



REMOVABLE PROSTHETIC TREATMENT IN CHILDREN -LITERATURE REVIEW.

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ABSTRACT:

The defects of the dental arches, which are result of various genetic diseases, traumas, multiple and early childhood caries can significantly impair speech, chewing function, aesthetics and normal development of orofacial structures. In such cases, different types of removable prosthetic treatments allow recovering the three medico-biological indicators and support the correct physical and mental development of the child.

The purpose of this study is to present the current scientific data on the use of the removable prosthetic treatment in children.

The survey is conducted from December 2017 to February 2018. A total of 330 literary sources found by keywords are subjected to critical analysis.

The results show that in children aged 3 to 14, which suffer from total or partial edentulism, prosthetic treatments are conducted with total dentures, partial dentures with bent or plastic hooks or with tooth supported overdentures. Plastic primary or permanent teeth are used following the routine clinical stages, and the constructions are continuously modified according to age-related physiological and anatomical requirements.

Conclusion: Removable prosthetic treatments in children provide an opportunity for full masticatory and speech function and improves the quality of life of the kids.

Keywords: removable prosthetic treatments, children, total dentures, partial dentures

INTRODUCTION:

Causes of premature loss of deciduous and permanent teeth may include various genetic diseases (ectodermal dysplasia, Papillon-Lefèvre syndrome (PLS), amelogenesis imperfecta, etc.), traumas, early childhood caries, multiple caries and its complications. In a number of cases, defects in dental rows affect the three medical-biological indicators - prophylaxis, function (speech and chewing) and esthetics. Complications, such as tooth migration, alveolar bone loss and impaired occlusion, affect the proper and proportional development of orofacial structures [1].

Because of the over-sensitive nature of children, dis-

turbances in the appearance of teeth and speech frequently lead to a change in the psychological status, development of emotional disorders and difficulties in the social adaptation of the affected child. These, in turn, may have an influence on the child's overall well-being, self-esteem and quality of life [2]. This is evidenced by the studies of Feitosa et al. [3] and Martinz et al. [4] who found that 31.2% of the children, suffering from severe dental diseases, feel sad and/or ashamed of their teeth and smile, are significantly more irritable, more likely to be absent from school, to avoid social contacts, have more sleep problems, and perform less well in training activities than healthy and rehabilitated children. Therefore, prosthetic constructions in childhood should meet both the anatomical requirements and the age-related physiological and psychological features [5, 6].

OBJECTIVE:

The aim of this review is to present and analyze current literature data on the use of removable prosthetic constructions in children.

MATERIALS AND METHODS:

From December 2017 till February 2018, an electronic search was conducted in the PubMed, Google, Lilac, Yandex, eLibrary.ru databases by using the following keywords: "снимаемо протезиране", "детска възраст", "цели протези", "частични протези" and the corresponding terms in English, German, Russian and French: "removable prosthetic treatment", "children", "childhood", "complete dentures", "partial dentures", "herausnehmbareprothetische Behandlung", "Kindheit", "Vollprothesen", "Teilprothesen", "съемное протезирование", "детство", "полные протезы", "частичные протезы", "prothèse amovible", "enfance", "prothèses partiellesamovibles", "prothèses totales". The final selection included 47 scientific researches, the data of which were analyzed, summarized and presented in the main part of this review.

RESULTS:

Healthy and maintained deciduous and permanent dentition is vital for the overall well-being of any child [7]. Defects in dental rows and severe dental diseases frequently

pose a challenge to the pediatric dentist because their treatment requires a multidisciplinary approach, management of the child's behavior, preservation of the other dental and oral structures, and the achievement of high-performance results in terms of parents' satisfaction.

Planning and placement of removable prosthetic constructions should be consistent with a number of criteria, in order to restore the effective masticatory and speech function, to achieve acceptable appearance and to ensure the unimpeded development of the oral structures and the whole organism [8, 9].

There are [10, 11] several different techniques for the treatment of children suffering from dental malformations and/or partial/total tooth loss.

Prosthetic treatment with removable total dentures with acrylic denture base, partial dentures and tooth-retained overdentures is the most common choice for restoring the oral structures in childhood [12]. A major impetus for the development of alveolar bones is the eruption of teeth. In cases of hypo- and anodontia, therefore, there is atrophy of the alveolar bone and decreased ability to retain removable constructions. However, partial and complete conventional dentures are successfully used for the oral rehabilitation of children. According to Walsh [13], the removable prosthesis in young patients requires much more time and a more complex approach, compared to adults.

An advantage of the use of removable constructions in children is the possibility for their easy modification and processing during the periods of growth and development of the maxillary and mandibular bones. Although considered to be an inadequate alternative of the healthy dentition by Ladda et al. [14], these dentures provide the possibility for adequate nourishment of the growing children, for improving their social activities, raising their self-esteem and significantly benefit their quality of life.

