

# Ultraconservative fixed partial denture: esthetic and preservation of dental structure

*Prótese parcial fixa ultraconservadora: estética com preservação de estrutura dental*

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## ABSTRACT

*The oral rehabilitation can be made with several ways with the objective to reestablish the masticatory function and the esthetic of the patient. The aim of this clinical case is to present a different type of fixed partial denture, as alternative option to the dental surgeon, showing particularities like indications, contraindications, advantages, disadvantages and technical procedures necessary to its fabrication. The sequential presentation of the realized procedures emphasized the unique aspects of the dental preparation, impression techniques, and cautions during metal structures and ceramic try-in procedures, and esthetic overlay on the metal with composite resin. As a result, it could be observed that the ultraconservative fixed partial denture required lesser removal dental structure, re-established the esthetic and the occlusion of the patient. Finally, it can be concluded that the ultraconservative fixed partial denture is a treatment option to be used in the small prosthetic space with success both mechanically and esthetically.*

*Indexing terms: Dental esthetic. Fixed partial denture. Prosthodontic tooth preparation.*

## RESUMO

A reabilitação oral pode ser realizada de diversas formas com o intuito de restabelecer a função mastigatória e a estética do paciente. Este caso clínico tem o objetivo de apresentar um tipo diferente de prótese parcial fixa, como opção alternativa para o cirurgião-dentista, mostrando suas particularidades quanto à indicação, contraindicação, vantagens, desvantagens e procedimentos necessários à sua elaboração. A apresentação sequencial dos procedimentos realizados ressaltou os aspectos únicos do preparo dental, da técnica de moldagem, dos cuidados a serem observados na prova da estrutura metálica, na prova da cerâmica, dos aspectos diferenciais na cimentação e do recobrimento estético da estrutura metálica com resina composta. Como resultado pode-se observar que a prótese ultraconservadora exigiu menor desgaste estrutural dos dentes pilares, restabeleceu a estética e a oclusão do indivíduo. Diante disso, pode-se concluir que a prótese parcial fixa ultraconservadora é uma opção de tratamento a ser utilizada em pequenos espaços protéticos com sucesso mecânico e estético.

**Termos de Indexação:** Estética dentária. Prótese parcial fixa. Preparo prostodôntico do dente.

## INTRODUCTION

The tooth loss causes disorders that affect the functional, aesthetic, emotional and social aspects of the patient<sup>1</sup>. The prosthetic replacement should consider not only these aspects but should also be performed with minimal biological damage to the patient<sup>2</sup>.

There are different types of rehabilitation treatments that can reverse this condition<sup>3</sup> improving the oral health condition of people and therefore their life quality<sup>4</sup>.

Although dental implants are a great option for treatment<sup>5</sup> to replace a missing tooth, in some situations

resulting from the impaired systemic health condition or even by the patient's option, the choice of the treatment could be a fixed partial denture.

Among the different types of prosthesis, there is an ultraconservative fixed partial denture (UFPD) which is a mixed prosthesis type that combines principles of fixed prosthesis (metal structures, abutment teeth, pontics, ceramic veneering and cementation), and restorative dentistry (which uses restorative materials with innovations for esthetic, wear, polishing and especially adhesive systems that favor the longevity of the restoration<sup>6</sup>) that allow simpler and less aggressive preparations<sup>7</sup>.

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The component that differentiates UFPD from the conventional fixed prosthesis is a metal retainer that is inserted into the proximal and occlusal preparations of the abutment teeth<sup>5,8</sup>, usually at or supragingivally favoring the biological aspects and hygiene<sup>9</sup>. Subsequently, the metal retainers are covered with composite resin improving the longevity of the restoration<sup>10-11</sup>, preserving the tooth structure and restoring the aesthetics of the dentition.

The objective of this paper is to present a different type of fixed partial denture as an alternative option to the dentist, showing its peculiarities regarding the indication, contraindication, advantages, disadvantages and procedures for its fabrication.

## CLINICAL CASE

A male patient, 55, attended the dental clinic, in April 2011, reporting the need for prosthetic replacement of some upper teeth. During clinical examination, the absence of the second premolar (15) and first molar (16) on the right side, and reduced space for prosthetic replacement of these elements were observed. In this situation, the prosthetic indication could be a conventional fixed partial denture with two pontics, whose prognosis could be favorable<sup>12</sup>. However, as the abutment teeth presented a relative integrity with vital pulp, no changes in the soft tissues, Class I amalgam restoration and proper alignment in the dental arch, all are clinical conditions compatible with indication of a UFPD<sup>5,8</sup>. As the patient agreed and signed a consent form for the development and dissemination of the work, the option of the treatment was the UFPD.

