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سيلات الام الجافية والأوردة المخيية في البغل

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هذا البحث يتعلق بتكوين ومسارات سيلات الام الجافية في
دماغ البغل ، الى جانب الصرف الوريدى وعلاقة الأوردة المخيية
وروافدها مع السيلات .

هذا وقد تمت مناقشة نتائج هذا البحث مع النتائج الموجودة في
الابحاث المتوفرة والتي عالجت نفس الموضوع في الحيوانات الأخرى .

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SINUS DURAE MATRIS AND Vv. CEREBRI IN MULE
(*Equus hinrus*)
(With One Figure)

By

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SUMMARY

The examined Sinus durae matris of the mule include a dorsal and ventral system. The dorsal system comprises Sinus sagittalis dorsalis, Sinus rectus, Sinus transversus and Sinus occipitalis dorsalis, while the ventral system includes Sinus cavernosus, Sinus intercavernosus caudalis, Sinus basilaris and Sinus petrosus ventralis. There is no connection between the dorsal and ventral systems of the Sinus durae matris in mule.

The position, relations and the flowing cerebral i.e. cerebellar veins into each Sinus were completely described. Moreover, the emissary veins connecting the Sinus durae materis with other veins of the head and neck were also mentioned.

INTRODUCTION

The Sinus durae matris were described in details by DENNSTEDT (1903) in horse and donkey in addition to the cattle, sheep, goat, pig, dog and cat. Moreover, SISSON/GROSSMAN (1969) and SEIFERLE (1975) have described the venous sinuses of the dura mater in the domestic animals.

The present work aimed to describe the Sinus durae matris and the cerebral veins in the mule, compared with those of other equines and domestic animals.

MATERIAL and METHODS

The present study was carried out on ten heads of adult mules of the species *Equus hinrus*. The animals were anesthsied, bled and the heads were injected with blue coloured gum milk Latex through the mandibular labial veins after occlusion of the vertebral and transverse canals. The examination of the sinuses begin after removal of the cranial bones dorsally. The nomenclature used is that adopted by the NOMINA ANATOMICA VETERINARIA (1973).

RESULTS

Sinus sagittalis dorsalis

The dorsal sagittal sinus (1/1) begins at the most rostral part of Falx cerebri by the joining of two minute meningeal vessels on both sides of Crista galli. It ascends caudally along the Crista sagittalis interna within the attached border of Falx cerebri till the internal occipital protuberance. It is completely separated into two parallel vessels by a median septum which disappears at the caudal third of the sinus.

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At the Confluens sinuum, it receives the Sinus rectus ventrally and divides into two transverse sinuses. It also receives the Vv. cerebri dorsales, 2 - 3 meningeal branches and 4 - 5 diploic veins from Os frontalis and Os parietalis.

The Vv. cerebri dorsales are arranged in three groups; frontal, parietal and occipital, they become dilated at their termination to form the Lacunae laterales.

Sinus rectus:

The straight sinus (1/2) is a short vessel of about 2 cm in length and receives the Sinus sagittalis ventralis and V. cerebri magna at a level caudal to the Splenium corporis callosi. It ascends within the Falx cerebri to join the dorsal sagittal sinus at the Confluens sinuum.

Sinus sagittalis ventralis:

The ventral sagittal sinus (1/3) is a small vessel which lies within the free border of the Falx cerebri. It begins at a level dorsal to the Genu corporis callosi by two vessels coming from the ventrorostral part of the medial aspect of the frontal lobe.

The V. cerebri magna (1/4) is a short vessel formed by Vv. cerebri internae and V. thalamostriata. It passes between the Splenium corporis callosi and the pineal body to join the rostral end of Sinus rectus.

The right and left internal cerebral veins are formed by several twigs at the dorsolateral aspect of the intermediate mass of the thalamus and V. choroidea rostralis which drains the plexus of the lateral and third ventricles. The thalamostriate vein is represented by two vessels which drain the Thalamus and Corpus striatum.

Sinus transversus:

The right and left transverse sinuses (1/5) form the caudal direct continuation of the two end divisions of the Sinus sagittalis dorsalis just rostral to the Osseous tentorium cerebelli. As it reaches the internal opening of the temporal meatus, it joins the Sinus petrosus dorsalis and continues as Sinus temporalis.

The transverse sinuses are connected with each other through two Sinus communicans (1/5) which pass through transverse canals within the Processus tentorius. The caudal one connects with the Sinus occipitalis dorsalis and V. emissaria foraminis occipitalis.

