"Clinical features of diagnostics and their defenses in patients with dysfunction of the high-mandibular joint without pathology, inflammatory-dystrophic origin"

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Abstract: *Temporomandibular joint dysfunction (TMJ) is a progressive disease; with prolonged exposure to the etiofactor, and sometimes even after its elimination, deep, often irreversible changes occur in the joint, causing dysfunction. Also, it should be noted that among the diseases of the joint, one of the first places is occupied by the so-called "internal disorders", which are understood as changes in intra-articular relationships, including displacements, defects, deformities of the articular disc, sprains and ruptures of the articular ligaments [1.3.5]; with various clinical manifestations and the absence of clear diagnostic principles, such patients often turn to doctors of other specialties and do not receive appropriate treatment [2.6].*

Key words:*Temporomandibular joint dysfunction, diagnosis and treatment, pathology, etiology and pathogenesis.*

1. Introduction

Despite the fact that, in recent years, various aspects of joint dysfunction have been studied and the introduction of high-tech methods of diagnostics and treatment of dental patients into medical practice [4.7], cannot find a solution to these problems. Also, in the literature, the anatomical prerequisites of pain dysfunction syndrome (SD) of the TMJ are not fully considered, the knowledge of which can contribute to their prediction and early diagnosis in clinical dentistry and maxillofacial surgery [1.7]. SDS is one of the most common TMJ diseases, which is inextricably linked to disruption of the masticatory muscles [3.4], damage to the branch of the ear-temporal nerve, as well as permanent microtrauma caused by changes in the tone of the masticatory muscles [8.11.13].Today, three main theories of the origin of SDS are considered: occlusive disorders, muscle imbalance, psychophysiological phenomenon. With the interaction of these factors, hyperfunction of the masticatory muscles may develop with the appearance of fatigue, pain, and limitation of mobility in the joint. Dysfunctional dysfunctions of the neuromuscular complex are caused by various reasons: psychogenic factor, lesions of the central nervous system, parafunctions of the masticatory muscles, occlusive disorders, premature contacts, errors in prosthetics [9.10.12].Currently, the dental clinician often uses in practice the classification of Yu.A. Petrosov, who divides the TMJ diseases into 5 groups [14.17.18], but in the first place singled out the dysfunctional states of the TMJ; - neuromuscular dysfunctional syndrome (DS); - occlusive articulation syndrome (OADS); - habitual dislocations and subluxations of the lower jaw (n / h); dislocations of the intra-articular meniscus (IVD) and parafunction of the masticatory, facial muscles and muscles of the tongue.We know that a full diagnosis of TMJ disorders is possible when performing general clinical and special research methods [15.16]; general clinical research methods include the patient's complaints about special research methods include: study of diagnostic models, occlusionography, radiography of the TMJ, contrast radiography, computed tomography (CT) of the TMJ in lateral and axial projections, magnetic resonance imaging of the TMJ, electromyographic (EMT) examination of the masticatory muscles movements n / h, electronic axiography (EAG) [19.20]. Differential diagnosis of various nosological forms of TMJ diseases is carried out among themselves and with facial pain [19.21]; special difficulties arise in the differential diagnosis of paresthetic syndromes, facial pain associated with a violation of the dentition and facial pain in neuralgia of the ear-temporal, trigeminal, glossopharyngeal nerves, styloid syndrome, cervical osteochondrosis, hyperkinetic syndromes of the masticatory muscles, or or dystonia [22.23].

However, there is no unified understanding of the medical tactics and the algorithm for a comprehensive examination of patients, which allows obtaining complete information about the morphofunctional state of the PCA, allowing to form a treatment plan and predict its outcome [21.24.25].Thus, in the presence of a wide variety of methods for special diagnostics of diseases of the temporomandibular joint, errors are still made in the differential diagnosis, diagnosis and the appointment of appropriate treatment. It is necessary to take into account the etiological factors and the clinical condition of the patient to select the optimal amount of diagnostic measures and develop new research methods.

2. The purpose of the study

To determine the diagnostic efficacy of research methods for TMJ SD not associated with inflammatory-dystrophic disorders of the joints.

