Research Article

Condition of lateral teeth in physiological types of bite and complete dentition in individuals aged 18–29

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ABSTRACT

Aim: Occlusive and articulation interaction is affected by a number of factors, a thorough study of which is of particular importance in the prevention of temporomandibular joints dysfunction. Iatrogenic factors of therapeutic, orthodontic, and orthopedic treatment can have a significant negative impact on articulation. **Materials and Method:** We conducted a study to assess the occlusal-articulatory interaction in patients with complete dentition and physiological types of occlusion. **Result and Discussion:** Improper location of third molars resulting in premature hyperbalancing contacts is a common cause of occlusion disharmony. Diagnosing of occlusive interactions as well as proper planning and conducting therapeutic treatment taking into account the state of the antagonizing dentition is of prime importance in the prevention of traumatic occlusion and dysfunctional conditions of temporomandibular joints. **Conclusions:** The findings clearly demonstrate the significance of diagnosing occlusal-articulatory relationships, their proper formation at the stages of development of the masticatory and speech apparatus and the influence iatrogenic factors exert on them.

KEY WORDS: Defects in therapeutic dental treatment, Dystopia and retention of third molars, Gnathology, Iatrogenic factors, Occlusive and articulation interaction, Supracontacts of teeth, Temporomandibular joint dysfunction

INTRODUCTION

Many recent scientific articles report a significant increase in the number of patients with temporomandibular joints dysfunction. Researchers state that the age group of people applying for dental care is becoming younger.[1-3]

According to gnathology, three determinants limiting the movements of the mandible are the following: Anterior - the dentition, distal - joint fossa of the temporal bones, and the neuromuscular system located around.

Given the integrity of the human body, the interrelation of the masticatory and speech apparatus with other organ systems should be kept in mind.[4]

The anterior determinant is directly involved in the activities of dental practitioners of all specialties. At the same time, the temporomandibular joint and the neuromuscular system can mostly be indirectly affected.

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Dental interventions can lead to both the positive effect in the presence of temporomandibular joint dysfunction and to the negative one.[5-7] Moreover, in a number of cases, the negative effe1ct does not result in dysfunction immediately, but in quite a prolonged period of time,[8] due to marked adaptive abilities of the human body including those of the masticatory apparatus.

The most significant negative effect of the formation and development of the dentofacial system can be achieved by therapeutic treatment of permanent teeth, especially the first molars during their eruption. The incidence of caries in people aged 16–19 is 90–95% mainly in the lateral parts of the dentition. In the age group 18–29, the decay-missing-filled teeth index is 12.51.[9-11] It should be noted that the average number of decayed teeth in this age group is 1.8, while the number of filled teeth is 9.39.

We cannot deny the fact that due to the lack of time or restless behavior of children, dentists rarely think about proper anatomical modeling of the occlusal surface or proper reconstruction of contact points of the neighboring teeth at the stage of permanent teeth eruption. A significant iatrogenic effect on the formation of physiological occlusion can obviously be

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made at this age. In this case, the first molars having no anatomical occlusal surface are improperly set in relation to each other following their eruption resulting in an improper position of other teeth and formation of non-physiological occlusal contacts between the supporting tubercles and the marginal ridges of the antagonists. This relationship between the molars and premolars contributes to the occurrence of premature contacts, initially changing the lateral and forward control, and finally - the articular trajectories.

Aim of the study

The aim of this study was to demonstrate the importance of correct occlusal surface modeling in the treatment of lateral teeth and harmonious contacts between premolars and molars.

MATERIALS AND METHODS

We conducted a study to assess the occlusal-articulatory interaction in patients with complete dentition and physiological types of occlusion.[12]

The study involved 102 students of Smolensk State Medical University and Kaluga universities. The criteria for inclusion were the age of 18–29, complete dentition, orthognathic bite, or orthognathic ratio with bilateral 1st class according to Engle, absence of somatic pathology or temporomandibular joint trauma in the anamnesis. After receiving informed consent, all the respondents underwent a routine dental examination with filling in the diagnostic card, obtaining control and diagnostic models and their compulsory fixation in the Kavo Protar articulator. In addition, a dental photograph was taken at the moment of closing the dentition in the central, anterior, posterior, and two lateral occlusions, with the mouth open and from the occlusal surfaces of the upper and lower dentition in mirror reflection.

To diagnose the occlusal-articulatory interaction, an occlusogram of the dentition was performed with blue and red horseshoe-shaped 40 micron thick articulating paper. Multiple contacts on each pair of the antagonizing canines, premolars, and molars with a simultaneous contact of the vertices of tearing tubercles of the lower canines with the mesial crests of the upper canines and supporting tubercles of the lateral teeth with marginal ridges and central fissures (for molars) of the antagonists were considered acceptable [Figure 1].

