Changes in hemodynamic parameters of the tongue in persons with glossodynia as a result of treatment

Khasanov Fozil Kozimjonovich.
Department of Pediatric Therapeutic Dentistry, Tashkent State Dental Institute ***Rizayev Elyor Olimjonovich*** *Doctor of Medical Sciences, Professor*

Patient complaints of a burning sensation in the mouth represent one of the most difficult challenges for dental professionals. This condition is further aggravated if it is accompanied by pain. Pain is a common cause of suffering and seriously impairs a person's quality of life. The International Association for the Study of Pain (IASP) defines this condition as “burning pain in the tongue... associated with normal findings and laboratory findings, lasting at least 4–6 months” [4].

Patients often complain of burning pain in the mucous membrane of the tongue, accompanied by other disorders, such as dry mouth, changes in taste. This condition is often idiopathic in nature and its etiopathogenesis still remains unclear [6].

Treatment is usually aimed at relieving symptoms. Pharmacological treatment options include the administration of topical and systemic medications such as benzodiazepines, tricyclic antidepressants, anticonvulsants, capsaicin and alpha-lipoic acid [12]. In these patients, topical [9,10] and systemic [7] clonazepam is used to relieve symptoms. However, many of the medications listed above are known to reduce salivation [8]. Low-level laser therapy can also be used in the treatment of glossodynia [11,12]. Hormone replacement therapy and cognitive behavioral therapy (alone or in combination with medications) are used in treatment in some studies [3,5]. However, the most effective treatment method for such patients has not yet been described.

The complex and multifactorial etiology of glossodynia requires a systematic and multidisciplinary approach to properly manage these patients. Although many drugs and treatments have been proposed for treatment, none are the gold standard or satisfactory.

Materials and methods of research.

In accordance with the purpose and objectives of the study, 45 patients with glossodynia aged 45-64 years who applied to the Department of Therapeutic Dentistry of Samarkand State Medical University in 2022-2024 were examined.

The examined patients were divided into 2 groups according to the WHO age classification: middle-aged (45-59 years old - 27 people) and elderly (60-74 years old - 18 people). There were 6 men (13.3%), women – 39 (86.7%). The control groups consisted of 25 and 19 apparently healthy people of similar age (7 men, 37 women). In total, 13 men and 66 women took part in the study. The average age of patients at the time of examination was 56.1 years for men and 56.3 years for women. The study of the local hemodynamics of the tongue involved 89 people - the main and control groups of patients.

The study was carried out using an ultrasound machine "MINDRAY DC-70 X-insight" from Mindray (China) with a linear sensor with a frequency of 7.5 MHz, in the mode of gray ultrasound, color Doppler mapping of blood flow and pulsed wave Doppler. The measurement depth when using the sensor is up to 0.8 cm, radiation intensity is up to 0.05 W/cm2. The device made it possible to conduct a wide range of studies of the state of blood flow. The degree of impairment in the language area was assessed taking into account both the morphological and functional state of this area. The study was carried out in a horizontal position with a low, dense pillow placed under the shoulders. The patient was asked to open his mouth and stick out his tongue as much as possible. After drying, a special gel (Mediagel, Russia) was applied to the dorsal side of the tongue with a cotton swab. A linear sensor was installed on the back of the tongue, in the middle third (projection of the deep artery of the tongue) at an angle of 60° to its longitudinal axis. The research technology included a search for the right (or left) arteries of the tongue and a targeted study of its hemodynamic parameters.

Using pulse spectral Dopplerography, qualitative and quantitative indicators of regional blood flow were determined: maximum systolic (V – max) velocity, average maximum blood flow velocity (TAMx), volumetric blood flow velocity (VVV), resistance index (RI), pulsatory index (PI) and systole -diastolic ratio (S/D). Along with the artery, the lingual vein was visualized.

A method for complex treatment of patients with glossodynia and prevention of disease relapse.

