for the present study since it is more obtainable, and housing is easier than the dog. These situation has led us to chose the New Zelland rabbit as model.

In the present study, morphology and arterial vascularization of the accessory sex glands in the New Zelland rabbit were dealt with. The prostate and it's vascularization has especially been emphasized since it is thought that it might be a suitable model for various prostatectomy methods for the human prostate hypertrophy.

MATERIALS and METHODS

In the study, a number of 9 New Zelland rabbits on which experimental studies were conducted, obtained from the experimental animals unit, Faculty of Medicine, Gazi University, were used. Animals were deeply anaesthetized by ketamine xylazin combination (Ketamine hydrochlorur, 35 mg/kg im. + Xylazine Hydrochloride 5 mg/kg im.). One cc. liquemine (Heparine Sodium) was injected via auricular artery for the antiquagilation of the blood. Thoraxes of the animals in deep anaesthesia were gently opened using a costatome, apexes of the hearths were cut off, and related vessels were cleaned with physiologic saline. Latex colored with red Rotring ink was injected through the aorta. The cadavers were waited in water at room temperature for 1-2 days. They were finally dissected and photographs were taken.

''Nomina Anatomica Veterinary'', published in 1994[22] was employed for the anatomical nomenculature.

RESULTS

The vesicular gland (Glandula vesicularis) (Figs. 1,3-a)

The bilobed gland was observed to be located on the neck of the bladder. It is dirty white in color and, eventhough the size is extremely variable depending on the amount of the fluid it contains, it is nearly 2 cm. in lenght and 1 cm. in width. Each of the lobes was displayed being almost invisible at the middle and caudal parts because of a connective tissue covering them, eminently separated at the cranial end. These hollow cranial ends with their thick wall were dilated through the dorsal surface of the bladder when filled with the fluid. The thin-walled caudal portion of the gland was determined lying on the two ampullae while it was neighbored dorsally by the rectum, covered caudally by the prostat complex.

Proprostate (Proprostata) (Figs. 1,3-b)

This gland present at the cranial end of the prostate complex was seen covering cranially caudal part of the vesicular gland, caudally being separated from the prostate by a connective tissue septum. Its border is visible with naked eyes only if this tissue is to be removed, is dirty white in color and located at the beginning of the urethra. It is limited dorsally by the rectum. Similar to the other glands, it was also determined being bilobed by a slight longitudinal sulcus along the cranial and dorsal surface of it. The approximate lenght of the gland was measured as 1,9 cm., the with as 1,5 cm. The gland empties its secret into the urethra via two separated ducts that leave the ventral surface of it.

Kafkas Üniv. Vet. Fak. Derg.
2001, 7(1): 95-99

Prostate (Prostata) (Figs. 1,3-c)

The prostate was observed consisting of a pair of lateral lobes covered by a connective tissue capsule and overlapping the caudal part of the proprostate. Additionally, two lobes are divided by a thin connective tissue layer. The gland is separated from the bulbourethral gland by a distinct groove. It is distinguished macroanatomically by its lighter color from the proprostate because of its white secretory product. Its lenght was measured as nearly 1,8 cm., the weight as 1,5 cm. Each of the lobes has an excretory duct emerging from the ventral surface; thus opening into the urethra (not shown).

Paraprostate (Paraprostata) (Figs. 1,3-d)

The paraprostate glands were shown located dorsolateral to the distal aspect of the ampullae and ventrolateral aspect of the prostate. The glands that are not seen from the dorsal wiev are very small and microscopically they show two different types; one resembling to the bulbourethral gland, the other being identical with the prostate. Eventhough it is longer than the prostate, the witdh of it is very thin and caudally neighbored by the bulbourethral gland.

Bulbourethral gland (Glandula bulbourethralis) (Figs. 1,3-e)

The bulbourethral gland was seen situated at the caudal aspect of the prostate complex. Like prostate, it has two lobes which are separated by a connective tissue, also can be seen by a visible longitudinal groove. The gland with their darker color is limited; dorsally by the rectum, ventrally by the urethra at the level of the colliculus seminalis. It is separated from the root of the penis by a transversal groove. Each of the lobes was measured as nearly 2,5 cm. in lenght, 0,5 cm. in witdh. The number of the excretory ducts leaving the ventral surface of the each lobes varies and opens into the urethra.

