

# CLINICAL FEATURES OF TEMPOROMANDIBULAR JOINT DYSFUNCTION IN PATIENTS WITH MESIAL OCCLUSION COMPLICATED BY DENTITION DEFECTS

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**ABSTRACT** — Mesial occlusion is one of the most severe forms of dentoalveolar anomalies and can be complicated by the temporomandibular joint dysfunction. This study is focused on identifying the clinical features of the temporomandibular joint morpho-functional status in mesial occlusion. 20 patients with mesial occlusion were examined employing clinical methods, zonography, and functional diagnostics. As a result, the clinical signs most typical of this pathology were revealed, which helped reduce the severity of this pathology as a through treatment.

**KEYWORDS** — mesial occlusion, dentition defects, temporomandibular joint, zonography, functiography.

Dentoalveolar anomalies and deformations are fairly common pathologies [14, 18, 24, 28, 35, 39]. As a rule, they come combined and complicated by morphological and functional changes in the maxillofacial area [12, 17, 21, 25, 30, 37].

Specialists are paying a lot of attention to the diagnostics and choice of orthodontic and orthopedic methods for treating patients with dentoalveolar anomalies and deformations [1, 3, 5, 7, 9, 11, 13, 16, 19, 22, 26, 29, 36, 40].

One of the worst types of dentoalveolar anomalies is mesial occlusion [4, 32, 33, 34, 42].

Lack of timely orthodontic or device-based surgical treatments or the patient's rejection of these treatments, will only add to the development of associated



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complications manifested as defects and secondary deformations of the dentition, as well as muscular and joint disorders [2, 6, 8, 10, 15, 20, 23, 27, 31, 38, 41].

*Aim*

To identify morphological and functional maxillofacial changes in patients with mesial occlusion combined with the dental range issues and temporomandibular joint pathologies.

**MATERIALS AND METHODS**

The study involved 20 persons aged 20 through 65, who underwent prosthetic treatment for mesial occlusion combined with the dentition defects and complicated by a temporomandibular joint pathology.

The efficiency of the orthopedic treatment was determined based on the outcomes of clinical and laboratory research. We focused our evaluation on the following symptoms: the face symmetry; the amplitude of the vertical, lateral and onward mandibular movements; the symmetry of mandibular movements when opening the mouth; the pain in the temporomandibular joints and masticatory muscles at the lower jaw palpation and movements; articular noise identification. All the symptoms were scored where the sum of the points indicated the degree of functional disorders — 0 points — no dysfunction; 1–10 points — mild dysfunction; 11–20 points — moderate dysfunction; 20–50 points — severe dysfunction. To evaluate the anatomical and topographic structure of the temporomandibular joint, tomography was used, which was performed using the universal radiographic unit ORTHOPHOS 3 of SIEMENS. The temporomandibular joint and masticatory muscles functions, just like the identification of occlusal disorders were carried out through functiography (by Kleinrok-Hvatova), based on intraoral recording of the lower jaw movements.

The statistical processing was performed directly from the common data matrix of ECXEL 7.0 (Microsoft, USA) also involving certain features offered by the STATGRAPH 5.1 (Microsoft, USA) software, ARCADE (Dialog-MGU, Russia), and implied detecting the median values, its mean root square deviation, and the non-sampling error. Further on, following the patterns commonly employed for medical and biological studies (sample numbers; type of distribution; non-parametric criteria; reliability of the difference of 95%, etc.) the significance of the sampling difference was evaluated subject to the Student's criterion (*t*) and the respective significance index (*p*).

**RESULTS AND DISCUSSION**

In 60% of the cases, an external examination revealed a face asymmetry in patients with mesial occlusion combined by lateral dentition defects and complicated by temporomandibular joint dysfunction. Mouth opening was impeded — in the vertical plane

— in 40% of the cases; in the horizontal plane — in 45% of the cases. The mandibular onward movement issues were observed in 35% of the patients. Deviation affecting the mouth the opening was present in 55% of the cases, while 35% of the cases revealed deflection. Auscultation showed the articular noise pathology in 80% of the patients. Temporomandibular joint pain occurring at a single movement of the lower jaw, was detected in 15%, whereas as far as two or more movements were involved, then pain sensations were reported by 10% of the patients. Masticatory muscle pain at a single mandibular movement was observed in 25% of the cases; at two or more movements — in 10%.

Clinical examination revealed signs of temporomandibular joint dysfunction in all observations — a mild degree of dysfunction was detected in 40% of the cases; moderate — in 40%, and severe — in 20% of the cases. The presence of the clinical signs of the muscular-articular dysfunction confirms the idea that the mesial mandibular displacement is also accompanied by impaired functional status of the masticatory muscles and of the temporomandibular joint. At the same time, the patients experienced abnormal articular noise at mandibular movements; the joint and the masticatory muscle pain, which irradiated to various parts of the head; deviation and deflection when opening the mouth, as well other symptoms. This symptomatology is due to an asynchronous contraction of the masticatory muscles, displaced lower jaw and articular disc in the mandibular fossa, and their non-conventional movement. A number of patients had mesial displacement of the lower jaw, which was due to the loss of antagonist-teeth in the lateral dentition; lack of the mandibular shift into the posterior contact position; direct occlusion; increased abrasion in the front teeth, which maintain the interalveolar height and the lower face height.

