The European Proceedings of
Social & Behavioural Sciences
EpSBS

ISSN: 2357-1330

https://doi.org/10.15405/epsbs.2019.08.03.149

EDU WORLD 2018
The 8th International Conference

NON-INVASIVE AND MINIMALLY INVASIVE PROSTHETIC THERAPIES – PRESENT DAYS TRAJECTORIES WITH FORMATIVE CHARACTER

Irina Gradinaru (a), Loredana Liliana Hurjui (b)*, Cristina Gena Dascalu (c),
Magda – Ecaterina Antohe (a)
*Corresponding author

(a) „Grigore T.Popa" University of Medicine and Pharmacy of Iasi, Faculty of Dentistry, Department of Implantology, Removable Denture, Technology, 16 Universitatii Street, Iasi, Romania, irigrad@yahoo.com, magda.antohe@yahoo.com
(b) „Grigore T.Popa" University of Medicine and Pharmacy of Iasi, Faculty of Medicine, Department of Physiology, 16 Universitatii Street, Iasi, Romania, loredana.hurjui@umfiasi.ro
(c) „Grigore T.Popa" University of Medicine and Pharmacy of Iasi, Faculty of Medicine, Department of Medical Informatics and Biostatistics, 16 Universitatii Street, Iasi, Romania, cdascalu_info@yahoo.com,

Abstract

Introduction. Adhesive prosthetic therapies anchored in the registry of minimally invasive prosthetic therapies, in conjunction with the evolution of biomaterials and techniques, materializes in a viable solution for rehabilitation of reduced edentations, in the context of analysing local and loco-regional conditions of patients. The **purpose** of this study is to manage non-minimally invasive and minimally invasive prosthetic therapies in a clinically-technological vision based on a rapid, efficient algorithm adapted to the particularities of clinical cases. **Material and method**. Analysis of the criteria for the choice of non-invasive and minimally invasive therapeutic solutions for rehabilitation of partially reduced edentation by the wax-up method and various types of mathematical simulations in order to quantify the forces acting in the prosthetic field, individualized on different clinical situations. **Results and discussions**. A comparative study of the most commonly used and non-invasive methods of rehabilitation of various clinical situations of partial edentation has been carried out, with the help of mathematical simulations, resulting in the selection of the choice solution depending on the type of edentation, its location, the biomaterials and adhesives chosen, as well as the tensions involved. **Conclusions**. These non-invasive and minim-invasive therapies, which are predominantly anchored in the adhesive register, lead to successful results with a very good functional integration, their choice being in full agreement with a series of parameters represented by the etiology of edentation corroborated with the architecture of the edented ridge, and the type of occlusion.

Keywords: Prosthetic therapy, oral rehabilitation, adhesive therapy, partially edentation**.**

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Selection and peer-review under responsibility of the Organizing Committee of the conference
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1. Introduction

Modern dentistry has seen the development of many new materials and techniques. Two major developments lately are adhesion to dentin and stronger ceramic systems in the past. These technologies are still relatively new and therefore have not passed the test of time; uncontested scientific evidence is rare. The dentist is left with the presumption of trying to make clinical decisions based on scientific research and still be able to offer his or her patients the latest materials and techniques. The key to making a decision is a good understanding of the limitations and clinical indications of these new materials as well as the use of correct techniques. Dentists must also take into account basic biomechanical principles and be aware of the information provided by companies with extensive commercial influence.

Fractured plate generally appears as an aesthetic defect of minor importance and is easily corrected by polishing or intraoral repairs; often goes unnoticed by the patient. For this reason, the resistance rates of zirconium fixed dental prostheses and ceramic-metallic restorations are estimated to be equivalent (97-99% over five years) (Gupta, Tandon, & Prabhu 2002; Whitmore, 2002; Christensen, 2004).

The greatest number of complications resulting from the use of zirconium oxide in prosthetic treatments occur in fixed partial prostheses or decks. Current literature has identified numerous clinical trials in which the cohesive fracture of plated material is the main and most common defect. However, there are some controversies about the frequency of this mechanical failure as a result of variations in the variables analysis from different studies. Regarding the mechanical behaviour of fixed prosthetic restorations, the most important requirement is that they resist masticatory forces without fracture..