Vascularization

Origin of the prostatic artery (Figs. 2,5- 3,2) that supply the accessory sex glands was displayed varying greatly. These origins were external iliac (Fig. 2,2) or internal iliac arteries (Fig. 2,3) both from the common iliac artery (Fig. 2,1) , or their point of separation. Very small branches from the artery of the penis were also seen joining the caudal part of the bulbourethral glands (Not shown).

The bilateral umbilical artery (Figs. 2,4- 3,1) after leaving its origin from different sources goes directly onto the accessory sex glands. At the level of the border between the vesicular gland and the prostat complex, it sends the prostatic artery and turns cranially onto the vesicular gland. The prostatic artery was determined descending caudally; thus, giving several branches for the prostate complex and bulbourethral glands. These are the following; artery of seminal vesicle to the vesicular gland, branches to the prostate complex, and artery of bulbourethral gland to the bulbourethral gland. The umbilical artery was seen continuing as the caudal vesicular artery (Fig. 3,3) mainly supplying the vesicular gland and caudal parts of the bladder.

DISCUSSION

Accessory sex glands in mammals provide optimum live condition, enhance the capability of the fertilization, movement, and contribute to the color and motility, of the spermatozoa. They are generally located along the urethra. Morphology of the glands in farm animals and pets has been vastly documented in the literature. Among them, the situation in dogs has been especially focused by the researchers to develop different surgical techniques and to construct a model for the prostate operations for the people who have hypertrophic gland[4,15-17]. Most of the studies have dealt with the physiologic and pathologic hypertrophy of the glands since they are very improtant in the surgery, so are their arterial vascularization.

To begin with those, the present study was also conducted to enhance the knowledge about the subject in laboratory animals (in this case the New Zelland rabbit). The results of the study was thought to give different ideas especially to the prostate operations on man.

The size of the vesicular gland in the study was found extremely variable depending on the amount of the fluid it contains. This is thought

to be a unique situation among the higher vertebrates whose glands are well-known. The prostate complex is also displayed very different from those of the higher vertebrates since it possesses three different types of parts eventhough they are generally covered by a same connective tissue. For this, the prostate complex is grossly observed as a two lobed compact organ as seen in higher animals. The two lobed bulbourethral gland was observed elongated craniaocaudally.

Morphology of the accessory sex glands in the New Zelland rabbit was documented in the study. The results have showed that the glands in this subject are somewhat different from those found in higher animals. This should be considered carefully when this subject is to be thought to be a model for new operation techniques.

Arterial vascularization of the glands has also been observed in the study. Nomenclature on the subject so far has not been clearly shown. Studies have named the vessels that supply the accessory sex glands of the different breeds of rabbits in different ways[7,23]. This study has called the vessel as the umblical artery from which the prostatic artery and the other branches supplying the glands arise. This was done in accordance with the latest literature[23].

The present study has showed that the accessory sex glands in the New Zelland rabbit are supplied mostly by the prostatic artery and its branches. Only very thin branches(not shown) from the artery of the penis were also seen joining the caudal part of the bulbourethral glands, which appears not involving in the vascularization of the prostate complex. It can be said that the prostate complex receives blood only from the prostatic artery. However, the idea should always be considered that any branches from a main vessel might join the supply.

In conclusion, morphology of the accessory sex glands and their vascularization in New Zelland rabbits were examined and their features were documented. The results are thought to give some onformation to the researchers dealing with the laboratory animals.

