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APPROACHES TO THE DIAGNOSIS OF THE DYSFUNCTIONAL STATE OF THE TEMPOROMANDIBULAR JOINT

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Abstract – According to some literature data, special attention in the diagnosis of dysfunction of the temporomandibular joint is given to a detailed analysis of complaints, the collection of anamnesis and data of the main research methods characterizing the dental status of profile patients in the form of structural algorithms using databases focused on this pathology [10, 12, 16, 25, 35, 37, 43], as well as generalized clinical methods for the diagnosis of functional disorders of the dentoalveolar system, taking into account modern scientific views [6, 7, 8, 18, 21].

Key words: temporomandibular joint, the dentoalveolar system, lower jaw, masticatory muscles, temporal muscles, topographic relationships.

I.Introduction

To date, a non-contact method of computerized assessment of the state of movements of the lower jaw is proposed; for the determination of occlusal disorders, it is reliably considered the latest computer technology - the T-Scan apparatus, ARCUS digma and a virtual articulator with software through the use of intraoral scanners [36, 38, 39, 41]. Other authors argue that electronic axiography remains relevant in the diagnosis and treatment of temporomandibular joint dysfunction [3, 9, 15, 24, 40].

According to a number of authors, electromyographic study of the masticatory muscles is effective for a differentiated assessment of muscle balance in patients with temporomandibular joint dysfunction [19, 23, 27, 28, 29, 44], others believe that the possibility of diagnosing the state of the masticatory and temporal muscles with using a computer neuromyographic analyzer in persons with pathology of the temporomandibular joint [11].

We know that, on a tomogram of a joint with dysfunction, uneven narrowing and widening of the joint space is determined in different parts of the right and left [1, 5, 30], therefore, today a number of authors consider the most informative method for visualizing the topographic relationships of joint elements in the diagnostic process and planning of treatment for patients with dysfunction, there remains computed tomography and digital technologies in general [4, 26, 32, 33].

It is also noted that for the timely detection of the asymmetry of the facial skeleton, leading to a violation of the interposition of articular elements and the development of dysfunction, it is advisable to use teleradiography [22]; on the role of staged orthopantomograms in the treatment of malocclusion and prevention of temporomandibular joint dysfunction [2].

The module developed for the analysis of biometric parameters of occlusal contacts and near-contact zones of antagonizing teeth should be considered relevant [20].

II.Literature review

A special role in the diagnosis of the disease should be given to psychosomatic manifestations accompanied by neurotic disorders of the depressive and hysterical character of the patient's personality [17]. Also, for many years the problem of the diagnostic significance of psychological stress in the origin of myofascial disorders remains controversial [46]. At one time, the assertion of foreign authors that the symptoms of sleep disorders are both an indicator of the risk of development and a sign of the existing dysfunction of the temporomandibular joint [42], including spasm of the masticatory muscles [31].

Early signs of temporomandibular joint dysfunction in modern literature include deviation of the lower jaw up to 5 mm to the side, zigzag opening of the mouth, impaired smoothness of movement, limiting the amplitude of mouth opening to 3 cm, clicking when opening the mouth, fatigue of the chewing muscles [14].

According to modern scientists, dysfunction of the temporomandibular joint, as a syndrome, is a craniomandibular disorder based on neuromuscular syndromes, and alternately involving various components of the maxillofacial system, forming polytopathogenetic disorders, while not being an independent pathology [13, 34, 45].

Thus, analyzing the literature data, we can say that the main pathogenetic mechanisms for the development of temporomandibular joint dysfunction are changes in the masticatory muscles, articular disc, capsular-ligamentous component of the biomechanical system; as occlusal-articulatory disorders, irrational prosthetic constructions, defects and deformations of the dentition, complicated by a violation of the biomechanics of the lower jaw, stress and bruxism are the causes of central genesis.

III.Analysis

To identify the incidence and structure of diseases of the temporomandibular joint, an examination was carried out and filled in every 1197 patient aged 20 to 70 years living in the Bukhara region, including in the city of Bukhara according to the map developed by us and approved by the Ministry of Health of the Republic of Uzbekistan (No. 0498, Protocol dated May 25, 2020) in accordance with the recommendations of the World Health Organization. All patients applied for specialized help at the dental center at the Bukhara State Medical Institute and consulted with the staff of the department, orthopedic dentists, psychotherapists and neurologists of the department of the institute.

