THE CLINICAL FEATURES OF THE COURSE OF STYLOHYOID SYNDROME COMPARED TO FUNCTIONAL DISPHONIA AND PATHOLOGY OF THE TEMPOROMANDIBULAR JOINT, THE METHODS OF TREATMENT OF PATIENTS WITH A COMBINATION OF THESE DISEASES, GENERALIZING FEATURES AND DIFFERENCES

Anatoliy Shchelkunov[1]
Irina Dobronravova[2]

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Abstract. Stylohyoid syndrome is a disease caused by irritation of the surrounding nerve, vascular and muscle structures by the styloid process of the temporal bone. Symptoms of stylohyoid syndrome are found in various otolaryngological, neurological and dental diseases, which requires differential diagnosis, predominance of one or another symptom of stylohyoid syndrome, or other pathology. There was a need to develop a differential diagnosis algorithm for practicing doctors when referring to patients with confirmed elongation of the styloid process of the temporal bone, and the presence of a visual picture of disorders of the vocal apparatus, for a correct idea of which symptomatology prevails. The following symptoms are characteristic for stylohyoid syndrome: long-lasting pain in the pharynx, feeling of a foreign body in the throat that does not depend on the passage of food, pain in the neck radiating to the ear, jaw, and back of the head. With hypotonous dysphonia and aphonia, with laryngoneurosis, pain in the pharynx and a feeling of a lump in the throat occur when swallowing the so-called "empty sip", is accompanied by a voice disorder, and increase with vocal strain. We examined and treated 242 patients in full, 108 people (44.6) assessed the success of treatment as 0 points (absence of complaints), 72 people (29.7%) had 1 point, 43 people

[1] Candidate of Medical Science, Associate Professor,
Odesa National Medical University, Ukraine
[2] Candidate of Medical Science, Assistant,
Odesa National Medical University, Ukraine

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had 2-3 points (17.8%), with 4-5 points – 20 patients (8.3%), which means that no significant effect of the treatment was achieved. For those patients who had the result of treatment on a scale of 3-4-5 points, and had a visual picture of dysphonia, we appointed a consultation with a phoniatrician who conducted the appropriate treatment. There were 5 such patients. After the therapy, they all rated the success of the treatment as 0 points (no complaints). Patients who had problems with the temporomandibular joint were consulted with a dentist, there were 6 such patients.We came to conclusions, that differential diagnosis between the stylohyoid syndrome, the pathology of the temporomandibular joint, and various types of dysphonia should be carried out with confirmed elongation of the styloid process of the temporal bone, after performing CT screening with contrast and performing functional tests and the presence of visual pattern. This is done to determine the predominant symptoms of a disease, eliminating the unnecessary prescription of appropriate conservative or surgical therapy. Only the elongation of the styloid process of the temporal bone doesn't mean the development of stylohyoid syndrome. The choice of treatment method depends on the results of differential diagnosis. It is possible to prescribe treatment for one of the described diseases, or prescribe a combination of methods of therapy in the presence of symptoms of stylohyoid syndrome and various types of dysphonia, which includes vitamin therapy, sedetative, stimulating, physiotherapy and phonopedia. Increasing of the creatine phosphokinase level is characteristic for functional dysphonia because this disease proceeds with a pronounced tension of the external muscles of the larynx and neck and the development of muscle pain. The symptoms that are characteristic for stylohyoid syndrome disappear or reduce after performing. In the absence of the effect from the blockade in the area of the styloid process, or with a slight effect, we used the execution of the blockade in the area of the temporomandibular joint. In case of disappearance or pronounced reduction of symptoms, it was believed that the cause of suffering of patients is the pathology of the temporomandibular joint.

1. Introduction

Stylohyoid syndrome is a disease, caused by irritation by the styloid process of the temporal bone surrounding nervous, vascular and muscular structures. The syndrome manifests itself as chronic pain in