The x-ray outcomes showed that the mesial mandibular displacement came accompanied with a disrupted structure and interrelations of the temporomandibular joint elements. Thus, the zonograms in patients with mesial displacement of the lower jaw, revealed a decrease in the articular tubercle height and, as a consequence, a decrease in the mandibular fossa depth. The lower jaw head had mesial position, with the width of the joint cavity in the anterior region decreasing down to 1–2 mm, while in the upper and posterior parts it increased by 3–4 mm (Fig. 1).

Functiographic intraoral observation of the mandible movements helped detect that the gothic angle value was reduced going down to  $85.04 \pm 2.730$ . The gothic angle revealed asymmetry, disturbed straightness and length of the sides. The gothic arch

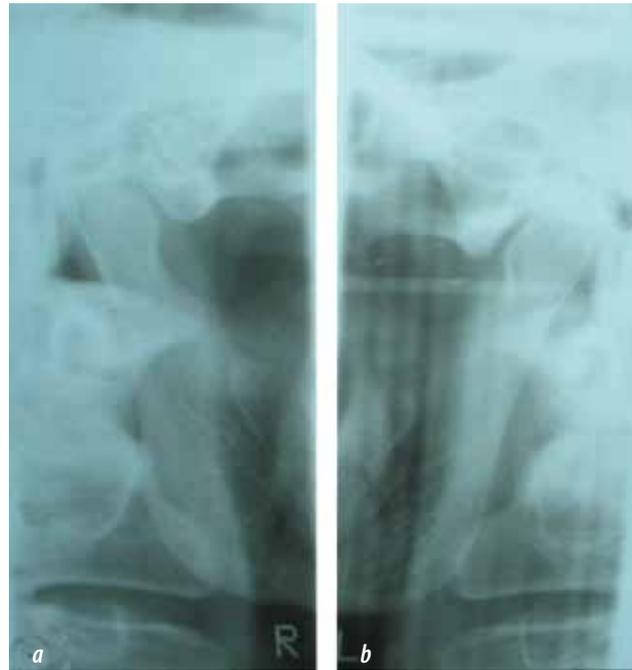


*Fig. 1. Temporomandibular joint prior to treatment (zonogram): a) right; b) left*

manifested a shortness in one or two sides, asymmetry and curvature in the lateral movements as well as asymmetry of the occlusal field location. At the first stage of treatment, the mandible position was brought to normal, with the occlusal-articulatory relations of the dentition and interalveolar distances restored, for which the patients were given tooth-guards and occlusal bite splints of various design. At the same time, we were seeking the restoration of the canine position, which contributed to the patients' adjustment under the new conditions of the maxillofacial functioning. The duration of the first stage was 3–6 months.

Once the first stage of the treatment was over, the signs of the temporomandibular joint dysfunction were observed in 70% of the cases. However, patients reported a severity decrease in the clinical manifestations. A mild degree of dysfunction, for instance, was observed in 50% of the cases; a moderate degree – in 15% of the cases, while another 5% were found to have a severe degree of the dysfunction. 30% of the patients had no signs of the dysfunction. An examination of the tomograms taken after the first stage of the treatment was completed, showed no change in the shape and size of the bone elements of the temporomandibular joint. However, the treatment helped change the topography of the mandible heads in the mandibular fossa. Thus, a forced forward position of the mandible heads was eliminated in all the cases, which contrib-

uted to restore the symmetry of their both right and left location. As a result, an increase in the width of the anterior, and a decrease in the width of the posterior and upper sections, of the joint space were observed (Fig. 2).



*Fig. 2. Temporomandibular joint after the treatment (zonogram): a) right; b) left*

The outcomes gained through the first stage of the treatment were fixed through prosthetics done in view of the size and the topographic features of the dentition defects (Fig. 3).

After the treatment, the functiograms showed similar and symmetric sides of the gothic angle. The gothic angle reached  $98.37 \pm 1.820$ . The gothic arch was observed to feature curve smoothness as well as symmetry on the sides. The occlusal field was located on both sides of the middle line of the metal plate.

## CONCLUSIONS

1. Dentition defects in the lateral sections, lack of the possibility for displacing the lower jaw in the posterior contact position, direct bite, increased abrasion of the front teeth with mesial occlusion — all these contribute to extra anterior displacement of the mandible.
2. Mesial displacement of the mandible, just like distal one, is accompanied by discoordination of muscular contractions, displaced mandible heads and articular disks in the mandibular fossa, their



Fig. 3. Teeth joining: a) before treatment; b) after treatment

atypical movements, and as a result, functional issues in the masticatory muscles and anatomical topographic changes in the temporomandibular joint.

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