International Medical Case Reports Journal

Dovepress
open access to scientific and medical research

Open Access Full Text Article

CASE REPORT

The tongue after whiplash: case report and osteopathic treatment

This article was published in the following Dove Press journal:
International Medical Case Reports Journal
7 July 2016
Number of times this article has been viewed

Bruno Bordoni[1–3]
Fabiola Marelli[2,3]
Bruno Morabito[2–4]

[1]Department of Cardiology, Santa Maria Nascente IRCCS, Don Carlo Gnocchi Foundation, Institute of Hospitalization and Care with Scientific Address, Milan, [2]CRESO, School of Osteopathic Centre for Research and Studies, Castellanza, [3]CRESO, School of Osteopathic Centre for Research and Studies, Falconara Marittima, Ancona, [4]Foundation Polyclinic University A, Gemelli University Cattolica del Sacro Cuore, Rome, Italy

Abstract: The tongue plays a fundamental role in several bodily functions; in the case of a dysfunction, an exhaustive knowledge of manual techniques to treat the tongue is useful in order to help patients on their path toward recovery. A 30-year-old male patient with a recent history of whiplash, with increasing cervical pain during swallowing and reduced ability to open the mouth, was treated with osteopathic techniques addressed to the tongue. The osteopathic techniques led to a disappearance of pain and the complete recovery of the normal functions of the tongue, such as swallowing and mouth opening. The manual osteopathic approach consists of applying a low load, in order to produce a long-lasting stretching of the myofascial complex, with the aim of restoring the optimal length of this continuum, decreasing pain, and improving functionality. According to the authors' knowledge, this is the first article reporting a case of resolution of a post whiplash disorder through osteopathic treatment of the tongue.

Keywords: tongue, indirect osteopathic techniques, fascia, fascial release

Introduction

The tongue plays a fundamental role in several bodily functions such as swallowing, breathing, speaking, and chewing. The tongue originates from the branchial arches, approximately from the fourth week of pregnancy.[1] The connective tissue and the vascular system are derived from the cranial neural crest cell–derived mesenchyme, while most of the tongue muscles are developed from the myoblasts that migrated from the occipital somites of the mesoderm.[1] There is also a close embryological and functional relationship between the tongue, the occipital area, and the hyoid bone, which originates from the second branchial arch.[1] The tongue is a complex muscular organ composed of intrinsic and extrinsic muscles: four couples of intrinsic muscles without bone support (transversalis, verticalis, inferior longitudinalis, and superior longitudinalis) and four couples of extrinsic muscles with bone support (genioglossus, styloglossus, hyoglossus, and palatoglossus).[2] The fibers of the extrinsic muscles originate from the external bony attachments, ie, the mandible, the hyoid bone, and the styloid process, and terminate in the mass of the tongue.[2]

According to a study, other muscles that belong to the group of the extrinsic muscles are the glossopharyngeus (ie, a slip from the superior pharyngeal constrictor connecting to the tongue) and the chondroglossus (a small muscle sometimes regarded as part of the hyoglossus).[2] The contraction of the fibers of the intrinsic muscles determines the shape of the tongue, whereas the fibers of the extrinsic muscles mostly influence its position.[3] The cortical part of the tongue is integrated at different levels, with

Correspondence: Bruno Bordoni
CRESO, School of Osteopathic Centre for Research and Studies, Falconara Marittima (AN), Via Santorre di Santarosa, 2/A, 60015 Ancona, Italy
Tel +39 349 6300617
Email bordonibruno@hotmail.com

submit your manuscript | www.dovepress.com
Dovepress
http://dx.doi.org/10.2147/IMCRJ.S111147

an evident somatotropic structure.[4] Its innervation is provided by the lingual nerve and the hypoglossal nerve, with a wide distribution to the muscular fibers.[5] The hypoglossal nerve is connected to the first cervical roots through the cervical loop and receives presynaptic impulses from the phrenic nerve and the intercostal muscles.[5] The floor of the mouth is innervated by the trigeminal system through afferent fibers.[5] Therefore, based on this complex of efferent and afferent information, one can understand why any dysfunction in the tongue may produce a negative impact not just limited to the one area.

