

The Relevance of the Research Topic and the Degree of its Elaboration

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ABSTRACT

Dental diseases are among the most common in the world, and dental anomalies and deformities occupy the third place among them after caries and periodontal diseases. Their prevalence according to the literature is in the range from 11.4 % to 80 %.

Timely teething is one of the important indicators of the normal development of the chewing apparatus (Khoroshilkina F.Ya. 1979, 2006; Mishutina O.L., 2006; Postnikov M.A., 2009; Gioeva Yu.A. 2014; Persin L.S., 2016; Kozlov V.A., 2017;

Omlnel L., Sipher D., 1987). Retention of individual teeth is often the cause of impaired formation of dentition, their closure, functional and aesthetic deviations (Mannanova F.F., 1998; Persin L.S., 2016; Harzer W., Reinhardt A., Soltes K., 1989; Hyomoto M., Kawakami M., Inoue M., Kirits T., 2003).

According to various data, the prevalence of tooth retention ranges from 4% to 29% among all dental anomalies (Shulkina N.M., 1985; Khoroshilkina F.Ya., Zhigurt Yu. I., 1997; Persin L.S., 1995, 2016; Korsak A.K., 1999; Korbendau J.-M., Patti A., Weiss J., 2009).

Currently, there is a tendency towards an increase in the proportion of adult patients, which is 68% of the total number of those who have applied for orthodontic care [Kalivrajian E. S., 2003]. This group is the most vulnerable to relapse. Often in the treatment of vertical incisor dysocclusion, repeated orthodontic treatment is required.

INTRODUCTION

Dysocclusion of the dentition disrupts the function of chewing, swallowing, speech and causes dissatisfaction of patients with a smile and other aesthetic disorders [Sysoev N.P. et al., 2010], contributes to the development of diseases of the gastrointestinal tract and creates communication problems [Slabkovskaya A.B., 2006; Persin L. S., 2015]. Violation of the closure of the dentition is the cause of functional overload of the periodontium and the main or additional traumatic factor in chronic or acute dental injuries [Terekhova T.N., Gorbacheva K.A., 2006; Oleinik E.A., 2008]. With this pathology, the main dental diseases are progressing [Hamadeeva A.M., 2010; Ulitovsky S.B., 2012; Feldens C.A. et al., 2015], pathological abrasion of tooth enamel [Gioeva Yu.A. et al., 2015], which is increasingly observed in young people [Arnadottir I.B. et al., 2010]. Retented teeth often (12.5%) lead to resorption of the roots of neighboring teeth [Ishmuratova A.F., Stepanov G.V., 2011]. Patients with vertical incisor dysocclusion have a 1.2-fold higher risk of developing diseases of the temporomandibular joint [Marangoni A.F. et al., 2014].

To draw up an orthodontic treatment plan, a detailed analysis of clinical examination data, a telerepentgenogram of the skull in lateral and, if necessary, in direct projections, CBCT of the jaws,

photographs of the face, dentition and diagnostic models of the jaws is necessary. However, in a number of cases, even after the full implementation of the diagnostic protocol, the question of choosing the tactics of orthodontic treatment remains open.

Throughout the development of orthodontics, a large number of HPLA classifications have been proposed. Attempts to give a quantitative assessment of ZCHLA were made by L.S. Persin (1997), Yu.M. Malygin (1999), quantitative methods for assessing ZCHLA include the aesthetic index DAI (Dental Aesthetic Index; Cons N. et al., 1986) and the index for assessing the need to correct dental anomalies, its 4 estimated complexity and effectiveness of the treatment result ICON.

A significant factor influencing relapse after orthodontic treatment, as well as the termination of orthodontic devices, is the stretching of the ligamentous apparatus of the tooth and the attached gum (Arutyunov S.D., 2016; Dawson P.E., 2016; Persin L.S., 2016; Ravindra Nanda et al. 2019).

There are various ways to prevent the development of relapses of anomalies: a small degree of hypercorrection is necessary, while the teeth should be in this position for as long as possible; the use of retention devices in patients for several years, and sometimes throughout life. To prevent relapse in the retention period after orthodontic treatment of the crowded position of the incisors in the anterior section of the 4th dentition, due to an undesirable reaction of the ligamentous apparatus of the tooth (displaced teeth tend to return to their original position), additional surgical manipulation is used, namely fibrotomy.

