



## Optimization of Orthodontic Treatment of Dental Anomalies

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### ABSTRACT

The main criterion is the constancy of the teeth. The inconsistency of these parameters can lead to the appearance of gaps between the teeth. This article presents data on the structural features of the dentition and facial skeleton, as well as data on the preservation or removal of teeth when planning orthodontic treatment. Based on the study of patient data, it is necessary to study the biometric structural features of the dentition with angles of the first and second Engel occlusal in patients who need tooth extraction before orthodontic treatment, to conduct a comparative analysis of biometric and X-ray cephalometric indices with anomalies of the bite of the first and second Engle classes.

### Keywords:

dental alveolar arch, removable functional-acting and mechanically-operating devices, self-ligating braces, teleroentgenogram, cephalometric analysis, craniofacial complex, X-ray cephalometric indicators.

Teething is a physiological process, which is one of the significant components of morphofunctional development. Over the past 20 years, a lot of work has been done on the analysis of information about the characteristics of the eruption of permanent teeth. The timing of the eruption of permanent teeth directly depends on the degree of physical development of the child, the degree of maturity of the child's body and puberty, as well as on the characteristics of the constitution.

The main criterion responsible for the position of the teeth in the dentition is the ratio of the parameters of the dental arches to the size of the permanent teeth. A discrepancy between these parameters can lead to crowding (crowding of teeth) or spacing (the appearance of gaps between teeth) [1]. teeth.

The discrepancy between the size of the teeth and the parameters of the jaws is considered the main cause of anomalies in the shape of the dental arches. The total assessment of the space in the dentition is expressed in millimeters of additional or deficient length of the dental arch. Various methods have been proposed for their calculation [2]. The most widely used method for determining the total mesial-distal size of unerupted teeth according to x-ray data. The difference between the total size of unerupted permanent posterior teeth and the size of the existing gap for them is indicated by the phrase "free space" [3].

The primary task of orthodontic treatment for narrowing and shortening of the dental arches of the upper and lower jaws during the period of milk and mixed dentition is to expand or lengthen the dentition and accelerate the growth of apical bases. For this purpose, removable functionally acting and mechanically acting removable devices are used [4].

At the present stage of development of orthodontics, non-removable orthodontic appliances are actively used for intensive expansion of dentoalveolar arches in various modifications, which allow to expand the dentition significantly and in a short time [5].

In world orthodontic practice, of the vast number of types of non-removable equipment, the straight wire technique (Straight-wiretechnique) has found the widest

application. It was developed and pioneered by the American orthodontist L.F. Andrews in 1969. The essence of the straight arch technique is to bring the dentition to an ideal anatomical shape due to the design features of the braces and a straight orthodontic wire arch of a rectangular section. [6].

At the end of the 20th century, self-ligating brackets were proposed (the archwire was fixed in the groove with a special clip located on the vestibular surface of the bracket), which did not require frequent visits to the doctor [7].

Self-ligation is of two types - active and passive. In active self-ligating systems, the wire is actively pressed against the bottom of the bracket slot, creating adhesion and friction of the wire in the slot. In brackets with a passive type of self-ligation, the wire is not pressed against the bracket, and the friction force is practically absent [8].

Orthodontic treatment using pre-expansion of the dental arches followed by the use of the straight-wire technique makes it possible to achieve pronounced changes in the alveolar and basal structures, increase the size and improve the shape of the dental arches, without resorting to the extraction of individual teeth [9].

Another treatment option is to correct dentoalveolar anomalies with the extraction of teeth. At the same time, some authors propose to remove the upper first premolars, and sometimes, to create a correspondence between the longitudinal dimensions of the dental arches, and the lower teeth [10]. Thus, an artificial reduction of the gnathic part of the facial skeleton is achieved, the growth of the upper and lower jaws slows down with a simultaneous change in the aesthetics of the face [11]. In addition, after the extraction of teeth, the soft tissues of the maxillofacial region can emphasize, or, conversely, mask the anomaly in the shape of the dentition and jaws [12, 24-25].

