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Arterial Vascularization of the Penis in the Chinchilla (Chinchilla lanigera)

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Summary

The arterial vasculature of the penis was studied in a total of 10 apparently healthy adult male chinchillas. In order to exhibit the arterial vascularization network by dissecting under a magnifier, latex colored with red ink was injected through the carotic common artery. The main vessel of the penile blood supply in the chinchilla was observed to be penile artery. It was determined to be a branch coming from the internal pudendal artery. The penile artery was divided into three branches before 4-5 mm from the ischiadic arc. These were the deep artery of the penis, the dorsal penile artery and the most thin branch (entered and supplied the urethrae). The other penile arteries arised from the arteria pudenda externa and divided into two branches. One of these branches extended to preaputium and the other also divided into two further branches. The one branch supplied blood to the ischiocavernosus muscle, rectum and surrounding muscles and the remaining branch extented up to the root of the penis.

Keywords: Artery, vascularization, penis, chinchilla.

Şinşilla'da (chinchilla lanigera) Penis'in Arteriyel Damarlaşması

Özet

Penis'in arteriyel vaskularizasyonu 10 sağlıklı, ergin erkek şinşilla kullanılarak çalışıldı. Arteria carotis communis'ten kırmızı mürekkep ile renklendirilmiş latex enjekte edilerek, lup altında diseksiyon yapılıp arteriyel vaskularizasyonu ortaya çıkarıldı. Şinşillada penisin esas kan damarının arteria pudenda interna'dan gelen arteria penis olduğu gözlendi. Arteria penis arcus ischiadicus'tan 4-5 mm önce üç kola ayrıldı. Bunlar arteria profunda penis, arteria dorsalis penis ve en ince dal'dır (urethhra'yı girer ve besler). Penis'in diğer arterleri arteria pudenda externa'dan çıkar ve iki kola ayrıldı. Bu kollardan biri preputium'a uzanmış ve diğer kol ikiye ayrılmıştır. Bu kollardan biri musculus ischiocavernosus, rectum ve çevresindeki kaslara, diğer kolda penis'in kök kısmına girdiği belirlendi.

Anahtar sözcükler: Arter, vaskularizasyon, penis, şinşilla.

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INTRODUCTION

Chinchillas belong to the classs of Mammalian (Mammals) and their order and family are called as Rodentia (Rodents) and the Chinchillidae (Chinchillas and Visachas), respectively[1-3]. They are closely related to the porcupine and the guinea pig[4], perhaps the best known for their soft, thick and luxurious fur, and they are becoming more popular as pet animals[5].

In many male species, the main vessel of blood supply of the penis is the penile artery. It arises from the internal pudendal artery[6-9]. The artery of the penis is divided into three brnaches such as the artery of the bulb (the penile artery), the profund artery of the penis and the dorsal artery of the penis[7,10-12]. The artery of the bulb, supplies the bulb and then runs distally within the organ to supply the corpus spongiosum about the urethra and later on approaching the apex of the penis[7,13]. The profund artery of the penis passes through the tunica albuginea at the root of the penis and ramifies in the corpus cavernosum[11,14]. Dorsal artery of the penis travels along the dorsal surface of the penis[13].

The purpose of this paper was to observe the origin and distributional pattern of the penile artery in the chinchilla.

MATERIALS and METHODS

A total of 10 apparently healthy adult male chinchillas (Chinchilla lanigera) obtained from the Center for Experimental Medicine, Research and Application, Afyon Kocatepe University, Turkey were included in the study. The live body weight of chinchillas were varied from 550g to 600g. Animals were euthanised by the methods of Flecknell et al. 1980[15] and Poore et al. 1997[16]. To this end, regulations of the ethical committee of Afyon Kocatepe University was considered where necessary. Immediately following euthanasia, one ml of heparine sodium (Nevparin) was injected via jugular vein to prevent blood coagulation and animals were bled by cutting the jugular vein. The vein was cleaned with 0.9% physiologic saline. Latex colored with red ink was injected through the carotic common artery. The animal cadavers were fixed in 10% formaldehyde solution for 24 hour at room temperature. They were dissected under a magnifier and photographed by means of a digital camera.