the deep part of the lateral region of the face, radiating to the root of the tongue, the upper jaw on the corresponding side, the pharynx and the ear, dysphagia, disphonia, symptoms of cerebral circulation disorders [1, p. 68; 2, p. 81; 3, p. 61]. Symptoms of stylohyoid syndrome occur in various otolaryngological, neurological and dental diseases, which requires differential diagnosis, the predominance of one or another symptom of stylohyoid syndrome, or another pathology, for a better diagnosis and treatment of the prevalent disease. There is a generally accepted assumption that the occurrence of the syndrome is associated with the elongation of the process and ossification of the stylohyoid ligament. Many works on the study of this problem have been devoted to determining the acceptable, i.e. normal length of the stylohyoid process, the increase of which leads to the possible development of the disease, taking into account its various curvatures [4, p. 73; 5, p. 29]. And relatively, pressure on the structures surrounding the process. This follows from the work we have carried out over many years [2, p. 80-81; 3, p. 61]. In our work, we used the method of computer tomography of the styloid processes with contrast of the main vessels of the neck, with the performance of the so-called functional tests, i.e. maximum tilting of the head back and pressing the chin to the sternum during the study. This research method allows us to determine not only the presence of elongation of the styloid process, but also possible pressure on the surrounding structures, both in the normal position of a person and during movement of the head and neck, during active human activity [3, p. 62;12, p. 3454; 15].

Relevance. The relevance of our study is determined by the fact that stylohyoid syndrome remains an insufficiently studied and described disease, and therefore little known to many doctors. A large number of vessels, nerves, and the muscular apparatus of the neck are anatomically and functionally connected with the styloid process of the temporal bone [13; 14]. There is a need for a clearer understanding, knowledge and differential diagnosis of stylohyoid syndrome with diseases that occur with similar symptoms. In this case, with a pathology of the temporomandibular joint and pathology that includes a number of functional and organic voice disorders in which the neuromuscular apparatus of the larynx suffers. These are hypotonic, hypertonic, spastic dysphonia, aphonia, laryngeal neurosis, myogenic laryngeal paresis or combination of these diseases [6; 7; 8].

It is also necessary to determine the predominant disease for further, better treatment of this pathology and prevention of disease recurrence.

Purpose. Development of a differential diagnostic algorithm for practicing physicians when patients with confirmed elongation of the styloid process of the temporal bone, according to CT scan data, and the presence of a visual picture of voice disorders, pathology of the temporomandibular joint are referred to them for a correct understanding of which symptomatology prevails: stylohyoid syndrome, functional voice disorders, temporomandibular joint pathology or a combination of these pathologies. Selection of the correct treatment tactics and prevention of recurrence of symptoms in the future, prevention of errors in diagnosis and to exclude unnecessary prescription of conservative or surgical therapy that will not give the desired result. Determination of correct treatment tactics for patients with a combination of these diseases. Correctly assessment of the results of treatment and, if necessary, making corrections in each specific case.

Tasks

1. Improvement and development of clear criteria for differential diagnosis of stylohyoid syndrome with pathology of the vocal apparatus (hypotonic, hypertonic, spastic dysphonia, aphonia, laryngeal neurosis, myogenic laryngeal paresis), which have similar symptoms. Clear definition of the predominance of symptoms of one or another disease in their combination.
2. Improvement and optimization of the diagnostic techniques of an elongated styloid process, differential diagnosis of stylohyoid syndrome with pathology of the temporomandibular joint, which has symptoms similar to it. A clear determination of the predominance of symptoms of a disease.
3. Choice of treatment methods for patients with symptoms of stylohyoid syndrome and the presence of functional disorders of the vocal apparatus, taking into account the data obtained.

2. Own observations

In this work, we will alternately examine the similarities and differences of these diseases, their combinations. We describe their diagnostic criteria and methods of therapy.

Differential diagnosis of stylohyoid syndrome and functional disorders of the voice apparatus

The symptoms of stylohyoid syndrome have been described by us in previous articles [1, p. 68; 2, p. 81; 3, p. 62; 4, p. 73-74; 5, p. 29-30]. In this article we can briefly list them. The following symptoms are characteristic for stylohyoid syndrome: prolonged pain in the throat, which intensifies in some patients when swallowing solid food and when opening the mouth wide, a feeling of a foreign body in the throat, which does not depend on the passage of food, neck pain intensifies with prolonged vocal load, intensifies when turning the head, radiating to the ear, jaw, and back of the head. Dizziness is possible when the head is tilted forward and thrown back.

In hypotonic dysphonia and aphonia, in laryngoneurosis, pain in the throat and a feeling of a lump in the throat occur when swallowing the so-called "empty" sip, not solid food, is accompanied by a voice disorder, and intensified by vocal load.