Sinus petrosus dorsalis:

The dorsal petrosal sinus (1/6) descends in the most lateral portion of the Tentorium cerebelli membranaceum and receives the V. rhinalis caudalis, V. cerebri basalis and meningeal twigs from the caudoventral portion of the dura mater. It joins the ventrolateral aspect of the Sinus transversus.

The caudal rhinal vein (1/7) forms the continuation of the rostral rhinal vein and receives the ventral cerebral vein and a twig from the olfactory trigone. It continues caudad in the Sulcus rhinalis to join the Sinus petrosus dorsalis.

The rostral rhinal vein drains the venous network at the ventral aspect of the olfactory bulb and receives two ventral cerebral veins from the occipital pole. It runs in the rostral rhinal groove to continue caudally as V. rhinalis caudalis.

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The basal cerebral vein (1/8) is formed at the ventral aspect of the optic tract by the union of a rostral branch which drains the infundibulum, Tuber cinarium and the mammillary body and a caudal branch which drains the olfactory trigone. It ascends along the medial aspect of the piriform lobe to join the dorsal petrosal sinus.

Sinus temporalis

The temporal sinus (1/9) forms the continuation of the Sinus transversus within the Meatus temporalis. It leaves the cranial cavity via For. retroarticularis where it joins the V. auricularis rostralis as V. emissaria foramenis retroarticularis.

Sinus occipitalis dorsalis

The dorsal occipital sinus is situated on the caudodorsal aspect of the cerebellar hemisphere and Vermis. It receives the Vv. cereblli dorsales, V. choroidea caudalis, 2-3 Rr. medulares and 1-2 diploic veins from the squamous part of Os occipitalis.

The dorsal cerebellar veins comprise a rostral group which drains the rostradorsal aspect of the cerebellar hemisphere and Vermis, while the caudal group includes three considerable veins which drain the lateral and caudodorsal aspect of the cerebellum.

The caudal choroid vein originates from the medial aspect of the choroid plexus of the 4th ventricle and joins the Sinus occipitalis dorsalis.

Sinus cavernosus

The cavernous sinus (1/11) lies in a large groove on the cerebral surface of Os basisphenoidale lateral to the Sella turcica. It continues rostrally through the For. orbitale as V. emissaria fissurae orbitalis to join the ophthalmic venous plexus. It receives 2-3 hypophyseal veins and connects behind the hypophyseal fossa with its fellow through the Sinus intercavernosus caudalis. The caudal portion of the cavernous sinus behind the Sinus intercavernosus caudalis continues as Sinus basilaris.

The caudal intercavernous sinus measures about 1 cm in width and breadth and receives 2-3 hypophyseal veins and connects caudally with the ventral occipital plexus.

Sinus basilaris

The basilar sinus (1/13) lies on the cerebral surface of the basilar part of Os occipitalis and extends from caudolateral angle of the cavernous sinus just caudal to the level of the Sinus intercavernosus caudalis.

Sinus petrosus ventralis

The ventral petrosal sinus (1/14) is situated along the lateral border of the basilar portion of the occipital bone. It closes the For. lacerum and extends caudally to form its bulbed end within the Fossa condylaris ventralis. It is connected with the cavernous sinus through the Incisura carotica and anastomoses with the venous subtemporal plexus rostrally and joins the V. emissaria foramenis jugularis caudally.

Plexus occipitalis ventralis

The ventral occipital plexus lies on the inner surface of the floor and lateral walls of the Os occipitalis and forms a circular venous plexus within the For. magnum. It joins

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the V. emissaria canalis n. hypoglossi and the Plexus venosus vertebralis internus ventralis caudally.

DISCUSSION

The Sinus sagittalis dorsalis in mule has no connection with nasal veins as stated by DENNSTEDT (1903) in horse and donkey and SEIFERLE (1975) in other animals. The median septum which divides the dorsal sagittal sinus partially was also observed in horse by SISSON/GROSSMAN (1969) and by HASHEM (1980) in camel. However, DENNSTEDT (1903) mentioned that this septum is poorly developed in donkey and absent in cattle.

The position and course of the Sinus rectus simulate those described by DENNSTEDT (1903) in donkey, BRADLEY/GRAHAME (1947) in horse and HABERMEHL (1973) in dog.

The position of the transverse sinus in mule on the side of the Osseous tentorium cerebelli differs from that in other domestic animals. It is situated either in a transverse groove in the parietal bone as in horse (BRADLEY/RAHAME, 1947 and SISSON/GROSSMAN, 1969); Canalis transversus as in dog (HABERMEHL, 1973) and horse (SEIFERLE, 1975) or at the base of the Tentorium cerebelli membranaceum as in pig, cattle (SEIFERLE, 1975) and camel (HASHEM, 1980).

