

First permanent molar (6 years molar) edentation: Classic prosthetic rehabilitation versus implant supported prosthetic rehabilitation (preliminary study)

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ABSTRACT

Introduction. Prosthetic restoration of single tooth edentation produced by the loss of the permanent first molar (6-year molar), regardless of its location (maxillary or mandibular), represents a challenge for any dentist.

Purpose. In this study we tried to present some theoretical and practical aspects regarding the advantages of implant-prosthetic rehabilitation, regarding the advantages of implant-prosthetic rehabilitation compared to the classic prosthetic rehabilitation, for the restoration of the 6-year molar single tooth edentation, taking into account both the opinions of the dentists and the preferences of the patients.

Material and method. The study was conducted between April 15 and June 30, 2018 on a group of 39 dentists, based on a questionnaire with 8 questions.

Results and discussion. The results obtained from the analysis of the answers given to the 8 questions, have been exposed in a varied iconography for easier understanding.

Conclusion. The most important aspect of this study is that most practitioners have recommended fixed prosthetic restorations on implant support, because of their superior advantages, compared with fixed prosthetic restorations with aggregation on the teeth bordering the edentulous breach.

Keywords: implant supported fixed prosthetic rehabilitation, 6-year molar single tooth edentation

INTRODUCTION

Partial edentation is considered by most prosthetic specialists as a complex edentation, which

can alter and/or modify all the functions of the dento-maxillary system, in the short or long term. And when we talk about these extremely important functions of the dental-maxillary apparatus,

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we actually talk about chewing, swallowing, phonation and physiognomy.

As clinical forms of partial edentation, it should be noted that, they are quite numerous, can appear from very young ages and can start from single tooth edentations and can reach subtotal edentations (1-6).

Practically, any type of partial edentation can be accompanied by more or less clinically detectable complications, the most common complication being the dental displacement, which appears as a result of the loss of contact points at teeth level, which border the edentulous breaches.

In general, any clinical form of partial edentation, including single tooth edentation, can have multiple causes, starting from untreated or incorrectly treated dental caries, and continuing with various forms of periodontal disease (especially deep chronic marginal periodontitis), maxillary bones or soft parts tumors, trauma resulting in loss of teeth, iatrogenesis, and here we can mention incorrect orthodontic treatments, creating fixed prosthetic restorations with an insufficient number of supporting teeth, incorrectly adapted partial prosthesis clasps etc.) (1-6).

PURPOSE

Due to the teeth loss, functions disorders of the dentomaxillary system of varying intensity can occur, and here we refer in particular to the physiognomic and masticatory functions. Mastication is severely altered, especially when posterior teeth are lost. Aesthetics and phonation problems appear especially when the teeth in the anterior area are lost. Specifically, there is the following tooth loss orders: 6-year-old molars (especially the mandibular ones), premolars (especially the upper ones), upper incisors, lower incisors, 12-year-old molars and last, canines.

Regarding the differential diagnosis of single tooth edentations at the level of the dental arches, this can be done with: hypodontics, dental inclusion, dental ectopia, spacings from the dentoalveolar incongruence, false breaches (when the root fragments are located subgingival), dental migrations and/or prosthetically restored edentations (1-6).

Usually, the patient presents to the dentist for restoring physiognomic function and less for restoring masticatory function. But, next, we will treat the single tooth partial edentations, that appear by the absence of the first molar of the permanent dentition, maxillary or mandibular, also known as the 6-year-old molar (1.6, 2.6, 3.6, 4.6),

a situation with which we meet very often in dental offices.

Basically, the objective of this preliminary study is the edentation of the 6-year-old molar, because the attitude of the patients towards this type of edentations is of delay until the appearance of other breaches, considering that the lack of a single tooth has no implications, regarding the functions of the dentomaxillary system. The only cases of single tooth edentations in which the patient wants immediate prosthetic restorations are frontal edentulous breaches, which are becoming more and more frequent as a result of the traumas. In these edentations the physiognomy is obviously affected (1-6).

