CASE REPORT

Association between conventional and flexible removable partial denture: literature review and case report

André W S Brandão | Eduardo S Uemura1 | João Maurício F da Silva2 |
Marcela M Penteado3*

1Undergraduate student, Odontology course; São Paulo State University (UNESP), São José dos Campos, SP, Brazil
2PhD student, Department of Dental Materials and Prosthodontics; Institute of Science and Technology, São Paulo State University (UNESP), São José dos Campos, SP, Brazil
3Assistant Professor, Department of Dental Materials and Prosthodontics; Institute of Science and Technology, São Paulo State University (UNESP), São José dos Campos, SP, Brazil

Abstract
Flexible Removable Partial Denture (flex RPD) prostheses aim to provide greater comfort and esthetics to partially edentulous patients, but it contradicts one of the main foundations of conventional prostheses: it lacks the rigidity of the metallic structure responsible for absorbing and correctly distributing the masticatory load to supporting tissues, avoiding damage to adjacent structures. The aim of this work was to propose the association of the two abovementioned types of prostheses, in view of adequate biomechanics and satisfactory esthetics. A clinical case was performed, with the preparation of upper total prosthesis and lower modified partial removable prosthesis. Upon patient’s request, the clamps supported on the abutment teeth were made with flexible polyamide resin to match the color of the gingiva. All other procedures were performed according to the traditional prosthesis preparation protocol. After installation and clinical monitoring of the prostheses, the patient reported confidence when eating and overall satisfaction with the esthetics. Associating the conventional removable partial denture (RPD) with the flexible version (flex RPD) is an alternative to encompass biomechanical and esthetic results concomitantly.

KEYWORDS
Denture partial, Mouth rehabilitation, Dental esthetics

1 | INTRODUCTION

Removable Partial Denture (RPD) is a classic option for the rehabilitation of partially edentulous patients; its metallic structure, however, makes it difficult for users to accept, as they usually look for cosmetic solutions to disguise their use as much as possible [1]. To overcome this limitation, metal-free, fully or partially flexible prostheses appeared [2], but their functionality is strongly challenged, since it contradicts one of the fundamental concepts of conventional prostheses, the rigidity of the metallic structure, except for the third end of the retention arm [1].

The biomechanics of RPDs work due to the rigidity of the constituent elements, i.e. the rigid supports receive the masticatory load focused on the artificial teeth and transmit it to the supporting teeth. In addition, the smaller and larger rigid connectors allow a better distribution of such masticatory load through all the supporting elements of this prosthesis, ensuring a mechanically favorable prosthesis, and avoiding damages to adjacent structures [1].

Many authors consider the use of flex RPD the appropriate treatment to guarantee comfort and esthetics to the patient [3]. Others report that the absence of the ideal requirements of a conventional RPD leads to flex RPD receiving an indication of a provisional prosthesis, since the absence of rigidity may render severe wearing in a short time of use [4].

There are also practitioners who argue that flex RPD causes mobility in the abutment teeth and bone resorption in the fibrous mucosa region, which virtually receives all masticatory load, since it is not properly transmitted to the abutment teeth [1]. There is an option to minimize this effect, which is the injection molding of glass-fiber-reinforced for non-metal-clasps [5].

Some reports in the literature indicate that polyamide-based resin presents impossibility of relining, low thermal conductivity, lack of chemical adhesion with acrylic teeth, polishing deficiency and color change [3,4].

There is no consensus in the literature on the most appropriate option for partially edentulous patients. In this way, the purpose of this work was to propose the association between classic RPD and flex RPD, aiming to provide adequate biomechanics and satisfactory esthetics.

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2 | CASE REPORT

A 78-year-old female patient (MAM) attended the Partial Removable Prosthodontics Clinic of the School of Dentistry São Paulo State University, São José dos Campos/SP, Brazil, complaining of difficulty in chewing due to the partial absence of her lower teeth, intending to replace her full superior denture, which was unsatisfactory in terms of esthetic and functionality.

After detailed anamnesis and physical and radiographic examinations, no changes were observed, as the remaining elements presented satisfactory periodontal health. The proposed planning was to rework the full denture in the upper arch and a Kennedy Class I RPD in the lower arch, where elements 33, 32, 31, 41, 42, 43, 44 were present. Initially, moldings were made to study the upper and lower arches, with alginate (Hydrogum five) and stock molds (Veners). The lower arch diagnostic cast was taken to the designing device for the layout and planning of the future RPD (Figure 1). A metal structure with T-clamps (direct retainers) on teeth 33 and 44, a lingual plating as the major connector, and a metal-reinforced plastic saddle were planned. When presenting the planning of the future inferior prosthesis for the patient, she requested the removal of the clasps in the abutment teeth, for esthetic reasons. As it was not possible to remove the retaining arms from the direct retainers, the patient was offered a removable partial denture with a conventional metal structure, but with retaining clasps made of a gingiva similar material (flexible polyamide resin – nylon).