Unlike pain in the throat in stylohyoid syndrome, in hypotonic dysphonia, myogenic laryngeal paresis, a different mechanism of pain syndrome operates. The vocal folds do not close completely at the time of phonation, a gap remains between them, the shape of which depends on which pair of internal muscles is affected [9; 10; 11]. This causes hoarseness from mild hoarseness to aphonia with vocal fatigue. Such phonation requires compensatory tension of the external muscles of the larynx and neck, which are forced to perform an unusual function in an attempt to close the vocal folds. As a result, they become overstrained, lactic acid accumulates in them, and a condition similar to muscle soreness occurs.

Delayed onset muscle soreness syndrome (DOMS) is a complex, including painful sensations in the muscles that occur several hours or days after continuous or intense physical exertion.

Pain occurs in the pharynx, muscles of the neck, back of the head and chest, which are aggravated by vocal load. Important for differential diagnosis: pain in the muscles of the neck and pharynx passes literally on our eyes during phonopedic exercises, when the load is redistributed correctly, forcing the internal muscles of the larynx to work, created for phonation, and freeing the external muscles, returning them to adequate load.

With hypotonic dysphonia, a headache may occur due to tension in the external muscles of the larynx and neck. It occurs during vocal exertion due to the fact that tense laryngeal muscles compress large vessels of the neck, disrupting venous outflow and increasing intracranial pressure.

In hypertonic, spastic forms of dysphonia, there is a spasmodic contraction of both the internal muscles of the larynx, which narrow the glottis, and the tension of the external muscles of the larynx and neck muscles, which help push air through the spasmodic (closed) glottis. Spasms of the laryngeal muscles make the slit so narrow that the voice of patients suffers due to impaired airflow and the inability to vibrate the vocal folds. As a result, there is a headache, sore throat, pain in the muscles of the neck, and the back of the head. Differential diagnosis between the described diseases should be carried out with confirmed elongation of the styloid processes (computer tomography with intravenous contrast, functional tests are mandatory) and the presence of anamnestic and visual picture during examination of the larynx, characteristic of various types of dysphonia. The elongation of the styloid processes of the temporal bone alone does not indicate the development of stylohyoid syndrome.

Similar symptoms for both described diseases.

1. Pain in the pharynx, neck muscles, back of the head, chest.
2. Sensation of a foreign body in the pharynx.
3. Increased pain during vocal load.

Different symptoms.

1. Pain in the throat, neck muscles, back of the head, chest - significantly decreases or disappears during anti-inflammatory treatment using intraoral blockades in stylohyoid syndrome. This does not happen with voice disorders and laryngoneurosis. With a combination of both diseases, there is also a decrease in pain, but the symptoms do not disappear.

2. With laryngoneurosis and voice disorders, the sensation of a foreign body in the throat is present only with an “empty sip”, this sensation is absent when food passes. With the pharyngeal form of stylohyoid syndrome, the sensation of a foreign body in the throat is present both with an empty swallow and when food passes.

3. With laryngoneurosis and voice disorders, pain in the neck muscles and pharynx disappears with phoniatric treatment, especially when performing

phonopedic exercises. In stylohypoglossal syndrome, phonopedic exercises do not affect the nature of the pain, in some cases even increase it.

For a clear understanding of the problem, we will give the generalizing features and differences of these two diseases.

For stylohyoid syndrome, the presence of the effect of intraoral blockades is characteristic; a foreign body sensation during an "empty sip" may or may not be present; a foreign body feeling is present during the passage of food, especially in the pharyngeal form of the syndrome; the effect of phonopedic exercises is absent.

For laryngoneuroses and voice disorders, the absence of the effect of intraoral blockades is characteristic; the presence of a foreign body sensation during an "empty sip", which is not present during the passage of food; a pronounced effect of phonopedic exercises is present.

For differential diagnosis, it is important to analyze the above symptoms to determine the prevailing symptoms of a particular disease, or their combination. We also proposed determining the level of creatine phosphokinase (CPK) in the examined patients, which allows us to assume with a high probability the prevalence of one of the above pathologies. Functional dysphonia is accompanied by tension of the external muscles of the larynx and the appearance of muscle pain.

Creatine kinase (creatine phosphokinase, CPK) is an enzyme that catalyzes the formation of a high-energy compound of creatine phosphate from ATP and creatine, which is consumed by the body during increased physical exertion. It is contained in the cells of the heart muscle, skeletal muscles, brain, thyroid gland, lungs. The greatest clinical significance for the diagnosis of muscle soreness of the external muscles of the larynx and neck is KK-MM (muscle isoenzyme found in skeletal muscles). High activity of total creatine kinase is often found in traumatic injuries and diseases of skeletal muscles, as well as in all types of progressive muscular dystrophy, myopathy, myodystrophy, dermatomyositis.