Use of complete dentures in children

There are literature data [15, 16, 17, 18, 19] that discuss the successful use of complete removable dentures in childhood. The need for such prosthesis is most commonly seen in children with abnormalities in the development of jaws and the formation of dental follicles, systemic diseases (e.g. ectodermal dysplasia), genetic diseases, traumas, rampant caries, early childhood caries, etc.

According to a number of authors [20, 21, 22, 23], complete denture prosthesis in children aged 3 to 14 years follows the routine clinical steps: obtainment of a preliminary impression and fabrication of an individual impression tray; obtainment of a functional impression of the prosthetic field; determination of the vertical and horizontal inter-maxillary relationships by using wax shafts and mounting the casts on the articulator; arrangement of the artificial teeth according to the location of the alveolar ridges and a clinical evaluation of the wax trial denture. The prosthesis is finished by using a heat-polymerizing plastic and after their adjustment and articulation, is inserted into the mouth with the appropriate instructions to the patient.

There is a difference between the individual cases in the selection of the artificial teeth for fabricating the prosthesis.

Ladda et al. [14] and Bani et al. [20] recommend the use of artificial teeth that are shaped as permanent teeth in children with mixed dentition. It is assumed that this provides better static and dynamic occlusion and proportional restoration of the vertical dimensions of the masticatory system.

There are data [21] on the use of artificial teeth that are shaped as deciduous teeth in children aged 3 to 7 years. The purpose of their use is to create an age-appropriate appearance and function. Because of the underdeveloped alveolar ridges, it is recommended to increase the vertical dimensions by about 1 mm while arranging the artificial teeth, in order to restore the balance of the temporomandibular joint/maxillary/mandibular relationships and the face profile.

To optimize the esthetic and functional performance, a standard tooth set is used by Pannu and Singh [22] in the treatment with complete dentures, which is duplicated and fabricated with the appropriate deciduous tooth-like color.

There is also a need for complete restoration in cases of extraction of all deciduous teeth due to rampant caries. An example of this is given by Hugar et al. [23], who suggest the use of conventional complete dentures as a method of temporary rehabilitation until the eruption of permanent teeth takes place.

Individual clinical stages in complete denture prosthesis may turn difficult to be carried out, due to the age-related characteristics of the patients. In order to increase the child's cooperation, Dalkiz and Beydemir [24] suggest the use of motivation techniques. For example, children get the opportunity to practice self-training - they insert and remove the impression tray by themselves and then bring it home between the clinical visits. The authors believe that this greatly reduces the stress during the stage of impression taking. The recording of inter-maxillary relationships may also turn difficult to the dental practitioner. In order to better control the child's behavior when fixing the wax shafts, it is advisable to avoid heated instruments or heat procedures or, as a last resort, the heat source should be outside the child's field of vision.

According to Dominguez et al. [25], treatment with removable dentures is a complex process that requires continuous modification, correction, and refabrication of the constructions, in order to ensure unimpeded teeth eruption, normal growth and development of the maxillary bones and facial skeleton.

According to Gupta et al. [26], the removable prosthesis is poorly tolerated by children aged between 3 and 14 years, but after an adaptation period of about 1-3 months, there is a significant improvement in children's tolerance. In their study, Ohno and Ohmori [27] indicate considerable children's satisfaction with complete dentures with regard to masticatory efficiency (the ability to chew meat and rice crackers) and speech function (the ability to pronounce sibilants). All this is of essential importance for the child's normal physical and mental development, which makes complete denture prosthesis a suitable choice of treatment in cases of total tooth loss.

In a number of cases, there is a need for combining

complete and partial dentures or partial dentures and other prosthetic constructions.

Use of partial dentures and combined prosthetic constructions in children

Partial dentures with or without bent/plastic clasps can be used in cases of hypodontia caused by various genetic and hereditary diseases. Examples of this are the studies of Jani et al. [28], Gupta and Tyagi [29], who apply this method of treatment to children with partial tooth loss, aged between 4 and 6 years. They recommend the arrangement of more translucent and smaller teeth, with tremas between them. This creates conditions that correspond to the physiological increase of the jaws and the natural appearance, characteristic of this age.

The results of one-year study [30] on masticatory strength in children with partial dentures have shown an increase in the values of masticatory strength over the first three months. This suggests that this type of restoration is suitable for replacing the missing deciduous teeth, with the possibility for improving the function of the masticatory system.

The scientific literature [12, 31, 32, 33] describes cases of combined prosthesis in early childhood caries, premature tooth loss, or in the presence of irregularly shaped teeth in combination with hypo- and oligodontia.

Parisotto et al. [34] recommend combined pediatric prosthetic treatment with single metal crowns and partial dentures with acrylic denture base. As a reason for choosing metal constructions, the authors point out their high prophylactic value regarding caries and its complications, restoration of occlusion, favorable prognosis over the time, and low cost. In the children with prostheses, significant improvements have been reported with regard to masticatory and speech function, as well as psychological and social development.

