

اعصاب القائمة الخلفية للجمل ذات السنم الواحد

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الملخص

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TOPOGRAPHY OF THE NERVES OF THE HIND LIMBS OF THE CAMEL (*Camelus dromedarius*)

with 3 Figures

By

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SUMMARY

The origin, course and distribution of the different nerves which supply the hind limbs of the camel (*Camelus dromedarius*) have been carefully dissected and described in details. In general a great similarity was found to exist between the nerves of the camel and those of the Ox except for a few differences which are described in this paper.

Nothing was found in the available literature about the nerves of the hind limbs of the camel except for a very brief account given by LESBRE (1903) and by VON W. HEINZE (1964). In this respect the present investigation was carried out with the object of studying in detail the topography of these nerves and defining the various structures innervated by them.

MATERIALS AND METHODS

Four camels of the species (*Camelus dromedarius*) were used in this work. The origin, course and distribution of the nerves from the lumbo-sacral plexus to the eight hind limbs were examined by careful dissection. The nomenclature used in this paper was that adopted by the *Nomina Anatomica Veterinaria* (1973).

RESULTS

The nerves to the hind limbs of camel comes from the lumbo-sacral plexus. They include: the lateral cutaneous femoral, the femoral, the obturator; the cranial and caudal gluteal, the caudal cutaneous femoral and the sciatic nerve.

N. cutaneus femoris lateralis:

The lateral cutaneous femoral nerve ((1/a) is formed by roots from the ventral branches of the 3rd, 4th and 5th lumbar nerves. After a short course in the abdominal cavity it pierces the wall of the abdomen close to the tuber coxae and descends in the thigh along the medial aspect of the *M. tensor fasciae latae*. At the distal end of the thigh it curves cranially and ramifies in the skin of the medial and cranio-lateral aspect of the thigh and the stifle joint, by 2-3 twigs.

N. femoralis:

The femoral nerve (1/b) is formed by roots derived mainly from the ventral branches of the 5th and 6th lumbar nerves but it also receives a small twig from the ventral branch of the 4th lumbar nerve. It passes between the two psoas muscles to come into lateral relation with the external iliac artery. On reaching the level of the pecten of the pubis it detaches the saphenous nerve and 3-5 muscular branches.

The muscular branches (*Rami musculares*) enter the cleft between the vastus medialis and rectus femoris at the proximal end of the thigh to supply the quadriceps femoris muscles. The femoral nerve also detaches a small twig to the ilio-psoas muscle, a strong branch to the pectineus muscle and an articular branch to the hip joint.

N. saphenus:

The saphenous nerve crosses the lateral aspect of the external iliac artery to gain cranial border of the femoral and saphenous arteries along which it continues distally covered medially by the sartorius muscle.

The saphenous nerve detaches 3 muscular twigs (*Rami musculares*) to the sartorius muscle. It then appears superficially at the distal third of the thigh from the cleft between the sartorius and gracilis muscles where it gives off a branch which proceeds to the medial and cranial aspects of the stifle joint. The saphenous nerve then divides into two unequal cutaneous branches (*Rami cutanei*) which descend along the cranial and caudal borders of the saphenous artery. The larger cranial branch ramifies on the cranio medial aspect of the leg; one of its twigs continues distally to the cranio medial aspect of the tarsus.

N. obturatorius:

The obturator nerve (1/c) arises by roots derived from the ventral branches of the 5th and 6th lumbar nerves. From its origin it curves caudally and distally along the lateral wall of the pelvic cavity with the homonymous artery and vein. It then disappears beneath the internal obturator muscle to leave the pelvic cavity through the obturator foramen in a cranial and a caudal branch. The cranial branch (*Ramus cranialis*) divides into three twigs for the pectineus, adductor and gracilis muscles. The caudal branch (*Ramus caudalis*) ends in the adductor muscle. The obturator nerve also gives off a branch to innervate the external obturator muscle.

N. gluteus cranialis:

The cranial gluteal nerve (1/d) arises in common with the cranial root of the sciatic nerve from the ventral branches of the 6th and 7th lumbar nerves. It passes through the great sciatic foramen and immediately divides into 3-4 branches which innervate the gluteal muscles. It also furnishes a long branch which reaches the M. tensor fascia lata between the deep and middle gluteal muscles.

N. gluteus caudalis:

The caudal gluteal nerve (1/G) arises with the caudal root of the sciatic nerve and the roots of the caudal cutaneous femoral nerve from the ventral divisions of the 1st and 2nd sacral nerves. It emerges through the great sciatic foramen and proceeds caudally and distally, curving around the caudal border of the middle gluteal muscle where it divides into 2-3 branches which innervate the gluteal, biceps femoris and semitendinosus muscles.