When planning orthodontic treatment of anomalies of the dentition, as a rule, there is no balance between the lack of space within the dentition and the size of the morphological basis, that is, the length and width of the apical and basal arches, as well as the length and width of the dentition [13]. In addition, not all authors

take into account jaw growth factors, face type and aesthetics to determine the orthodontic treatment plan with the preservation or extraction of teeth [14]. The analysis of the lower dental arch is the determining factor in the decision to remove the teeth. It is also necessary to conduct a cephalometric analysis [15].

At the present stage of development of orthodontics, there are still no definite indications for treatment with the extraction of individual teeth, taking into account the parameters of the cranio-facial complex, the degree of discrepancy between the size of the teeth and these parameters with various options for individual sizes of permanent teeth. The development of orthodontic techniques has made it possible to limit the cases of treatment with the removal of individual teeth. However, the absolute indications for tooth extraction in patients with anomalies are supernumerary teeth of irregular shape, complicating the process of eruption of permanent teeth, or violating the shape of the dental arches, as well as with relative and absolute macrodontia.

When planning orthodontic treatment of anomalies of the dentition, as a rule, there is no balance between the lack of space within the dentition and the size of the morphological basis, that is, the length and width of the apical and basal arches, as well as the length and width of the dentition. In addition, not all authors take into account jaw growth factors, face type and aesthetics to determine the orthodontic treatment plan with the preservation or extraction of teeth [16, 21-22].

The choice of treatment method (with or without extraction of teeth) depends on the capabilities of the orthodontic equipment used. In the 21st century, orthodontics has changed. With the introduction of a new type of non-removable orthodontic technique - passive self-ligation - it became possible to treat complex dentoalveolar anomalies without removing complete teeth [17-20, 23, 24].

Thus, at present, a number of key positions have been formed that determine the relevance of further study of this problem. In particular, in the literature available to us, we did not find data on the features of the clinical picture of

dentoalveolar anomalies, on the structural features of the dentition and the facial skeleton in patients who need tooth extraction for orthodontic indications. In addition, an automated system has not yet been developed for determining indications for the preservation or extraction of teeth when planning orthodontic treatment. These are the questions that were the subject of our study.

To solve the tasks set, we examined and accepted for treatment patients with anomalies of the dentoalveolar system of the first and second classes of Angle, in the amount of 100 people who were indicated for extraction of teeth before orthodontic treatment, aged 17 to 35 years.

The division of patients into groups was made on the basis of nosological forms of dentoalveolar anomalies (Table 1.):

**Table 1**  
**Distribution of admitted patients**

Nosological form					
Occlusion anomalies class I		Occlusion anomalies class II Angle			
Angle		I subclass		II subclass	
22		44		34	
Women	Men	Women	Men	Women	Men
12	10	24	20	18	16

In the first group with Angle's first class malocclusion, all first premolars were removed. In the second group with malocclusion of the second class of the first subclass of Angle, the first upper premolars were removed.

In the third group with malocclusion of the second class of the second subclass of Angle, the first upper premolars were also removed.

Along with premolars, 75 patients had their third molars removed in preparation for orthodontic treatment.

For the treatment of patients with bite anomalies of the first and second Angle class, we used an instrumental method using fixed orthodontic appliances (bracket system, straight-wire technique). Braces with Roth prescription were used in 81 cases, with Damon prescription in 19 cases.

All those clinical cases in which it was possible to carry out orthodontic treatment without extraction (that is, with the preservation of teeth), we did not include in the groups of examined persons.

Dental examination of patients in need of orthodontic correction of anomalies of the dentition was carried out according to a standardized scheme and included a survey, external examination and examination of the oral cavity, and the study of X-ray cephalometric parameters.

When choosing a treatment method, we took into account age, individual characteristics of the anomaly pathogenesis, the severity of morphological, functional and aesthetic disorders. Particular attention was paid to the profile of the face, the position of the lips relative to the Ricketts aesthetic line, the nature of the closure of the lips, the size of the crowns of the teeth, the angle of the incisors to the jaw base, the size of the apical bases, the severity of the tight position of the teeth, and the lack of space.

Thus, it can be confidently stated that the study of biometric, anthropometric and X-ray-cephalometric indicators of the structure of the dentition in patients with malocclusion who need to remove teeth before orthodontic treatment creates the possibility of clearly determining the indications for saving or removing teeth before orthodontic treatment.

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