3. Materials and research methods

To conduct a study in 120 patients aged 20 to 59 years (78 women and 42 men) who have complaints of the TMJ, including 39 - OSA; 28 - NMS; and 17 - dislocation of the intra-articular disc (IVD) without inflammatory-dystrophic changes; also as a control group (CG) of 36 patients without TMJ violation, in the Bukhara Regional Children's Dental Clinic, where the base of the department "Orthopedic Dentistry and Orthodontics" of the Bukhara State Medical Institute is located. The

identification of the symptoms of TMJ pathology was carried out using examination cards compiled on the basis of a survey and an objective examination that we developed to supplements, and all patients underwent general clinical and special examination methods using the recommended method. As you can see, from the data in Table 1 it follows that TMJ SD was more common in women 61.9%, and the main number of patients accounted for 59.6% after 40 years; also of the revealed common pathologies of the TMJ SD, 46.42% was OSA.

Table 1Distribution of patients by group, age and gender (% x)

Pathology		**SBD TMJ**			**Total patients**	**Control**
Age	**Floor**	SLA (OG-1) NMS	(OG-2) VD	(OG-3) SBD TMJ	SLA (OG-1)	**Healthy (KG)**
20-29 n=12	M; n=4	2 (6,25%)	2 (6,25%)	-	***12 (14,28%)***	*2 (12,5%)*
	W; n=8	4 (7,69%)	3 (5,76%)	1 (1,9%)		*2 (10,0%)*
30-39 n=22	M; n=7	3 (9,37%)	2 (6,25%)	2 (6,25%)	***22 (26,19%)***	*5 (31,25%)*
	W; n=15	8 (15,38%)	4 (7,69%)	3 (5,76%)		*5 (25,0%)*
40-49 n=24	M; n=8	3 (9,37%)	3 (9,37%)	2 (6,25%)	***24 (28,57%)***	*5 (31,25%)*
	W;n=16	8 (15,38%)	5 (9,61%)	3 (5,76%)		*6 (30,0%)*
50-59 n=26	M; n=13	7 (21,87%)	4 (12,5%)	2 (6,25%)	***26 (30,95%)***	*4 (0,25%)*
	W;n=13	4 (7,69%)	5 (9,61%)	4 (7,69%)		*7 (35%)*
M; n= 32 (38,09%)		15 (17,85%)	11 (13,09%)	6 (7,14%)	***84 (100%)***	*16 (44,44%)*
W; n=52 (61,9%)		24 (28,57%)	17 (20,23%)	11 (13,09%)		*20 (55,55%)*
Total patientsn=84 (100%)		**39 (46,42%)**	**28 (33,33%)**	**17 (20,23%)**	***84***	*36 (100%)*
Generalsurvey.n=120	**84 (70,0%)**	**39 (32,5%)**	**28 (23,33%)**	**17 (14,16%)**	***84/36***	*36 (30,0%)*

With the help of occlusiography, premature contacts were revealed according to the technique of registration of movements of n / h in the vertical direction (Kamenova LA Patent of the Russian Federation for a useful model No. 133709 dated 27.10.2013); the study of the bioelectrical activity of the masticatory muscles was carried out on a four-channel adaptive electromyograph (EMG) for dental research "Synapsis" by "Neurotech" (Taganrog, Russia); registration of biopotentials was carried out according to the same scheme for all studied: at rest (20 s) and under functional loads, namely with maximum compression of the jaws (5c), voluntary chewing and chewing alternately on the right and left sides of 0.8 g of dried almonds (15c). When processing electromyograms, the following was determined: the average amplitude of biopotentials in the phases - rest (BEP), when chewing a nut (BEAzh), with maximum compression of the jaws (BEAw) in μV, chewing time in seconds, rest time, chewing frequency and coefficient "K".

Computed tomography was performed on a spiral multislicetomograph (company "GE Light Speed" (USA), with a closed and open position of the mouth and a scanning time of one phase 5-7 s. Scanning parameters: 120 Kv; 140 mA; slice thickness 1.25 mm, with a reconstruction interval of 0.8 mm, multiplanar reconstructions were also performed in the sagittal and frontal planes, as well as reconstruction of a three-dimensional (3D) image with a closed and open mouth.At the same time, the line from the apex of the articular tubercle (point A1) to the lower edge of the external auditory canal is (point A5); therefore, the line formed the following points of intersection with the glenoid head and the glenoid fossa: A2 - with the anterior surface of the articular head; A3 - with the posterior surface of the articular head; A4 - with the posterior surface of the glenoid fossa.To the segment A1-A5 from the highest point of the articular head - (point B1), a perpendicular was lowered - point B2; the B2-B1 segment continued upward until the intersection with the glenoid fossa, this is point B3; angles A1B2B3, A5B2B3 were divided by bisectors. Each bisector crossed the glenoid head and the glenoid fossa at two points. Thus, the analysis of the SCT of the temporomandibular joint allows us to study the width of the joint space between the points: C1-C2 = D1 - superior-anterior dimension; B1-B3 = D2 - top size; C3-C4 = D3 - upper back size; A1-A2 = D4 - front size; A3-A4 = D5 - back size. With the mouth closed, tomograms were studied on a section passing through the highest part of the articular head, and with an open mouth, through the apex of the articular tubercle. We studied the

