Definition of the *To Be Named Ligament* and *Vertebrodural Ligament* and Their Possible Effects on the Circulation of CSF

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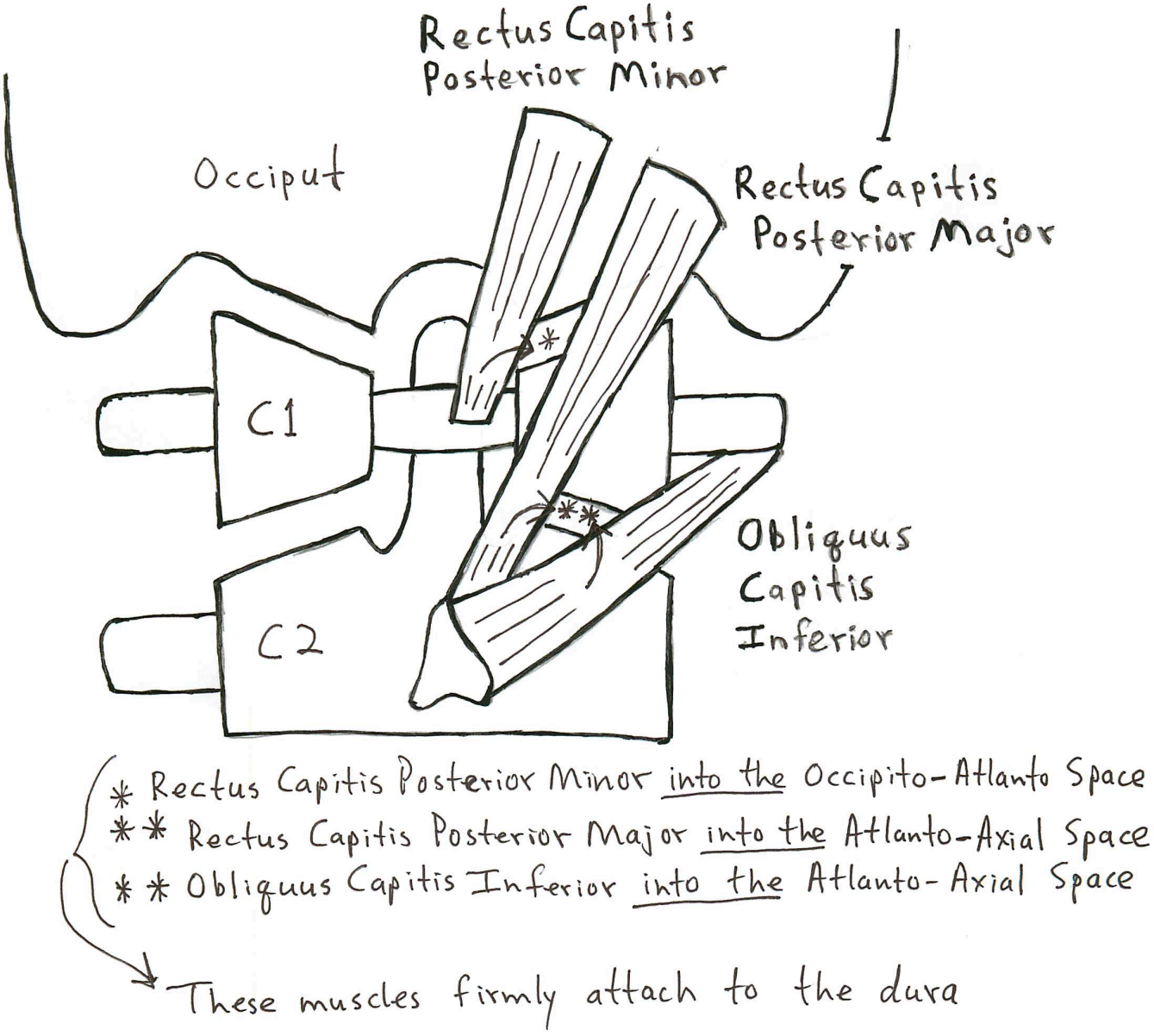

BACKGROUND FROM DAN MURPHY:

Numerous prior studies have shown that the suboccipital muscles are firmly attached to the cervical spinal canal dura mater via a strong, dense connective tissue bridge that travels in the space between the occiput-atlas and the atlas-axis. This article shows the existence of additional strong, dense connective tissue bridges existing between the cervical spinal canal dura mater and the nuchal ligament.