MATERIAL AND METHOD

Regarding the loss of permanent primary molars, the effects can be visualized either in the positioning of neighboring and antagonistic teeth, or in the management of the mandibular movements, due to premature contacts and/or interference's, which can even lead to mandibular lateral-deviations. However, the early loss of the six-year-old molar also involves a series of migrations, as follows: sagittally from adjacent teeth and vertically from antagonist teeth. The consequences of losing 6-year-old molars at an early age determine changes in the eruption of neighboring teeth and antagonists, changes that affect their speed and direction of eruption.

Sagittal migrations following the loss of permanent, maxillary or mandibular first molars occur, in children and adolescents, according to some rules, listed by Zarnea L. (1-6):

- a. The amplitude of the displacement is greater, as the loss of the tooth occurred at a younger age;
- b. the amplitude of the displacement is higher at the upper arch and smaller at the lower arch.
- c. The amplitude of the displacement is greater for the teeth on the distal side of the breach and more limited for those located on the mesial side of the breach; early loss is followed by bodily displacement and, therefore, simultaneous translation of the coronary part and the root.
- d. The late loss is followed by crown tipping displacement of the teeth while root is maintained in a fixed position, having as a result their bending.

Vertical migrations of antagonists together with sagittal movements tend to close the edentu-

lous breach. These displacements occur with greater amplitude, when the loss of the first molar occurs at a younger age, when the deforming capacity of the alveolar bone is higher. In addition, the displacements of the maxillary molar are much more important than those of the mandibular molar (1-6).

In almost all situations of single tooth edentations produced by the absence of the permanent first molar (or the 6-year molar), regardless of the location of the edentation, maxillary or mandibular, the patients want fixed prosthetic restorations. Regarding the choice of treatment by fixed prosthetic methods, there is the option of using the teeth limiting the edentulous breach or the option of creating an implant supported restoration (1-6).

In the last 10 years, implant supported prosthetic restorations has gained ground over teeth supported fixed prosthetic restorations, patients being convinced that it is the only treatment option that can provide them with long-term comfort. The advantages of implant supported prosthetic restorations consist in preserving the vitality of the neighboring teeth, maintaining bone support, easy hygiene and reducing the risk of periodontal pathology (Fig. 1) (7-11).

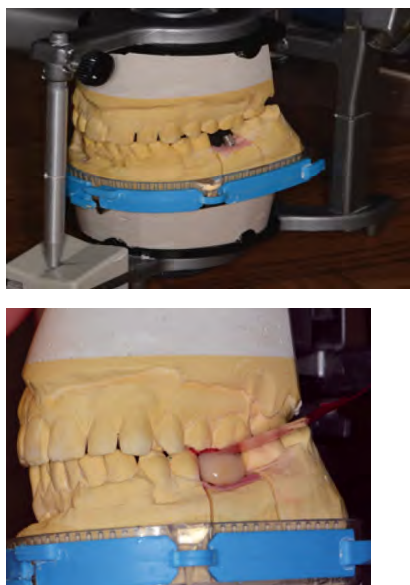


FIGURE 1. Implant supported prosthetic rehabilitation of a mandibular 6-year molar edentation

Possible treatment options at the present time include both fixed and mobile prosthetic solutions. How one of the treatment options is decided depends on both the clinical situation and the patient’s availability, as well as time and especially financially.

Starting from these aspects regarding the single tooth edentation that appeared after the loss of the first permanent molar (or the 6-year-old molar), regardless of localization, maxillary or mandibular (1.6, 2.6, 3.6, 4.6), but also the therapeutics of this condition, we elaborated a very brief and interesting questionnaire, consisting of 8 questions, which was applied to a number of 39 dentists from Bucharest, Brasov and Timisoara, which are specialized also in the implant supported prosthetic rehabilitation (both surgical insertion of the dental implants and, subsequently, their prosthetic rehabilitation). The study took place from April 15, 2018 till June 30, 2018. The dental practitioners included in the study ranged from age 35 to 56 years, and their gender distribution was as follows: 26 of the subjects (representing 66.67%) were male, while the remaining 13 dentists (representing 33.33%) were female (Fig. 2).