Chewing involves an anterior–posterior movement of the tongue and of the hyoid bone on the horizontal plane, whereas the hyoid bone has almost no role in speaking.[6] During respiration, the hyoid bone is moved in a cranial–caudal direction (due to the action of the extrinsic muscles of the tongue), and the pharyngeal space enlarges.[7] The tonus of these muscles must be well-balanced, otherwise dysfunctions can occur, resulting in alteration of the position of the hyoid bone and of the functionality of the tongue.[2]

We will propose two osteopathic techniques based on the anatomy and the embryology of the tongue, with special attention to the abovementioned connections with the hyoid bone and the occipital–cervical tract. The techniques described below can be defined as an indirect osteopathic approach or a myofascial release. Osteopathic techniques aim to release fascial restrictions, to mobilize tight ligaments, and to drain congested lymphatics.[8] The purpose of these therapies and treatments is to alter the mechanical properties of fascia, such as density, stiffness, and viscosity, so that the fascia can more readily adapt to physical stresses.[8] In fact, some osteopathic physicians and manual therapists report local tissue release after the application of a slow manual force to tight fascial areas; these reports have been explained as a breaking of fascial cross-links, a transition from gel to sol state in the extracellular matrix and other passive viscoelastic changes of fasciae.[8] The fascial osteopathic technique is the application of a low load, long duration stretch into the myofascial complex, with the aim of restoring the optimal length of this complex.[8] The practitioner palpates the fascial restriction and the pressure is applied directly to the skin, into the direction of restriction, until resistance (the tissue barrier) is felt.[8] Once found, the collagenous barrier is engaged for 90–120 seconds, without sliding over the skin or forcing the tissue, until the fascia complex starts to yield and a sensation of softening is achieved.[8] We do not know the exact scientific reasons for this fascial release, although previous studies already demonstrated the usefulness of the fascial osteopathic treatment in many clinical conditions.[8] In vitro studies demonstrated how the osteopathic techniques can influence the metabolic behavior of fibroblasts, in terms of proliferation and inflammatory response.[8] The myofascial techniques practiced by manual operators utilize an approach very similar to indirect techniques. Myofascial release is a widely employed direct manual medical treatment, which utilizes specifically guided mechanical forces in order to manipulate and reduce myofascial restrictions of various somatic dysfunctions.[8] It is proved that, by applying this method, fibroblasts are able to change their orientation and probably their mechanical behavior. Another different explanation not related to the use of indirect techniques has been previously proposed. An improved sliding of the various fascial layers would allow to reset the afferent of the free nerve endings, resulting in physiologic response of the efferent ones.[8] The muscular complex of the tongue, its links with the hyoid bone, and the occipital–cervical area meet the definition of fascia.[9]

Case presentation

A previously healthy 30-year-old male patient with a recent history of whiplash (type II from whiplash-associated disorders) was admitted to the Santa Maria Nascente IRCCS, Don Carlo Gnocchi Foundation, Institute of Hospitalization and Care with Scientific Address 6 months after the traumatic event. The patient complained of severe neck pain (in particular, the first cervical tract C1–C3) during swallowing and the reduced ability to open his mouth, as the opening of the mouth led to increasing pain. All the movements of the cervical spine were limited, but not painful. The X-ray performed after the trauma showed a loss of the physiological cervical lordosis, in the absence of hernias or other serious injury. Spondyloarthrosis was present, in the absence of any vertebral functional impairment. The patient was a business owner, an active sporty person, without any family history of spinal pathologies. He had no present or previous pathologies and no history of previous surgery. He did not consume any drug, except for nimesulide in order to alleviate the pain related to the recent trauma.

After the osteopathic evaluation, it was decided to treat the patient with two techniques focused on the tongue, since an abnormal tension in tongue's activity (probably consequent to cervical and oropharyngeal tension) was considered as the main cause of symptoms.

The two techniques we used in this case consisted of indirect osteopathic approach and myofascial release to the tongue and the occipital area/hyoid bone. The tongue is held with one hand with a piece of gauze (in order not to release the hold), while the patient is in a supine position. The other hand with the palm opened has to be placed behind the head of

Figure 1 Technique with a grip of tongue and a hand resting on the area that includes the cervical and occipital surface.

Figure 2 Technique with a grip of tongue and a hand on the great horns of the hyoid bone.

the patient, in an area that includes the cervical and occipital surface (Figure 1). The tongue must be gently pulled out, until the tension generated is perceived in the occipital–cervical area. This position has to be maintained until the muscular tissue of the tongue and the posterior cervical and occipital tract is reduced, and a sensation of looseness and lightness is perceived.

For the second technique, with the patient being always in supine position, the tongue is held with one hand as previously described, whereas the other hand gently grasps the hyoid bone (Figure 2). In this position, we wait until the suprahyoid tissue and that of the tongue reach a balanced tension, resulting in a perception of looseness and lightness. The hyoid bone is essential for proper functioning of the tongue and represents the junction point between the tongue and the occipital–cervical area.