Table № 1

Distribution of examined patients with temporomandibular joint dysfunctions and healthy people by age and gender (n - in%)

Groups examined		**Temporomandibular joint pain dysfunction syndrome**			**Total examined**	
Age	**Gender**	**Occlusion - articulati**	**Neuromuscular syndrome**	**Dislocations of the intra-**	**Syndrome of pain dysfunction**	***Healthy (Control group)***

		on syndrome (Main group-1)	**(Main group-2)**	**articular disc (Main group-3)**	**of the temporomandibular joint**	
20-29 n=88	Women; n=30	8 (7,14%)	6 (9,52%)	4 (4,65%)	**n=48 (7,89%)**	***20 (9,21%)***
	Men; n=58	10 (7,51%)	12 (13,18%)	8 (6,50%)		***20 (5,37%)***
30-39 n=154	Women; n=67	17 (15,17%)	10 (15,87%)	10 (11,62%)	**n=99 (16,28%)**	***25(11,52%)***
	Men; n=87	35 (26,31%)	12 (13,18%)	15(12,19%)		***30(8,06%)***
40-49 n=248	Women; n=118	25 (22,32%)	12 (19,04%)	21 (24,41%)	**n=127 (20,88%)**	***50 (23,04%)***
	Men; n=130	35 (26,31%)	14 (15,38%)	20 (16,26%)		***71 (19,08%)***
50-59 n=398	Women; n=148	35 (31,25%)	18 (28,57%)	23 (26,74%)	**n=165 (27,13%)**	***85 (39,17%)***
	Men; n=250	31 (23,31%)	28 (30,76%)	30 (24,39%)		***148 (39,78%)***
60-69 n=309	Women; n=115	27 (24,1%)	17 (26,98%)	28 (32,55%)	**n=169 (27,75%)**	***46 (21,19%)***
	Men; n=194	22 (16,54%)	25 (27,47%)	50 (40,65%)		***94 (25,26%)***
Women	**n=478 (39,93%)**	n=112 (23,43%)	n=63 (13,17%)	n=86 (17,97%)	**n=261 (42,92%)**	***217 (37,79%)***
Men	**n=719 (60,06%)**	n=133 (18,49%)	n=91 (12,65%)	n=123 (17,10%)	**n=347 (57,07%)**	***372 (62,20%)***
Total patients n=608 (100%)		**n=245 (40,29%)**	**n=154 (25,32%)**	**n=209 (34,37%)**	**n=608 (100%)**	***n=589 (100%)***
Total surveyed n=1197 (100%)		**245 (20,46%)**	**154 (12,83%)**	**209 (17,46%)**	**n=608 (51,16%)**	***n=589 (49,03%)***

As can be seen from the table, out of 1197 examined people, 51.16% had a syndrome of pain dysfunction of the temporomandibular joint according to the ICD10 code - K07.8; of them - 42.92% Women, 57.07% Men.

Determination of the dental status of patients was carried out on the basis of a comprehensive examination, which includes generally accepted in-depth clinical methods; survey, examination, palpation, percussion, probing.

The early signs of dysfunction included: deviation of the lower jaw when opening the mouth to the right or left side more than 5 mm, zigzag movement of the lower jaw when opening the mouth, limiting the opening of the mouth to 3 cm, increased fatigue of the chewing muscles; when collecting the anamnesis of the disease, special attention was paid to their detailing

according to the recommended method [Edited by SA Gafforov. Dentistry, 2018; Tereshina, T.P., 2014].

All obtained data were processed using the Microsoft® Office® Excel® 2010 software package, Microsoft Corporation (Redmond, WA, USA) and the WinPEPI 11.45 software using the Spearman's rank correlation coefficient ρ; method of multivariate analysis of variance (reliable value $p < 0.05$).

Analysis of the research materials obtained from Table № 1 shows that the main group consisted of patients with the syndrome of painful dysfunction of the temporomandibular joint 608 (100%); of them, patients with occlusive-articulatory syndrome - 245 (40.29%) (Main group-1), with neuromuscular syndrome - 154 (25.32%) (Main group-2) and with dislocation of the intra-articular disc - 209 (34, 37%) (Main group-3); control group - 589 people with practically no problems with the temporomandibular joint; also, 50-59 and 60-69 years of age, the highest rate of pathology of the temporomandibular joint was established - 27.13% and 27.75%, respectively, healthy people amounted to 49.03%, of which 37.79% were Women, 62.20% - Men. According to nasological clinical forms, occlusive-articulatory syndrome at the age of 50-59 years among women - 31.25%; neuromuscular syndrome - 28.57% in women and 30.76% in men; also dislocation of the intra-articular disc - at the age of 60-69 years was found among men - 40.65%, in Women - 32.55%.