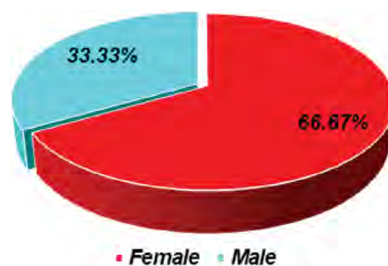


FIGURE 2. Gender distribution of study group

Next, we will present the 8 questions that were the basis of our study:

Questionnaire

1. The causes that can lead to various clinical forms of partial edentation, including single tooth edentation, are? **a.** Untreated or incorrectly treated dental caries; **b.** Incorrect orthodontic treatments; **c.** Maxillary bones or soft parts tumors; **d.** Trauma resulting in loss of teeth; **e.** Poor technical and material conditions in the dental laboratory.

Correct answers: a, b, c, d.

2. In the case of various clinical forms of partial edentation, including single tooth edentation, which is the order of tooth loss? **a.** The 6-year-old molars (especially the lower ones), the premolars (especially the upper ones), the upper incisors, lower incisors, 12-year-old molars and last canines; **b.** Canines, 6-year-old molars (especially the lower ones), premolars (especially the upper ones), upper incisors, lower incisors, and the last 12-year old molars; **c.** Upper incisors, 6-year-old molars (especially the lower ones), premolars (especially the upper ones), lower incisors, 12-year-old molars and last, canines.

Correct answer: a.

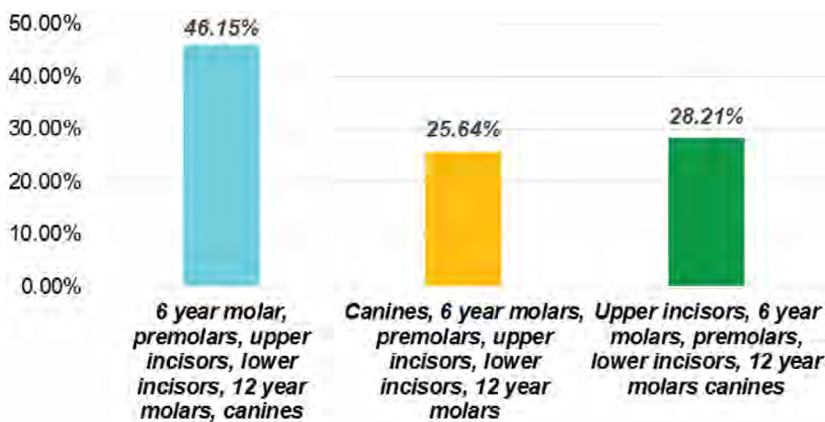


FIGURE 3. The order of permanent teeth loss

3. Migrations in the sagittal plane following the loss of first permanent maxillary or mandibular molars occur in children and adolescents, according to a few rules? **a.** The amplitude of the displacement is the greater, as the loss of the tooth occurred at a younger age; **b.** The amplitude of the displacement is higher at the upper arch and smaller at the lower arch; **c.** The amplitude of the displacement is greater for teeth distal to the breach and more limited for teeth mesial to the breach; early loss is followed by bodily displacement and, therefore, simultaneous translation of the coronary part and the root; **d.** The late loss is followed by crown tipping displacement of the teeth while root is maintained in a fixed position, having as a result their bending.

Correct answers: a, b, c, d.

4. The vertical migrations of the antagonist teeth, following the loss of the 6-year-old molar, regardless of the maxillary or mandibular localization, produce the following effects? **a.** They come together with sagittal movements and tend to close the edentulous breach; **b.** The displacements occur with a greater amplitude, when the loss of the first molar occurs at a younger age; **c.** The displacements of the maxillary molar are more important than those of the mandibular molar; **d.** The displacements do not cause changes in the temporomandibular joint.

Correct answers: a, b, c.

5. At the level of the dental arches, the differential diagnosis of single tooth edentations can be made with? **a.** Hypodontia; **b.** Dental inclusion and ectopia; **c.** Spacings from the dentoalveolar incongruence; **d.** False breaches (when root fragments are located subgingival); **e.** Extractions of premolars for orthodontic purposes **f.** Dental migrations and/or prosthetic restored edentations?

Correct answers: a, b, c, d, f.