An assessment of the presence of seals on the lateral teeth was made according to the following clinical requirements: Modeling of the occlusal surface, presence of the contact point, and edge slit. Orthopedic structures were assessed for marginal fit, occlusal surface modeling, and contact point quality. The supra- and infra-occlusions of tubercles or teeth were determined, as well as their influence on the trajectory of movement of the mandible from the position of the central occlusion to the anterior, lateral, and posterior ones. The front and lateral movements, the relationship between the teeth of the working and balancing sides, and the presence of balancing or hyperbalancing supracontacts were assessed as well. The data were statistically processed.

RESULTS

An analysis of occlusal-articulatory disorders [Figure 2] revealed multiple uniform contacts in the position of central occlusion on all lateral teeth not requiring correction in 15 (14.7%) patients, five of them having no signs of dental intervention. These patients did not present with premature contacts with all possible movements of the mandible within the contact between the teeth and signs of deviation on opening and closing the mouth.

As a result of the study, it was determined that the total number of seals was 615, 411 of which were performed in the 1st class, and 204 - in the 2nd class according to Black and the average number of lateral tooth seals per respondent was 6.02. The number of seals that met the clinical requirements for the modeling of the occlusal surface was 148 (24.07%). The number of seals that

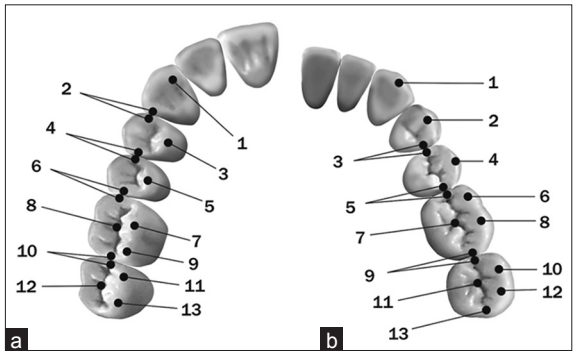

Figure 1: Scheme of ideal contact of canines and supporting tubercles, pits, and marginal ridges of premolars and molars (marked with similar figures) with central occlusion of the orthognathic bite (a) - upper jaw, (b) - lower jaw

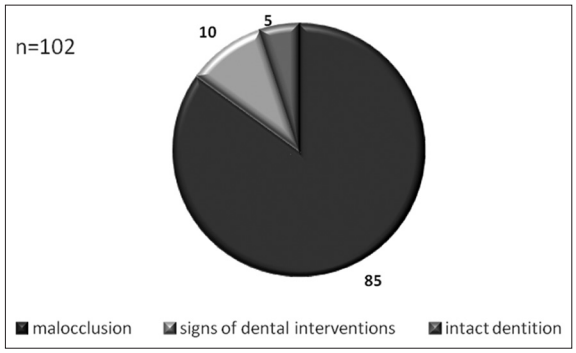

Figure 2: The need in occlusal correction

did not meet the requirements for the modeling of the occlusal surface was 467 (75.93%), for the contact point - 122 (59.8%), and for the presence of an edge slit - 421 (68.46%). A number of seals did not meet several points of the clinical requirement, mostly concerning the quality of occlusal surface modeling and the presence of an edge slit [Figure 3].

The following findings on orthopedic structures were revealed: The average number of artificial crowns of the lateral teeth per one respondent was 0.078; the total number of the crowns delivered was 8. 6 crowns (75%) met the clinical requirements. 1 crown (12.5%) did not meet the requirements for occlusion while 1 crown (12.5%) failed to meet the requirement for the contact point, both of which (25%) did not meet the requirement for the marginal fit.

The most common types of disturbances in the relief of the occlusal surface of sealed teeth observed were incorrectly modeled or missing marginal ridges (177 fillings - 28.8%), incorrectly restored supporting tubercles (108 fillings - 17.6%), guide tubercles (200 seals - 32.5%), and complete inconsistency of the occlusal surface to the anatomical tooth shape (169 fillings - 27.5%) [Figure 4].

The above-mentioned defects in therapeutic dental treatment do not normally cause complaints in patients for a long time, still being the causes of deformations of the occlusal surface of the dentition. There is a tendency of the tooth to move in the occlusal plane, in different directions, or around the axis.

The occlusal surface deformities observed were associated with improper filling or prosthetics, such as supra- or infra-occlusion of individual tubercles of molars and premolars on 251 teeth. In 32 of the respondents, 31.4% (42 premolars and molars) of the masticatory surface crossed the occlusal plane due to a complete inconsistency of the anatomical shape of the antagonist.