Treatment of glossodynia is one of the common problems in modern dentistry. In most cases, the solution can be effective, but sometimes it has a temporary effect. When developing a treatment regimen, we were guided by the following criteria:

1. The first goal of treatment is complete recovery or long-term remission.

2. The second goal of treatment is a quick first result to maintain the patient's level of confidence.

Planning of complex treatment measures was carried out individually for each patient, taking into account the severity of the course, its duration, the patient's age and the results of the study. Each treatment plan is coordinated individually based on research methods with specialists such as a neurologist, gastroenterologist, endocrinologist, psychotherapist, cardiologist, etc.
Proposed comprehensive treatment for patients with glossodynia
The method of complex treatment of patients with glossodynia includes:

1. Consultation with a neurologist, if necessary, a gastroenterologist, psychotherapist, endocrinologist, gynecologist, cardiologist, etc.;

2. Treatment of somatic disease;

3. Sanitation of the oral cavity;

4. Elimination of local irritants;

5. Professional oral hygiene, selection, control and correction of personal hygiene products and methods;

6. Recommendation for using R.O.C.S toothpaste. "PRO Moisturizing. Moisturizing" (Diarsi, Russia) and cleaning the surface of the tongue with special brushes twice a day;

7. Patients with chronic catarrhal gingivitis and generalized periodontitis need to use dental floss, interdental brushes and rinses.

The main tactics for the treatment and prevention of glossodynia was the use of means and methods of general and local action. Treatment regimens included drug treatment and physiotherapeutic procedures, which were carried out in 2 stages using primary treatment and anti-relapse treatment.
Treatment methods for the main group of patients with glossodynia**:**
1. Tebantin 0.3 mg (Gedeon Richter, Hungary) should be taken after meals according to the following scheme: 1st day - 1 tablet. 1 per day; 2nd day – 1 tablet. 2 times a day; Day 3 – 1 tablet. 3 times a day; 4 – 14 days – 1 tablet. 3 times a day. Duration of treatment - 14 days (under the supervision of a

neurologist), if ineffective - Pregabalin Richter (Gedeon Richter, Russia) 75 mg 2 times a day, if necessary - 150 mg 2 times a day.;

2. Enerion 0.2 (Servier laboratoires, France) 1 tab. 2 times a day after meals for 4 weeks; Persen (Sandoz, Slovenia) 1 capsule 3 times a day for 4 weeks; Pentoxifylline 0.1 (Jurabek Laboratories, Uzbekistan) 2 tablets. 2 times a day after meals (under the supervision of a cardiologist). Duration of treatment – 14 days;

3. For hyposalivation - infusion of coltsfoot (Zamona Rano, Uzbekistan), 1 tbsp. spoons per 200 ml of hot boiled water, heat for 15 minutes, take 1/2 cup 3 times a day;

4. Blockade of the lingual nerve with a 2% solution of vitamin B1 (1 ml) with a 2% solution of lidocaine (2 ml) alternately on both sides, a course of 10 procedures per day;

5. Ultraphonophoresis of 1% solution of vitamin PP (1 ml + glycerin 1 ml) on the tongue area in a course of 5-7 procedures per day;

In order to prevent relapses of glossodynia, clinical observation was carried out and every six months, if the treatment result was positive, anti-relapse treatment was prescribed: Neuromultivit (Valeant, Austria) 1 tablet. 3 times a day after meals for a month; Persen (Sandoz, Slovenia) 1 capsule. 3 times a day for 4 weeks; Ultraphonophoresis of vitamin PP (1 ml of 1% solution + 1 ml of 80% aqueous solution of glycerol) on the tongue for 5 procedures. Treatment in the comparison group included:

1. Neuromultivitis 1 tab. 3 times a day after meals for a month;

2. Novo-passit (Teva Czech Industries, Czech Republic) 1 teaspoon 2 times a day after meals;

3. Cavinton, 0.005 (Gedeon Richter, Hungary) 1 tab. 3 times a day (under the supervision of a cardiologist). Duration of treatment – 14 days;

4. Blockade of the lingual nerve with a 2% solution of vitamin B1 (1 ml) with a 2% solution of lidocaine (2 ml) alternately on both sides, a course of 10 procedures;

5. Rinse with 1% citral solution (Sherkhon Service, Uzbekistan) 3 times a day (15 drops per 200 mg of boiled water). The duration of treatment is 14 days.