The prosthetic preparation was performed on occlusal and distal surfaces of the first premolar and on the mesial and occlusal surfaces of the second molar, with the removal of the restorative material and the preparation of the proximal boxes by following characteristics: buccolingual width of at least one third of the buccolingual dimension of the teeth, occlusal design following the contour of the isthmus<sup>8</sup>, axial wall of the preparation not necessarily divergent toward the occlusal surface (Figure 1), occlusal box with about 1,5 to 2 mm depth and 1 mm depression depth in the pulpal floor of the opposite region in relation to the proximal area of the connection to the pontic, gingival wall of the proximal box at or above the gingival level, and no sharp angles throughout the entire preparation<sup>7,9</sup>.



Figure 1. Characteristics of the preparations.

The impression making can be performed by several techniques used in fixed partial denture such as two-stage or dual technique, single or simultaneous impression or triple impression technique. In this particular case, the triple impression technique with polyether impression material (Impregum, 3M ESPE, Sumaré, Brasil) was used, for copying simultaneously the dental preparations, antagonist teeth and bite registration<sup>13</sup>.

After obtaining the working casts, the wax-up and casting the metal structure of UFPD were made. In this phase, the metal structure should be adapted to the gingival margin of the proximal box of the preparation<sup>8</sup> similar to the adaptation of a conventional fixed partial denture, avoiding the need for the supplementation with composite resin in this inaccessible region (Figure 2).

In clinical try-in, the adaptation of the metal structure in the preparations and also the interocclusal space for placement of ceramic in the pontics and composite resin on the retainers were observed (Figure 2).



Figure 2. Adaptation of the gingival margin, the contour of the metal structure and the interocclusal space.

Articulated casts were sent to the laboratory for the application of ceramic on the pontics, leaving the retainers only with the applied opaque. In clinical sequence, the restoration was positioned on the preparations and the form, shape, color, and occlusion were reassessed (Figure 3).



**Figure 3.** Clinical try-in of ultraconservative fixed partial denture.

Prior to cementation, the pretreatment of the opaque of retainers with 10% hydrofluoric acid (Dentsply, Catanduva, Brazil), for 1 minute, thorough washing with water/air spray, drying with compressed air and applying a layer silane (3M ESPE, Sumaré, Brazil) were performed. With absolute isolation, prophylaxis of prepared abutment teeth with pumice and cotton balls was performed. Thorough washing with water/air spray and drying with gauze were accomplished. Cementation of the prosthesis was performed with a self-adhesive resin cement (RelyX-U100 - 3M ESPE, Sumaré, Brasil) dispensing the steps of etching, priming and adhesive application of the teeth<sup>14</sup>.

After cementation, the etching of the prepared abutment teeth with phosphoric acid 37% (37 Condac, FGM, Joinville, Brazil) for 20 segundos<sup>14</sup>, abundant washing with water, drying with compressed air and applying Single Bond (3M ESPE, Sumaré, Brazil) were performed, after that, the opaqued retainers were covered with A3.5 composite resin (Z350, 3M ESPE, Sumaré, Brazil) reestablishing occlusal morphology (Figure 4), and occlusal contacts (Figure 5).



**Figure 4.** Restoration with composite resin.



**Figure 5.** Final view of the ultraconservative fixed partial denture.

## DISCUSSION

As the ultraconservative fixed partial denture uses metal retainers inserted in the proximal prepared boxes, supporting the pontic that replace the lost tooth, its indication is for prosthetic rehabilitation of small spaces to no structural damage to the prosthesis and also to abutment teeth<sup>8</sup>. However, the indication of UFPD could be extrapolated to larger spaces, as showed in this case, because of the quality and positioning of the abutment teeth, the thickness of the metal structure which confers resistance to the prosthesis as well as the precise seating of the prosthesis on the proximal margins of the preparation. Also possible overloads resulting from parafunctional habits were discarded and care with the balanced distribution of the occlusal contacts in mandibular centric positions was taken, which could cause damage to the prosthesis and to the abutment teeth.