Alongside with the consistency of therapeutic and orthopedic treatment of individual teeth, the study evaluated the effect third molars exert on occlusal-articulatory relationships. The study revealed that 76.47% of the examined individuals had wisdom teeth (220 teeth). Improper vertical position (supra- or infra-occlusion) of third molars was noted in 64 (70.59%) patients (134 teeth). The causes of occlusal surface deformities did not result from therapeutic or orthopedic treatment but from a violation of eruption or the absence of the antagonist to one of the third.

Minor deviations in the position of individual teeth in the sagittal or transversal direction as well as turning around the axis were revealed in 83 patients (81.4%). In 30% of cases, this movement was associated with insufficient space for the eruption of the 8th teeth.

The condition of the fillings and dentures as well as other signs of primary occlusal trauma was assessed on examination of the teeth and dentition. Atypical facets of erasure, cracks in the enamel, and wedge-shaped defects were diagnosed in 205 teeth of 78 (75.5%) patients. We also revealed changes in the gingival margin (hyperemia, puffiness, local hypertrophy of the marginal gingiva, or recession) and primarily one-sided periodontal pockets on 106 lateral teeth of 66 patients (64.7%).

Assessing sagittal and transverse movements of the mandible (anterior and lateral control), we found that the abnormal position of individual tubercles or teeth led to supracontacts on the working side in 57 patients (55.9%), on the balancing side (hyperbalancing contacts) - in 44 patients (43.1%), while the anterior control was supported by lateral teeth in 16 people (15.7%) [Figure 5].

The majority of patients did not present with any complaints regarding articulation violations and only four of them had symptoms of temporomandibular joint dysfunction manifested by crunches, clicks on opening the mouth and deviation.

CONCLUSION

We specifically selected the patients who are in good dental health for their age group, i.e. complete dentition and physiological forms of bite. However,

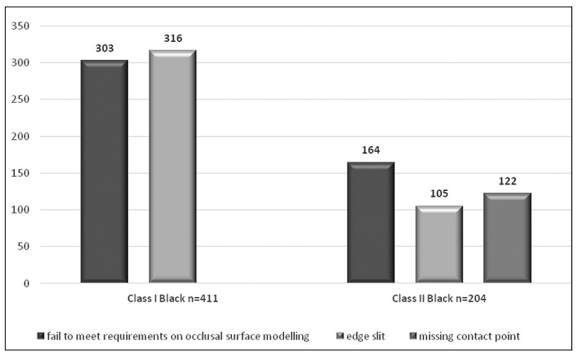

Figure 3: Correspondence of the 1st and 2nd class seals according to Black on premolars and molars to clinical requirements

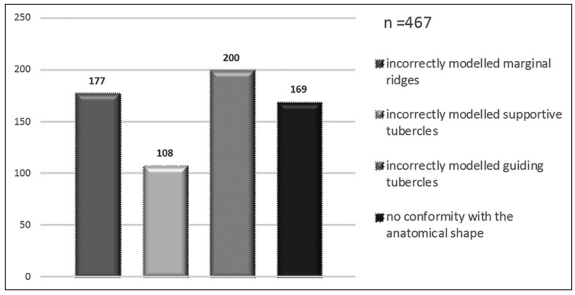

Figure 4: Types of disturbances of the occlusal surface on sealing the lateral teeth

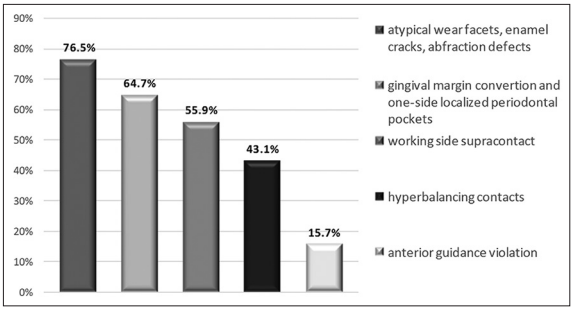

Figure 5: Clinical symptoms of abnormal occlusal surface relieff

even in this sample, only 15 patients (14.7%) had harmonious occlusive contacts.

Taking into consideration the data obtained, we can assume that in other types of bite, in the presence of dentition defects complicated by deformations as well as in older age groups, the incidence of various occlusal-articulatory disorders will be considerably higher and the conditions for compensation will be worse.

The findings clearly demonstrate the significance of diagnosing occlusal-articulatory relationships, their proper formation at the stages of development of the masticatory and speech apparatus and the influence iatrogenic factors exert on them.

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