In the presence of an elongated styloid process of the temporal bone, confirmed by CT scan data with intravenous contrast and functional tests, as well as the presence of a visual picture in the larynx during laryngoscopy, stroboscopy, treatment is usually started according to the scheme described by us in previous articles [2, p. 81; 3, p. 62-63; 4 p. 73-74]. Next, we evaluate the result of treatment. As a result of the described therapy, the

symptoms of stylohypoglossal syndrome regressed to varying degrees in most patients.

To assess the quality of conservative therapy, we used the scale of reducing patients' complaints developed by us in points from 5 to 0, which was described by us in previous articles. That is, 5 – lack of effect, 0 – complete absence of symptoms of stylohyoid syndrome [4, p.73; 5, p. 29-30].

We examined and treated 242 patients in full, 108 people (44.6%) rated the success of treatment as 0 points (absence of complaints), 72 (29.7%) rated it as 1 point, 43 people (17.8%) rated it as 2-3 points, 20 patients (8.3%) rated it as 4-5 points, that is, no significant effect of treatment was achieved. For those patients who had a treatment result on a scale of 3-4-5 points and had a visual picture of dysphonia, we scheduled a consultation with a phoniatrist who conducted the appropriate treatment. There were 5 such patients. After the therapy, all of them assessed the success of the treatment as 0 points (absence of complaints).

Differential diagnosis of stylohyoid syndrome with pathology of the temporomandibular joint.

This section will describe a variety of relations of the elongated styloid process of the temporal bone and its structures in different variants of its curvature and elongation. Also will be described the treatment of stylohyoid syndrome, taking into account the possibility of insufficient effectiveness of therapy in the form of not complete relief of its symptoms, given the presence of other disease in the patient, occurring with similar manifestations and complaints, in this case-pathology of the temporomandibular joint [6; 7; 12]. In the performed work, we took the purpose of improvement and simplification of conservative and surgical therapy, and their combinations for patients with stylohyoid syndrome, differential diagnosis of this disease with similar symptoms that are more likelu for pathology of the temporomandibular joint. They should be clearly divided into groups typical for stylohyoid syndrome and symptoms inherent for pathology of the temporomandibular joint, as a combination of two diseases, or the predominance of one of them. Also important is the correct interpretation of tomographic studies with contrasting of the main vessels of the neck, and with the performance of the so-called functional tests for the determination of the most appropriate techniques and accesses, taking into account the data of the features of the anatomical and topographic relationships

of the elongated styloid process of the temporal bone.The presence of pathology of the temporal-mandibular joint in this particular case, which requires differential diagnosis with stylohyoid syndrome, accordingly, the development of symptoms of the syndrome and faithful interpretation of complaints of patients, clinical data, obtained in the examination and the presence of concomitant pathology that occurs with similar symptoms.

Since we had specific patients with the elongation of the styloid process and with the symptoms of stylohyoid syndrome, regardless of the presence of concomitant pathology, we treated them with the standard therapy for the disease we studied. We started with conservative therapy, in the form of injections into the area of the apex of the styloid process, which is performed after a finger examination of the oropharynx and determining its clear localization (apex). As well we prescribed systemic anti-inflammatory therapy that accompanies it. This technique of injections was described in the previous articles, just like the method of finger examination of the oropharynx [5; 9].

As a result of the described therapy, the symptoms of stylohyoid syndrome regressed varying degrees of severity in most patients.

To evaluate the quality of conservative therapy, we used a scale of relief of symptoms in points from 5 to 0, which we described in past articles. That is, 5- The absence of effect, 0 is the complete absence of symptoms of stylohyoid syndrome. Examinating the data will be given below.

Here will be described the symptoms that are inherent for the pathology of the temporomandibular joint and has an analogy with a stylohyoid syndrome. We will try to highlight accurate symptoms characteristic of each disease and, of course, data of CT screenings and ultrasound to determine the predominance of a particular pathology.

Symptoms of stylohyoid syndrome.