The latest edition of nomina anatomica veterinaria was used for the terminology (NAV, 2005)[17]. The figures drawn by Barone et al. 1973[18] and Popesco et al. 1992[19] for rabbits were also considered as a guide for nomenclature.

RESULTS

The main vessel of the penile blood supply in the chinchilla was observed to be penile artery. This artery was determined to be a branch coming from the internal pudendal artery (Fig. 1/1).

The penile artery was divided into three branches before 4-5mm from the ischiadic arc. Among these branches, one division and the most thin branch entered and supplied blood to the urethrae (Fig. 1/2). The second, the deep artery of the penis, supplied blood to the corpus cavernosus penis (Fig. 1/3). The third, the dorsal penile artery, travelled along the dorsal surface of the penis (Fig. 1/4, 2/5).

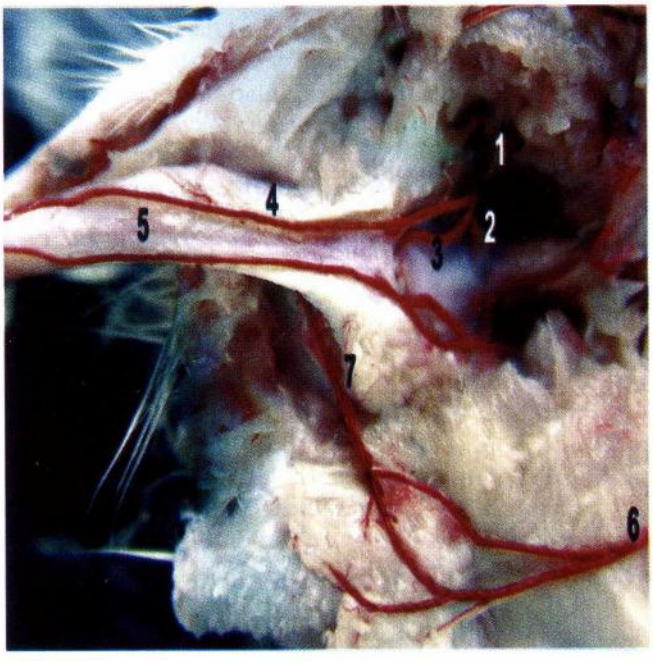

Figure 1. The branches of internal iliac artery (ventral view).
1- Internal pudental artery, 2- rami urethralis, 3- deep artery of the penis, 4-dorsal artery of the penis, 5- corpus penis, 6- epigastrica caudalis superficialis artery, 7- rami preputialis.
Şekil 1. Arteria iliaca interna'nın dalları (ventral'den görünüş).
1- Arteria pudenda interna, 2- rami urethralis, 3- arteria profunda penis, 4- arteria dorsalis penis, 5- penis'in gövdesi, 6- arteria epigastrica caudalis superficialis, 7- rami preputialis.

The deep artery of the penis was determined to enter the cavernosus body of the penis by passing through the ischiocavernosus muscle and penetrating to the tunica albuginea, and finally showing a spiral-type shape.

The dorsal artery of the penis was observed to pass caudally through the body of the penis in a groove formed by the right and left bulbocavernosus muscle after the leaving arteria pudenda interna, and later running along the dorsum penis, each side of the retractor penis muscle (Fig. 1/5, 2/6). Moreover, each dorsal artery of the penis reached the pars libera penis and ended in cavernos tissue (Fig. 2/7). The right and the left dorsal arteries of the penis displayed a web-shape anastomosis.

The other penile arteries was observed to be extension of the external iliac artery (Fig. 2/1). The superpficial epigastric caudal artery (Fig. 1/6, 2/3) arised from the arteria pudenda externa and divided into two branches (Fig. 2/2). The rami preaputialis as one of these branches extended up to the preaputium and the other also divided into two further branches (Fig. 1/7, 2/4, 2/8). The one branch supplied blood to the ichiocavernosus muscle, rectum and surrounding muscle layers and the remaining branch extented up to the root of the penis.

