

# APPLICATION OF OSTEOPATHIC TREATMENT IN INTERDISCIPLINARY DIAGNOSIS AND THERAPY OF HYPERFUNCTIONAL DYSPHONIA

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## ABSTRACT

Dysphonia most commonly affects people who use their voice professionally. Occupational voice disorders are accompanied by increased tension of the external laryngeal muscle what changes the position of the larynx and consequently disturbs the conditions of the vocal tract functioning. According to scientific literature, in order to carry out palpation examination of the anatomical structures indirectly and directly connected with the larynx a very good knowledge of anatomy and palpation experience is necessary, which falls within the competence of an osteopath. In this paper, we describe the published studies on the cooperation of osteopaths with phoniatician and voice therapists in the treatment of occupational dysphonia. The purpose of the study is to describe an interdisciplinary approach of diagnosis and treatment of hyperfunctional dysphonia with special description of using osteopathic procedures.

**Key words:** dysphonia, larynx, osteopathy, manual myofascial techniques

## Introduction

With the advent of information era, human voice has become one of the main working tools in many professions. In some of those professions, the burden put on the vocal apparatus is significant and the appearing voice problems lead to lower quality of professional, social and emotional life [1, 2]. Oc-

cupational voice disorders very often take the form of hyperfunctional dysphonia, which can pose problems with diagnosis and treatment.

Larynx, burdened with a long lasting vocal effort, performs a great work. In incorrect voice production technique, the overload of glottis is pathologically compensated with excessive tension in larynx and neck muscles. This can lead to laryngeal tension-fatigue syndrome. Patients experience voice "tiredness", the feeling of discomfort in the throat and neck area and sometimes, even severe pain preventing them from producing voice [3, 4]. Moreover, the etiology of functional voice disorders of a hyperfunctional type includes adaptive disorders in stress which can be jointly or mainly responsible for voice disorders [5]. Several mechanisms can be shown to explain the correlation between stress and voice disorders: 1. the shift of tension (e.g. from muscles of the neck and spine to internal and external muscles of larynx and vice versa), 2. refraining from reaction, which leads to throat "tightening", 3. shallowing of breath as a permanent reaction to stress, leading to impaired phonation. It comes as no surprise then that hyperfunctional dysphonia leads to excessive tension not only in the muscles of larynx, throat, face and neck, but also in the muscles of spine, chest and abdominal wall suture.

In the early stage, the voice disorders of hyperfunctional character are functional, that is they show no morphological changes in larynx, and the dysfunction is reversible. Untreated hyperfunctional dysphonia often results in organic changes

in glottis (e.g. polyps and nodule), which require surgical treatment. It should be noted, however, that in the early stage small pathologic changes, such as vocal nodules and vocal cord polyps, can be reversed after properly conducted voice rehabilitation, without the use of surgery.

This is why the therapy of voice dysfunction of hyperkinetic character requires proper management by an interdisciplinary medical team [6]. One of the methods is voice rehabilitation which aims to restore correct and optimal voice function of larynx through the correction of voice production and the improvement of vocal tract's condition. The rehabilitation should be preceded by functional diagnosis, conducted by a specialist, a laryngologist-phoniatrist. Videostroboscopic examination is an important part of diagnosis as it allows the observation of zoomed, live image of the larynx during breathing and phonation. The latest European standards stress that the treatment of voice dysfunctions should be complex and interdisciplinary, depending on the individual needs of patients [7, 8]. It is more and more common for the team of specialists, consisting of laryngologist/phoniatrist and speech therapist, to also include psychologist and physiotherapist. It should be stressed that the physiotherapeutic efforts are extremely effective in the treatment of hyperfunctional voice disorders related to increased myofascial tension in the area of larynx, throat and the surrounding structures. The task of the physiotherapist, preferably competent in the area of manual osteopathic techniques, is to improve the myofascial biomechanics of the vocal apparatus.

### Aim

Presentation of modern, interdisciplinary therapeutic approach in patients with vocal organ disorders, with the emphasis on the latest development in this area – the osteopathic therapy.

### Therapy of voice disorders

According to European standards, the treatment of voice disorders consists of direct therapy (teaching correct voice production techniques) and indirect therapy (teaching vocal hygiene and healthy lifestyle) [9, 10].