Some authors [35, 36, 37, 38, 39] suggest restoration of large carious lesions and irregularly shaped teeth with celluloid or composite crowns and restoration of partial tooth loss with conventional partial dentures.

The use of combined prosthetic dentures, suggested by Shigli et al. [40] and Yenisey et al. [41], is also of interest. Frequently, in the case of the hypodontia, underdeveloped alveolar ridges are observed, which makes it difficult to retain the constructions. Therefore, the authors suggest the application of partial overdentures with additional retaining devices, such as telescopic crowns and mechanical joints made on the pre-prepared teeth available. This creates pre-conditions for alveolar bone preservation, stability of the prosthesis and restoration of speech and masticatory function.

Sometimes a huge effort is required by the dental practitioner to encourage the child to cooperate during the treatment process. Most authors [26, 29, 32, 34, 38] recommend the "tell, show, do" technique to manage the child's behavior. In cases of negative mood, Bhargava et al. [42] suggest the existing, irregularly shaped, but intact deciduous teeth not to be restored, but covered directly with overdentures. This significantly reduces the stages of treatment and the time spent on the dental chair by the child.

Exploring the children and parents' satisfaction is particularly important for the work of the dental practitioner. The data obtained from this type of studies may determine the treatment success in the various aspects of function, prophylaxis and esthetics and accordingly provide information to the dental practitioners on the possible shortcomings in these areas. The patient's subjective assessment is an important part of each and every stage of the treatment and is decisive for the ultimate success [43].

Rodd and Atkin [44] examined the clinical presentation and the satisfaction with removable prosthesis in children. The results have shown that 36.2% of the applied prostheses were corrected at least once after insertion. Approximately 60% of the patients required repeated fabrication of newly modified dentures.

To evaluate the patients' satisfaction, the authors used a short questionnaire, completed by the children themselves, with the help of which the authors assessed the overall attitude towards wearing of the prosthesis, the type of prosthesis, nutrition, comfort and the perception by other children. To evaluate the responses, the authors used the Visual Analogue Scale (VAS). The study results have indicated a total high score, with the most positive response being related to ease of eating. However, a relatively high degree of irritation, which tends to increase over the time, has been reported.

DISCUSSION:

The presented data allow us to summarize the basic requirements that are to be met by removable prosthetic treatments in childhood. Removable prosthetic constructions should:

- restore masticatory function and effectiveness within the normal range, without injuring the adjacent and/or opposing teeth;
- allow the creation of occlusion-articulation equilibrium and prevent from injury of the underlying dental follicles [1];
- create the appropriate conditions for proper sound pronunciation and articulation of dental ([d], [t], [n], [l]), sibilant fricative ([s], [z], [ʃ], [ʒ]) and affricate consonants ([tʃ], [dʒ], [tʃ]) [45];
- meet the esthetic requirements of parents and children. It is well known that children aged 3 - 5 years are already well aware of how they should look and how they would like to be perceived by children of the same age and adults [46];
- provide optimal and proper tooth eruption and growth of facial and maxillary bones, which requires periodic modification and processing of the constructions against the developing tissues;
- function as space-retainers with regard to orthodontic deformations. The lack of prosthesis in edentulous areas may result in migration of the adjacent teeth, impaired eruption, changes in dental rows and occlusal discrepancies [1];
- the materials used for the constructions must be biocompatible and hypoallergenic, and the performance technique minimally invasive and supportive.

An important feature of prosthetic treatment in childhood is the work with sometimes too impatient and difficult to motivate patients, who are not able to understand the needs and benefits of timely treatment [47]. This requires a clinical approach to work, requiring speed, painlessness and effectiveness.

CONCLUSION:

Various genetic diseases, multiple caries and severe traumas may lead to partial or complete tooth loss in children. Impairment of oral structures results in ineffective masticatory function and disturbance of basic vital processes such as eating and speaking. Generally, the affected children restrict their nutrition to only a few types, mostly soft foods. This leads to insufficient intake and absorption of nutrients necessary for the proper development of the whole child's organism.

Impaired appearance and sound articulation fre-

quently lead to emotional and social problems. Typically, such children avoid communicating and feel sad, shy and irritable. Ignoring these problems may lead to disturbances in mental development.

All this necessitates the development of modern methods of restorative or prosthetic pediatric dentistry. The use of removable prosthesis as a method of oral rehabilitation in young patients requires particular attention, due to the continuous growth processes, age-related anatomical, physiological and psychological characteristics. The application of a removable construction requires a multidisciplinary approach, a detailed knowledge of the stages of planning and the means of managing the child's behavior. Where necessary, prosthetic treatment should be performed at the earliest possible moment in order to restore the speech and masticatory function and the normal appearance of the child and hence, the possibility of the child's normal physical, mental and social development.

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