2. Problem Statement

The search for more resilient and lasting aesthetic restorations has been ongoing since the inception of dentistry. Currently, dentists are working to combine ease of preparation and application with acceptable aesthetics and predictable clinical longevity in a manner that enhances the efficiency and economy of the dental office. In balancing the functional performance of a material with today's high aesthetic standards, dentists often have to give up a certain amount of aesthetic concerns in order to gain more resistance and durability (Holt & Drake, 2008; Ravinett, 1965; Hebel, Gajjar, & Hofstede, 2002).

Along with these philosophical options, there is often contradictory information on the best way to use and handle these new materials and techniques - whether or not they are burly or not, bamboos or not, photopolymerisation or self-curing, cement or glue? (Thilander et al., 2001; Edelhoff & Sorensen, 2002; Goodacre, Bernal, Rungcharassaeng, & Kan, 2003).

Over the past few years, in terms of indirect aesthetic materials such as lithium disilicate and zirconia have offered the profession higher degrees of resistance and aesthetics.

3. Research Questions

In order to have a pertinent study on an issue that is anchored in the reality of the immediate dental practice it is necessary to be able to answer a series of questions:

1. In these clinical situations can we approach minimal and non-invasive therapies?
2. What are the criteria for long-term stability of these therapies?

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3. To what extent do the clinical particularities and type the chosen biomaterial influences the ultimate therapeutic success?

4. Purpose of the Study

The purpose of this study is to manage non-minimally invasive and minimally invasive prosthetic therapies in a clinically-technological vision based on a rapid, efficient algorithm adapted to the particularities of clinical cases.

5. Research Methods

Analysis of the criteria for the choice of non-invasive and minimally invasive therapeutic solutions for rehabilitation of partially reduced edentation by the wax-up method and various types of biomechanic simulations in order to quantify the forces acting in the prosthetic field, individualized on different clinical situations. The study lot was represented by a number of 50 patients treated within the practical stage of the final years of study of the Faculty of Dental Medicine, Iasi, students. The patients were diagnosed with frontal and frontal – lateral reduced edentation and the therapeutic option used for these pathological entities was represented by adhesive methods: bounded bridges and minimally invasive methods. Another research direction approached was represented by the comparative analysis of the flexibility degree of various types of biomaterials used. The test were made on a Textenser mechanical trials equipment. The data were collected using MS Excel, the statistical processing was performed in SPSS 20.0 and the charts were generated also in Excel.

6. Findings

A comparative study of the most commonly used and non-invasive methods of rehabilitation of various clinical situations of partial edentation has been carried out, with the help of mathematical simulations, resulting in the selection of the choice solution depending on the type of edentation, its location, the biomaterials and adhesives chosen, as well as the tensions involved. Figure 01 provides the distribution of the three representative types of prosthetic restorations.

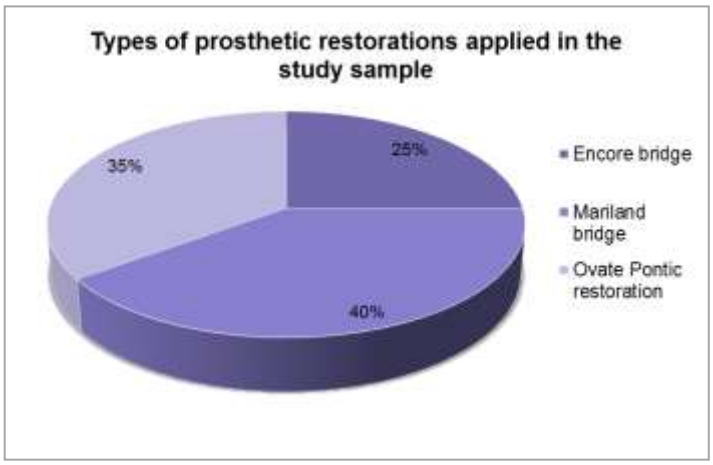

Figure 01. Type of prosthetic restorations applied in the study sample

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Regarding the prevalence of types of restorations analyzed, we remark a percentage of 40 % for Mariland bridge, a percentage of 35% for pontic ovate restorations returning them a percentage of 25% for Encore Bridge.