location of the articular head in relation to the articular tubercle, the degree of dislocation of the head of the condylar process by 1-2 mm, 3-4 mm, 5 mm or more, and structural changes in the articular elements.The obtained materials were statistically processed using the Statistika, Microsoft Office software package. The digital data were processed on a personal computer by the method of variation statistics.

4. Results and discussion

When analyzing 84 cards of patients in the main group, we identified the following nosological forms of SDS; OADS - 46.42% (OG-1); NMS - 33.33% (OG-2); dislocation of the intra-articular disc (IVD) - 20.23% (OG-3) (see table No. 2.). Based on the results of the examination of patients with OG-1, 2 and 3, we present the following table for clinical symptoms. With a careful study of the data identified by us, we identified the clinical symptoms, which in OG-1 - 95%; OG-2 and 3 in 100% of cases are found in nosological forms of TMJ SD.

Table 2.
Clinical symptoms in patients with SDS TMJ OG-1, 2 and 3.

Complaints	**ОАДС (n=39)**	**НМС (n=28)**	**ВВД (n=17)**	**Всего (n=84)**
Joint pain on one side	25	24	10	59
Joint pain on both sides	13	5	7	25
The nature of the pain: acute	-	26	6	32
dull, aching	38	19	12	69
Irradiation of pain in: temple, occiput, ear	28	4	6	38
chewing muscles	10	8		18
Clicking on one side	28	20	15	63
Clicking on both sidesн	10	5		15
Clicks occurring: Wednesday. opening. mouth.	38	21	7	64
reciprocal	-	10	8	1
Crunching when the jaws are tightly clenched	6	4	9	19
Sensation of a foreign body in the joint	14	26	10	50
Tinnitus, ear congestion	18	20	12	50
Blocking jaw movements	14	26	15	55
Hypertonicity of the chewing muscles	5	10	4	19
Daytime jaw clenching	6	8	2	16
Teeth grinding at night	5	3	3	11
Rapid muscle fatigue when chewing	14	6	20	40
Medical history				
Prolonged unilateral chewing	27	28	17	82
Bad habits	39	28	4	71
Wide mouth opening	3	8	6	17
Prolonged emotional stress	4	8	12	24
After orthodonto - orthopedic treatment	22	4	1	27
After dental filling	4	1	-	5

Physical examination data				
Asymmetry of the face to the affected side	9	28	12	49
Deflexion	-	28	16	44
Deviation	38	-	11	49
Restriction of mouth opening	15	28	15	58
Dental arches defects	12	12	10	34
Secondary deformation of the occlusion	9	9	7	25
Decreased interalveolar height	6	5	9	20
Pathological bite	8	8	14	30
Pain on palpation of the TMJ area	29	23	14	66
Pain on palpation of the actual chewing muscles	12	7	13	32

According to the results obtained with OADS, 97% of patients had the following combination of symptoms: clicking in the middle of opening the mouth, dull pain in the TMJ, bad habits, partial absence of teeth, pain on palpation of the TMJ region, deviation, premature contacts, decreased amplitude of chewing movements, increased bioelectricity. activity of the chewing muscles at rest. The same picture is observed in patients with NMS too. VVD in almost 100% of patients was accompanied by clicking in the middle of opening the mouth, acute and short-term pain in the temporomandibular joint during chewing and maximum opening of the mouth, sensation of a foreign body in the joint, rapid muscle fatigue when chewing, "jamming", "blocking" of the joint, inability to close correctly teeth, bad habits, chewing on one side, pain on palpation of the lateral pterygoid muscles, restriction of opening the mouth, deflection to the painful side, premature contacts, a decrease in the amplitude of mouth opening, narrowing of the joint space, the location of the articular heads on the clivus of the articular tubercles.As a result of studying the nature of vertical movements when opening and closing the mouth with OSA, NMS and VVD, it was revealed (table No. 3.) that the amplitude of movements decreased in OG-1 with maximum mouth opening by 1.0 ± 0.2 cm (24.8 ± 4.1%). The correlation coefficient, comparison with control, indicates a complete relationship between a decrease in the amplitude of vertical movements of the n / h and the occurrence of OSA, NMS and VVD of the TMJ. With the maximum opening of the mouth, the amplitude was - 2.9 ± 0.6 for OG-1; - 3.0 ± 0.2 for OG-2; 3.1 ± 0.7 for OG-3; on the CG - 4.4 ± 0.4; also by time (sec); - 6 ± 0.4; - 6 ± 0.3; - 5 ± 0.5; - 4 ± 0.2, respectively. When opening and closing the mouth by 2 ± 0.5 cm, the jaw deviated from the mid-sagittal line, and this was expressed in stretching and changing the direction of the pattern. The time spent on lowering the n / h was 4 ± 3 sec, which corresponded to the norm.