The degree of elaboration of the research topic. Publications on the diagnosis and choice of tactics for the treatment of retentive teeth are present in both domestic and foreign literature (Vinogradova T.F., 1988; ZhigurtYu.I., 1994; ShukMazen, 2004; Andreishchev A.R., 2005; Volchek D.A., Ospanova G.B., 2006; Gasymova Z.V., 2014; Persin L.S., 2004; 2016; Reichel I., 1987; Jacoby T., 1993; Pajioni D., Korbendau J.M., Le Bras C., 2003; Korbendau J.-M., Patti A., Weiss J., 2009).

Various classifications of this pathology have been proposed, methods of diagnosis and treatment of dental retention have been developed (Tochilina T.A. 1987, 1990; Persin L.S., 1995; Chibisova M.A., 2006, 2008; Fadeev R.A., Ispravnikova A.N., 2011; Richadson M.E. 1965; Schwaninger D., Shaye R., 1977; Rienhard R., Graf H., Koch E., Laugbein U., 1989; Crosby D.R., Alexander R. 1989; Reiner T.R., 1996).

Nevertheless, today there is no objective systematized method of diagnosis of retarded teeth according to dental computed tomography. There is no data on the parameters of bone density in the area of retented teeth that could be useful in drawing up a treatment plan and predicting its outcome. There is no data on the structure of the face in patients with dental retention. The prevalence of various types of retention of teeth also requires clarification.

To develop prognostic criteria and a set of corrective methods for the prevention of retention teeth. Improving the quality and effectiveness of treatment of patients with dental anomalies by improving the activities of dental technicians in modern conditions.

Research objectives: improving the quality of life of patients by optimizing their orthodontic treatment and rehabilitation.

1. To determine the frequency of occurrence of retention of teeth according to the data of patients seeking orthodontic care;
2. To study the clinical forms of dental retention;
3. Based on the cephalometric study to identify the features of the facial structure in patients with retention of teeth with different variants of the ratios of dentition;

4. To develop a method for diagnosing dental retention according to dental computed tomography;
5. To determine the normal parameters of bone density in the area of the erupted teeth of the upper and lower jaw according to dental computed tomography, which will allow predicting the tactics of orthodontic treatment in relation to retentive teeth.

The histological structure of the muco-periosteal cover in the anterior part of the alveolar process of the upper and lower jaws after orthodontic treatment and in the retention period in the main and control groups of patients was studied in a comparative aspect, which deepened the knowledge of the histological processes of restructuring the muco-periosteal cover in response to hardware treatment.

A method of clinical X-ray examination of children has been proposed and put into practice to determine the prognostic criteria for the emerging retention of the upper permanent canines.

The effectiveness of preventive treatment of the emerging retention of the upper permanent canines during the change of teeth has been proven.

Based on the analysis of the patients' requests for orthodontic care, the occurrence of various forms of dental retention was determined.

For the first time, the analysis of the facial structure in patients with dental retention was carried out according to profile telereöntgenography, distinctive features of the facial structure in patients with dental retention were revealed.

For the first time, a technique has been developed for the diagnosis of tooth retention according to dental computed tomography, including an analysis of the position of the retented tooth, the distance from the retented tooth to the compact plate of the jaw, an assessment of bone density in the root of the retented tooth.

Based on the analysis of computed tomograms performed on a computer tomograph "Sirona Gallileos", the values of bone density in the area of the roots of the teeth of the upper and lower jaw were determined, which can serve as a guideline for comparison with similar parameters in the area of retentive teeth and the choice of orthodontic treatment tactics.

The use of 3D technologies in the analysis of changes occurring during orthodontic treatment allows you to visualize and evaluate the quality of orthodontic treatment, reduce the number of complications and errors in the treatment of dental anomalies.

A method of complex treatment of patients with a crowded position of teeth, including hardware correction, fibrotomy, as well as vibropneumo stimulation, which allowed to increase functional and cosmetic outcomes, has been developed and theoretically substantiated.