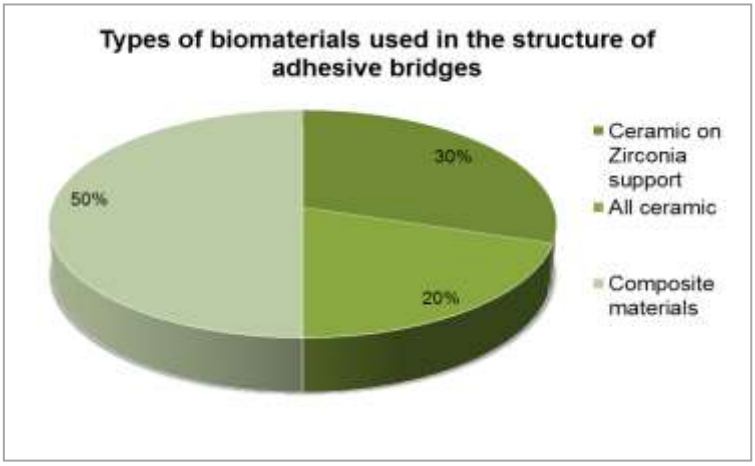

Figure 02. Types of biomaterials used in the structure of adhesive bridges

Regarding the type of biomaterial involved in adhesive and minimally invasive restorations, illustrated in Figure 02, we notice the prevalence of composite materials, in proportion 50%, followed by restorations in ceramic on zirconium, in proportion 30%, of the whole ceramic being distributed a percentage of 20%. Figure 03 indicates the prevalence of dental inclusion , 47%, regarding the ethiology of frontal and frontal-lateral edentulous, followed by congenital causes, 27%, periodontitis 18%, and orthodontic extraction, 8%.

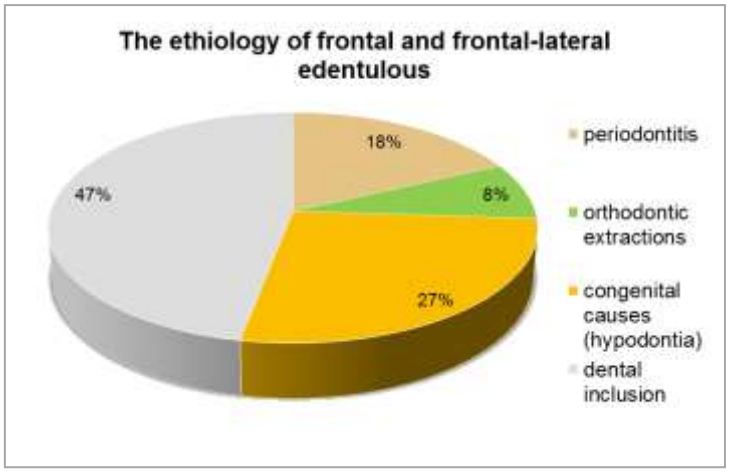

Figure 03. The ethiology of frontal and frontal-lateral edentulous

Significant implications for the choice of the therapeutic solution chosen from the regression of minimally invasive adhesives rests on the etiology of the edentation, at the frontal and frontal-frontal level, frequent clinical situations where the therapeutic indications refer to the curved bridges, the minimally invasive restorations, whose characteristics must cover the aesthetic binomial -functionality.

