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CLINICAL AND ANATOMICAL REQUIREMENTS AND INDICATIONS FOR USING A NOVEL MULTIFUNCTIONAL GNATIC DEVICE

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ABSTRACT — Knowledge of the clinical anatomy of the masticatory muscles contributes to the understanding of the etiopathogenetic and physiological aspects of the development of hypertonicity of the masticatory muscles. Hypertonicity of the masticatory muscles is a disease that leads to a number of other dental problems, such as abnormal abrasion, gum recession, trauma to the oral mucosa, wedge-shaped defects. We have developed and patented a pneumatic expander. It is feasible to treat hypertonicity of the masticatory muscles in a complex — myogymnastic exercises on the background of the use of the patented gnatic device. This paper presents clinical and anatomical requirements for the gnathic device as an uncoupling device in the treatment of both teeth and muscle relaxant.

KEYWORDS — hypertonicity, masticatory muscles, pneumatic trainer, myorelaxant.

INTRODUCTION

Hypertonicity of the masticatory muscles is often the cause of a number of pathological symptoms that lead not only to dental problems, but also other diseases (headache, migraine, stomalgia) [14]. Hypertonicity of the masticatory can arise under the influence of both general and local factors, while there is a two-way inverse relationship between the underlying factors and vice versa [3–8]. The impact on the group of masticatory muscles of the following factors: 1) General factors — impaired posture, neurogenic factors, autoimmune factors, traumatic factors; 2) Local factors — bite pathology, diseases of the temporomandibular joint, iatrogenic factor, bad habits. At the same time, there is an indirect inverse relationship between local and general factors [1]. The consequence of muscle hypertonia is the activation of anaerobic glycolysis, accompanied by the accumulation of lactic acid, which in turn irritates pain receptors, causing aggravation of pain symptoms [2, 11]. The emergence of a painful effect is a stressor agent, which leads to a more forced muscle spasm [10], against the background of the production of adrenaline. In parallel with this, there is a decrease in blood flow to the muscles, the formation of edema due to an increase in intercellular fluid and the appearance of painful muscle seals. The contracted muscle fibers lose their ability to function normally, which consists primarily of a partial loss of the chewing function [9] and the occurrence of other dental problems. Thus, a vicious circle is formed, which determines the duration of the course of the pathological process and its chronicity [13]. Based on this, we came to the conclusion that the place of the primary therapeutic effect in Hypertonicity of the masticatory should be the masticatory muscles.

The objective is to develop clinical and anatomical requirements for the use of a multifunctional gnathic device stimulating the masticatory muscles.

MATERIALS AND METHODS

Our proposed invention relates to medicine, namely to dentistry, and is intended for use in gnathic dentistry, as well as for separating the dentition during medical procedures in the oral cavity [12].

The pneumatic expander device has several effects, which is the clinical success. The functionality of the pneumatic expander-expander when creating an increased internal pressure in the bite block allows the device to be used as a fixer for the volume of mouth opening during various medical procedures in the oral cavity. The possibility of creating pressure in the cavity of the device makes it possible to controllably determine the degree of opening of the mouth, and, accordingly, the degree of stretching of the masticatory muscles, which is necessary in the treatment of patients with hypertonicity of the masticatory muscles. At the same time, the elasticity of the apparatus allows to use it as a stimulator counteracting muscle tissue atrophy. During the treatment and rehabilitation of patients, it

is possible to use the apparatus in conjunction with a complex of myogymnastics to increase its effectiveness and reduce the duration of rehabilitation [12].

REQUIREMENTS AND INDICATIONS

In the available literature, we did not find the requirements for pneumatic trainers — rotary dilators, so we tried to formulate them based on their structure and function under normal conditions.

From our point of view, a pneumatic trainer should:

— provide therapeutic and prophylactic effects;
— transfer action to the chewing muscles;
— have a range of motion close to that of a healthy person;
— have a lightweight and durable design, adaptable to the anatomical parameters of the oral cavity;
— be bioinert and safe for the patient;
— carry out the expansion of the mouth by the amount of 40–50 mm;
— be elastic and durable, to maintain high intracavitary pressure;
— be able to cyclically dosed air injection to the required values and its release as needed, depending on the nature of the disease and the impact on it;
— provide adequate access to the dentition for therapeutic and prophylactic treatment by a doctor;
— possess simplicity and availability of activation for a doctor and a patient;
— exclude the possibility of slipping from the dentition;
— exclude the possibility of aspiration during manipulations;
— to be easily disinfected, cleaned and sterilized;
— have the possibility of individual anatomical parameterization;
— do not affect the observance of oral hygiene;
— be easily to withdraw in case of inflammation of the mucous membrane and injury to the gingival papillae;
— be mobile and independent of power sources and affordable for the mass consumer.

This device should only be used and prescribed by compliant patients making regular visits to a dentist.

The use of a pneumatic expander is indicated for the following diseases classified according to the ICD-10 code.

Many patients with TMJ do not go to the doctor, however, they note the presence of one or more of the following symptoms, which are indication for the use of a pneumatic expander.

1. Dysfunctional conditions of the TMJ:	K07.6 – diseases of the temporomandibular joint (neuromuscular dysfunctional syndrome, occlusive-articulation syndrome, pain dysfunction syndrome) K07.62 – Habitual dislocation and subluxation of mandible K07.64 – Temporomandibular joint stiffness S03.0 – dislocation of the intra-articular meniscus S03.4 – Temporomandibular joint ligament sprain
2. Arthritis:	M00.VX – pyogenic arthritis of the TMJ M12.5X – traumatic arthropathy (acute traumatic arthritis) M05.VX – rheumatoid, rheumatic, infectious-allergic arthritis
3. Arthrosis:	M19.0X – primary arthrosis of other joints (TMJ) M24.6VX – joint ankylosis
4. Muscle damage:	F45.8 – Other somatoform disorders (bruxism, teeth grinding) M60.0 – Infectious myositis of the masticatory muscles M62.5 – Muscle wasting and wasting, not elsewhere classified M24.8.0 – muscle hypertonicity
5. Diseases of the nervous system:	G43 – Migraine G43.2 – Tension type headache K14.6 – Glossodyny

— Muscle pain;
— Night grinding of teeth;
— Pathological abrasion of teeth, chips of orthopedic and therapeutic structures;
— Fatigue of the chewing and facial muscles;
— Pathological bite;
— Headaches, migraines, tinnitus and ringing in the ears caused by overexertion of the chewing muscles;
— Abnormal fixed postural reflexes;
— Restriction of mouth opening;
— Pain in the joint while eating, talking;
— Change of face configuration due to hyper; masticatory muscle atrophy.

CONTRAINDICATIONS

There are also absolute and relative contraindications for a gnatic device:

Absolute:

— Intolerance to the components of the pneumatic expander-retractor;
— Increased gag reflex;

Relative:

— Low level of compliance between parents and child;

— Acute respiratory diseases;
— Unstable psycho-emotional behavior of the child;
— Persistent contracture of the temporomandibular joint, with limited mouth opening less than 10 mm;
— Period of exacerbation of periodontal and temporomandibular joint diseases;
— Cheilitis and erosive and ulcerative diseases of the oral mucosa in the acute stage.

CONCLUSION

Thus, clinical effects of the use of a pneumatic expander are achieved by redistributing the occlusal load on the joint, which results in gradually normalizing the function of masticatory muscles. This may be seen as a solution to myology problems in oral and maxillofacial region.

The application of a multifunctional gnathic device can be complemented with exercises and relaxing techniques to improve the therapeutic effect on the masticatory muscles.

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