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## ADHESIVE PROSTHESIS, AN AESTHETIC AND CONSERVATIVE TREATMENT FOR THE ANTE- RIOR SECTOR

### PRÓTESIS ADHESIVA, TRATAMIENTO ESTÉTICO Y CONSERVADOR DEL SECTOR ANTERIOR

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#### ABSTRACT

Edentulism is the absence of dental organs. Its main causes are caries, periodontal disease, root fractures among others. They increase due to the advancement of the years. A systematic search for treatment information was carried out in partial edentulous areas in the anterior sector, for which we framed ourselves in qualitative data of dental implants, removable partial prostheses, and fixed prostheses in addition to fixed prostheses adhered with a focus on Maryland bridges. The implant is one of the treatments that have the best effect in terms of solving lost teeth. Prosthodontics with full crown abutments has been used for a long time in the anterior sector, to avoid a removable partial prosthesis or surgical action for the implant. New modalities such as adhesive prostheses have been developed in order to provide rehabilitation through adhesive and non-mechanical retention. Before implantology, PPR, PPF, and PT had prosthetic alternatives. Within these modalities, new options such as adhesive prostheses have been developed. Through this research, it is concluded that the adhesive prosthesis would be the best option for edentulous areas in the anterior sector thanks to the new methods and materials.

**Keywords:** Maryland, fixed partial denture, dental aesthetics.

#### RESUMEN

El edentulismo es la ausencia de órganos dentales. Sus principales causas son caries, enfermedad periodontal, fracturas radiculares entre otras. Aumentan debido al avance de los años. Se realizó una búsqueda sistemática de información de tratamiento en áreas desdentadas parciales en el sector anterior, para lo cual nos enmarcamos en datos cualitativos de implantes dentales, prótesis parciales removibles y prótesis fijas además de prótesis fijas adheridas con enfoque en puentes de Maryland. El implante es uno de los tratamientos que mejor efecto tiene en cuanto a solucionar los dientes perdidos. La prostodoncia con pilares de corona completa se ha utilizado durante mucho tiempo en el sector anterior, para evitar una prótesis parcial removible o una acción quirúrgica del implante. Se han desarrollado nuevas modalidades como las prótesis adhesivas para proporcionar rehabilitación mediante retención adhesiva y no mecánica. Antes de la implantología, PPR, PPF y PT tenían alternativas protésicas. Dentro de estas modalidades se han desarrollado nuevas opciones como las prótesis adhesivas. A través de esta investigación, se concluye que la prótesis adhesiva sería la mejor opción para las áreas edéntulas del sector anterior gracias a los nuevos métodos y materiales.

**Palabras clave:** Maryland, prótesis parcial fija, estética dental.

## INTRODUCTION

Edentulism is the absence of dental organs, it has main causes to caries, periodontal disease, root fractures among other factors (Brunton et al., 2019). This can occur in the anterior or posterior sector of both the maxilla and the mandible, the front part being the most affected when we talk about the patient's self-esteem. This loss causes functional, aesthetic, and psychological alterations in people since their emotional state is altered as one of the teeth that shapes their smile is compromised since it loses the lip contour and adopts facial aging (Fernandez-Barreira et al., 2016), (Guijarro-Rodríguez et al., 2017).

Partially edentulous people increase due to the advancement of the years and are seen in the need to use prosthodontics, the removable partial prosthesis has been one of the treatments most chosen in a large part of the elderly population since they seek the correct masticatory function and of phonation. But, what about those who also go to get aesthetics? These patients are mostly young, who come for a solution beyond the functional, they are generally concerned about their appearance. Currently one of the drivers for the demand for aesthetic treatment is the influence of social networks, although older adults are not far behind in terms of aesthetic demands in recent years (Gutierrez-Vargas et al., 2015), (Arias et al., 2021).

