المدد الشريانى لمخ الجمل

ح • بدوى ، م • الشايب ، أ • قناوى

ملخص

ـ يصل الدم الى مخ الجمل عن طريق الشريان القاعدى بالاضافة الى الشريان السباتى الداخلى اللذان يكونان الشبكة الرهيبة الأمامية لفوق الأم الجحود .

ـ وقد تم وصف مسار وكذلك تفرعات هذه الشرايين بالتفصيل .

ـ على عكس القواعد المعروفة بالنسبة لتكوين الشبكة الرهيبة الأمامية لفوق الأم الجحود فى الثدييات نجد أنهـا واضحة النمو فى الجمل بالرغم من وجود الشريان السباتى الداخلى .

ـ كذلك وصفت الدائرة الشريانية المخيمة باختصار وقد وجد أنها تختلف عما هـو مألوف فى الحيوانات الأخرى .

Dept. of Anatomy and Histology, Faculty of Vet. Med.
Assiut Uuiversity.
Head Prof. Dr. H. Badawi

THE ARTERIAL BLOOD SUPPLY OF THE BRAIN OF CAMEL

(Camelus dromedarius)

(with two figures)

By

H. Badawi, M. El-Shaieb and A. Kenawy

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SUMMARY

1.—The brain of the camel (Camelus dromedarius) receives its blood supply from the basilar artery as well as from the A. Carotis interna which form the rete mirabile epidurale rostrale.

2.—The course and distribution of the above mentioned arteries were described in detail.

3.—Contrary to the general rules related to the formation of the rete mirabile rostrale in mammals, the camel is apparently an exception in possessing a well developed rete in spite of the presence of an internal carotid artery.

4.—A brief description of the formation of the cerebral arterial circle was given and which does not follow the usual pattern as in other animals.

INTRODUCTION

The arterial blood supply of the brain of most domesticated animals was subject to detailed description by many authors, but very little, in this respect in the camel has been recorded LESBRE, 1903 and KANAN, 1970). The nomenclature used in this work is that adopted by Nomina Anatomica Veterinaria (1973).

MATERIALS AND METHODS

Ten heads and necks of adult Camels of the species Camelus dromedarius were used in this work. Both right and left common carotid arteries were injected with 60% Gum Milk Latex coloured with Vulcanosol red. For the fixation of the brain the cerebral meninges were exposed by trephining the parietal bones and the specimens were preserved in 10% firmalin. The

dissection of the blood vessels of the brain was carried out under magnified lens.

RESULT

The brain of the camel was found to receive its arterial blood supply from the basilar artery and the intracranial part of the internal carotid artery which is represented by the rete mirable epidurale restorale.

A. basilaris :

The basilar artery (1,2/5) is formed at the ventral aspect of the medulla oblongata by the union of the two vertebral arteries. The basilar artery passes in a rostral direction ventral to the medulla oblongata and the sulcus basilaris of the pons. In the fossa cruralis (interpeduncularis) caudal to the hypophysis cerebri it joins the right and left caudal communicating arteries. During its course, the basilar artery gives off on each side 5-6 twigs, the Aa. cerebelli caudales and the A. labyrinthi.

Aa cerebelli caudales :

The caudal cerebellar arteries (1,2/6) encircle the ventrolateral aspect of the medulla oblongata to reach its dorsal aspect where they ramify in the caudal part of the cerebellum. Various anastomoses occur between the individual branches of the same side and also between those of the other side. These anastomoses are not mentioned by *KANAN* (1970).

A. labyrinithi

From it origin from the basilar artery, the A. labyrinthi (1,2/8) curves around the caudal margin of the pons, detaches branches to the caudal aspect of the cerebellum and the choroid plexus if the fourth ventricle, and continues its course along the ventral border of the vestibulocochlear nerve to the internal ear. The artery anastomoses with the most rostral twig of the caudal cerebellar arteries, the rostral cerbellar artery, and with its fellow of the opposite side at the ventral aspect of the nodulus. This last mentioned anastomosis was not reported by *KANAN*. (1970). In one case the A. Labyrinthi was double and the extra branch was much the smaller and it arose 1 cm. rostral to the main artery. Such finding was not also previously reported.

