

# A remarkable muscle

Rectus capitis posterior minor (RCPM) is a truly remarkable and clinically important muscle to both manual therapists and those involved in rehabilitation and movement therapy.

Research in 1994 identified a connecting bridge between this small suboccipital muscle and the dura at the atlanto-occipital junction. Subsequent research has shown it to have a major potential for symptom production when damaged or severely stressed (Hack et al 1995).

The superior insertion of the muscle is into the medial part of the inferior nuchal line and the occipital bone between the nuchal line and the foramen magnum. It arises from a tendon on the atlas. The orientation of the part of the muscle attaching to the dura is described as being perpendicular to it, an arrangement that 'appears to resist movement of the dura towards the spinal cord'. Researchers at the University of Maryland, Baltimore, state that, in reviewing the literature, the subject of functional relations between voluntary muscles and dural membranes has been addressed by Becker (1983), who suggests that the voluntary muscles might act upon the dural membranes via fascial continuity, changing the tension placed upon them, thus possibly influencing cerebrospinal fluid (CSF) pressure.

Our observation that simulated contraction of the RCPM muscle flexed the posterior atlanto-occipital membrane-spinal dura complex and produced CSF movement supports Becker's hypothesis.... During head extension the spinal dura is subject to folding, with the greatest amount occurring in the area of the atlanto-occipital joint. (Cailliet 1991)

One possible function of the RCPM muscle may be to modulate dural folding, thus assisting in the maintenance of the normal circulation of the CSF. Trauma resulting in atrophic changes to the RCPM muscle may interfere with this suggested mechanism. (Hallgren et al 1993)

The researchers further report that the dura lining the posterior cranial fossa is not only innervated by nerves that subserve pain (Kimmel 1961) but that pressure applied to the dura of the posterior cranial fossa in neurosurgical patients induces pain in the region of the posterior base of the skull (Northfield 1938). They postulate that the dura of the posterior cranial fossa can become symptomatic if stressed by the RCPM muscle acting on the dura mater.

Additional research at the Department of Osteopathic Medicine, Michigan State University College of Osteopathic Medicine utilizing magnetic resonance imaging of rectus capitis posterior major and minor, performed on six patients with chronic head and neck pain, as well as on five control subjects, produced remarkable findings (Hallgren et al 1994).

In the subjects with chronic pain, the muscles were shown to have developed fatty degeneration in which muscle tissue had been replaced by fatty deposits; this was not seen in the control subjects. The researchers suggest that the reduction in proprioceptive afferent activity in these damaged muscles may cause increased facilitation of neural activity which is perceived as pain.

Professor Philip Greenman, DO, a major researcher in both the studies reported above, has found, utilizing EMG testing, that rectus capitis posterior minor is not an extensor of the head, as is suggested by most physiology texts. When tested, the muscle does not fire during extension, but rather does so when the head is translated forwards (Greenman P, personal communication).

A recent study involving over 100 patients with traumatic neck injury, as well as approximately 60 patients with leg trauma, evaluated the presence of severe pain (fibromyalgia syndrome) an average of 12 months post-trauma (Buskilia et al 1997). The findings were that 'almost all symptoms were significantly more prevalent or severe in the patients with neck injury ... The fibromyalgia prevalence rate in the neck injury group was 13 times greater than the

leg fracture group.' Pain threshold levels were significantly lower, and myofascial trigger point counts were higher, in the neck injury patients as compared with leg injury subjects. Fully 21% of the patients with neck injury developed fibromyalgia within 3.2 months of injury as against only 1.7% of the leg fracture patients (a rate not significantly different from the general population).

The connection between the findings in this whiplash study and the findings of Greenman and his colleagues regarding degeneration of rectus capitis posterior minor following trauma remains to be proven; however, the likelihood is clear and intriguing.

This new knowledge relating to a comparatively minor structure has important implications clinically.

- It is precisely where fingers rest in cranial base release technique so widely employed in cranial therapy
- It is precisely where gall bladder 20 lies, an important acupuncture (and acupressure) site with relevance to headaches and pain in the region
- It is very much at the centre of the postural fine tuning at the heart of Alexander Technique – the 'primary control mechanism' involving head-neck positioning
- This is the region where scans reveal markedly diminished circulation through the brainstem in most fibromyalgia and chronically fatigued patients
- It is precisely the structure most under stress when typical 'chin poking' postural changes occur, accompanied by bilateral sternocleidomastoid shortening
- It is vulnerable to inappropriate, or inexpertly delivered, high velocity attention to the atlanto-occipital joint structures

*JBMT* has commissioned a review of this important muscle which will appear in a future issue.

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Editor

REFERENCES

- Becker R 1983 In: Upledger and Vredevoogd (eds). *CranioSacral Therapy*. Eastland Press
- Buskilia D, Neumann L et al 1997 Increased rates of fibromyalgia following cervical spine injury. *Arthritis and Rheumatism* 40(3): 446–452
- Cailliet R 1991 *Neck and Arm Pain*, 3rd edn. F.A. Davis, Philadelphia
- Hack G, Koritzer R, Robinson W, Hallgren R, Greenman P 1995 Anatomic relationship between rectus capitis posterior minor muscle and the dura mater. *Spine* 20: 23 2484–2486
- Hallgren R, Greenman P, Rechten J 1993 MRI of normal and atrophic muscles of the upper cervical spine. *Journal of Clinical Engineering* 18(5): 433–439
- Hallgren R, Greenman P, Rechten J 1994 Atrophy of suboccipital muscles in patients with chronic pain. *Journal of American Osteopathic Association* 94(12): 1032–1038
- Kimmel D 1961 Innervation of the spinal dura mater and the dura mater of the posterior cranial fossa. *Neurology* 10: 800–809
- Northfield D 1938 Some observations of headache. *Brain* 61: 133–162