#### **Indirect voice therapy**

- a) The first step in the rehabilitation process is education regarding the vocal hygiene. It involves two meetings in the form of individual conversation between a speech therapist and a patient on the following topics:
  - b) physiology of voice production;
  - c) rules of correct voice production;
  - d) work environment, with the emphasis on the microclimate of the rooms and noise in the workplace;
  - e) education regarding the detrimental effects of overusing and overloading one's voice;
  - f) education regarding the change of voice use habits;
  - g) personal hygiene (i.e. taking care of one's fitness, proper lubrication of voice cords, avoiding stimulants, including: smoking cigarettes, drinking alcohol, taking drugs drying the mucous membrane of throat and larynx);
  - h) changes in eating habits (i.e. avoiding large meals and late night snacks, fatty and spicy dishes, drinking strong coffee and tea, which is also a preventive measure in gastroesophageal reflux disease associated with occupational dysphonias);
  - i) techniques of dealing with stress in the workplace;

#### **Direct voice therapy**

The second step is voice training aimed at correcting voice production through the improvement of breathing, phonation and articulation coordination [11, 12]. Exercises most commonly used in the therapy of hyperfunctional dysphonias include:

- a) breathing and relaxation exercises  
This stage encompasses exercises in correct body posture, relaxation exercises reducing or eliminating tension in the muscles of face, neck and nucha, and also breathing exercises helping the patient to acquire correct breathing technique. The technique known as Appoggio, an important element of the exercises, is a form of respiratory support based on a conscious slowing down and deepening of inhalation, with the use of controlled tension of respiratory muscles. Through systematic breathing exercises the patient learns to breath properly, which, eventually, leads to restored functionality and efficiency.
- b) phonation exercises  
This stage allows the patient to produce soft sounds freely and with no effort, to speak in

the most economical and comfortable pitch, adjusted to the age and the sex of a given person. Phonation exercises allow to develop the ability to modulate the strength and the pitch of voice, which depend on correct breathing and phonation. Other important exercises are the exercises stimulating and using all resonators and resonance chambers, so that maximum resonance can be achieved. Acquiring correct arrangement of resonant spaces, by connecting chest resonator with upper resonators, will impact the carrying capacity and timber of voice, and will allow for effective and economical work of vocal apparatus.

c) articulation exercises

Direct voice training also includes articulation exercises which aim at removing unnecessary tensions from the vocal tract and at achieving natural arrangement of its elements. To achieve this, the patient is asked to perform exercises improving the vocal apparatus by obtaining elasticity and strength in the muscles of articulation organs. The next element is to perfect the speech technique which includes clear pronunciation of vowels and consonants, moderate speech tempo, wide opening of the mouth and correct lowering of the mandible.

d) integration and habituation exercises

The early stage of this training includes exercises in auditory self-correction which relies on teaching the patient to find differences between a correct and an incorrect voice. During next sessions the patient controls the correctness of performed exercises using biofeedback and evaluates one's voice and discusses its characteristics with a speech therapist. The next stage of training introduces exercises of learned and fixed elements of correct voice productions in conversation and in sentences requiring increased voice effort. During this training the speech therapist evaluates the progress patient has made. A special attention is paid to body posture, correct breathing technique, correct respiratory support, the ability to clear the lower and upper resonators, correct phonation and articulation during patient's free speech. If it is necessary, the patient is required to perform further respiratory, relaxation, phonation and articulation exercises. Recently, more and more attention is given the manual therapy of the vocal apparatus.

### **Laryngeal massage**

**Laryngeal massage – laryngeal manual therapy (LMT)** – consists of neck muscles massage, especially circular motions in the area of the greater cornua of the hyoid bone, thyrohyoid space, posterolateral cartilago thyroidea, suprahyoid muscles, internal and lateral suprahyoid muscles [13]. The idea of this therapy is to find the spots affected by tension and tenderness, to lower the perilaryngeal tissues, gradually shifted from tensed superficial layers to deep layers, to adjust the motions to patient's feelings and a simultaneous voice production by a patient. Laryngeal manual therapy can be performed by a voice therapist trained in the field, but it is better when it is performed by an osteopath, who, due to relevant qualifications, is highly competent in the normalization of myofascial structures in the voice tract.

### **Therapy and diagnostics of the voice tract**

Osteopathy is a method of the diagnostic, treatment and beside this, a philosophy of medical care. In the diagnostic field, it is based on an analysis of the tissues mobility, as the measure of its functional state. The healthy tissue is characterized by the physiologic, spontaneous mobility, elasticity, the tension and palpation tenderness. When an organism loses its natural ability for self-regulation at different levels – starting from cells and tissues and finishing on all systems than sooner or later it arises the natural mechanical barrier in expression of the mentioned properties. So any limitation in the physiological amplitude of movement and the change in tissue vector and consequently a disturbance of the proper tension, blood flow, the palpation tenderness and neurological control is a sign of dysfunction for osteopath and the right moment for the treatment beginning [14].

Therefore the significant element of osteopathic treatment for the patient with voice disorders is an accurate, visual and palpation diagnostic of anatomical structures directly and indirectly joined to the voice organ.