Rami ad pontem :

These comprise 2-4 branches (1,2/10) which arise from each side of the basilar artery, supply the ventro-lateral aspect of the pons and anastomose with each other and will the rostral cerebellar arteries anr A. labyrinthi.

A. carotis interna :

The internal carotid artery (1,2/11) forms the rete mirabile epidurale rostrale after traversing the foramen lacerum aborale which in 70% of cases is transformed into an S-shaped osseous canal. The rete mirabile epidurale rostrale (1,2/12) receives in addition fine twigs, Rami rostrale ad rete mirabile epidurale rostrale arising from the A. maxillaris as well as 2-3 fine branches, Rami caudales ad rete mirabile epidurale rostrale which irignate from the A. ophthalmica externa. These additional twigs pass through the foramen orbitorotundum to join the most rostrale part of the rete.

The rete mirabile epidurale rostrale has a triangular form. It lies on the floor of the cranial cavity surrounding the hypophysis cerebri. Its rostral extremity is found within the formen orbitorotundum, while its caudal extremity lies slightly behind the level of the spheno-occipital crest. The base of the rete extends along the maxillary nerve. The rete mirabile epidurale rostrale gives off the A. communicans caudalis, A. opthalmica interna, A. cerebri media, A. cerebri rostralis, and A. Choroidei (chorieidei) rostrale.

A. Communicans caudalis :

As the case in other domestic animals, the caudal communicating artery (1,2/14) connects the rete mirabile epidurale rostrale i.e. the internal carotid artery with the basilar artery. From its origin it passes in a converging manner with its fellow to form the caudo lateral quadrant of the circulus arteriosus cerebri. The caudal communicating artery gives off one of the two branches which form the caudal cerebral artery.

A. cerbri caudalis :

The caudal cereral artery (1,2/15) originates from the caudal communicating artery by a large vessel and frim the rete mirabile epidurale rostrale by ar. another relatively small branch. The caudal cerebral artery crosses the tractus cruralis. peduncularis to supply the caudomedial aspect of the cerebral hemisphere, and the thalamus by Rami corticales and Rami centrales.

The A. cerebri caudalis gives off Rami choroidei (chorioidei caudales) to the fourth ventricle and Aa. cerbelli rostrales.

Aa.cerebelli rostrales :

The rostral cerebellar arteries (1,2/16) are represented by a variable number of vessels that spring from the caudal cerebral and from the caudal communicating arteries and curve upward around the tractus cruralis (peduncularis) to attain the dorsal aspect of the pons. They supply the corpira quadrigemina, the rostral and dorsal aspect of the cerebellar hemispheres as well as the vermis, and anastomose with the caudal cerebellar arteries.

A. Ophthalmica interna : (1,2/17)

The internal ophthalmic artery is a small vessel which after supplying the optic chiasma passes along the optic nerve through the optic foramen and anastomoses with a branch from the rete mirabile opthalmicum.

A. cerebri media :

The medial cerbral artery (1,2/18) is the largest branch of the rete mirabile epidurale rostrale. It is distributed in the corresponding dorso-lateral aspect of the cerebral hemisphere and ansastomoses with branches from the rostral cerebral and caudal cerebral arteries.

A. Choroidea (chorioidea) rostralis :

The rostral choroid artery (1,2/19) arises from the rete mirabile epidurale rostrale close to the origin of tthe middle cerebral artery. It passes caudally and slightly medially along the optic tract to reach the caudo-medial aspect of the cerebral hemisphere where it detaches small branches to the choroid plexus of the third ventricle and to the thalamus.

A. cerebri rostralis :

The rostral cerebral artery (1,2/20) arises from the erte mirabile epidurale rostrale. It curves medially from its origin to the dorsal longitudinal fissure where it divides into a Ramus corticalis and a Ramus centralis. The rostral cerebral artery supplies the following vessels.