The use of the proposed technique for diagnosing tooth retention according to dental computed tomography data allows you to accurately localize the anomaly, determine the position of the retented tooth, the distance to the compact plate of the upper or lower jaw, as well as to assess the density of bone tissue in the area of the retented tooth. The parameters of bone tissue in patients with the absence of retention of teeth and clinical manifestations of periodontal diseases, which can serve as a guideline for the choice of orthodontic treatment tactics, were determined.

Material and method:

The methodology of the dissertation research is based on the study and generalization of literature data on improving the treatment of patients with dental alveolar shortening in the retention period, assessing the degree of development and relevance of the topic. In accordance with the set goal and objectives, a plan for the implementation of all stages of the dissertation

work was developed, research objects were selected and a set of modern research methods was selected.

Provisions submitted for protection:

1. Retention of teeth can accompany various forms of dental anomalies, accompanied by neutral, distal and mesial ratios of dentition. Regardless of the nature of the ratios of the dentition, retention of the eighth teeth is most often noted. With retention of teeth, most often there is a violation of the structure of the size and position of the jaws in the skull.
2. The features of the facial structure in patients with various forms of retention of teeth, which include: underdevelopment or posterior position of the upper and lower jaw, anterior inclination of the lower jaw to the base of the skull, anterior inclination of the occlusal plane.
3. The application of the proposed method of analyzing the retention of teeth using dental computed tomography data makes it possible to determine the position of the retented tooth and the density of bone tissue, which makes it possible to plan the tactics of orthodontic treatment.
4. The normal parameters of bone density in the area of the erupted teeth of the upper and lower jaw were determined, giving the basis for the choice of tactics for the treatment of retentive teeth.

Methods of histological and statistical analysis of the study were also used – before and after orthodontic treatment. 106 7 patients in the age category from 18 to 40 years old with crowded teeth in the anterior part of the jaws were examined and treated.

The first group (control) included 50 patients who underwent orthodontic treatment according to the generally accepted method, using fixed equipment (braces).

The second group included 56 patients (comparison group) who were initially fixed with fixed equipment (bracket system), vibropneumostimulation sessions were performed during hardware treatment according to the author's method, at the final stages of hardware treatment 3-4 weeks before the removal of braces, fibrotomy was used and in the retention period vibropneumostimulation according to the author's method.

Based on the designated goals and objectives of the study, the author has developed a plan for the implementation of each stage of the work. The objects of research are selected, effective modern research methods are selected. The object of this study was patients who were diagnosed with "crowded position of teeth in the anterior part of the jaws".

The reliability of scientific conclusions and provisions is based on sufficient clinical material, based on the modern research methods used, which is confirmed by statistical processing of the digital data obtained. The analysis of the results obtained during the study was carried out using evidence-based medicine methods using traditional methods of descriptive statistics.

Research results and their discussion

The degree of reliability of scientific work is determined by the number of patients (40 patients), modern research methods and the results of statistical data processing. The voluntary participation of patients in the study was confirmed by their written consent. Statistical processing of the results of the study was carried out in accordance with the principles of evidence-based medicine.

The patients were diagnosed after a clinical examination and based on the data of anthropometric

analysis of plaster models of the jaws, OPTG of the jaws and TRG of the head in a lateral projection. In the first group (control), 50 patients underwent orthodontic treatment according to the generally accepted method, using fixed equipment (braces). The second group (56 patients), who were initially fixed with fixed equipment (bracket system), had vibropneumostimulation sessions during the hardware treatment according to the author's method, at the final stages of the hardware treatment 3-4 weeks before the removal of the braces, fibrotomy was used and in the retention period vibropneumostimulation according to the author's method. During the clinical examination of patients, an external examination, a survey and an examination of the oral cavity were performed. During the survey, it was clarified when the patient drew attention to the presence of an anomaly, and whether there was an aggravation of the incorrect position of the teeth with age, whether orthodontic treatment was carried out earlier. When examining the face, attention was paid to the symmetry of the left and right halves of the face, the width of the face (IFM index), the type of face profile, the height of the lower third of the face, the harmony and symmetry of the smile were revealed. The proportionality of the three vertical proportions of the face was considered as proof of its harmony. When studying the anthropometric indicators of plaster models of the jaws of patients with a crowded position of the incisors, the following parameters were determined: lack of space in the dentition, the index of irregularity of the Little2, transversal dimensions of the dentition. Such parameters as the size of teeth, as well as the sagittal and transversal size of the dentition according to Pont and Korkhaus were studied.