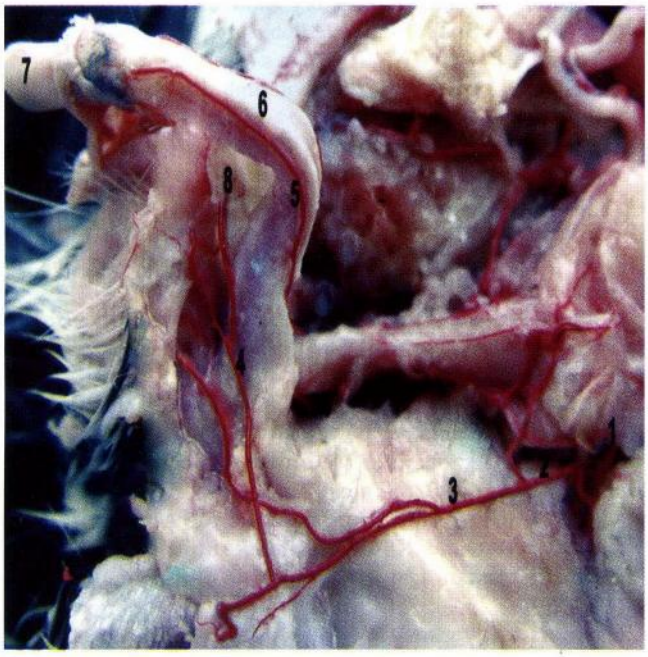

Figure 2. The external iliac artery and its branches (ventro-lateral view).
1- The external iliac artery, 2- External pudental artery, 3- epigastrica caudalis superficialis artery, 4- rami preputialis, 5- dorsal artery of the penis, 6- corpus penis, 7- pars libera penis, 8- preputium.
Şekil 2. Arteria iliaca externa ve onun dalları (ventro-lateral'den görünüş).
1- Aretria iliaca externa, 2- arteria pudenda externa, 3- arteria epigastrica caudalis superficialis, 4- rami preputialis, 5- arteria dorsalis penis, 6- penis'in gövdesi, 7- penis'in serbest uç kısmı, 8- preputium.

DISCUSSION

There are number of studies on the vascularization of the penis of several species such as Guinea pigs[20], wood mice[21] and New Zealand rabbits[22]. The penis of chinchilla, as with other species of mammals, supply the penile artery[8,9,14,17,23]. The origin of the penile arteries from pudenda interna to be branch of the internal iliac artery in male laboratory rodents varies according to species. Lopez-Fuster et al. 1993[21] reported that the penile artery arised less commonly from the external iliac artery, but it exclusively arised from internal iliac artery in our study.

According to the some literature[7,11,24] reported that the artery of the penis divided into three branches, the artery of the bulb of the penis, the deep artery of the penis, and the dorsal artery of the penis. Özgel et al. 2003[22] and Takçı 1992[25] revealed that the penile artery divided into the deep artery of the penis at the level of the ischiadic arch. In chinchillas, we showed that it was divided into three branches before 4-5mm from the ischiadic arc, one division and the most thin branch entered and supplied the urethrae, the second, the deep artery of the penis, which supplied corpus cavernosus penis, the third, the dorsal penile artery travelled along the dorsal surface of the penis.

The deep artery of the penis entered and supplied the corpus cavernous penis by penetrating the tunica albuginea[13,22] and the present study determined the same finding.

Tewari and Parakash[26] indicated an H-shaped anastomosis between the right and left dorsal arteries of the penis, however this was not the case in our study since we showed that the anastomosis was a web-shape appearance. Özgel et al. 2003[22] reported that the dorsal artery of the penis passed caudally through the body of the penis in a groove formed by the right and left ischiocavernosus muscle, and lied on

each side of the subischiocavernosus muscles. However, we observed it to pass caudally through the body of the penis in a groove formed by the right and left bulbocavernosus muscle, and later running along the dorsum penis each side of the retractor penis muscle. Özgel et al. 2003[22] revealed that it reached the pars libera of the penis and ended in an anastomose, but in chinchilla, each dorsal artery of the penis reached the pars libera penis and ended in cavernos tissue.

In conclusion, arterial vascularization of the penis in the chinchilla was demonstrated to be supplied by the penile artery which arised from the internal pudendal artery which possessed two branches such as the deep artery of the penis, the dorsal artery of the penis, whereas the ramus praeputialis arised from the external pudendal artery.

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