N. cutaneus femoris caudalis:

As it has been mentioned before, the caudal cutaneous femoral nerve (1/f) thus arises from the ventral branches of the 1st and 2nd sacral nerves. The nerve traverses the great sciatic foramen and on the sacro-sciatic ligament reaches the tuber ischii where it becomes superficial. It then continues distally between the biceps femoris and semitendinosus muscles to be distributed in the skin at the caudo-lateral aspect of the thigh.

N. ischiadicus:

The sciatic nerve (1/E) arises by two roots, cranial and caudal. The cranial root is derived from the ventral rami of the 6th and 7th lumbar nerves together with the cranial gluteal nerve root. On the other hand the caudal root arises from the ventral branches of the 1st and 2nd sacral nerves together with the caudal cutaneous femoral and caudal gluteal nerve roots. From its origin the sciatic nerve emerges through the great sciatic foramen and descends caudally on the sacro-sciatic ligament between the middle and deep gluteal muscles. At the hip joint it passes over the gemellus and the tendon of the internal obturator muscles. In the thigh it descends between the biceps femoris and semitendinosus muscles laterally and the adductor and semimembranosus muscles medially. At the middle of the thigh or approximately 8cm. proximal to the gastrocnemius muscle, the sciatic nerve divides into the common peroneal and tibial nerves.

Along its course the sciatic nerve detaches muscular branches (*Rami musculares*) which are distributed as follows:

— One of these branches is given off from the deep face of the sciatic nerve at its proximal end for the supply of the internal obturator muscle.

— A branch is given off from the deep face of the sciatic nerve which divides into two twigs for the *M. gemellus* and *M. quadratus femoris*.

— A large muscular branch is given off from the caudal aspect of the sciatic nerve just above the hip joint; it descends along the caudal border of the parent nerve then divides into several branches three of them to the *M. biceps femoris*; two to the *M. semitendinosus* and a long one to the *M. semimembranosus*.

N. peroneus communis:

The common peroneal nerve is the smaller branch of the terminals of the sciatic nerve. It descends under the deep fascia of the leg between the biceps femoris and the lateral head of the gastrocnemius muscle with a slight cranial inclination. On gaining the proximal end of the peroneus longus it divides into superficial and deep peroneal nerves.

The common peroneal nerve gives off the following branches:

- A muscular branch to the biceps femoris muscle which sometimes arises from the lateral cutaneous sural nerve.
- A communicating branch to the N. cutaneus surae caudalis.

N. cutaneus surae lateralis:

The lateral cutaneous sural nerve arises from the common peroneal nerve at the distal third of the thigh. It pierces the distal end of the biceps femoris muscle to appear superficially on the lateral aspect of the distal end of the thigh and continues to the proximal end of the leg in the skin of which it ramifies.

N. peroneus superficialis:

The superficial peroneal nerve (3/1) leaves the common peroneal nerve and passes at first beneath the M. peroneus longus to which it detaches two muscular branches (Rami musculares), then continues distally towards the tarsus between the M. peroneus longus and M. extensor digitorum longus. It divides above the hock joint by 3-4 cm. into lateral and medial cutaneous branches (Rami cutanei). The lateral and medial branches (N. digitalis dorsalis communis IV (3/2) and N. digitalis dorsalis communis II (3/3) continue distally along the dorsal aspect of the metatarsus on either side of the common extensor tendon and in company with the saphenous vein. At the middle of the metatarsus or at its distal third each nerve divides into inner and outer rami. The inner branch of the N. digitalis dorsalis communis II continues distally along the abaxial aspect of the medial digit as N. digitalis dorsalis proprius III abaxialis (3/4).

Similarly the outer division of the N. digitalis dorsalis communis IV continues distally along the abaxial aspect of the lateral digit as the N. digitalis dorsalis proprius IV abaxialis (3/5). The outer divisions of the parent nerves are connected with each other in the distal portion of the metatarsus to form the N. digitalis dorsalis communis III (3/6) which descends in the interdigital space and divides into the N. digitalis dorsalis proprius III axialis (3/7) and the N. digitalis proprius IV axialis (3/8) which course along the axial aspect of the corresponding digit.