When evaluating the diagnostic cast, a retention area of 0.25 mm was detected, which is considered adequate for a conventional prosthesis, but not for a flexible one; in this way, it was necessary to perform a re-contour by adding composite resin with a retention calibration of 0.75 mm. Furthermore, we checked whether it was necessary to make additions in composite resin on the lingual face of the canines and incisors for support preparations. It was also planned to carry out the preparation of a support in the mesial of the 44 and guide plans in the abutment teeth. All plans made in the diagnostic cast were transferred to the patient’s mouth. After that, the work molding was performed through individual mold and mercaptan (Kerr). The metal frame (Figure 2) was tested in the mouth and adjustments were made, obtaining better clinical functionality and comfort. Then, the upper arch molding was performed through individual mold with chemically activated acrylic resin (Jet Clássico) and mercaptan (Kerr). After the adaptation of the upper test base, adjustments of the upper wax rollers, assessment of the facial arch, delimitation of the orientation planes, and bite registration in centric relation, the work was sent to the prosthetic laboratory for the assembly of the artificial teeth (New ace). After tooth testing, occlusion adjustments, and process and finished (Figures 3,4), the prostheses were installed. After sessions of clinical monitoring, the patient reported confidence when chewing and defined that she was happy with the esthetics mainly because there were no metallic clips.

3 | DISCUSSION

Seeking a better esthetic option that does not sacrifice the basic properties of a biomechanically favorable RPD, metal Removable Partial Dentures conjugated with flexible prosthesis have been used. Esthetically, these types of prosthesis have a similar appearance to conventional removable partial dentures, with a larger connector, occlusal supports and posterior clasps, but the artificial gingiva resin is conjugated to the flexible prosthesis material, extending to the anterior clasps in the same material, i.e. metal-free clamps [6,7]. Literature is rather controversial regarding the use of RPD. Conventional ones are esthetically impaired, depending on the classification type. Flex RPDs are often indicated only as space maintainers or temporary prostheses. Moreover, there are authors that indicate them for patients with metal allergy, absence of only a few elements, or small loss of occlusal support. They include esthetics but are contraindicated in cases where there is insufficient inter maxillary space, prominent residual ridge, and inadequate labial space [8].

A comparative study on the retention and load capacity required to displace cobalt-chromium, polyoxymethylene or acetate resin clamps showed that clamps made from acetate resin (0.02N) presented lower retention force when compared to cobalt-chromium (2N) clamps. For better retention, the design of the resin clamp should be larger than the design of the Co-Cr alloy, increasing plaque buildup in the region, resulting in periodontal disease [9,10]. The flexible resin has a great translucency that reflects the natural color of the patient’s gingiva, as well as the strength and flexibility that make it easier for the patient to insert and remove, in addition to lower susceptibility to water absorption when compared to thermally active resins, thus facilitating hygiene and rendering less
plaque accumulation [11]. Considering literature findings and the suggestion to new studies which show clinical evidence [12], the treatment chosen for the above-described patient was a conventional RPD conjugated to a flex RPD. Because it was a Kennedy class I, where the anterior teeth are present, it was necessary to place clamps on the abutment teeth (44 and 33). In this case, the clamps were made of polyamide resin, which is generally better accepted by patients [13,14], even though they know the greater effectiveness of cobalt-chromium clamps.15 Singhal M15 reported that flex prostheses are better suited to geriatric patients because of the ease of insertion and removal, especially in patients with motor impairment. In this way, it is believed that flexible clamps may favor prosthesis placement by the 78-year old patient. Fully flexible prostheses, although esthetically superior, present some biomechanical disadvantages, which may compromise the treatment in the medium-to-long-term. There is no need to perform support preparations on the supporting teeth, which is considered an advantage.1 However the lack of adequate preparation and rigid support in the structure of flex prostheses means that it may not present adequate support, with all absorption of the masticatory load being on the fibrous mucosa, even in dental-supported cases.2 This, over time, implies damage to the fibrous mucosa, material distortion and mal adaptation. The prosthesis made for the patient MAM is the result of the combination of a conventional prosthesis with all its traditional elements that promote stability and rigidity through the metal and an esthetically-oriented approach through the use of flex resin in the retention arms.13 A fully flexible removable partial denture could be made for this patient only provisionally [2], but the patient chose to make the definitive prostheses directly.

The combination of the two prosthesis types eliminates the problem of lack of rigidity, thus ensuring correct absorption and distribution of the masticatory load by the metal supports and larger rigid connectors. This increases the prosthesis’ longevity, and preserves the supporting structures, tooth and fibrous mucosa, as these two biological elements will, therefore, be acting in the support of the prosthetic apparatus, while the esthetic part is ensured because the retaining arms are made of flexible material, mimicking the presence of this structure. In general, conjugated prostheses may be indicated for a wide range of cases, requiring good planning and execution, thus ensuring greater patient satisfaction, both for esthetics and for their function [14]. The use of flexible resins for the preparation of RPD guarantees satisfactory esthetics and comfort for insertion and removal of the prosthesis, but due to the lack of fundamental elements essential for biomechanics, they are only provisionally indicated.

4 REFERENCES