Symptoms are generally divided into two groups – "vascular", associated with impaired circulation of the brain as a result of pressure of the elongated styloid process, and "pharyngeal" associated with disorders of the food lump and pain of varying degrees of severity [4; 8]. For differential diagnosis of stylohyoid syndrome with diseases of the temporomandibular joint, we believe that a group of patients with vascular pathology can be excluded because the pathology of the joint is unable to cause circulatory disorders of the brain. [12] Stylohyoid syndrome is characterized by the following

symptoms: prolonged pain in the pharynx, in some patients, when solid food is passed and with widespread opening of the mouth; Pain that irradiate into the tongue, the bottom of the oral cavity, the anterior surface of the neck, orbit, ear, nape, problems with sleep [4; 13].

Symptoms of diseases of the temporomandibular joint.

In this article, we will not describe every problem of temporomandibular joint. We will describe the symptoms that are common or have a similarity to the symptom of stylohyoid syndrome.

The symptoms most common for the temporomandibular joint problem: headache, pain in the muscles of the jaw when chewing, clicking or locking the position of the lower jaw, pain in the joint area, pain in the neck when stretching hands, dizziness, sleep problem.

As we can see, the symptoms of joint diseases and stylohyoid syndrome are largely similar. Therefore, it is very important to differentiate them from each other. When performing a CT scan of the styloid process with contrast, we are proposed to inspect and describe the temporomandibular joint for the preliminary search for its pathology.

An example of a description of CT scan

Patient R. MSCT-styloid processes with angiography of brachiocephalic arteries. With intravenous bolus enhancement "Tomogexol-350", dosage by weight.

The right styloid process – 12 mm; calcification of stylohyoid ligament at the level of the C1 vertebra in a length of 19 mm.

In the position when the chin is brought to the breast: the fat layer between the inflamed ligament and the internal carotid artery is preserved, in the proximal part is closely adjacent to the internal jugular vein; There is a distance of about 13 mm from the side wall of the pharynx.

In the position when the head is thrown back: the fat layer between the inflamed ligament of the internal carotid artery, the internal jugular vein is preserved; There is a distance of about 13 mm from the side wall of the pharynx.

Left styloid process is 10 mm long; calcification of stylohyoid ligament at the level of C1 of the vertebra with a length of 13 mm.

In the position when the chin is brought to the breast the fat layer between the inflamed ligament and the internal carotid artery and the internal jugular vein is preserved.

The free edge of the process is about 15 mm from the side wall of the pharynx.

In the position when the head is thrown back: the fat layer between the inflamed ligament of the internal carotid artery, the internal jugular vein is preserved; It is at a distance of about 13 mm from the side wall of the pharynx.

Vascular bundles of the neck are evenly contrasted, not deformed.

Kimerli anomalies are not determined.

The lower jaw head is somewhat flattened, eroded.

An example of CT scan of styloid processes and joint projection.

To clarify the diagnosis, in the presence of pathology of the temporomandibular joint, it is possible to appoint a conical CT with open and closed mouth. (Fig. 1, 2).

Important in the differential diagnosis of these diseases is the performing of blockages in the area of the styloid process through the mouth and into the area of the temporomandibular joint through the skin.

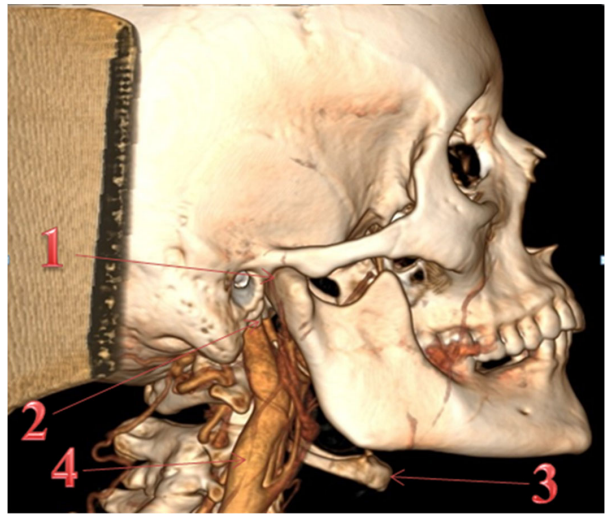

Figure 1. 3D reconstruction of the CT of styloid process with contrasting of the main vessels (1 – temporomandibular joint, 2 – styloid process, 3 – sublingual bone, 4 – external jugular vein)

