**MORPHOLOGY OF THE ACCESSORY SEX GLANDS AND THEIR ARTERIAL VASCULARIZATION IN NEW ZEALAND RABBITS**

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**Summary:** In the present study, morphology of the accessory sex glands and their vascularization in New Zealand 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 photographs 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 umbilical 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 Zealand rabbit, accessory sex gland, vascularization.

**INTRODUCTION**

In male mammals, accessory sex glands, glandulae genitales accessoria (gl. vesicularis, gl. prostaticae and gl. bulbourethralis) are located cranio-caudally at the beginning 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 spermatozoa. Morphology of the glands in several species such as dog1-8, Guinea pig6, rabbit7, ferret8 and rat9-13 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, prostatica, paraprostatica, 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. Prostatica (vesicular part of the prostate) is oval and gri in color, is veiled by the ampulla of the ductus deferens and the gl. vesicularis7. Constructed by the two lobes, prostatica 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
construct a model, on several animals such as
dog1,4,14-17, Guine pig6, rabbit7, ferret8,18, and
rat19. Prostate of the dog has been especially
vastly studied since the topography of that re-
sembles that of the human being. Most of the
studies have dealt with the physiologic and
pathologic hypertrophy of the gland1,15,20.
Since very important in the surgery, arterial vas-
cularization of the gland has been especially fo-
cused on by the researchers.

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 vas-
cularization 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 limited7. Hence, New
Zeland rabbit was chosen 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 Zeland rabbit as
model.

In the present study, morphology and arterial
vascularization of the accessory sex glands in
the New Zeland 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 pros-
tatectomy methods for the human prostate hy-
pertrophy.

MATERIALS and METHODS

In the study, a number of 9 New Zeland rab-
bbits on which experimental studies were con-
ducted, obtained from the experimental animals
unit, Faculty of Medicine, Gazi University,
were used. Animals were deeply anaesthetized
by ketamine xylazin combination (Ketamine hy-
drochlorur, 35 mg/kg im. + Xylazine Hydro-
chloride 5 mg/kg im.). One cc. liqueumine (He-
arine Sodium) was injected via auricular artery
for the antiquagilation of the blood. Thoraces of
the animals in deep anaesthesia were gently
opened using a costatome, apexes of the
hearts were cut off, and related vessels were
cleaned with physiologic saline. Latex colored
with red Rotring ink was injected through the
aorta. The cadavers where waited in water at
room temperature for 1-2 days. They were fi-
nally dissected and photographs were taken.

“Nomina Anatomica Veterinary”, published
in 199422 was employed for the anatomical no-
menculature.

RESULTS

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

The bilobed gland was observed to be locat-
ed 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 length 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 blad-
der when filled with the fluid. The thin-walled
caudal portion of the gland was determined ly-
ing on the two ampullae while it was neigh-
borred dorsally by the rectum, covered caudally
by the prostate complex.

Prostate (Prostata) (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 be-
ing 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 de-
termined being bilobed by a slight longitudinal
sulcus along the cranial and dorsal surface of it.
The approximate length of the gland was mea-
sured as 1.9 cm., the with as 1.5 cm. The gland
empties its secret into the urethra via two separ-
ated ducts that leave the ventral surface of it.
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 prostrate. 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 prostate because of its white secretory product. Its length 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 view 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 width 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 prostrate 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 length, 0.5 cm. in width. 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 diferent surgical techniques and to construct a model for the prostate operations for the people who have hypertrophic gland\cite{15-17}. Most of the studies have dealt with the physiologic and pathologic hypertrophy of the glands since they are very important 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 Zeland 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 even though 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 cranio-caudally.

Morphology of the accessory sex glands in the New Zealand 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. This study has called the vessel as the umbilical artery from which the prostatic artery and the other branches supplying the glands arise. This was done in accordance with the latest literature.

The present study has showed that the accessory sex glands in the New Zealand 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 Zealand rabbits were examined and their features were documented. The results are thought to give some information to the researchers dealing with the laboratory animals.

**LITERATURE**


18. Çalışlar T: The genital organs of the rat, the guinea pig and the rabbit. Anat Histo1 Embryol, 14(2): 166.


**Figure 1.** Exposure of the accessory sex glands in New Zealand rabbit (removed). a- vesicular gland, b- prostatic, c- paraprostatic, d- paraprostate, e- bulbourethral gland.

**Resim 1.** Yeni Zelanda tavşanında erkek ekleni bezlerinin üstün görünüşü (gösterilmüş). a- gl. vesicularis, b- prostatic, c- paraprostatic, d- paraprostate, e- gl. bulbourethralis.

**Figure 2.** Vessels supplying the accessory sex glands, 1- common iliac artery, 2- external iliac artery, 3- internal iliac artery, 4- umbical artery, 5- prostatic artery.

**Resim 2.** Erkek ekleni bezlerini kanlandiran damlar, 1- a. iliaca communis, 2- a. iliaca externa, 3- a. iliaca interna, 4- a. umbicalis, 5- a. prostatica.

**Figure 3.** Exposure of the accessory sex glands and vessels in New Zealand rabbit (with higher magnification). a- vesicular gland, b- prostatic, c- prostatic, d- paraprostatic, e- bulbourethral gland, 1- umbilical artery, 2- prostatic artery, 3- caudal vesicular artery.

**Resim 3.** Erkek ekleni bezlerinin görünüşü ve damaları (büyükülmüş), a- gl. vesicularis, b- prostatic, c- prostatic, d- paraprostatic, e- gl. bulbourethralis, 1- a. umbicalis, 2- a. prostatica, 3- a. vesicularis caudalis.