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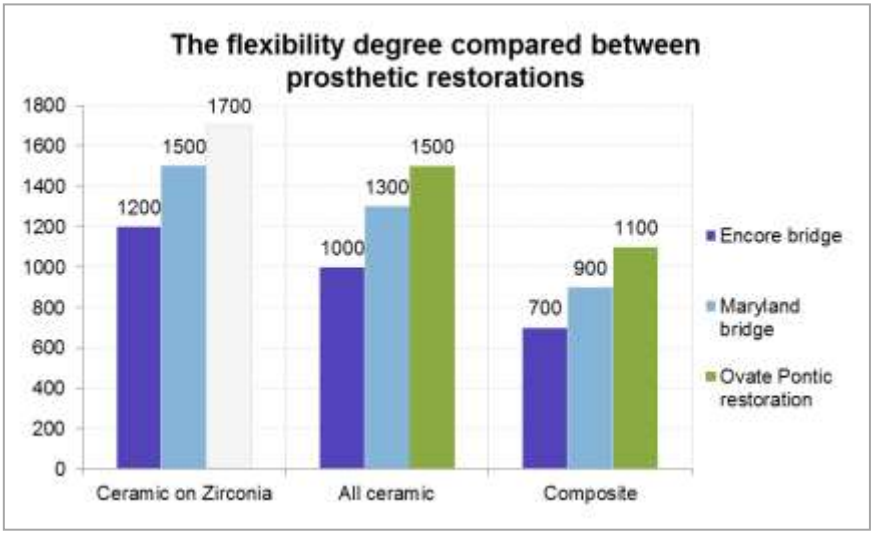

Figure 04. The flexibility degree compared between prosthetic restorations

The degree of flexibility of prosthetic restorations, illustrated in Figure 04, is an essential condition for therapeutic long-term care, which must be correlated with the parameters that characterize the odonto-periodontal support, the type of occlusion of the patient, and the biomechanical behavior of the chosen type of restoration.

In the formative aspects, a particularly important direction is given to the implementation of all the criteria for choosing the therapeutic solution of choice, represented by the practical applications.

A representative clinical case is the application of a collapsed bridge at level 24, applying the two extensions at levels 23 and 25. The noninvasive structure of the adhesive bridge is shown in Figure 05 and Figure 06.

Particularly important aspects of the clinical algorithm are the application of acid to the oral face of canine and second premolar, on the surface to be applied to the second extension of the bridge, followed by the spraying, the application of the adhesive, who was polymerized 20s, then a dual cement resin will be applied.The clinical algorithm and final aspect of adhesive bridge are illustrated in Figure 07, Figure 08 and Figure 09.

Figure 05. Aspect of adhesive bridge on model

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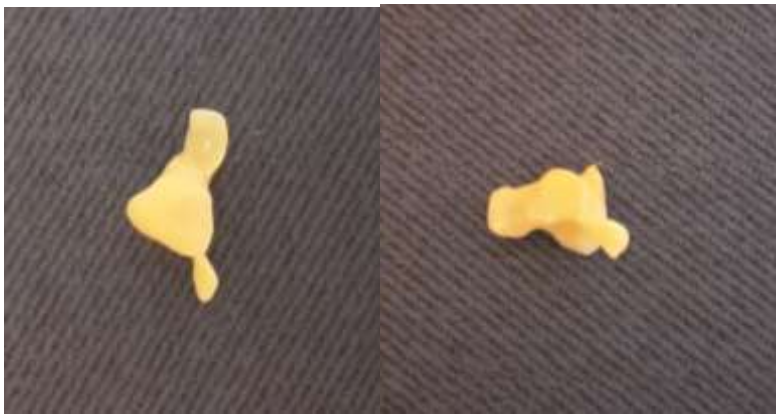

Figure 06. Aspects of adhesive bridge

Figure 07. Intraoral aspects of the adhesive bridge

Another clinically representative case of the problem addressed is the rehabilitation of an interstellar edentation at level 24, rehabilitated by a fixed ceramic restoration on zirconium, which involved limiting preparations as soon as the biological criterion prevailed.

Figure 08. Aspects of ceramic on zirconia bridge

Figure 09. Aspects of ceramic on zirconia bridge on model and intraoral

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7. Conclusion

These non-invasive and minim-invasive therapies, which are predominantly anchored in the adhesive register, lead to successful results with a very good functional integration, their choice being in full agreement with a series of parameters represented by the etiology of edentation coroborated with the architecture of the edented ridge, the type of occlusion with the 2 essential aspects: static and dynamic, as well as the other features of each clinical case, thus leading to targeted and individualized therapeutic approaches.

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