Research shows that people want a treatment that improves their aesthetics over their oral or general health, since a beautiful smile increases the chances of social acceptance, raising their self-esteem and confidence when smiling. In other words, in this way, they increase their self-esteem by feeling more attractive, which is a positive psychosocial impact (Von Marttens et al., 2010)

Dentistry has been modernized, constantly updating itself. The new materials together with adhesion techniques that have been renewed to find a conservative and less traumatic treatment in the rehabilitation of the dental organs are suggestions for the patient and a challenge for the clinician. Today we have several types of treatments to solve edentulous areas, these are: fixed prosthesis, implant, or removable partial prosthesis

This research aims to analyze the ideal, effective, aesthetic, and economic procedure that goes hand in hand with conservative dentistry for unit partial edentulism in the anterior sector, determining its advantages and disadvantages. In such a way that you can have variety in the treatment plan and thus find the ideal therapy depending on the needs of each patient

## DEVELOPMENT

A systematic search for treatment information was carried out in partial edentulous areas in the anterior sector, for which we framed ourselves in qualitative data of dental implants, removable partial prostheses, and fixed prostheses in addition to fixed prostheses adhered with a focus on bridges. Maryland.

The research was carried out in the virtual modality in Google Scholar, in Pubmed, and in the Journal of Dental Research both of articles, book fragments, undergraduate and postgraduate theses published by different professional societies in Ecuador and in the international context with an inquiry limit in time, no more than 5 years elapsed, using the keywords of the investigation. The bibliographic review was done in Spanish as well as in English. Using the base books on fixed prostheses: Contemporary Fixed Prosthesis by Rosenstiel, and Fixed Prosthesis by Pegoraro (Smarandache et al., 2020), (Ricardo et al., 2020), (Ehab Rushdy 2021).

The study has considered the risk/benefit ratio of the reviewed treatments, informing on time the objectives, benefits, or consequences that the therapeutic alternatives entail, leaving the best option to treat the edentulous area to the clinician's consideration since each patient is a different world.

Dental implants are one of the treatments that have the best effect in terms of solving lost teeth. Even before implantology, they had prosthetic alternatives PPR, PPF, and PT. Implants have improved over the years, having better effects of osteointegration of the material with the bone tissue, as well as providing dental aesthetics, since it is a valuable role in what we can come to consider a successful rehabilitation (Velasco Ortega et al., 2008).

It is the treatment that does not distribute the occlusal loads with other teeth, thus improving the masticatory function and reducing stress to the adjacent organs, avoiding tooth mobility in addition to preserving their tissues. Despite the advantages, the local considerations of the bone tissue where it is going to be implanted, the general health limits its application in patients with systemic diseases, or the fear of a surgical procedure is sometimes the factors that make this technique not carried out finished. Although the bone is too thin or soft, a bone tissue graft can be performed, but this would increase the time and cost of the treatment (García García et al., 2004), (Mar Cornelio et al., 2021).

Although the treatment has the best prognoses, a study by Elani HW shows that the prevalence of dental implants has been increasing since 1999, but even so, access, in

general, is very low, since this type of procedure is consistently prevalent in favored social groups, due to its economic cost and accessibility to specialists in implantology (Elani et al., 2018).

#### Advantage

- It is aesthetic
- Long-term success
- Better chewing function as it reduces the loads to the adjacent dental organs
- Preserves tissue from neighboring teeth
- They do not present problems when speaking
- They are artificial teeth that are considered natural
- Psychological: Favorable

#### Disadvantages

- The need for surgical intervention
- The time of the procedure
- It is limited to patients with bone problems or periodontitis problems
- Limited to patients with systemic diseases
- The price is relatively high compared to the other alternatives

Removable partial prostheses have been the treatment most chosen by the advanced adult population (Ecuadorian), it has the purpose of rehabilitating the masticatory function at an accessible price and in the shortest possible time compared to other prosthodontic alternatives,<sup>o</sup> but when it comes to conformity, some discomfort is manifested when using it, since many of the times the prosthesis becomes unstable due to resorption of the edentulous area due to the occlusal load or irritations that this causes (Hernández & Férez, 2012), (García Alpizar et al., 2010), (Carralero et al., 2020).

In young people, there seems to be a trend in favor of restorations with implants or fixed prostheses instead of removable partial prostheses and more so when it comes to previous rehabilitation since their long-term use clearly shows a greater risk of caries and periodontal disease. But when economic factors influence decision making, the choice is often for removable partial dentures.