A. meningea rostralis :

The rostral meningeal artery (1,2/21) extends along the olfactory bulb which it supplies and its covering mater. The vessel anastomoses with a twig from the external ethmoidal artery and detaches a small branch which joins its fellow of the other side.

A. communicans rostralis :

Unlike the case of other domestic animals the rostral communicating artery joins together the two central branches of the rostral cerebral artery, forming the rostral boundary of the circulus arteriosus cerebri.

Ramus croticalis :

The cortical branch (1,2/22) is the smaller terminal branch of the rostral cerebral artery. It runs along the lateral margin of the dorsal longitudinal fissure to supply the frontal lobe. In addition it detaches small branches to the olfactory tract.

Ramus centralis :

The central branch (1,2/23) courses into the dorsal longitudinal fissure and divides into two branches which extend along the medial aspect of the cerebral hemispheres to end in the corpus callosum and the gyrus fornicatus; it anastomoses with twigs from the caudal cerebral artery. In three specimens, one of the central arteries was larger than its fellow while in an another one of the two central arteries joined together forming a single artery which redivides into 2 branches.

Circulus arteriosus cerebri :

The cerebral arterial circle in the camel is formed caudolaterally by the caudal communicating arteries, rostro-laterally by the rostral cerebral arteries and the rostral communicating branches. Although *KANAN* (1970) did not describe the formation of the circle, yet he reported that in the camel it does not follow the usual pattern as in other mammals.

DISCUSSION

The present investigation shows that owing to the large size of the basilar artery and its branches, the flow of blood would be towards the circulus arteriosus cerebri and not in the reverse direction as it is observed by *DANIEL, DAWEE* and *PRITCHARD* (1953) in other species of artiodactyla namely the sheep and the ox. It is also known from an extensive study of the rete in other mammals that a well developed rete mirabile epidurale rostrale is the rule in these animals in which either the internal carotid artery is absent or it is in a degenerating condition. KANAN (1970) suggests that probably the significance of well developed rete, particularly in long necked mammals

like the camel, is more of a haemodynamic and physiological importance, considering the great amount of blood that passes through the rete and the special features associated with the cerebral circulation. Accordingly the camel is apparently an exception in possesing a well developed rete mirable epidurale rostrale in spite of the presence of an internal carotid artery. Moreover, the suggestion that the development of a rete occurs only whenever the internal carotid artery fails to pass through a bony canal *KANAN* (1970)or to circumscribe an S-shaped curve *NICKEL* and *SCHWARZ* (1963) does not seem to concur with the condition found in the camel in which the internal carotid artery forms an S-shaped curve within the peculiar form of the foramen lacerum orale for which a reference was previously given.

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Auther Adress : Prof. Dr. Badawi Dept. of anat. and hist. Assiut University.

Fig. 1

Fig. 2

a. Bulbus olfactorius.
b. N. opticus.
c. N. trigeminus.
d. N. maxillaris.
e. N. facialis.
f. N. vestibulocochlearis.

1. A. verebralis.
2. Islet formation between the left and right vertebral arteries.
3. Rami spinales.
4. A. spinalis ventralis.
5. A. basilaris.
6. Aa. cerebelli caudales.
7. Ramus anastomoticus between the most caudal branch of the Aa. cerebelli caudales and A. occipitalis.
8. A. Labyrinthi.
9. Its branch to the plexus choroidea (Chorioidea).
10. Rami ad pontem.
11. A. carotis interna.
12. Rete mirabile epidurale rostrale.
13. Rami rostrale ad rete mirabile epidurale rostrale.
14. A. communicans caudalis.
15. A. cerebri caudalis.
16. Aa. cerebelli rostrales.
17. A. ophthalmica interna.
18. A. cerebri media.
19. A. choroidea (chorioidea) rostralis
20. A. cerebri rostralis.
21. A. meningea rostralis.
22. Ramus corticalis.
23. Ramus centralis.
24. A.maxillaris.