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Commentary

Dysfunctional Breathing - A Neglected Cause of Musculoskeletal Pain

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Neck pain, headache, carpal tunnel syndrome, and bruxism are commonly seen in a physician's office. Generally, a physician would take a detailed case history and perform a physical examination. If necessary, he may refer the patient for imaging studies.

In the presence of chronic neck pain, the patient is usually referred for radiographs of the cervical spine. Pain is generally attributed to the degenerative changes or altered spinal biomechanics seen on the x-rays. For chronic or recurrent morning headaches, the patient is generally referred for neurological examination, including advanced imaging such as computed tomography of the head and magnetic resonance imaging of the brain to rule out any sinister pathologies. For chronic carpal tunnel syndrome, the patient may be referred for a nerve conduction test, hormonal workup, or ultrasound imaging for diagnosis. In bruxism, the patient may be referred to a dentist for a splint.

Breathing patterns and modes are generally not evaluated, despite the conditions being resistant to the conventional standard treatments. Many studies have shown that dysfunctional breathing can contribute to the above conditions. Chronic hyperventilation, chest breathing, sleep apnoea and oral breathing have been reported to be associated with neck pain [1], headache [2], carpal tunnel syndrome [3], as well as bruxism [4].

McLaughlin (2009) reported that chronic hyperventilation might be associated with neck and low back pain. Breathing retraining to reduce breathing frequency and elevate the end-tidal carbon dioxide level decreased neck and low back pain, which reached a plateau after manual therapy [1]. He suggested using capnography as an adjunctive treatment to manual therapy in managing patients with neck and low back pain [1].

Obstructive sleep apnoea (OSA) and oral breathing have been reported to be related to morning headaches [2], carpal tunnel syndrome [3], and bruxism [4]. Many studies have shown that OSA is associated with a morning headache, a bilateral headache present upon awakening from sleep, with a duration of fewer than 4 hours; headache during a nap or sleep is not regarded as a morning headache [2]. Suzuki., *et al*. (2015) reported that continuous positive airway pressure (CPAP) treatment improves 81.3% of the morning headache, and the headache does not recur after the CPAP treatment [2]. Similarly, Jose., *et al*. (2011) reported that CPAP successfully treated a case of acute cluster headache associated with OSA [5].

Carpal tunnel syndrome has also been found to be related to dysfunctional breathing as well. A retrospective study [3] compared the frequency of carpal tunnel syndrome in 80 OSA subjects with 80 healthy controls. The study showed that OSA patients have a higher frequency (27%) of carpal tunnel syndrome than healthy subjects [3]; carpal tunnel syndrome is not related to body positioning during sleep, but is possibly related to the hypoxemia resulting from OSA [3].

Bruxism has also been reported to be associated with sleep apnoea [4]. A prospective study has shown a positive correlation between bruxism episode index (BEI) and apnoea-hypopnoea index (AHI) in mild and moderate OSA subjects. The apnoea-hypopnea index is the number of apnoea and hypopnea events per hour of sleep and measures the severity of the OSA [4].

The exact mechanisms for which OSA, oral breathing, and chronic hyperventilation contribute to the above conditions are unknown. However, they may be related to the apnoea-hypocapnia during the apneic episodes. Oral breathing and exaggerated ventilation following an apneic episode may reduce the blood carbon dioxide levels [6], resulting in respiratory alkalosis and hypocalcemia. The decrease in serum calcium level, in turn, excites the sensory and motor fibres of the peripheral nerves [7] and results in vasoconstriction. These changes cause paresthesia and muscle spasms and may contribute to nocturnal carpal tunnel syndrome, bruxism, and morning headache.

As a quick test as to whether nocturnal breathing dysfunction contributes to the patient's clinical presentation, the author generally advises the patient to tape the mouth during sleep to encourage nasal breathing instead of mouth breathing. Improvement of the symptoms would indicate that the patient may orally breathe or have sleep apnoea during sleep. One study showed that mouth taping improved the AHI significantly, from 12.0 per hour before treatment to 7.8 per hour during treatment [8].

Thus, evaluating breathing patterns is suggested in patients with signs of dysfunctional breathing, including chronic hyperventilation, sleep apnoea and oral breathing, particularly when the conditions are resistant to standard conventional management.

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