KEY POINTS FROM THIS STUDY:

1) The suboccipital region is one of the most complex anatomical regions in the human body.

2) There is a connective tissue continuity (fibrous bridge) between the suboccipital muscles and the cervical dura mater, "integrating motion of the atlanto-occipital and cervical intervertebral joints with that of the cervical dura mater."

3) The objective of this study was to examine the presence of the fascial connection in the posterior epidural space at the level of C1 to C2 and to the nuchal ligament (NL). The authors used 30 human cadavers. Gross dissection was performed on the suboccipital regions of the 20 specimens. Histological assessment was performed on 10 specimens.

4) In ***all*** specimens the authors identified a dense fibrous band between the nuchal ligament, through the atlantoaxial interspace, to the dura mater. It was termed as the *to be named ligament* (TBNL).

5) Also, "in all 30 specimens the existence of a fibrous connection was found between the posterior aspect of the cervical dura mater and the posterior wall of the spinal canal at the level of the atlas to the axis." This fibrous connection was identified as vertebrodural ligament (VDL). This ligament was also firmly attached to the nuchal ligament.

6) In ***each*** of the thirty head-neck specimens observed, "the existence of a fibrous connection was found between the posterior aspect of the dura mater and the posterior wall of the spinal canal from the atlas to the axis."

7) "Aside from suboccipital muscles, the nuchal ligament (NL) has been shown to attach to the cervical dura mater via the atlantooccipital and atlantoaxial interspaces."

8) These authors speculated that the movements of the head and neck affect the shape of the cervical dural sleeve via the TBNL and VDL.

9) These authors hypothesized that the suboccipital muscles "may work as a pump providing an important force required to move the CSF in the spinal canal."

10) These authors speculate that anything that affects the nuchal ligament might therefore also affect the spinal dura matter, including the trapezius, splenius capitis, superior posterior serratus and rhomboid minor muscles.

11) These authors found the presence of a dense portion in the nuchal ligament, termed the "to be named ligament" (TBNL), which coursed through the ***atlanto-occipital*** interspace and ultimately attached to the cervical dura mater.

12) These authors speculate that TBNL is stretched tight when we nod. As a result, the TBNL can draw the cervical dura mater posteriorly via the atlanto-occipital interspace.

13) These authors found evidence that the rectus capitus posterior minor muscle might emit a muscular bundle terminating at TBNL. "It is assumed that rectus capitus posterior minor muscle might provide essential functional forces on the cervical dura mater via the TBNL."

14) Any structure connected firmly with the TBNL could exert a force resulting in an effect on the dura mater.

15) The VertebroDural Ligament (VDL) firmly linked the dura mater to the posterior wall of the spinal canal from the atlas to the axis.

16) "It is highly possible that in the upper cervical region, the VDL serves as a vehicle to integrate the motion of the head and neck with the cervical dura sleeve."

17) "The Suboccipital Myodural Bridge through the atlantoaxial interspace is part of the VDL and that the related suboccipital muscles may directly exert a force on the cervical dura mater via the VDL."

18) "The authors speculate that the movements of the head and neck are likely to affect the shape of the cervical dural sleeve via the TBNL and VDL in some mechanical or kinematic manner, and as a result, will affect the volume of the subarachnoid space in the upper cervical part."

19) "The movements of the head and neck are likely to contribute to the circulation of cerebral spinal fluid. Moreover, the muscles-VDL-cervical dural sleeve complex in the suboccipital region might work as a pump to provide an important part of the circulating power to the CSF in the spinal canal."