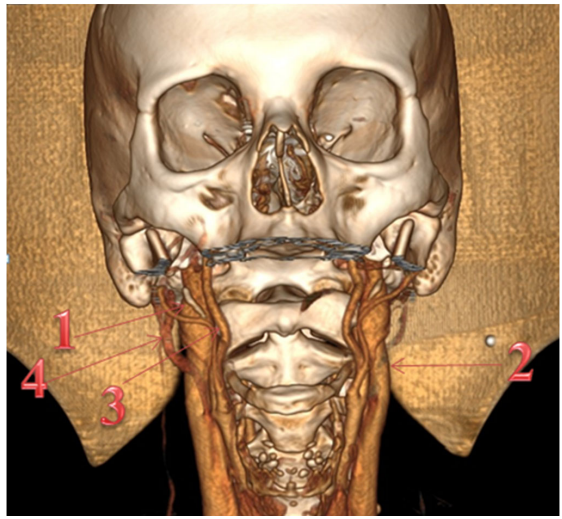

Figure 2. 3D reconstruction of the CT of styloid process with contrasting of the main vessels (1 – styloid process, 2 – external jugular vein, 3 – internal carotis arteria, 4 – external carotis arteria)

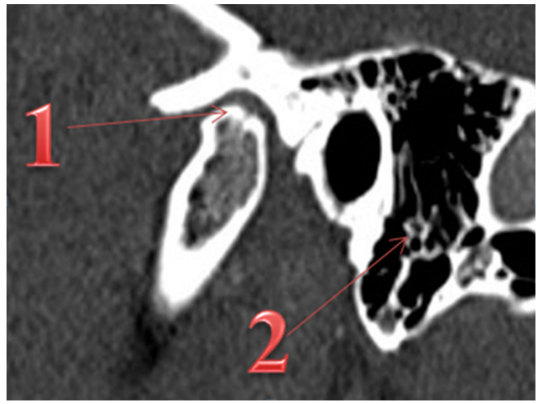

Figure 3. CTG of the temporomandibular joint (1 – head of the temporomandibular joint, 2 – mastoid process of the temporal bone)

The method of performing of blockade into the area of the styloid process through the mouth.

Injections into the area of the vascular-nerve bundle and the apex of the elongated styloid process are performed in this way (Fig. 4). At the beginning with the help of a finger examination of the oropharynx at maximum throwing of the head back, palpation of the apex of the process, and determined with the injection site. The proper performance of the injection is achieved by the maximum effect in the treatment of stylohyoid syndrome [5].

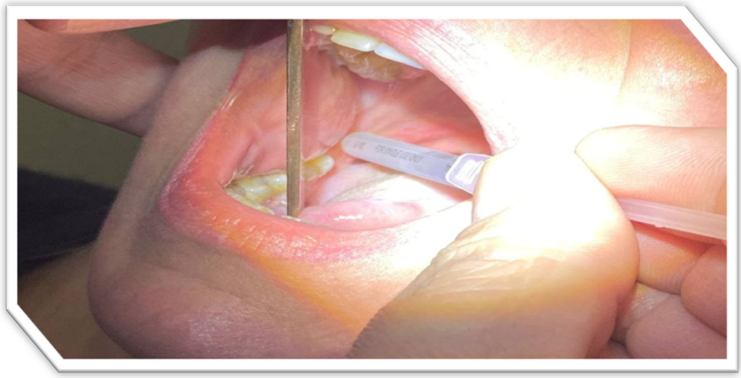

Figure 4. An example of injection into the area of the apex of the styloid process

The method of performing of blockade in the area of the temporomandibular joint.

The method of blockage of the motor branches of the mandibular nerve Berche.

The essence of the method is in injection of anesthetic through the skin under the lower edge of the zygomatic arch at a distance of 2 sm in front from the base of the tragus (Fig. 5). As a result of the blockade of the motor branches, the chewing muscles and the opening of the mouth are relaxed. This type of blockade is used in inflammatory reflex contracture of the mandible, when the patient cannot fully open the mouth for examination

and surgery in the oral cavity. This method is also used in dysfunction of the temporomandibular joint with severe pain. It was used for differential diagnosis of the diseases described [7]. There are methods of intraoral joint blockade, but we do not use them, as the anesthetic can partially block the branches of the glossopharyngeal nerve and hide a picture of stylohyoid syndrome.