6. The restoration methods of the single tooth edentations produced by the absence of the first permanent molar, regardless of location (maxillary or mandibular), can be? **a.** Implant supported fixed prosthetic restorations; **b.** Teeth supported fixed prosthetic restorations; **c.** Complete dentures?

Correct answers: a, b.

7. The advantages of implant supported prosthetic restorations consist of? **a.** Preserving the vitality of the neighboring teeth; **b.** Maintaining bone support; **c.** Easy hygiene; **d.** Reducing the risk of periodontal pathology; **e.** Cheap and easy treatment?

Correct answers: a, b, c, d.

8. In the case of restoration of single tooth edentation produced by the absence of the first permanent molar, regardless of location (maxillary or mandibular), which is your therapeutic recommendation of choice? **a.** Fixed implant supported prosthetic restorations; **b.** Fixed teeth supported prosthetic restorations; **c.** Removable dentures?

RESULTS AND DISCUSSIONS

For the first question related to the causes that lead to the appearance of edentations, all the practitioners included in the study answered correctly, namely variants a, b, c and d.

Regarding the order of permanent teeth loss for different reasons, the opinions are divided. 18 respondents (representing 46.15%) answered correctly - variant a (6 year molars, premolars, upper incisors, lower incisors, 12 year molars, canines). 10 respondents (representing 25.64%) incorrectly chose variant b, while 11 respondents (representing 28.21%) incorrectly chose variant c (Fig. 3).

Concerning the migrations in the sagittal plane following the loss of the permanent molars, 35 of the study participants (representing 89.74%) answered correctly – variants a, b, c and d, while the

rest of 4 participants excluded from the correct variants the response related to bending of the roots when the dental loss is late and is accompanied by the inclined displacement of the coronary part (Fig. 4).

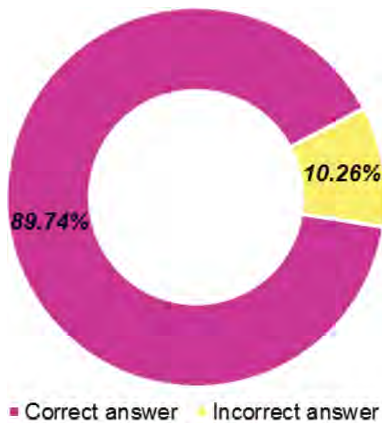


FIGURE 4. Knowledge of the migrations in sagittal plane following the loss of the permanent first molars

For the 4th question, related to the vertical migrations of the antagonistic teeth, all the practitioners answered correctly - variants a, b and c.

Most of the subjects included in the study (35, representing 89.74%) answered correctly the question linked to the differential diagnosis of single tooth edentations – variants a, b, c, d and f. However, 4 subjects (representing 10.26%) had incorrectly included among the variants of response also extractions of premolars for orthodontic purposes (Fig. 5).

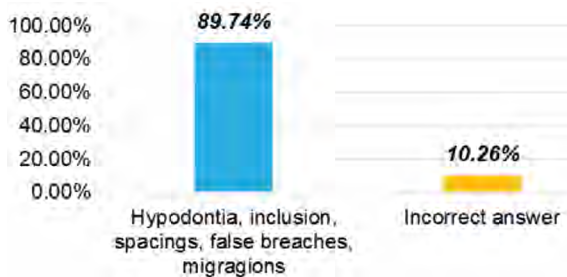
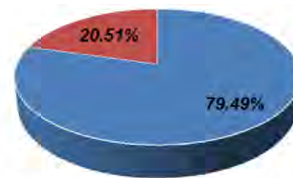


FIGURE 5. Understanding of the differential diagnosis of single tooth edentations

As expected, at the 6th question about restoring methods for single tooth edentations, all respondents answered correctly – variants a and b.

About the advantages of implant supported prosthetic restorations, the majority of the doctors participating in the study (31 representing 79.49%) answered correctly – variants a, b, c and d. Only 8 doctors (representing 20.51%) excluded from the correct answers the variant related to reducing the risk of occurrence of periodontal pathology (Fig. 6).