Results and discussion. The results of ultrasound examination of the hemodynamics of the deep artery of the tongue (DA) in the treatment of the main and control groups of patients with glossodynia are presented in the table. 1. According to the presented data, the results of the main indicators of Doppler measurements of the GAN before treatment of patients were identical and did not differ statistically from each other (p1>0.05). At the same time, the results of functional studies after treatment of patients in the main and comparative groups were different**.**

Spectrogram analysis included assessment of qualitative and quantitative characteristics of blood flow. After treatment of the main group of patients, the amplitude characteristics were more pronounced than before treatment. The Doppler spectrum display corresponded to arteries with low peripheral resistance: clearly defined systolic, catacrotic and dicrotic waves, as well as the diastolic phase. The presence of a spectral window was found in 75.5% of the study cases.

Unlike the main group, patients in the control group had pulse wave peaks, their smoothing, and the appearance of additional peaks in the systole and diastole phases (the spectral window was “clean” only in 41.6% of the study cases.

Table 1. Indicators of Doppler study of GAN

Doppler indicators GTA	Main group		control group	
	before treatment	before treatment	before treatment	before treatment
Diametr, mm	1,013 ± 0,01	1,114 ± 0,02	1,12±0,01	1,036 ± 0,025
P	p1 >0,05	p2 <0,01 p4>0,05		p3>0,05
V-max, м/с	0,145 ± 0,0002	0,325 ± 0,02	0,25±0,05	0,191 ± 0,012
P	p1 >0,05	p2<0,001 p4<0,001		p3<0,001

Resistance index (Purcelo)	0,78 ± 0,0054	0,75 ± 0,0072	0,73 ± 0,008	0,753 ± 0,007
P	p1 >0,05	p2 <0,001p4<0,01		p3>0,05
Pulsatory index (Gosling)	3,83 ± 0,321	2,56 ± 0,1	2,8 ± 0,06	3,01 ± 0,332
P	p1>0,05	p2<0,05 p4>0,05		p3>0,05
TAMx, m/s	0,225 ± 0,024	0,327 ±0,016	0,257 ± 0,02	0,241 ± 0,01
P	p1>0,05	p2<0,05 p4<0,01		p3>0,05
S/D	2,76 ± 0,11	3,11 ± 0,105	2,85 ± 0,05	2,9 ± 0,112
P	p1>0,05	p2>0,05 p4<0,05		p3>0,05
OSK, ml/min	14,9 ± 1,2	19,1 ± 0,156	18,3 ± 1,1	16,21 ± 0,152
P	p1>0,05	p2<0,01 p4<0,001		p3>0,05

Note:

p 1 - significance of the difference in indicators between the main and control groups before treatment.

p2 – significance of the difference between the indicators of the main group before and after treatment.

p3 – significance of the difference between the indicators of the control group before and after treatment.

p4 – significance of the difference between the indicators of the main group and the control group after treatment.

Determination of quantitative indicators of hemocirculation after complex treatment in patients of the main group revealed a significant improvement in linear indicators of blood flow. Thus, the maximum value of blood flow velocity in the systole phase was 0.325 ± 0.02 m/sec. (compared to 0.145 ± 0.0002 m/s) and on average over time – 0.327 ± 0.016 m/s. (vs. 0.225 ± 0.024 m/s) (CI 95-99.9%).

It should be noted that the use of the proposed complex method of treating glossodynia in patients of the main group contributed to a significant improvement in the tone and peripheral resistance of the deep artery of the tongue, as well as its elastic properties. At the same time, the probability of a

decrease in the Purcelot and Gosling indices (by 4 and 33.1%, respectively) and an increase in the associated indicator of the diameter of the GJ by almost 10% indicated the normalization of the indicators of venous outflow from the tissues of the tongue and the influx of arterial blood to this organ, which , according to the literature [1,2], helps eliminate one of the clinical symptoms of glossodynia - swelling or pasty appearance.

The blood flow rate has improved significantly. An increase in its statistical value by 28.2% ($p2<0.01$) indicates the normalization of microhemodynamic disorders of the tongue. At the same time, Doppler studies in patients in the comparison group during treatment with traditional therapy did not reveal a pronounced positive dynamics of the frequency shift of local hemodynamics, which is clearly presented in the table. The difference between their indicators and the initial level was statistically insignificant ($p3>0.05$). Thus, according to Doppler ultrasound, after treatment of patients in the comparison group, local blood flow disturbances persisted, which confirmed the low effectiveness of traditional therapy for glossodynia.

