An anatomical study on the conformation of the femoral artery in Chinchilla lanigera

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SUMMARY

This study was carried out to determine the course of the femoral artery and its branches in 6 adult healthy Chinchilla lanigera. We recorded that the first branch of the femoral artery was a common trunk formed by the lateral femoral circumflex and the superficial caudal epigastric arteries, and that the deep femoral artery was absent in the chinchilla. The findings of our study suggest that the conformation of the femoral artery of this species showed nearly similarity to that of the rat. Results from this study are thought to throw light on the future studies on the arterial system, and to contribute to present anatomical knowledge in this species.

Keywords: Anatomy - femoral artery - Chinchilla lanigera.

Introduction

Chinchilla lanigera, which means long-tailed chinchilla, is a member of the rodent family (Chinchillidae). Fully grown they are about 12 inches long and weigh between 18 - 35 ounces, and can live up to 20 years of age. They look similar to rabbits with squirrel-like tails. These animals are being raised for use as pets. They are also used as experimental animals [9, 13]. The exact anatomical knowledge of the vascular system may secure a practical view for experimental studies [6, 7, 11]. Vascular catheters into the femoral artery are surgically placed in various species to facilitate the repeated or routine sampling of fluids, or to allow for repeated or routine injections of materials [1, 3].

In the literature, no study was found on the vascular system of Chinchilla lanigera. Previous an anatomical study was related to the topography of the abdominal and pelvic organs of Chinchilla Boliviana [12]. Considering this, we have aimed to investigate the conformation of the femoral artery in this species.

Materials and methods

A total of 6 healthy Chinchilla lanigera, aged 3-4 years, and weighing between 600 and 800 g were used. They were judged to be clinically healthy based on physical examination and laboratory evaluation (serum chemistry, complete blood cell count). The animals were anaesthetized with 0.15 ml/kg xylazine HCl (Rompun®, Bayer, Istanbul, Turkey) and 0.1 ml/kg ketamine HCl (Ketanez®, Alke, Istanbul, Turkey) intramuscularly, exsanguinated via the common carotid artery without consciousness. After opening of the abdominal cavity, plastic tubes were inserted and tied to the external iliac arteries in a caudal direction. The vessels were rinsed with 0.9 % physiological saline. Red (Setacolor™, cardinal red, no. 24, Pebeo, Cedex, France) - coloured latex (Rubber latex™, Mercan, Istanbul, Turkey) were injected into the external iliac arteries. After solidification of the latex solution, the branches of the femoral artery were revealed and photographed.

Results and discussion

Femoral artery was the continuation of the main trunk of the external iliac artery down the medial surface of the leg, beginning at the dorsal side of the inguinal ligament.

The authors recorded that the femoral artery first gave the lateral circumflex [8] or deep femoral arteries in the rabbit [2, 10]; the superficial circumflex iliac [4, 5] or superficial caudal epigastric arteries in the rat [14]. In this study, however, the first branch of the femoral artery in the chinchilla was a common trunk formed by the lateral femoral circumflex and the superficial caudal epigastric arteries immediately distal to the inguinal ligament (Figures 1.1 and 1.2). Moreover, we recorded that the deep femoral artery was absent in the chinchilla as reported in the rat [4], but another author [5] stated that the rat deep femoral artery sprang from the medial aspect of the femoral artery just distal to the superficial circumflex iliac artery.

The lateral femoral circumflex artery served the hip joint, the tensor fascia latae and iliacus muscles; and also proximal portions of the biceps femoris muscle and quadriceps muscles (Figures 1.1 and 1.2).

The superficial caudal epigastric artery run craniolaterally below the lateral femoral circumflex artery and thus supplying the skin of the medial and cranial surface of the thigh and inguinal region (Figures 1.1 and 1.2).

