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Original Research Paper

Anatomy

VARIATION IN SUBOCCIPITALES

Dr. Mrinmayee Deb Barma Assistant Professor, Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences.

Dr. Harshvardhan Ahlawat MBBS Intern, Jawaharlal Institute of Post Graduate Medical Education and Research .

ABSTRACT The suboccipital region extends from the inferior nuchal line of either side and spine of axis vertebra below along with the laminae. Laterally, the triangle is limited by mastoid process and transverse process of atlas and axis vertebrae. The triangle is bounded by rectus capitis posterior major supplemented by rectus capitis posterior minor supero-medially, obliquus capitis superior supero-laterally and obliquus capitis inferior inferiorly. In our study, we have reported a variant presentation of rectus capitis minor tendons and obliquus capitis inferior tendon. This triangle is a complex anatomical region. Studies showed that the obliquus capitis inferior is involved in dystonic head tremor. This muscle is chosen for dry needling to treat cervical mobility and sensorimotor control. Therefore, the variant morphology of the muscle described in the current study may improve the understanding of the intraoperative complications of the region. Therefore, the variant morphology of the muscle described in the current study may improve the understanding of the intraoperative complications of the region.

KEYWORDS : Suboccipital region, obliquus capitis inferior, rectus capitis posterior minor

INTRODUCTION:

The suboccipital region extends from the inferior nuchal line of either side and spine of axis vertebra below along with the laminae. Laterally, the triangle is limited by mastoid process and transverse process of atlas and axis vertebrae. There are four key muscles of this region. These are obliquus capitis superior, obliquus capitis inferior, rectus capitis posterior major and rectus capitis posterior minor on either side which form the boundaries of these region. These muscles act on atlanto-occipital and atlanto-axial joints. Unilateral contraction of these muscles causes rotation of head, bilateral contraction causes extension of head. The triangle formed in the region named after it, is bounded by rectus capitis posterior major supplemented by rectus capitis posterior minor supero-medially, obliquus capitis superior supero-laterally and obliquus capitis inferior inferiorly. Roof of the triangle is formed by semispinalis capitis medially and longissimus capitis laterally. Contents of the triangle are 3rd part of vertebral artery, suboccipital venous plexus and the first cervical nerve named as suboccipital nerve. In addition, Greater occipital nerve which is the thickest nerve of our body emerges below the lower border obliquus capitis inferior muscle, alongside there is a 3rd occipital N. which pierces the semispinalis capitis and trapezius ascending upwards to supply the area over external occipital protuberance. This nerve lies medial to greater occipital nerve. The occipital branch of external carotid artery present rests over the rectus capitis lateralis, obliquus capitis superior and semispinalis capitis in this region. In our study, we have reported a variant presentation of rectus capitis minor tendons and obliquus capitis inferior tendon. This triangle is a complex anatomical region. Studies showed that the obliquus capitis inferior is involved in dystonic head tremor. This muscle is chosen for dry needling to treat cervical mobility and sensorimotor control (Cesar Fernandez-de-las-Penas)[1]. On the other hand, Rectus capitis posterior minor affects the biomechanics of duramater (McPartland JM et al, 1999)[2]. Another treatment modality of this region is surgical decompression of the greater occipital nerve. As the greater occipital nerve emerges through the lower margin of obliquus capitis inferior, any variation of obliquus capitis inferior changes the surgical landmark of greater occipital nerve. Therefore, the variant morphology of the muscle described in the current study may improve the understanding of the intraoperative complications of the region.

