

ASPECTS REGARDING THE CONFORMATION AND STRUCTURE OF THE RETE MIRABLE EPIDURALE AT SHEEPS

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Abstract

The rete mirable epidurale in sheep is situated at the back of the basisphenoid, ordered medial from the maxillary branch of the trigeminal nerve and it comes in contact with pituitary tent's internal blade on which it fits. It is powered by two principal branches, a proximal and a distal one, detached from the maxillary artery, with different morphological variations.

The small artery's vascular wall from the rete has the median tunic flanked on both sides by endothelium, the adventitia being absent.

The arterial endothelium can structure small intravascular "pillows" with meaning to control the sanguine flow capacity at the level of encephalon.

Keywords: sheep, rete mirable, encephalon;

Introduction

The rete mirables plays, for the beneficiary species, a fundamental role in controlling the sanguine flow at the level of the encephalon (1, 6, 9). Since in specialty literature we did not come across dates about morphological and structural particularities of the arterioles that structure the rete mirable, we considered the study of these structures to be necessary (2, 3, 4, 5, 7, 8, 10).

Materials and methods

The study was achieved using the rete mirable from four ovines. Thus, right after sacrificing the animals we washed the vascular sublayer at the level of the rete mirable, injecting physiologic serum inside the carotid artery, until the respectively physiologic serum in the symmetric artery presents no blood traces. Afterwards, we proceeded to extracting the rete mirable through the subsphenoidal region. After extracting, we dipped the rete in formaldehyde solution 10%, in order to make further histological mounts. The histological study made within the histological laboratory of the Faculty of Veterinary Medicine-Bucharest. The images obtained were studied and photographed with the help of a Nikon optical microscope, equipped with a microphotography device. As a colouring method, we used hematoxilin – eozin , Giemsa , and orceine in order to highlight the elastic fibres in the vascular wall.

Results and discussion

The rete mirable epidurale at the sheep is situated at the back of the basisphenoid, ordered medial from the maxillary branch of the trigeminal nerve and it comes in contact with pituitary tent's internal blade on which it fits.

The proximal branch of the rostral mirabile epidurale rete can be detached medial from the origin of alveolo-mandibular artery or from the dorsal edge of the maxillary artery. It has upward trajectory of the skull's base and enters in the skull through the oval hole, medially accompanying the mandibular branch of the trigeminal nerve. This is the rostral mirabile epidurale rete's main supply artery, which is approached of the side edge's posterior third.

The distal branch of rostral mirabile epidurale rete detaches from the deep temporal artery, behind the external ophthalmic artery. Latero- ventrally it accompanies the maxilar branch of the trigeminal nerve and enters in the skull by the orbital-round hole. At 25% of cases, this artery is represented by multiple branches (2-3) that enters in the skull, both medial face and laterally from the maxillary branch of the trigeminal nerve.



Fig. 1 Side view of the encephalon with branches highlighting of the maxillary artery which will participate at the mirabile epidurale rete's supply

1- the maxillary branch of trigeminal nerve; 2- the mandibular branch of trigeminal nerve; 3-olfactory bulb; 4- cerebellum; 5- common carotid artery; 6- cerebro-spinal artery; 7- maxillary artery; 8- proximal branch of rete mirabile epidurale; 9- distal branch of rete mirabile epidurale.

Each mirabile rete laterally embrace the pituitary area, stretching from the medial face of the mandibular branch of trigeminal nerve and rostrally reaching the lateral side of the gray tubercle (Fig. 2). The two symmetrical mirabile epidurale retes are often connected (75% from cases) caudal from the pituitary by a fine branch that describes in median plan an angle with the aboral oriented top. Sometimes, (25% from cases) this connection branch can miss.

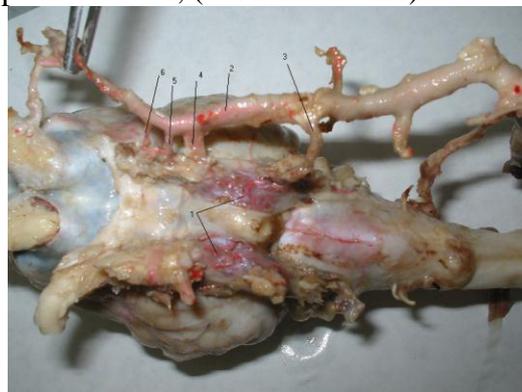


Fig. 2 The distal branch of the mirabile epidurale rete when it appears multiplied

1 - mirabile epidurale retes in the cavernous sinus; 2 -maxillary artery; 3 - proximal branch of mirabile epidurale rete; 4,5,6 - multiple distal branches of the mirabile epidurale rete.

Generally speaking, the rete mirabile includes large arterioles, that have the following features: the intima tunic, very thin, composed by the endothelium, subendothelial layer with collagen and elastic fibres; the media tunic composed by 2-6 concentric layers of smooth muscular cells, fine elastic and collagen fibres. In the rete mirabile's case, the media layer is doubled at its exterior by the venous cavernous sinus's endothelium that includes the rete. In these cases, the adventitia is absent. Most of the times, the differences between the small muscular arteries and arterioles are difficult to notice (Fig. 3, Fig. 4).

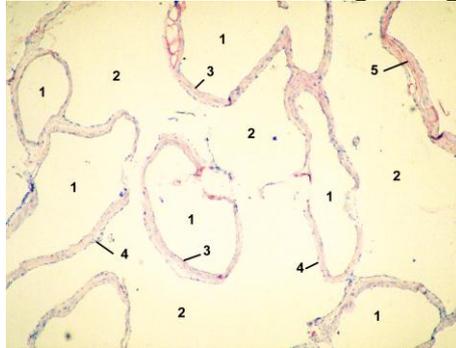


Fig. 3. General aspects of the rete mirabile Giemsa colouring method, ob. 4x
1 - arterial ramifications; 2- venous cavernous sinus spaces; 3- arterial endothelium; 4- veinal endothelium; 5- leucocytes.



Fig. 4. Elastic fibres from the vessel walls of the rete Hematoxylin-eosin colouring, ob. 10x
1- vessels; 2- nerve fibres; 3- conjunctive septum.

Conclusions

1. In sheep, there is only the rostral mirabile epidurale rete, the aboral one is missing.
2. At this rete's structure mainly participates the proximal branch of mirabile epidurale rete and distal branch of it, both with the origin in maxillary artery.
3. The distal branch of rostral mirabile epidurale rete can be double or even triple, and enters in skull by the orbito-round hole, in company of the maxillary branch of trigeminal nerve.
4. The media tunic is composed by the concentric layers of smooth muscular cells; elastic fibres are abundant at this level, highlighted by the orceine colouring method.
5. The media layer of the arterioles that structure the rete mirabile is doubled at the interior by the arterial endothelium and at the exterior by the venous cavernous sinus's endothelium.

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