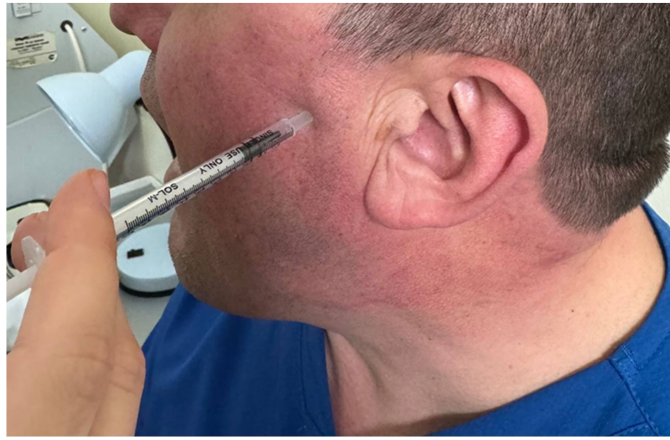

Figure 5. Performing the blockade into the area of the temporomandibular joint

Analysis and differences

After blockade in the area of the apex of the styloid process, the symptoms that are characteristic for the stylohyoid syndrome, described above, disappear or significantly decrease. This confirms the prevalence of pathology caused by an elongated styloid process.

In the absence of the effect from the blockade in the area of the styloid process, or with a slight effect, we used the blockade in the area of the temporomandibular joint. In case of disappearance or pronounced reduction of symptoms, it was believed that the cause of suffering of patients is the pathology of the temporomandibular joint. Such patients needed consultations and treatment with the dentist, that means that elongated styloid processes do not cause the development of stylohyoid syndrome.

In our study there were 2 cases when the blockade in the area of the styloid process and in the joint of the mandible gave a significant reduction of pain in the patient. In these cases, a combination of the described two pathologies was observed. After consultation of the dentist, these patients were performed surgery of resection of the styloid proces on the appropriate side. In the future, these patients continued treatment with the dentist.

Of the 230 patients, the success of treatment at 0 points (absence of complaints) was estimated by 106 people (46%), 1 point-70 (30.4%), 2-3 points-38 people (16.5%), in 4-5 points – 16 patients (7.0%), that is, no significant effect of treatment was achieved. To those patients who had the result of treatment in a scale of 4-5 points, we offered surgical treatment-resection of the styloid process on the appropriate side.

The score distribution table with results of therapy

All patients	Score				
		0	1	2-3	4-5
230 people	Ammount of people	106	70	38	16
	%	46%	30,4%	16,5%	7.0%

16 patients who had a result of 4-5 points were offered a surgical method of treatment-resection of the styloid process on the corresponding side. Before this, we conducted differential diagnosis with diseases that occur with similar symptoms to determine the predominant pathology and the development of further tactics of treatment and examination of the patient. Of the 16 people who were offered surgical treatment, the pathology of the temporal-mandibular joint, was determined by CT scans in 6 people, which required differential diagnosis with stylohyoid syndrome at the dentist (Fig. 1, 2, 3). And 5 patients who had a picture of functional disorders of the vocal apparatus underwent therapy with a phoniatrist.

Conclusions

1. Differential diagnosis between the stylohyoid syndrome, the pathology of the temporomandibular joint, and various types of dysphonia should be carried out with confirmed elongation of the styloid process of the temporal bone, after performing CT screening with contrast and performing functional tests and the presence of visual pattern. This is done to determine

the predominant symptoms of a disease, eliminating the unnecessary prescription of appropriate conservative or surgical therapy. Only the elongation of the styloid process of the temporal bone doesn't mean the development of stylohyoid syndrome.

2. The choice of treatment method depends on the results of differential diagnosis. It is possible to prescribe treatment for one of the described diseases, or prescribe a combination of methods of therapy in the presence of symptoms of stylohyoid syndrome and various types of dysphonia, which includes vitamin therapy, sedetative, stimulating, physiotherapy and phonopedia.

3. Increasing of the creatine phosphokinase level is characteristic for functional dysphonia because this disease proceeds with a pronounced tension of the external muscles of the larynx and neck and the development of muscle pain.

4. The symptoms that are characteristic for stylohyoid syndrome disappear or reduce after performing. In the absence of the effect from the blockade in the area of the styloid process, or with a slight effect, we used the execution of the blockade in the area of the temporomandibular joint. In case of disappearance or pronounced reduction of symptoms, it was believed that the cause of suffering of patients is the pathology of the temporomandibular joint.

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