- preserving vitality, maintaining bone, hygiene, reducing periodontal pathology
- Incorrect answers

FIGURE 6. Understanding the advantages of implant supported prosthetic restorations

The last question in the study concerns the way in which the participating physicians, following their theoretical but especially practical experience, consider that the single tooth edentation caused by the absence of the permanent first molar should be restored. Treatment options are centralized in Fig. 7.

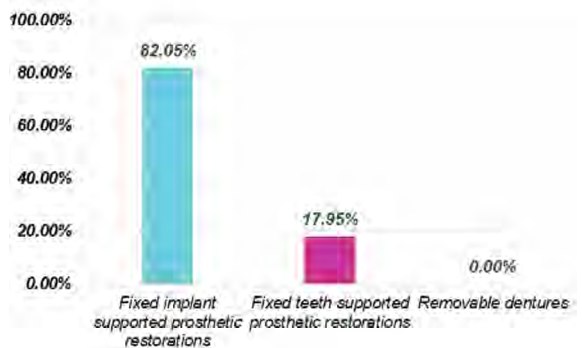


FIGURE 7. Treatment options for single tooth edentations caused by the absence of the 6-year-molar

CONCLUSIONS

Most of the dentists involved in the study (over 75%) have very strong theoretical knowledge both regarding the causes of first permanent molars loss, as well as about the sagittal migrations of the neighboring teeth or the vertical migrations of the antagonist teeth of the edentulous breach.

Over 85% of the dental practitioners participating in this study correctly defined the differential diagnosis of single tooth edentations, which denotes a very good theoretical training among these dental specialists, on some problems of interest in their current activity.

Most of the practitioners (over 79%) have firm and precise knowledge about the importance of implant supported fixed prosthetic restorations, all of these dentists having extensive experience in implant supported prosthetic rehabilitation.

Although, from a financial point of view, the fixed implant supported prosthetic rehabilitation of the edentation produced by the lack of the first

permanent molar is considerably more expensive, than the classic alternative of tooth supported fixed prosthetic restoration, most patients chose the implant option. This aspect is also understandable, considering that the implant supported therapeutic alternative avoids the reduction of teeth that limit the edentulous breach.

And if we also refer to the dental practitioners who rehabilitate this type of edentation produced by the loss of the 6-year-old molar, regardless of maxillary or mandibular localization, over 80% of

the practitioners included in the study have recommended the implant supported fixed prosthetic restorations, due to its superior advantages, compared with the tooth supported fixed prosthetic restorations with aggregation on the teeth bordering the edentulous breach.

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REFERENCES

- Dina MN, Andrei OC, Ionescu I et al. Aspecte teoretice și practice în tratamentul clasic și modern al edentației unidentare. În: Tănase G, Dina MN, Dumitru S.Gh. et al. Probleme în medicină și biologie – Vol. IX. Ed. Ars Docendi, București, 2019:165-312.
- Gall II. Asistența stomatologică. Ed. Didactică și Pedagogică, București, 1971.
- Miyasaki-Ching CM. Elemente clinice de stomatologie. Ed. All Educational, București, 2001.
- Zarnea L. Pedodontie. Ed. Didactică și Pedagogică, București, 1993.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary fixed prosthodontics. 4th Edition. St. Louis: Mosby Elsevier, 2006.
- Anusavice KJ. Dental materials. Philips' Science 11th Edition. St. Louis: Saunders Elsevier, 2003.
- Ispas DC, Eftene OA, Burlibașa M et al. Implications of titanium in orthodontics and dental facial orthopedics. *Metalurgia International*. 2011; 16(10):72-74.
- Burlibașa M, Cernușcă-Mițariu M, Cernușcă-Mițariu S et al. Theoretical and practical aspects related to biomaterials decontamination in dental medicine (with reference to dental prosthetics). *Metalurgia International*. 2013; 18(4):261-267.
- Burlibașa L, Domnariu C. Epigenetic landscape of human diseases. *Acta Medica Transilvanica*. 2018; 23(2):33-37.
- Bodnar DC, Burlibașa L, Vârlian C et al. Mercury, biocompatibility and its impact on environment. *Metalurgia International*. 2009; 14:95-100.
- Cristache CM, Burlibașa M, Cristache G et al. Zirconia and its biomedical applications. *Metalurgia International*. 2011; 16(7):18-23.