Branching the trunk mentioned above, the femoral artery gave the saphenous artery which was the most superficial,
longest and thickest branch of the femoral artery (Figures 1.1 and 1.2). The saphenous artery ran down the cranio-medial surface of the gracilis muscle, crossing the distal end of the adductor magnus muscle. As it passed over the medial surface of the stifle joint, it sent a single genicular branch to the skin and superficial fascia covering the medial side of the joint. It also served the cranial and extensor digitorum longus muscles proximal and medial to the tibia. At the level of proximal third of the tibia, as the saphenous artery crossed the caudal border of the semimembranosus muscle, it divided into two branches as the cranial and caudal branches. The cranial branch obliquely crossed medial to the tibia in a distocranial direction, and reached on the dorsal surface of the tarsal joint. The caudal branch first travelled distally between the caudomedial aspect of the tibia and the cranial aspect of the medial head of the gastrocnemius muscle, and then lay caudomedial to the tibia up to the caudomedial surface of the tarsal joint.

Giving the saphenous artery, the femoral artery distally ran medial to thigh. In its course it furnished the caudofemoral, adductor magnus and brevis, vastus medialis and intermedius muscles (Figure 1.1).

The femoral artery gave cranially the highest (descending) genicular artery at the level of the distal third of the thigh. The highest genicular artery, a small branch, ramified on the medial surface of the genicular joint, the vastus medialis and intermedius muscles (Figure 1.2).

Passing between the adductors longus and magnus muscles, the femoral artery continued through the popliteal fossa just above the medial epicondyle of the femur as the popliteal artery (Figures 1.2 and 1.3). In this study, we showed that the popliteal artery supplied the biceps femoris, vastus lateralis, popliteus, lateral and medial heads of the gastrocnemius muscles and extensor digitorum longus muscle. At the level of the popliteal notch, it divided into the caudal and cranial tibial arteries. Springing from the caudal surface to the popliteal artery, the cranial tibial artery plunged into the flexor hallucis longus muscle. At the level of the midpoint of the tibia, the cranial tibial artery coursed cranial to common calcanean tendon and reached on the caudomedial surface of the tarsal joint. In its course, the cranial tibial artery gave branches to the stifle joint, the popliteus, flexor hallucis longus, flexor digitorum longus, and lateral head of the gastrocnemius muscles (all the caudal muscles of the leg) (Figure 1.2). The cranial tibial artery ran distally as the continuation of the popliteal artery between the tibia and fibula to reach on the dorsal surface of the tarsal joint (Figure 1.3). It first gave twigs to the knee joint, the cranial tibial, peroneus longus and brevis muscles (all the cranial muscles of the legs) immediately below the head of the fibula. Descending cranial to the tibia, it sent branches to the extensor digitorum longus and extensor hallucis longus muscles, and several very fine twigs perforated the interosseous membrane to anastomose with the caudal tibial artery. The irrigation areas of the branches of the femoral artery are also given in table I.

In conclusion, this study is the first one on the arterial vascularisation of Chinchilla lanigera. The course of the femoral artery of this species and its branches showed nearly similarity to those of the rat. The results obtained in this study seem to be shed light on the future studies on the arterial system and proper diagnosis of pathological disorders related to the arterial vessels, and to contribute to present anatomical knowledge in this species.

References


7. — KONDO K., SUZUKI Y., IKEDA Y.: Genistein, an isoflavone included in soy, inhibits thrombotic vessel occlusion in the mouse femo-


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**Figure 1.** Femoral artery and its branches in *Chinchilla Lanigera*

   a) femoral artery  b) saphenous artery  c) cranial branch of saphenous artery
d) caudal branch of saphenous artery  e) lateral femoral circumflex artery
f) superficial caudal epigastric artery  g) genicular branch of saphenous artery
h) muscular branch of saphenous artery  i) highest (descending) genicular artery  k) popliteal artery
l) caudal tibial artery  m) cranial tibial artery
1) gracilis  2) medial head of gastrocnemius  3) vastus medialis  4) adductor brevis
5) adductor magnus  6) caudalis femoris  7) semimembranosus  8) rectus femoris
9) semitendinosus  10) flexor digitorum longus  11) tibialis caudalis  12) tibialis cranialis  13) lateral head of gastrocnemius  14) peroneus longus

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