According to the respondents, 46.1% had complaints of clicks in the temporomandibular joint when opening and / or closing the mouth, eating and talking, 41.8% had painful sensations in the joint. Restriction or other violation of opening of the mouth was experienced by 29.5% of the surveyed; inconvenience when closing teeth, violation of occlusion was noted by 58.1% of respondents (Table № 2). Moreover, the symptoms of functional disorders of the temporomandibular joint; both click and anamal occlusion disorders were noted much more often in women than in men (55.5% and 64.7%; 38.9% and 53.1%, respectively). This means that the classic triad of symptoms is formed: pain in the temporomandibular joint and / or chewing muscles, noise in the joint and limitation of movement. Also, a relationship was revealed between the age of respondents, the frequency and number of complaints; so, if at the age of 20-29 years, noise phenomena in the joint and pain were recorded in 37.5% of cases, then by the age of 60-69 the percentage increased by 53.2%.

Table № 2

The prevalence of individual symptoms in the history of patients' syndrome of pain dysfunction of the temporomandibular joint of different age groups

Age group and absolute number		Temporomandibular joint pain dysfunction syndrome							
		History of pain		History of restriction of mouth opening		History of clicks		History of occlusion	
		Abs.	%	Abs.	%	Abs.	%	Abs.	%
20-29 years old n=48		19	39,6	8	16,7	18	37,5	11	22,9
30-39 years old n=99		40	40,4	30	30,3	32	32,3	31	31,3

40-49 years old n=127	62	48,8	49	38,6	58	45,7	49	38,6
50-59 years old n=165	83	50,3	48	29,1	82	49,7	93	56,4
60-69 years old n=169	97	57,4	45	26,6	90	53,2	169	73,4
Women n=261	122	46,7	77	29,5	145	55,5	169	64,7
Men n=347	179	51,6	103	29,7	135	38,9	184	53,1
Total patients n=608	301	49,5	180	29,6	280	46,1	353	58,1

The share of persons with one or more than three complaints had a positive trend. In the age group 20-29 years, 12.5% of patients presented one or more three complaints, by the age of 30-39 and 40-49 the number of two complaints was 34.3% and 29.9%, respectively; three complaints 26.3% and 22.1%, and among respondents 60-69 years old and two complaints 23.6%, and three complaints amounted to 17%. Also, during the survey, 24% of all surveyed confirmed the presence of bad habits, smoking accounted for 45.9%, biting the lower lip - 27.3%. Oral breathing, cheek biting, nail biting, hand biting, bruxism, and eating seeds were equally common (3.4-4.0% each). Those who had no complaints among Women made up 52.3%, among Men 48.4% (Table № 3).

Table № 3

The prevalence of individual symptoms in the history of patients' syndrome of pain dysfunction of the temporomandibular joint of different age groups

Age group and absolute number	**Temporomandibular joint pain dysfunction syndrome**									
	No complaints		**One complaint**		**Two complaints**		**Three complaints**		**More than three complaints**	
	Abs.	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**
20-29 years old n=48	29	60,4	6	12,5	25	52,1	10	20,8	6	12,5
30-39 years old n=99	59	60,0	18	18,2	34	34,3	26	26,3	12	12,1
40-49 years old n=127	65	51,2	12	9,4	38	29,9	28	22,1	26	20,5
50-59 years old n=165	82	49,7	4	2,4	39	23,6	28	17,0	30	18,2
60-69 years old n=169	72	42,6	2	1,2	25	14,8	29	17,2	17	10,1
Women n=261	139	53,2	20	7,7	75	28,7	63	24,1	45	17,2
Men n=347	168	48,4	18	5,2	74	21,3	58	16,7	46	13,3
Total	307	50,5	38	12,3	161	26,5	121	19,9	91	14,9

patients n=608										

During external examination, a number of respondents with pathologies of the syndrome of pain dysfunction of the temporomandibular joint revealed facial asymmetry due to hypertrophy of the masticatory muscles; including those without asymmetry - in 328 (53.94%) patients; asymmetry on the right - 65 (10.69%); asymmetry on the left - 58 (9.53%); two-sided asymmetry - 161 (26.48%); by age, the highest indicator is observed asymmetry on the right - 40-49 years in 25 (19.68%) patients; asymmetry on the left - 50-59 years old in 31 (18.78%) patients; bilateral asymmetry - 60-69 years old in 69 (40.82%); by sex - Women have asymmetry on the right - 30 (11.49%); asymmetry on the left - in 52 (19.92%); bilateral asymmetry - in 68 (26.05%); Men - 28 (8.06%); - 45 (13.25%); - 50 (14.40%), respectively.