In this case, the abutment teeth were in optimal conditions, both structural and positional, for a UFPD, but in the possibility that they were not aligned with each other, which would not be an accurate indication for UFPD<sup>8</sup> because the difficulties in adaptation and integration of metal retainers in the proximal boxes, it is important to be clear that adjustments in the form of dental preparations can address this shortcoming and facilitate the rehabilitation without mechanical, aesthetic or functional impairment.

Another aspect to be considered in relation to the abutment teeth, although not applicable in this case, is the quantity and quality of remaining structural, since according to Lacy<sup>8</sup> badly damaged abutment teeth may not be strong enough to receive the metal retainers and nor contain the restoration. But despite this, it is important to select the type of rehabilitation that previous



conditions on the abutment tooth be considered, which at first may contraindicate this type prosthesis<sup>8</sup>, but due to adjustments in the treatment planning could become viable, for example, a combination of an ultraconservative retainer and a full crown retainer.

Although the clinical point of view, in this case, the structural conditions of the abutment teeth allowed preparations with margins located above the gingiva (Figure 1) which made the impression procedures simpler, without the need of gingival displacement<sup>3</sup>, besides of being appropriate from biological point of view and hygiene<sup>9</sup>, and the type of conservative preparation in these areas did not compromise the aesthetics of the patient, parameter that must be observed in abutment teeth with unfavorable conditions.

The cementation phase of UFPD is a relevant procedure. Attention to the isolation of the operative field, the selection of the luting agent and the use according to the manufacturer's guidelines must be taken in consideration. It is also worth mentioning that the UFPD present two types of retention on the abutment teeth, that is, retained by the action of the self-adhesive cement that has chemical bond to the metal of the retainers and pulpal and gingival walls of the proximal boxes<sup>14</sup> and by the action of the composite between the retainer opaque ceramic, conditioned and silanized and other walls of the preparations that were etched and have received the application of the adhesive (Single Bond, 3M ESPE, Sumaré, Brazil).

UFPD is a prosthesis that combines the strength and aesthetics of metal ceramic restorations with the preservation of tooth structure of composite resin restorations and may consider it a prosthesis with action for mutual protection of the materials, ie, the high resistance of ceramic protecting the least resistance abrasion of the composite. Moreover, according to the work of other authors<sup>10,11</sup>, the composite restorations showed values of mechanical strength and wear resistance with satisfactory clinical results and adequate longevity, which reinforces the choice for this type of rehabilitation.

UFPD is a type of prosthesis that has advantages over conventional fixed prosthesis during the fabrication, such as cost, time and ease execution procedures, no require sophisticated equipment neither personnel with specialized technical training. And in case of wear of the

composite resin, by time or other occurrences, the repair is made clinically by adding restorative material, quickly and easily performed without the need for total removal of the prosthesis<sup>8</sup>. Moreover, in case of clinical failure, the UFPD can be removed without irreversible procedures on abutment teeth, similar to the preparation made in the adhesive prosthesis<sup>15</sup> enabling the execution of another type of rehabilitation less conservative.

The supragingival limit facilitating impression and fitting procedures and cleaning of the prosthesis by the patient; the type of preparation in the proximal boxes allowing support to the prosthesis at the gingival margin and visualization tooth/metal interface<sup>8</sup>, the choice of self-adhesive resin cement as it is indicated for cementation of metal restoration, presents low solubility and good mechanical properties<sup>14</sup>; the chemical union of opaque ceramic to metal; micromechanical union of the composite resin to the opaque ceramic, chemical bond due to the presence of the silane and aesthetics/strength of ceramics are all factors that favor the good clinical performance of the UFPD, as in the present case, with 1-year follow-up, which presented with marginal integrity of both the occlusal and proximal areas of the abutment teeth and with satisfactory aesthetics of the prosthesis.

## CONCLUSION

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The authors presented ultraconservative fixed partial denture emphasizing indications, contraindications, advantages, disadvantages and procedures necessary for its development through the presentation, illustration and discussion of a clinical case. They concluded that UFPD is a viable option for prosthetic treatment, especially of cases of small space and abutment teeth with large amount of healthy dental structures.

## Collaborators

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W MATSUMOTO and TH HOTTA developed the clinical case and participated in the writing of the paper. RPA ANTUNES, RM FERNANDES and IA ORSI were responsible for the literature review and revision of the article. All authors participated in the discussion about the benefits and dies advantages of the technique.

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Received on: 23/3/2012

Final version resubmitted on: 16/6/2012

Approved on: 1/8/2012