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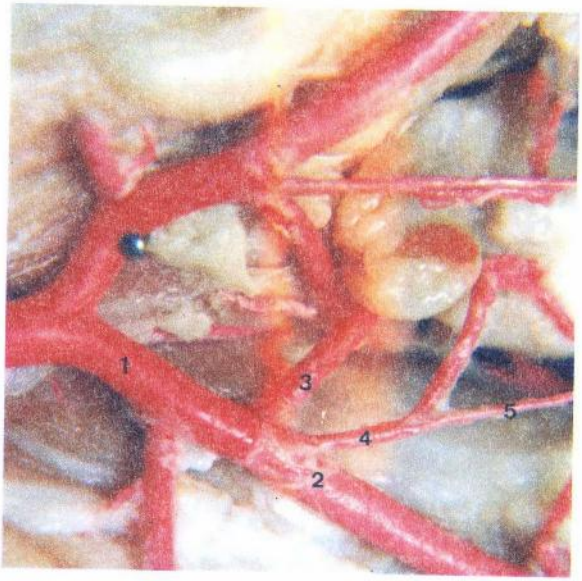

Figure 2. Vessels supplying the accessory sex glands, 1- common iliac artery, 2- external iliac artery, 3- internal iliac artery, 4- ublical artery, 5- prostatic artery
Resim 2. Erkek eklenti bezlerini kanlandıran damarlar, 1- a. iliaca communis, 2- a. iliaca externa, 3- a. iliaca interna, 4- a. umblicalis, 5- a. prostatica.

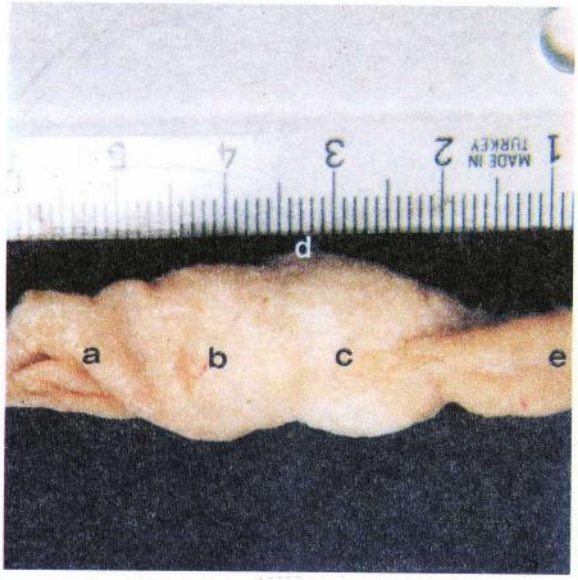

Figure 1. Exposure of the accessory sex glands in New Zelland rabit (removed). a- vesicular gland, b- proprostate, c- prostate, d- parapostate, e-bulbourethral gland.
Resim 1. Yeni Zelanda tavşanında erkek eklenti bezlerinin üstten görünüşü (çıkarılmış). a- gl. vesicularis, b- proprostat, c- prostat, d- paraprostat, e- gl. bulbourethralis.

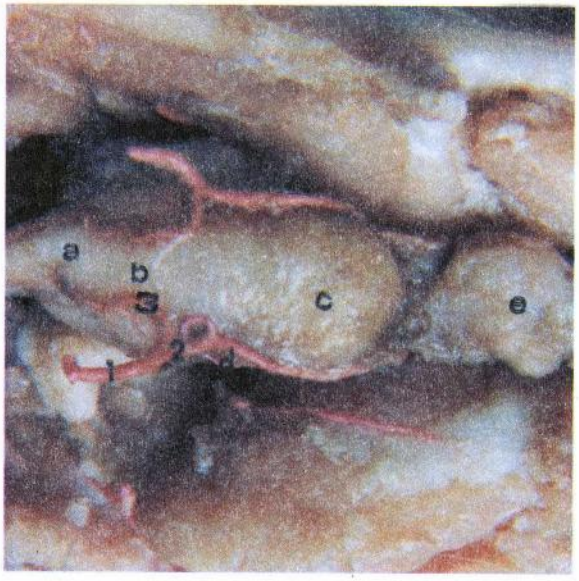

Figure 3. Exposure of the accessory sex glands and vessels in New Zelland rabit (with higher magnification). a- vesicular gland, b- proprostate, c- prostatė, d-paraprostate, e- bulbourethral gland, 1- umblical artery, 2- prostatic artery, 3- caudal vesicular artery.
Resim 3. Erkek eklenti bezlerinin görünüşü ve damarları (büyütülmüş), a- gl. vesicularis, b- proprostat, c- prostat, d- paraprostat, e- gl. bulbourethralis, 1- a. umblicalis, 2- a. prostatica, 3- a. vesicularis caudalis.