#### Advantage

- Economic cost
- Does not require a surgical intervention
- Time of preparation

#### Disadvantages

- Uncomfortable to speak and chewing function
- Not accepted by much of the young adult population
- Risk of plaque, tooth decay, periodontitis
- Minimal dental wear (for rests)
- Lower aesthetics
- Irritations caused by chewing
- Unstable grip, use of adhesives to stabilize
- Reabsorption of bone in the mucosal area due to lack of blood supply
- Psychological: unfavorable (when removing the prosthesis, the patient feels that he has not been rehabilitated)

Prosthodontics with full crown abutments has been used for a long time in the anterior sector, in order to avoid a removable partial prosthesis or surgical action for the implant. The clinician mostly seeks to preserve healthy dental structures since they prefer not to wear out healthy tissue, but certain clinical cases are necessary to restore morpho-functional through bridges if the patient is not suitable for implants (Tamez et al., 2017), (Mar Cornelio et al., 2020).

Technological advancement has made it possible for the results to be digitized and printed, in order to replace them in a precise, aesthetic, and durable way possible, taking into account the conservation of the tissues. However, wearing 2 crowns to replace one is no longer conservative.

#### Advantage

- Relatively cheaper than an implant
- Long-lasting time due to new materials and methods
- Helps in the aesthetics of the patient
- There is no need to remove the prosthesis
- Morphological correction of pillar organs
- Mostly aesthetic
- Greater comfort for the young adult patient than a PPR
- Easy to maintain hygiene

#### Disadvantages

- Wear of neighboring teeth, sometimes healthy tissue
- Economically higher than a removable partial denture
- Bridge metal may color gums

- Aesthetically, 3 or more false crowns are visible
- Dental mobility due to excess chewing load
- Possible leak between the bridge and dental stump

New modalities such as adhesive prostheses have been developed in order to provide rehabilitation through adhesive and non-mechanical retention. This variant appeared in the early 1980s, improving patient comfort and significantly reducing tooth wear compared to the use of full-coverage crowns. In other words, the treatment has precedents, however, they did not have the acid etching properties and the adhesion methods that exist today but the minimal dental damage stood out. This is how the fixed prosthesis gives rise to the Rochette Bridge, Virginia Bridge, and Maryland Bridge (Valle Rodríguez et al., 2007).

Maryland has been the last to appear as the other bridges have been modified and improved, it was considered a temporary treatment due to its limited durability but it has been demonstrated with new materials and methods, the Maryland bridge can be considered as a definitive treatment and an alternative to the conventional prosthesis. This consists of the replacement of the missing dental organ following the concept of maximum preservation of dental tissue, aesthetics for the patient, long duration, and comfort to ensure correct functionality (Méndez Silva et al., 2013), (Carralero et al., 2020).

The edentulous area is rehabilitated with a crown, which is attached to the dental organs using lingual or palatal wings, with the preservation of enamel at the level of the neck of the dental organ. The structure of this prosthesis has evolved according to the materials and this is how it goes from cast metal to metal-free ceramics, in this way the disadvantage of staining the gingival tissue with metal remains out of date.

In the search for the material that meets the mechanical, biocompatible, and aesthetic characteristics, we found lithium disilicate as an application in dentistry, it offers the strength and subtlety necessary to replace a dental organ, as well as a conservative option (Salazar et al., 2019). The correct planning of this bridge, a suitable choice of materials, adhesion method, and dental preparation will be important for the success of this type of rehabilitation. (Salazar-López & Quintana-del Solar, 2016), (Gómez et al., 2019).

#### Advantage

- Preservation of dental tissue, since the wear is minimal
- Possibility of maintaining supragingival margin
- No need for anesthesia for wear
- Preservation of the aesthetics provided by the patient's natural teeth (only a front crown is visible)

- Preservation of the buccal surfaces of the adjacent teeth intact
- Shorter treatment time
- Lower cost than a prosthesis with conventional crowns and the implant

#### Disadvantages

- Limited edentulous space
- Does not correct alignment

The adhesion system has improved as dentistry is updated, with the main objectives of preserving as much healthy tissue as possible, achieving optimal retention in rehabilitation, and avoiding micro-leaks. Sandblasting the prosthesis consists of creating a rough surface in such a way as to increase its surface area and the mechanical fixation of the cement. Then the correct adhesion protocol together with a sandblasting with aluminum oxide will provide the adhesion with a more durable prognosis (Mandri et al., 2015).

