Abstract

Equine Myodural Bridge, a novel discovery – gross anatomy, histology and in vitro MRI

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Background

The myodural bridge (MDB) is defined as the indirect fascial contact between m. rectus capitis minor (RCM), the atlanto-occipital membrane (MAO) and the dura mater (DM). In human it has been known for some decades [1;2], but it has never been identified in horses [3]. The last years of research has focused on the function of the MDB in relation to symptoms such as chronic headache, dizziness, nausea, imbalance, vision dysfunctions and loss of memory [4]. As horses are prone to head and neck trauma and different riding techniques, they are frequently presented in the clinic with chronic biomechanical neck dysfunctions. This study was undertaken to investigate if an equine MDB was present.

Methods

Ten horses of different breeds and gender were euthanized due to other reasons than the studies. The horses were treated with respect to animal welfare. Head and neck were meticulously dissected, frozen and cut in transverse and sagittal planes or MRI-scanned with head and neck in flexion and extension. Additionally, histological samples were collected from the MDB.

Results

The gross dissections showed obvious contact from RCM through the dorsal membrana atlanto-occipitalis to DM in the atlanto-occipital (AO) space. Additionally, in the dorsal intervertebral atlanto-axial (AA) space myodural contact was seen to m.obl. cap.caudalis and lig. nuchae via membrana atlanto-axiale (MAA). The two membranes also had close connections to the respective joint capsules of the facet joints. Histology showed the membranes to have three layers with variation in density and direction of collagen fibers and hyaluronan content. Several retinacula structures were observed between the membranes and the DM. Movement of DM was visible when stretching the muscles manually. On MR images of cadaver necks the MDB’s were obvious.

Conclusion

Dissection, histology and MRI have for the first time confirmed, MDB’s in horses, namely the AO and AA MDB. The indirect contact between the intrinsic neck muscles and the DM was visualized and demonstrated macroscopically and histologically. The findings underline that damages due to acute external trauma or repetitive microtrauma on the equine neck must be taken seriously and further studies of the effect and influence need to be performed.

References


Figure legends

Fig. 1. Saggital section of the equine myodural bridge in the atlanto-occipital region. The components of the MDB is in white labelling

Fig. 2. Presents an MR scan of an upper neck of a horse. The MDB is located within the white ellipse.