The passage of the temporal sinus within the temporal meatus is similar to that reported in horse by SISSON/GROSSMAN (1969) and SEIFERLE (1975) and in camel by KHIDER (1980). However, DENNSTEDT (1903) in donkey and BRADLEY/RAHAME (1947) in horse stated that the transverse sinus passes within the temporal meatus and continues as dorsal cerebral vein which joins the superficial temporal vein. SEIFERLE (1975) mentioned that the transverse sinus in carnivores, pig and ruminant animals divides within the Sulcus sinus transversi into the rostrally situated Sinus temporalis and the caudally directed Sinus sigmoideus s. condylaris. He added that the temporal sinus in dog and ruminants leaves the cranial cavity as V. emissaria f. retroarticularis, while in cat and pig, it leaves the cranial cavity as V. emissaria f. jugularis. Moreover, the same author described the Sinus Sigmoideus as the connecting channel between the dorsal and ventral systems of the Sinus durae matris in all domestic animals except horse. However, such sigmoid sinus is absent in mule as in horse.

The cavernous, rostral and caudal intercavernous sinuses form the Sinus circularis described by DENNSTEDT (1903) and SEIFERLE (1975). However, such circular sinus is not found in mule owing to the absence of the rostral intercavernous sinus, as the case described in dog by DENNSTEDT (1903) and in dog and sheep by SEIFERLE (1975).

The ventral occipital plexus in mule corresponds to the Sinus occipitalis inferior described in horse and cattle by DENNSTEDT (1903), moreover, SEIFERLE (1975) stated that the ventral occipital sinus (or plexus) forms a large venous plexus around the Medulla oblongata in cattle or on the lateral and ventral walls of the For. magnum in horse. Therefore, the term Plexus occipitalis ventralis is more reasonable than Sinus occipitalis ventralis, specially it merges caudally with the Plexus venosus vertebralis internus ventralis.

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LEGENDS

Fig. (1): Diagram showing the Sinus durae matris in mule:

1- Sinus sagittalis dorsalis, 2- Sinus rectus, 3- Sinus sagittalis ventralis, 4- V. cerebri magna, 5- Sinus transversus, 5'- Sinus communicans, 6- Sinus petrosus dorsalis, 7- V. rhinalis caudalis, 8- V. cerebri basalis, 9- Sinus temporalis, 10- V. emissaria for. retroarticularis, 11- Sinus cavernosus, 12- V. emissaria fissurae orbitalis, 13- Sinus basilaris, 14- Sinus petrosus ventralis, 15- V. emissaria for. jugularis.

- a) internal opening of the temporal meatus,
- b) retro-articular foramen,
- c) For. lacerum,
- d) For. orbitale.

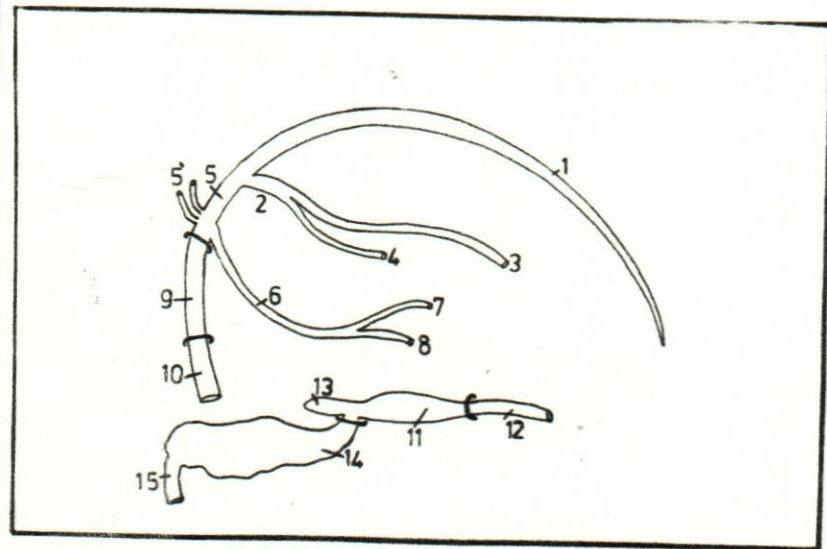


Fig. (1)

Sinus durae matris in mule