#### Case report

A 21-year-old female patient presented to the consultation with the desire for a fixed prosthesis. A clinical record, X-rays, and intraoral examination were performed. After visual inspection, parts 12 and 22 are absent, due to true partial anodontia. She refers to have received previous orthodontic treatment for two years, to achieve adequate space for the placement of implants, which failed and made her look for alternative treatment (Aparicio Muñoz et al., 2021), (Cornelio et al., 2019).

In order to achieve maximum conservation and due to the optimal conditions of the patient, an adhesive prosthesis was chosen, with minimal tissue wear compared to a conventional fixed prosthesis.

#### Dental preparations:

Preparation of the palatal surfaces that will be the retainers of the teeth to be replaced. An approximate reduction of 1.5 mm was performed with a frusto-conical diamond bur, eliminating the retention areas proximally.



Figure 1. Palatal faces design.

Once the palatal surfaces have been made, an impression taking with silicone by adhesion (See figure 2). The bite registration is made and sent to the laboratory with the antagonist cast in stone.

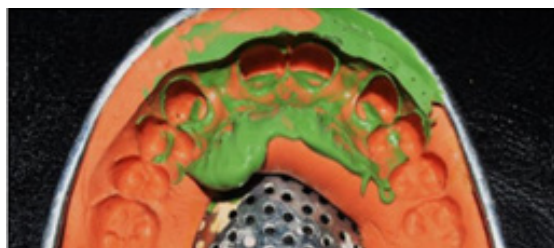


Figure 2. Printing with adhesion silicone.

Laboratory phase:

The prescription for the laboratory was two Maryland-type adhesive prostheses, which were made in an IPS e.max lithium disilicate CAD/CAM frame and laminated with feldspathic porcelain with a pointed pontic design (See figure 3).



Figure 3. Adhesive prostheses

Cementation:

In the consultation, the adaptation of the prostheses is checked. Etch the enamel on the preparations with Scotchbond Etchant Phosphoric Acid 3M Espe 34% for 15 seconds (See figure 4), wash with plenty of water and dry. Subsequently, it is conditioned with the Single Bond Universal® 3M Espe adhesive, aerated and light-cured.



Figure 4. Acid etching.

Apply hydrofluoric acid 9% Ultradent® Porcelain Etch for 30 seconds, wash and dry. Then we apply the Silane, aerate and let it dry (See figure 5).



Figure 5. Engraved prostheses.

Cementation with a dual resin cement, Variolink N LC Vivadent/Ivoclar, the excess cement is removed and with light pressure, it is light-cured for 30 seconds. Occlusal contacts are checked, and polished with silicone tips (See figure 6).



Figure 6. Cemented prostheses.

Frontal vita of cemented prostheses (See Figures 7 and 8).



Figure 7. Front view (1).



Figure 8. Front view (2).

Dalton Rodríguez states that even before implantology they had prosthetic alternatives PPR, PPF, and PT. Within these modalities, new options such as adhesive prostheses have been developed (Pinto & Shinya, 2007)

Pegoraro states that adhesive prostheses have presented a very large development in terms of cementing agents and carving care (Méndez Silva et al., 2013).

In the work carried out by Elani HW, it is shown that the prevalence of dental implants has been increasing since 1999 but even so, access, in general, is very low since this type of procedure is consistently prevalent in favored social groups, due to its economic cost and access to specialists in implantology. Research by Henostroza states that there is no universal cementing agent.

## CONCLUSIONS

Rehabilitation in the anterior sector seeks beyond the morpho-functional restoration, finding aesthetics and comfort are indisputable criteria since the level of social life that can be led also depends on this. At present, the implant is the ideal treatment chosen by the clinician. However, many of the times, people are not available to access this type of treatment, either because of the economic cost or because of fear of a surgical act.

Having as alternative options the fixed or removable prosthodontics. However, when it comes to the smile, what people are looking for is the most aesthetic and durable possible in this way, discarding the removable partial prosthesis. Through this research, we conclude that the adhesive prosthesis would be the best option for edentulous areas in the anterior sector thanks to the new methods and materials. With a Maryland bridge, it would have the least possible wear, an accessible and aesthetic price since it would only be visualized in the oral cavity a crown.

The precision of the sealing and marginal adjustment can be achieved through CAD-CAM technology. The correct management of the adhesion techniques will meet the objectives required for a long durability of the adhesive prostheses. However, this treatment would be limited if the edentulous area is extensive or if the dental organs that will support the bridge have an excess of cavities.

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