After two osteopathic sessions in 1 week, the patient could swallow and open his mouth without pain; the movements of the cervical spine were normal, with no functional limitations. The patient signed an informed consent; all patients of our clinic are evaluated and are subjected to standard treatment, according to the Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects.

Discussion

The tongue plays local and systemic roles, affecting behavior and body health. One study reported that a whiplash trauma causes several health problems and structural alterations, including functional impairment in the occipital myofascial area, resulting in painful syndromes.[10] Neck pain and concomitant dysfunction in the mouth opening can be observed, due to muscular and neurological connections.[11] Whiplash trauma can also cause difficulty in swallowing, probably related to a morphological and functional alteration of the oropharyngeal region.[12]

Myofascial release has been reported to reduce pain and improve quality of life in different pathologies.[13] Dysfunctions arising from physical trauma are thought to decrease fascia tissue length and elasticity resulting in limiting the sliding of the various fascial layers.[13] The pain relief obtained by using osteopathic techniques probably represents the result of the restoration of the physiological length of the fascial system, reducing the activity of trigger points of the cervico-occipital, and with less inflammatory status.[13] Furthermore, the symptoms resolution obtained through the osteopathic treatment of the tongue reported in this case can be explained when considering the myofascial and neurological connections to the cervical spine and the hyoid area; when these neurological connections are improved with

manual techniques, the symptoms also improve. We know that there is a mechanical hypersensitivity after whiplash, with hyperexcitability in central nociceptive pathways via trigeminal reflex (the lingual nerve is part of the trigeminal system, and the hypoglossal nerve is connected to the trigeminal system).[14] We can speculate that the osteopathic treatment improves the receptorial mechanical response, reducing the hyperexcitability that leads to pain.

Conclusion

The methods of treatment are sequential and can be integrated in a process of rehabilitation that combines the work of the doctor with that of the therapist. Further studies dealing with the tongue are needed in the field of osteopathy, with the final purpose of corroborating the osteopathic practice and hypotheses of treatment illustrated in the article.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Parada C, Han D, Chai Y. Molecular and cellular regulatory mechanisms of tongue myogenesis. *J Dent Res*. 2012;91(6):528–535.
2. Sanders I, Mu L. A three-dimensional atlas of human tongue muscles. *Anat Rec (Hoboken)*. 2013;296(7):1102–1114.
3. Bailey EF, Huang YH, Fregosi RF. Anatomic consequences of intrinsic tongue muscle activation. *J Appl Physiol (1985)*. 2006;101(5):1377–1385.
4. Picard C, Olivier A. Sensory cortical tongue representation in man. *J Neurosurg*. 1983;59(5):781–789.
5. Bordoni B, Zanier E. Anatomic connections of the diaphragm: influence of respiration on the body system. *J Multidiscip Healthc*. 2013; 6:281–291.
6. Matsuo K, Palmer JB. Kinematic linkage of the tongue, jaw, and hyoid during eating and speech. *Arch Oral Biol*. 2010;55(4):325–331.
7. Jordan AS, White DP. Pharyngeal motor control and the pathogenesis of obstructive sleep apnea. *Respir Physiol Neurobiol*. 2008;160(1):1–7.
8. Bordoni B, Zanier E. Understanding fibroblasts in order to comprehend the osteopathic treatment of the fascia. *Evid Based Complement Alternat Med*. 2015;2015:860934.
9. Bordoni B, Zanier E. Clinical and symptomatological reflections: the fascial system. *J Multidiscip Healthc*. 2014;7:401–411.
10. Bismil Q, Bismil M. Myofascial-entheseal dysfunction in chronic whiplash injury: an observational study. *JRSM Short Rep*. 2012;3(8):57.
11. Eriksson PO, Häggman-Henrikson B, Zafar H. Jaw-neck dysfunction in whiplash-associated disorders. *Arch Oral Biol.* 2007;52(4):404–408.
12. Grönqvist J, Häggman-Henrikson B, Eriksson PO. Impaired jaw function and eating difficulties in whiplash-associated disorders. *Swed Dent J.* 2008;32(4):171–177.
13. Ajimsha MS. Effectiveness of direct vs indirect technique myofascial release in the management of tension-type headache. *J Bodyw Mov Ther*. 2011;15(4):431–435.
14. Watson DH, Drummond PD. The role of the trigemino cervical complex in chronic whiplash associated headache: a cross sectional study. *Headache*. 2016;56(6):961–75.