In the control group, we performed orthodontic treatment of the crowded position of teeth in the anterior section in 50 patients according to a generally accepted technique using fixed equipment, in particular, a bracket system of passive self-ligation (Ormco).

Patients of the second group (56 people), who were initially fixed with a fixed bracket-a passive self-ligation system (Ormco), underwent vibropneumostimulation sessions during hardware treatment according to their own methodology. At the final stages of the surgical treatment, fibrotomy was used for 3-4 weeks. In the retention period, vibropneumostimulation sessions were used again according to their own methodology.

Conclusions

1. For orthodontic help, unmarried women, persons aged 18 – 29 years, with higher education, working in a budget organization 30 – 40 hours a week, with an average income, living in a separate apartment, preferring to visit theaters, cinemas, music salons in their free time, considering themselves practically healthy, without bad habits.
2. Their age and gender have a significant impact on patients' assessment of their quality of life. Patients over 40 years of age consider their quality of life to be the lowest. They rate it 1.4 times worse than patients in the age groups younger than 30 years, and of the criteria studied, they are most concerned about problems with eating. Women with dental anomalies rate their quality of life 1.2 times lower than men, while they pay more attention to communication problems.
3. Before the start of orthodontic treatment, the quality of life of patients is affected by the presence of other dental diseases, except for the dental anomaly itself. In such patients, the quality of life is 1.35 times worse than in patients with occlusion anomalies and 1.24 times worse than in patients with individual teeth anomalies.
4. Orthodontic treatment generally improves the quality of life by 1.6 times in patients with individual dental anomalies and in patients with dental anomalies with other dental pathology, and by 1.5 times in patients with occlusion anomalies. But the level of quality of

life of patients with dental anomalies, having another 22 dental pathology at the end of treatment is 30% less than in the other two groups.

5. The analysis of the data of orthodontic centers of the Samara region showed: relapse of treatment of patients with a crowded position of teeth in the anterior part of the jaws is diagnosed from 30.3% to 37.2% of patients.
6. A vibrotode and a vibropneumostimulator were developed and introduced into clinical practice to eliminate and prevent recurrence of the crowded position of teeth in the anterior part of the jaws, which allowed reducing the number of relapses by 18.86%, compared with the control group.
7. Vibropneumostimulation techniques, vibration frequency parameters of 18 ± 2 Hz, with a rest interval of 5 ± 2 s. and the duration of the time parameter of vibration action of 8 ± 3 min. in the process of orthodontic treatment have been developed and introduced into clinical practice of complex treatment of patients with a crowded position of teeth in the anterior part of the jaws. In the retention period, the vibration frequency parameters are 7 ± 2 Hz, with a rest interval of 5 ± 2 s. and the duration of the time parameter of vibration action is 1.5 ± 0.5 , which made it possible to reduce the duration of treatment by 2.0 ± 0.9 months.
8. In patients of the control group, histological examination showed the presence of inflammatory dynamics both during orthodontic treatment and in the retention period. Vibropneumostimulation in the complex method of treatment of the crowded position of teeth in the anterior part of the jaws, contributed to the stimulation of collagen formation in the muco-periosteal covering of the alveolar process of the upper and lower jaws, limiting the size and duration of the inflammatory reaction

Practical recommendations.

1. The performed analysis of defects in orthodontic treatment can become a methodological aid for orthodontists, heads of orthodontic departments of dental organizations, representatives of the health management.
2. The creation of a set of criteria for assessing the quality of orthodontic treatment will allow objectifying the characteristics of this type of medical care. This complex can become the basis of a conceptual model of clinical quality standards of dental treatment.
3. The created system for assessing the quality of orthodontic care for patients with various forms of dental anomalies "ESTE", including its automated version, can be used in the activities of dental clinics and departments, for various examinations in the event of conflict and disputable situations in clinical activities, in the work of conflict commissions of health management bodies.

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