The protocol proposed by Jacob Leiberman for patients with voice disorders is a precise and practical tool for their evaluation. He was engaged in diagnostic and therapy of the voice organ, creating a multi-step protocol. The first part includes the visual evaluation of the spine centre of gravity, its curvatures as well as curvatures of the thorax, breathing habits and the head posture joined to the neck position. It also includes the assessment of



larynx position and activity, performed by evaluation of posture in sitting and standing positions.

The second part is based on precise palpation of the larynx and the surrounding tissues, which are performed at rest and during phonation process. This study evaluates the mobility of particular anatomical structures, the increased tension of soft tissues and the presence of pressure evoked pain. The tension of masseter muscles, muscles of oral cavity, suprahyoid muscles and the height of larynx position. It is also evaluated mono- or bilaterally the tension and pain in stylohyoideus, mylohyoideus, geniohyoideus, digastricus and hyoglossus muscles. The assessment of the hyoid bone position with the reference to the mandibula and the space between hyoid bone and the cartilago thyroidea is applied. During the dynamic study, when the pinch grip is performed between thumb and index, the quality of mobility (its lost or facilitation) during the lateral transition of hyoid bone and larynx with the reference to mandibular is assessed. In a double grip – one hand to hyoid cartilage and second hand applied to hyoid bone – there is assessed the symmetry of mobility during the lateral move in an opposite direction. The mobility asymmetry indicates the improper tension of examined tissues [15].

The next part of anatomical structures studies which are directly joined to the larynx is the evaluation of space between cartilago thyroidea and cartilago cricoidea. The therapist should check the symmetry of these cartilages position each other. This space should be sensed without phonation. During phonation it should be sensed the dynamic, symmetrical, narrowing movement in this space.

Rubin et al. [15] state, that the experienced osteopath in patients with long and thin neck is able to detect with palpation the arytenoidei cartilages, cricoarytenoid joints, examine and compare the tension and palpation tenderness of interarytenoideus muscles and posterior cricoarytenoidei muscles. This examination can be, however, uncomfortable for the patient.

During manual manipulations in the larynx area, it should be paid attention to the unexpected effects of pressure to the carotid aorta or carotid sinus. They may lead to changes in blood pressure and pulse, particularly in the elder patients. There is also possibility to interfere with atherosclerotic plaques in the carotid aorta [16].

After examination and therapy directly joined to the larynx and muscles on the anterior area of neck it should be also performed the osteopathic study of cervical spine. Its proper function allows

for right activity and position of larynx. Osteopathic examination should assess quantitatively the global mobility of cervical spine and facet joints. Normalization of disturbances at joints or soft tissues is suggested [16].

### **Osteopathic therapy**

Osteopathic therapy is an important element of interdisciplinary care in patients with voice apparatus disorders. It facilitates the normalization of particular anatomical structures, directly and indirectly connected with the larynx, what influences the appearance or maintaining of dysphonia. The myofascial-skeletal-visceral system especially should be treated by osteopaths as a whole what affects the existing disorders in the larynx area [14- 17].

Below we present a description of osteopathic techniques with additional physiotherapeutic techniques used in therapy of patients with voice apparatus disorders.

- 1) Global techniques concerning occipital, neck and cervico-thoracic junction:
  - Fascial global neck normalization  
The therapist places the patient's head in a maximum bend, and performs the head rotation during exhalation, upon which apnoea of maximum intensity and maximum duration takes place [18] (Figure 1).



Figure 1. Fascial global neck normalization.

- Normalization of Jones points for cervical spine.  
The therapist looks for a tender Jones point and depending on their location bends, straightens or rotates the cervical spine by keeping this (released) position for 90 seconds [18,19] (Figure 2).

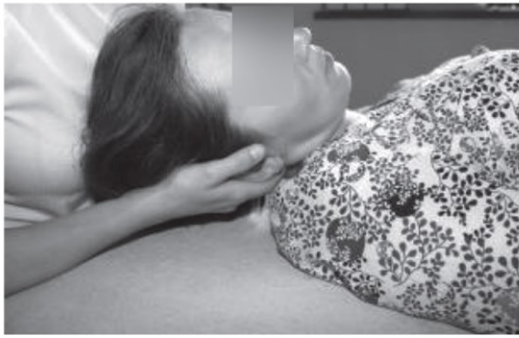


Figure 2. Normalization of Jones points for cervical spine.

- Facilitated positional release (FPR) technique to normalize the sternocleidomastoid muscle. The therapist looks for a tender point in the sternocleidomastoid muscle, bends the head forward, rotates it and bends it ipsilaterally, adding a 5 seconds compression in the head axis [18, 19] (Figure 3).



Figure 3. Facilitated positional release (FPR) technique to normalize the sternocleidomastoid muscle.