Findings:

During the routine dissection of MBBS teaching curriculum, we observed some morphological variants in the suboccipital region. The cadavers are fixed with formalin. Careful dissection of the region following the steps from Cunninghams Manual of Practical Anatomy volume 3, we dissected the triangle. This triangle is the most complex area to dissect due to the presence of dense fibrous tissues over here. Semispinalis capitis deep to the trapezius present on either side of ligamentum nuchae. We reflected the semispinalis capitis and the sternocleidomastoid muscle present laterally and splenius capitis deep to it. We then explored the suboccipital region. There were four slips of rectus capitis posterior minor which were attached to the posterior tubercle of C1 vertebra superiorly attached to the medial part of inferior nuchal line. The representation is quite uncommon. Three slips were present on the right side of ligamentum nuchae and one slip of the muscle on the left side. Whereas rectus capitis posterior major was present bilaterally with single slip. In the right side, there was doubling of obliquus capitis inferior, the greater occipital nerve emerged in between the two slips of muscles. Obliquus capitis inferior on the left side had normal representation. Obliquus capitis superior on either side showed normal anatomy.

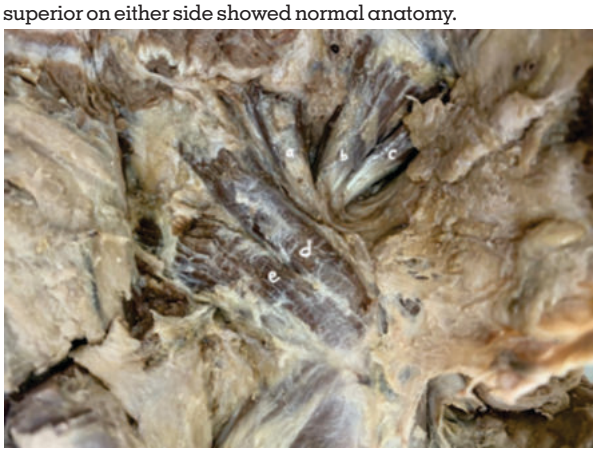

Figure 1:
In this picture, right suboccipital region is shown, a), b), c) rectus capitis posterior minor, d) rectus capitis posterior major, e) obliquus capitis inferior

DISCUSSION:

Spine is usually surrounded by the deep muscles to strengthen it. Suboccipital region is a complex area to define.

Rectus capitis posterior minor muscle is connected to duramater by myodural bridge. Some of the fibres of the muscle take origin from atlanto-occipital membrane along with the normal attachment. This muscle is important for balancing of neck. Integrity of the muscle can be evaluated by MRI. Arts J. et al, 2012 mentioned in a study that RCP minor protects the spinal cord against dural enfolding[3]. This muscle generates tension to the dura mater. RCP minor maintains the integrity of the subarachnoid space as mentioned by Fernandez de-Las-Penas et al, 2008[1]. SR Nayak et al, 2011 reported a case of bilateral anomaly of rectus capitis posterior muscles[4]. Double rectus capitis major and bilateral absence of rectus capitis posterior minor may lead to incordination of the movement causing cervicogenic headache, as it works as a pump to provide power for CSF circulation.

In our study, we have reported total four slips of rectus capitis, three slips in the right side of ligamentum nuchae in the right suboccipital region and one slip in the left side of suboccipital region. This kind of arrangement is not been reported in any study.

A study by Bergman RA et al, reported double oblique muscle in 2.6%, 1 % in right side and 1.7% in left side. Doubling of rectus capitis posterior minor in 1.5% bilaterally, accessory slips as a continuation of spinalis cervicis[5]. Schramm A et al, 2017 stated that involvement of obliquus capitis inferior is present in dystonic head tremor and this muscle is chosen for Botulinum neurotoxin injection. Anomalous attachment of rectus capitis muscles was reported by Schramm A et al but such variations in obliquus capitis muscles are very rarely reported so far[6]. As reported by Yamauchi M et al, 2017 observed that the fat tissues and the neurovascular contents of the suboccipital region shows different morphologies therefore there might be a possibility of embryological influence[7].

In current study, we represented the double obliquus inferior muscle unilaterally present on the right side which has been reported rarely.

CONCLUSION:

This study represents the morphological variation of rectus capitis posterior minor and obliquus capitis inferior. Though our findings corroborate previous anatomical findings but such arrangement of rectus capitis posterior minor is rarely reported along with the unilateral doubling of obliquus capitis inferior. Such findings may be useful for significant clinical implications. Anomalous suboccipital muscles may cause cervical dysfunction.

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