N. peroneus profundus:

The deep peroneal nerve is the other terminal branch of the common peroneal nerve. It disappears between the *M. extensor digitorum longus* and *M. peroneus longus* giving off 3-4 muscular branches (*Rami musculares*) which supply all the extensor muscles of the tarsus and digits. It is continued distally by a small branch along the cranial tibial artery and caudal to the tendon of the extensor digitorum longus. It is directed towards the cranial aspect of the tarsus where it divides into two twigs which end in the *M. extensor digitorum brevis*, and one of them supplies the skin on the dorsal aspect of the metatarsus.

N. tibialis:

The tibial nerve (2/1) is the larger of the two terminal branches of the sciatic nerve. It descends on the medial aspect of the biceps femoris to enter the space between the two heads of the gastrocnemius muscle and in the leg it lies along the cranial border of the *M. flexor digitorum superficialis* beneath the deep fascia and caudal to the saphenous vein and artery. Just above the tarsus the tibial nerve divides into the lateral and medial planter nerves.

Along its course the tibial nerve detaches the following branches:

N. cutaneus surae caudalis:

The caudal cutaneous nerve of the leg is given off before the tibial nerve disappears between the two heads of the gastrocnemius muscle. It descends between the lateral head of the gastrocnemius and the biceps femoris muscles to gain the caudo-lateral aspect of the leg along the lateral border of the tendoachillis. In the distal third of the leg it divides into three twigs which are distributed to the skin of the leg and tarsus.

Rami musculares:

Several muscular branches are given off while the *N. tibialis* lies between the heads of the gastrocnemius muscle to that muscle, the *M. flexor digitorum superficialis* and the soleus muscle. Other muscular branches reach the *M. popliteus* and the deep flexor muscle. The tibial nerve also detaches an articular branch to the stifle and the hock joints.

N. plantaris lateralis:

The lateral planter nerve (2/2) is the smaller of the two terminal branches of the tibial nerve. It descends into the metatarsus as the *N. digitalis plantaris communis IV* (2/5) along the lateral border of the flexor tendons. At the distal fourth of the metatarsus it is connected with a branch from the medial planter nerve and continues along the abaxial aspect of the lateral digit as *N. digitalis plantaris proprius IV abaxialis* (2/6) being dorsal to the corresponding digital artery. The lateral planter nerve also detached 2-3 deep branches (2/4) to supply the suspensory ligament.

N. plantaris medialis:

The medial planter nerve (2/3) is the other terminal branch of the tibial nerve. It descends into the metatarsus along the medial border of the flexor tendons together with the common digital artery.

It becomes the *N. digitalis plantaris communis* II (2/7) on the planter aspect of the superficial flexor tendon and then divides at the middle of metatarsus into inner and outer divisions. The outer division is the *N. digitalis plantaris communis* III (2/9) and is directed into the interdigital space after it detaches a communicating branch to the *N. digitalis plantaris proprius* IV abaxialis (2/6). It divides into *N. digitalis plantaris proprius* III axialis (2/11) and *N. digitalis plantaris Proprius* IV axialis (2/12) at the proximal end of that space. Each of these nerves continues along the axial aspect of the medial and lateral digits respectively. The inner division is *N. digitalis plantaris proprius* III abaxialis (2/8, 10), it continues along the abaxial aspect of the medial digit.

In the gluteal region under the skin five cutaneous branches are found which are derived from the dorsal division of the sacral nerves.

DISCUSSION

The present paper shows that the course and distribution of the various nerves which supply the hind limbs of the camel have, in general, a great similarity to those of the cattle with slight differences.

Owing to the presence of seven lumbar nerves in the camel the origin of these nerves from the lumbo-sacral plexus presents some variations from that of the ox. Studies of the lumbo-sacral plexus and its component nerves to the hind limbs in the higher mammal were carried out by PATERSON (1887) and SHEERRINGTON (1892).

In addition to the innervation of the quadriceps femoris muscle, the femoral nerve of the camel also gives off a strong branch to the pectineus muscle which receives a branch from the obturator nerve as in other animals. In this respect RAGHAVAN (1964) reported that the femoral nerve in the Ox supplies variable branches to the pectineus muscle and BRADLEY (1947) and SISSON (1969) mentioned that in the horse the pectineus muscle is innervated only by the obturator nerve. Moreover the deep peroneal nerve of the camel does not participated in the formation of any of the digital nerves contrary to the case in the Ox as stated by RAGHAVAN (1964), WUNSCH (1966) and SISSON (1969).

The terminology used by GHOSAL and GETTY (1967) who considered it more appropriate for the description of the nerves of the hind limbs of ruminants (Ox, Sheep and goat) is replaced in this work by that adopted by the *Nomina Anatomica Veterinaria* (1973) on the advice of the general assembly of the world association of veterinary anatomists in Mexico (1971).

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