- Jones point release SPI technique for the supraspinatus muscle  
The therapist holds with one hand a tender point in the supraspinous fossa and bends and abducts with the other hand the upper limb of the patient while looking for a painless position, and then waits for 90 seconds for the occurrence of relaxation of this tender point [16-18] (Figure 4).
- 2) Techniques directly connected with the larynx:
- Larynx mobilization by stretching the space between the thyroid cartilage and the cricoid cartilage  
This technique decreases the tension of the internal muscles of the larynx. The therapist holds with one thumb the thyroid cartilage



Figure 4. Jones point release SPI technique for the supraspinatus muscle.

from below, and with the other thumb the cricoid cartilage from above, then he applies delicate pressure and stretching of the cricothyroid muscle [20] (Figure 5).



Figure 5. Larynx mobilization by stretching the space between the thyroid cartilage and the cricoid cartilage.

- Mobilization of the hyoid bone towards the thyroid cartilage  
This technique stimulates the thyrohyoid muscle and because of that improves the tone. The osteopath holds with the index finger and the thumb of one hand the thyroid cartilage and with the other index finger and thumb grasps the hyoid bone. One hand stabilizes the hyoid bone, and the other moves the thyroid cartilage aside, up and down [15] (Figure 6).
- Mobilization of the hyoid bone during the swallowing  
The therapist grasps the hyoid bone, moves it downwards and asks the patient to swallow a saliva. It is a dynamic stretching of this area [20] (Figure 7).





Figure 6. Mobilization of the hyoid bone towards the thyroid cartilage.



Figure 7. Mobilization of the hyoid bone during the swallowing.

- Lateral mobilization of larynx  
The therapist moves the larynx laterally to the moment of sensing the tissue resistance, holding it for 20 seconds. This technique increases the blood flow of the area and decreases its tension [15, 20] (Figure 8).



Figure 8. Lateral mobilization of larynx.

- Fascial relaxation of the suprahyoid muscles  
The therapist performs fascial relaxation of suprahyoid muscles, lowering the too high hyoid bone [15, 20] (Figure 9).



Figure 9. Fascial relaxation of the suprahyoid muscles.

- FPR technique for normalization of the cervical joint of the spine  
The FPR technique consists in positional relaxation of the joint, using the parameters of bending, rotating and compressing for 5 seconds [18] (Figure 10).



Figure 10. FPR technique for normalization of the cervical joint of the spine.

- Technique to normalize dysfunction at the level C0/C1 during  
The therapist holds the occipital condyles with one hand, and mandible with the other. The patient presses diagonally with the mandible, whereby the therapist gains in the range of motion at the level of a given condyle [21] (Figure 11).



Figure 11. Technique to normalize dysfunction at the level C0/C1.

During the group activities, patients learn the autotherapy techniques, f.e. postisometric relaxation of the neck muscles and fascial techniques decreasing tension of the thoracic outlet.

- Postisometric relaxation of the trapezius muscle  
In order to stretch the shortened muscle the patient places the hand on the opposite side of the head, bends it sideward to the first feeling of stretching and tries to straighten it, limiting the return movement with hand pressure for 8 seconds. Then he increases the range of stretching and repeats the tension [20, 22, 23] (Figure 12).



Figure 12. Postisometric relaxation of the trapezius muscle.

- Postisometric relaxation of the levator scapulae muscle  
The patient puts the hand on his/her head, bends the head diagonally and backwards in the opposite direction for 8 seconds and then he/she increases the range and repeats the tension [20,22-24] (Figure 13).



Figure 13. Postisometric relaxation of the levator scapulae muscle.

- Active relaxation of the nuchal fascia  
The patient presses with the flat hand the tender point in the trapezius muscle. At the same time bends and straightens his/her head several times in the opposite direction [16] (Figure 14).



Figure 14. Active relaxation of the nuchal fascia.

- Relaxation of the suprahyoid muscles  
The patient arranges the thumbs at the level of the angle of the mandible and moves them slowly chin-wards [15,20] (Figure15).



Figure 15. Relaxation of the suprahyoid muscles.

## Discussion

Many authors consider laryngeal manual therapy to be the most important method of treatment in hyperfunctional dysphonias [25-27]. Van Lierde et al. [28], who studied the effects of laryngeal manual therapy with the use of Dysphonia Severity Index, described the method as very effective, especially in patients who had not benefited from other therapies. However, it needs to be stressed that an osteopath should be trained in the etiopathogenesis and therapeutic conduct in occupational voice disorders, and cooperate with other occupational dysphonia specialists from the rehabilitation team [29]. Individual help, as a part of physiotherapy and osteopathy, also includes recommendations for the patient, regarding properly matched exercises which can be performed by the patient with no assistance. It will reduce the negative effect of



factors causing dysphonia – occupational motor organs' overloads, incorrect posture and work-related stress.

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