The results of the EMG study showed an increase in the bioelectrical activity (BEA) of the chewing muscles at rest (BEP) on OG-1, OG-2 and OG-3; decrease in max-squeezing and chewing.

Table 3.
Functional characteristics of the actual masseter and temporal muscles in patients with TMJ OADS (n = 29) before treatment

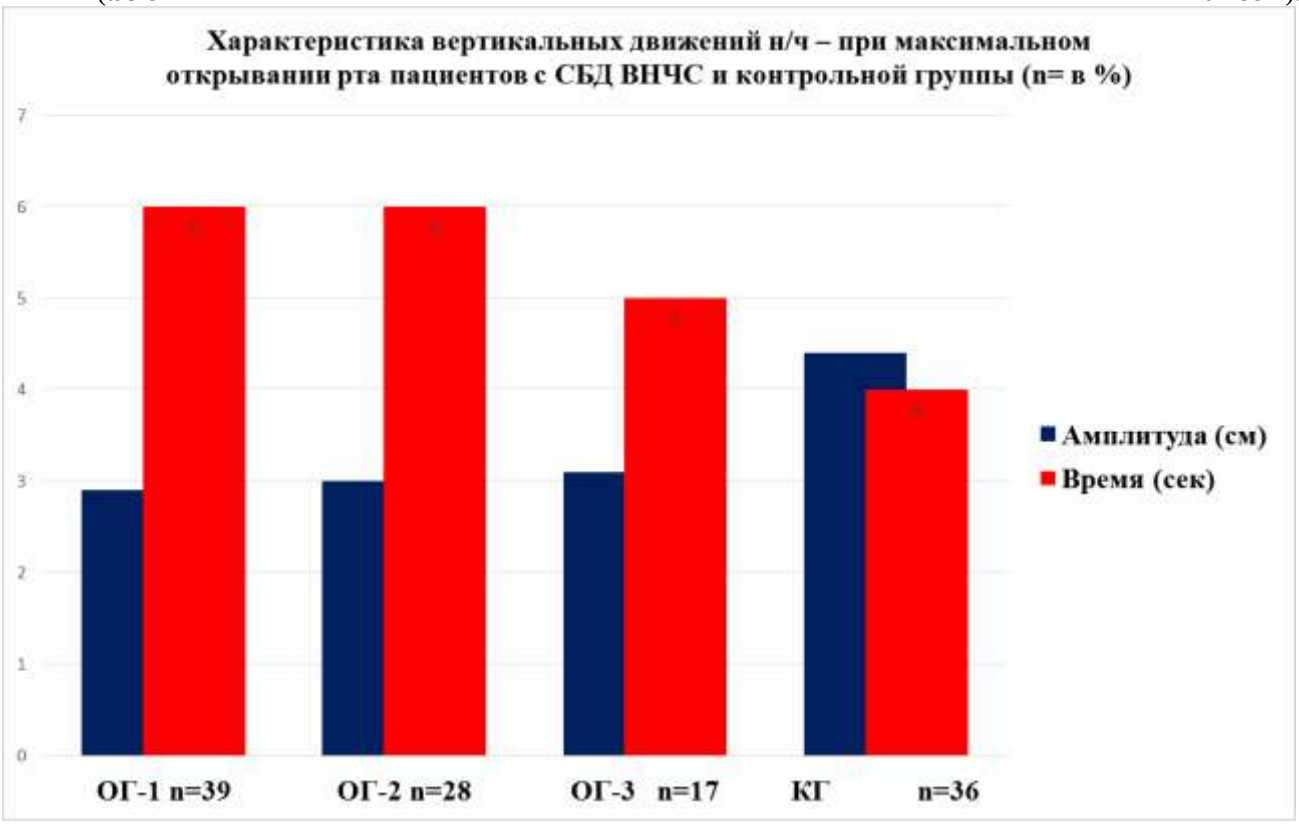
	EMG indicators (μV)	**Actually, the chewing muscles**		**Temporal muscles**	
		Struck-I side	**Healthy side**	**Struck-I side**	**Healthy side**
OG-1	**BEP**	41,2±4,9	39,7±5,1	43,8±4,2	39,0±4,9
	BEA (compression)	490,2±43,2	461,4±32,2	432,6±50,3	473,4±46,2
	BEA (chewing)	377,2±69,4	367,2±60,1	334,3±81,4	354,8±69,1
	Chewing time (s)	7,98±0,2	7,47±0,3	7,98±0,4	7,54±0,3
	Rest time (s)	6,44±0,5	6,33±0,2	6,56±0,6	7,21±0,2
OG-2	**BEP**	42,2±5,1	41,2±4,3	38,8±3,6	37,3±4,1