IV.Discussion

The study revealed: accompanying the movement of the lower jaw with noise phenomena in 280 (46.06%) patients in the temporomandibular joint; including clicking when opening the mouth on the right - in 45 (15.84%); on the left - in 80 (28.57%); clicking when closing the mouth on the right - in 92 (32.85); on the left - in 63 (22.5%) patients, including it is noted that the age groups from 50-59 and 60-69 years old have high noise indices.

When examining pain on palpation of the temporomandibular joint, it was established; tenderness to palpation on the right in 178 (59.13%); pain on palpation on the left in 123 (40.86%) patients; by age, the main pain on the right is observed more in patients of 40-49 years old, 50-59 and 60-69 years old surveyed (58.2%; 54.8% and 55.3%), respectively.

An important diagnostic sign of functional disorders is a dysfunction of the joint, which is clinically expressed in a change in the volume and nature of movements of the lower jaw; the distribution of symptoms among patients according to the fullness, symmetry and painfulness of opening the mouth is presented in table № 4.

When examining patients at the time of opening the mouth, we recorded lateral displacements of the lower jaw. We believe that the jaw shifted towards the unaffected or less affected joint. The absence of lateral movements could indicate not only the norm, but also the dysfunction of the two joints. In a number of persons, when opening the mouth, wave-like movements were noted, since the jaw first shifted towards the joint with the smallest amplitude of movement, and then in the opposite direction.

Table № 4

The number of noted symptoms by the degree of mouth opening and symmetry in different age categories in patients with the syndrome of painful dysfunction of the temporomandibular joint

Symptoms	**20-29 years old**	**30-39 years old**	**40-49 years old**	**50-59 years old**	**60-69 years old**	**Total symptoms**
Limited	2	28	11	44	18	**103**
	3,70%	26,92%	5,55%	15,82%	6,20%	**11,14%**
In full	-	7	78	100	117	**302**
	0%	6,73%	39,39%	35,97%	40,34%	**32,68%**

Overly	2	4	5	6	5	**22**
	3,70%	3,84%	2,52%	2,15%	1,72%	**2,38%**
Symmetry	45	63	85	82	24	**299**
	83,33%	60,57%	42,92%	29,49%	8,27%	**32,35%**
Deflection	2	1	8	42	32	**85**
	3,70%	0,96%	4,04%	15,10%	11,03%	**9,19%**
Deviation	3	1	11	4	94	**113**
	3,70%	0,96%	5,55%	1,43%	32,41%	**12,22%**
Women 261/42,92 %	**25/46,29 %**	**59/56,73 %**	**116/58,58 %**	**157/56,47 %**	**171/58,96 %**	**528/57,14%**
Men 347/57,07 %	**29/53,70 %**	**45/43,26 %**	**82/41,41%**	**121/45,68 %**	**119/41,03 %**	**396/42,85%**
Number of patients n=608	**54/100%**	**104/100%**	**198/100%**	**278/100%**	**290/100%**	**n=924/100 %**

The analysis of the results obtained from Table № 4 can be noted as a statistically significant increase in indicators with age groups in terms of symptoms in the full volume and deflection of a straight line, and in terms of symmetry of the opposite relationship; It can also be noted that of the certain pathological symptoms, the most often noted "in full" (32.68%), "deviation" 12.22%, "limited" 11.14% of cases.

When determining the bite in the examined by us it was found that 315 (51.80%) patients had orthognathic bite, 34 (5.59%) - straight; occlusion anomalies were observed in 293 (48.19%) respondents; including - frequent narrowing of the dentition of the upper and / or l/j, deep bite in 85 (13.98%), prognathia in 66 (10.83%).