Conclusion. When comparing quantitative indicators of the Doppler frequency shift after treatment in two groups of patients (main and comparative), significant differences in values were established. Thus, the maximum blood flow after treatment of patients in the main group was higher than the control by 70.1% ($p4<0.001$), on average over time (TAMx) by 35.7% ($p4<0.01$), volume by 17.8% (p4). <0.001). The best indicators of vascular resistance and systole-diastolic ratio were established in patients of the main group compared to the comparison group (CI 95-99%). The results obtained indicated normalization of the hemodynamics of the hemodynamics of the main group of patients.

Thus, triplex scanning of regional blood circulation in the GTA is an informative method for assessing the treatment of patients with glossodynia. A significant improvement in linear and volumetric indicators of blood flow in the deep artery of the tongue can serve as a criterion for assessing the effectiveness of treatment for patients with glossodynia. The normalization of the main indicators of blood circulation (V-max, TAMx, OSK) was facilitated by complex ultrasound treatment, which improves vascular microcirculation. A significant improvement in regional blood flow is associated with the normalization of tone and peripheral vascular resistance under the influence of vitamin PP due to its vasodilating effect. The use of Pentoxifylline, which normalizes the rheological

properties of blood and impaired peripheral resistance, contributed to the improvement of microhemodynamic parameters in the tissues of the tongue.

REFERENCES:

1. Дычко Е. Н., Ковач И. В. Обоснование лечебной коррекции глоссалгии // Вісник стоматології. – 2008. – № 2. – С. 24–26.
2. Дычко Е. Н., Ковач И. В., Штомпель А. В., Биденко Т. Н. Характер микроциркуляции в полости рта при глоссалгии // Український стоматологічний альманах. – 2012. – № 2. – С. 31–34.
3. Михальченко В. Ф. Рукавишникова Л. И., Тригголос Н. Н. Диагностика и дифференциальная диагностика кариеса зубов и его осложнений : учеб. пособие – М.: «Джагар», 2006. – 103 с.
4. Терещенко А.В., Джапуева А.Я. Глоссалгия/глоссодиния как междисциплинарная проблема. Клиническая дерматология и венерология. 2021;20(1):19–24. https://doi.org/10.17116/klinderma20212001119
5. Хубаев С. З. Диагностические и лечебные подходы при глоссодинии // Вестник Волгоградского медицинского университета. – 2013. – № 3. – С. 35–37.
6. Coculescu EC, Tovaru S, Coculescu BI. Epidemiological and etiological aspects of burning mouth syndrome. J Med Life. 2014 Sep 15;7(3):305-9
7. Dubey PK. Gabapentin for the treatment of glossodynia due to an unusual cause. Anesth Analg. 2008 Aug;107(2):729. doi: 10.1213/ane.0b013e31817d5bbb
8. Klasser GD, Grushka M, Su N. Burning Mouth Syndrome. Oral Maxillofac Surg Clin North Am. 2016 Aug;28(3):381-96. doi: 10.1016/j.coms.2016.03.005
9. Seccia TM, Rossitto G, Calò LA, Rossi GP. Oral Burning With Dysphagia and Weight Loss. Medicine (Baltimore). 2015 Aug;94(31):e1163. doi: 10.1097/MD.0000000000001163. PMID: 26252275
10. Shinoda M, Takeda M, Honda K, Maruno M, Katagiri A, Satoh-Kuriwada S, Shoji N, Tsuchiya M, Iwata K. Involvement of peripheral artemin signaling in tongue pain: possible mechanism in burning mouth syndrome. Pain. 2015 Dec;156(12):2528-2537. doi: 10.1097/j.pain.0000000000000322
11. Yoshimura R, Ikenouchi A, Okamoto N, Konishi Y. A Case of Major Depression with Burning Mouth Syndrome and Tinnitus Successfully Treated with Vortioxetine. Int Med Case Rep J. 2021 Apr 28;14:271-273. doi: 10.2147/IMCRJ.S306154
12. Wieser H, Ciacci C, Gizzi C, Santonicola A. Otorhinolaryngological Manifestations and Esophageal Disorders in Celiac Disease: A Narrative Review. J Clin Med. 2023 Nov 10;12(22):7036. doi: 10.3390/jcm1222703