	BEA (compression)	337,1±98,2	344,5±101,3	204,3±100,3	234,5±122,1
	BEA (chewing)	240±71,3	265±65,4	239±67,4	263±90,3
	Chewing time (s)	9,42±0,3	8,2±0,2	9,47±0,2	9,0±0,2
	Rest time (s)	6,87±0,3	7,71±0,3	7,09±0,1	8,22±0,1
OG-3	**BEA (compression)**	42,4±5,8	40,2±6,3	40,4±2,8	36,3±5,1
	BEA (chewing)	360,1±100,2	376,5±122,3	218,6±125,3	248,4±134,1
	Chewing time (s)	244±70,3	288±80,2	260±87,4	295±93,3
	Rest time (s)	9,42±0,3	8,92±0,3	9,86±0,6	9,03±0,4
	BEA (compression)	7,03±0,6	7,81±0,3	7,48±0,1	8,67±0,4

Note: reliability at p <0.05

According to the results of spiral computed tomography in an oblique projection in the “mouth closed” position, all OG-1, 2, 3 revealed an expansion of the joint space in D4 and a narrowing of the gap - in the D2 and D5 sections on the diseased side, while on the healthy side - expansion in D2 and D5 departments. When examining in the “mouth open” position, the articular heads were located at the apex of OG-1 20 (51.28%); OG-2 12 (42.85%); in OG-3 9 (52.94%), on the posterior slope of the articular tubercle in 18 (46.15%); 13 (46.42%) and 8 (47.05%) patients respectively

(table number4).



Note:reliabilityat p<0.05

CT of the temporomandibular joint in an oblique projection was performed in all patients in OG-1, 2 and 3 in the “mouth closed” and “mouth open” positions during the examination. According to the study of CT in the "mouth closed" position on the affected side, a narrowing of the joint space in the D3, D5 sections, expansion - in the D4, section, on the healthy side - expansion in the D3 and D5 sections, narrowing - in the D4 sections was revealed. When examining in the “mouth open” position, the TMJ articular heads were located in 37 (94.87%); 28 (100%) and 17 (100%), respectively, patients on the posterior slope of the articular tubercle of the affected side and on the apex of the articular tubercle of the healthy side.

Figure №1. Photo patient 28 years old, medical card

Based on the data obtained during the collection of subjective, objective and special research methods, we compiled tables for the differential diagnosis of nosological forms of TMJ SD (Table 5), which included symptoms that occur in 100% of cases.

Thus, taking into account the symptomatic complex characteristic of each nosological form of TMJ BD, it is more likely to diagnose and prescribe the appropriate treatment. Because, when analyzing clinical observations of patients with DMD, TMJ; OSA, NMS and VVD were noted for common complaints - pain, clicking in the joint, tinnitus, and muscle fatigue when chewing. Anamnesis revealed that the causes of the disease were - restoration of chewing teeth with fillings without occlusion control, prolonged unilateral chewing and bad habits. In the future, there was a violation of the function of the ZChS, manifested in the restriction of opening the mouth, blocking the movements of the jaw and impaired chewing function.

5. Conclusions

When examining patients with SDS, TMJs were found to occur in 100% of cases, taking into account which the basis for a detailed table for the differential diagnosis of OSA, NMS and VD was developed. Using special research methods, it is possible to establish a relationship between the amplitude of vertical movements of the n / h, changes in the BEP of the masticatory muscles and the occurrence of OSA, NMS and VD.

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