Table № 5

Frequency of dentition defects in patients with temporomandibular joint pain dysfunction syndrome

Denture defects	**20-29 years old**	**30-39 years old**	**40-49 years old**	**50-59 years old**	**60-69 years old**	**Total symptoms**
absent	22	38	36	24	10	**346**
	68,75%	62,29%	20,45%	12,69%	6,66%	**56,90%**
small	8	16	42	24	47	**68**
	25%	26,22%	23,86%	12,69%	31,33%	**11,18%**
middle	2	5	48	68	47	**105**
	6,25%	8,19%	27,27%	35,97%	31,33%	**17,26%**
big	-	2	50	73	46	**89**
	0%	3,27%	28,40%	38,62%	30,66%	**14,63%**
Women 261/42,92%	**19/59,37 %**	**40/65,57 %**	**89/50,56 %**	**102/53,96%**	**88/58,66 %**	**352/57,89%**

Men 347/57,07%	**13/40,62 %**	**21/34,42 %**	**87/49,43 %**	**87/46,03 %**	**62/41,33 %**	**256/42,10%**
Number of patients n=608	**32/100%**	**61/100%**	**176/100%**	**189/100 %**	**150/100 %**	**n=608/100 %**

When analyzing the data on the state of the dentition, it can be noted that the overwhelming majority of patients in 346 (56.90%) had complete dentition, and only 262 (43.09%) patients had dentition defects of various lengths and localization (Table № 5). Also, when analyzing the length of dentition defects (diagram № 1), it was found that 11.18% of them are small defects (1 to 3 teeth were missing), and the share of medium defects (4 to 6 teeth were missing) and large (more than 6 teeth were missing) accounted for 17.26% and 14.63% (respectively).

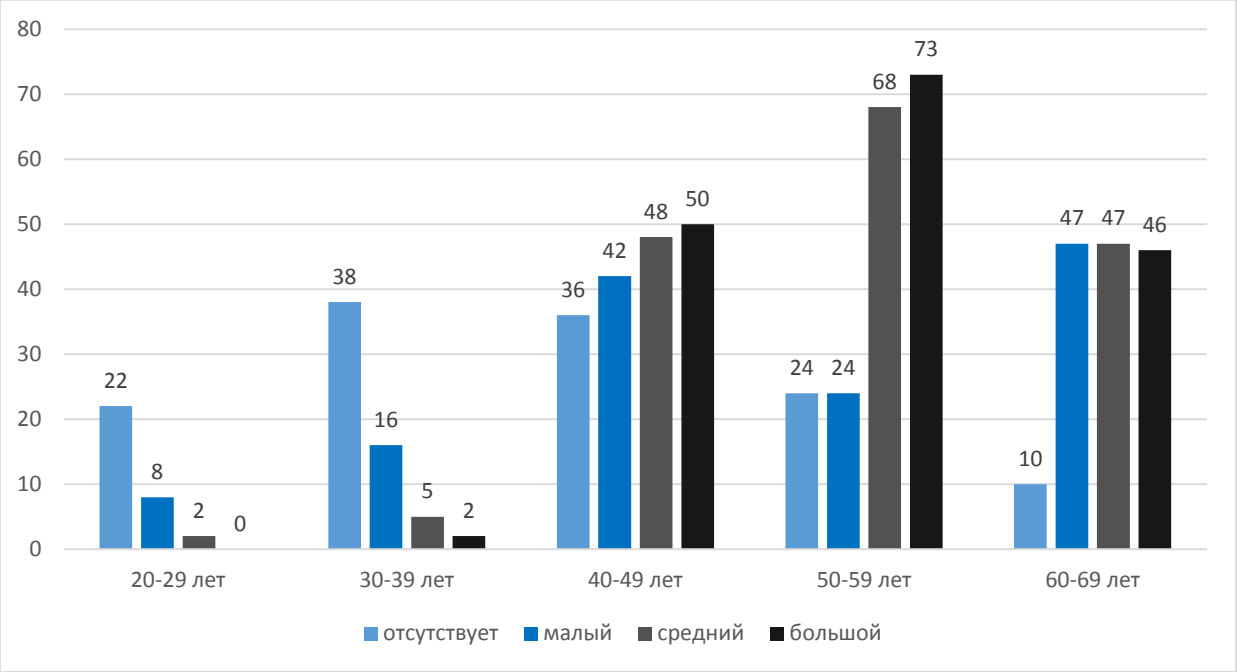

Diagram № 1. Defects of dentition depending on age in patients with the syndrome of pain dysfunction of the temporomandibular joint

V.Conclusion

The study indicates a high prevalence of symptoms of pain dysfunction of the temporomandibular joint: 46.1% have complaints of clicks in the temporomandibular joint when opening and / or closing the mouth, pain in the temporomandibular joint 49.5%, inconvenience when closing teeth, impaired occlusion in 53.1%, limited opening of the mouth experienced in 29.6% of the examined. Based on the results, it is possible to conduct in-depth scientific research in order to find the optimal means and methods for the prevention and treatment of diseases of the temporomandibular joint, taking into account the main pathogenetic mechanisms of their development.

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