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Clinical case

Minimally Invasive Direct Provisional Restoration after Tooth Extraction in the Anterior Sector. Case Report

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ABSTRACT

Introduction: Tooth loss, especially in the anterior sector, can have a significant emotional impact, affecting patients' self-esteem and social interaction. **Objective:** To report using a provisional Maryland-type direct resin and fiberglass prosthesis to replace an upper central incisor. **Case presentation:** Patient with grade III mobility and discomfort when chewing on tooth 21, who experienced external root resorption due to previous dental trauma. Although it was emphasized that the dental implant is the ideal option; it turned out to be impossible, so it was decided to

use a resin and fiberglass Maryland prosthesis in the affected area. **Conclusion:** Direct restoration with resin supported by fiberglass is a practical and aesthetic temporary solution when replacing a tooth in the anterior sector is necessary.

Keywords: Anterior tooth loss, dental trauma, Maryland bridge, aesthetic provisional, self-esteem.

INTRODUCTION

Tooth loss is related to aging; however, it can be a consequence or complication of carious lesions, trauma, and/or periodontal disease[1]. Evidence shows that edentulism is associated with a reduction in quality of life, in addition to the functional problems that patients may have[2]. In cases where the anterior sector is affected, it can cause low self-esteem, anxiety, and even depression[3]. The prevalence of partial edentulism in the anterior sector of the maxilla (Kennedy class IV) varies from 1% to 26%[4]. Data in Mexico are not very precise; in the Epidemiological Surveillance System of Oral Pathologies (SIVEPAB, its acronym in Spanish)[5] only the total edentulism variable is registered, however, for the year 2022 in the CPOD index, the total number of teeth lost in adults from 35 to 44 was 2.15 - 2.83 and for older adults (>65 years) it was 8.11 - 9.4[5].

Treatment options to recover function and esthetics after losing a central incisor can be varied. Conventionally, a fixed prosthesis of 3 units is often the traditional option. Nowadays, less invasive alternatives are sought, such as the placement of intraosseous implants[6], fixed prosthesis with palatal anchorage (*wing fixed dental prosthesis*)[7], provisional removable prosthesis, and *Maryland*-type restorations with resin or ceramics[8.]

The ideal post-extraction treatment of single teeth in the anterior sector is the dental implant, providing esthetic results with high predictability and a low prognosis of complications[9]. However, cost is often an impediment to the performance of this procedure. Therefore, minimally invasive alternatives such as those described above can be a temporary or permanent option to replace a missing incisor. The use of adhesive materials[10] allows an immediate (direct) restoration, which is ideal in the anterior sector. The present case report describes the placement of a *Maryland*-type bridge made directly with resin and fiberglass reinforcement to restore an upper central incisor post-extraction.

CLINICAL CASE PRESENTATION

A female patient, 54 years old, originally from Mexico City, married, employed, with her own home and basic services, with no domestic fauna, resident of the city of Aguascalientes for 34 years, attended the Integral II clinic of the Didactic Medical Unit of the Universidad Autónoma de Aguascalientes. About cardiovascular, respiratory, gastrointestinal, luetic, phymic, renal, hematological, endocrine, autoimmune, metabolic, genetic, psychological, sexually transmitted diseases (STDs), transfusions, and allergies, denied by the patient. The patient reported mobility and discomfort when chewing on tooth #21, with an evolution of three years, and also a dental trauma that occurred 10 years ago. Clinically, she presented a splint with wire and resin, placed three years ago; tooth 21 presented grade III mobility. Radiographically, root resorption and bone loss were observed; tooth 11 presented grade I mobility, and tooth 12 had no mobility or pathological data (Figure 1. A). The diagnosis of tooth 21 using ICD-11

was pulp necrosis (DA09.1), and consequent loss due to trauma and focal periodontal disease (DA0A.1).

Figure 1. Initial photographs. A. Dentoalveolar radiograph, showing placement of the splint with wire and resin; B. Intraoral frontal photograph showing the progress of the post-extraction healing. C. Occlusal photograph of the area.

The first treatment option was the placement of an implant and implant-supported crown, so the patient was referred to the periodontics clinic for periodontal treatment and to the endodontics clinic for evaluation by a specialist. The patient commented that she did not have the economic means for the placement of a dental implant, so it was decided to offer a direct *Maryland*-type restoration made with resin and supported by fiberglass after the extraction, prior authorization, and signature of informed consent, privacy notice, and use of data for research purposes. The treatment plan was divided into three phases, the first consisted of basic sanitation with dental prophylaxis and reinforcement of brushing technique. In phase 2, tooth #21 was extracted. An infiltrative block anesthetic procedure was done with 2% lidocaine with 1:100,000 epinephrine (FD®, Zeyco), with an upper anterior alveolar anesthetic technique and nasopalatine reinforcement. We proceeded with the syndesmotomy of tooth #21, luxation and avulsion with a small straight elevator, washing of the cavity with sterile solution, and placement of compressive gauze. Ibuprofen 600 mg every 8 hours for 3 days, oral hygiene, and mouthwash (Oral-B® Gingivitis) were indicated. In the third phase, after one month of postoperative evolution to favor the recovery of the soft tissues and ensure the final dimensions of tooth 21 (Figure 1. B-C), the reconstruction was performed with resin. After absolute isolation of teeth 13 to 23, selective wear on the palatal faces of teeth 11, 22 and 23 was done (Figure 2. A), followed by etching with orthophosphoric acid gel (3M™ Scotchbond™ Universal Etchant Gel) for 15 seconds, washing with abundant water, drying with filter paper (Whatman®, GE™), and application of universal adhesive (OptiBond™ Universal, Kerr™). The solvent was evaporated with air (Figure 2. B-C) and polymerized for 20 seconds with a light curing lamp (Valo Grand™, Valo™). Placement of braided fiberglass (Interlig®, Angelus®) with resin (Harmonize™, Kerr™) was performed on the palatal surface of the abutments (teeth 11, 22 and 23) (Figure 2. D); a vertical element with fiberglass was placed for the reconstruction of tooth 21 (Figure 2. E) with resin (Harmonize™, Kerr™, colorimetry A1E, A3D and XL), with layering technique, light-curing in each resin layer (Figure 2. F-G). After excess trimming, polishing, and occlusal adjustment, high gloss polishing was performed with discs (Sof-Lex™, 3M™) and paste (Diamond Gloss, TDV®) (Figure 2. H). After one month of postoperative evolution (Figure 3), the patient came to the clinic for

follow-up, and the restoration of tooth 21 was found in good condition, so she was referred for a periodontal treatment appointment (scaling and root planing).

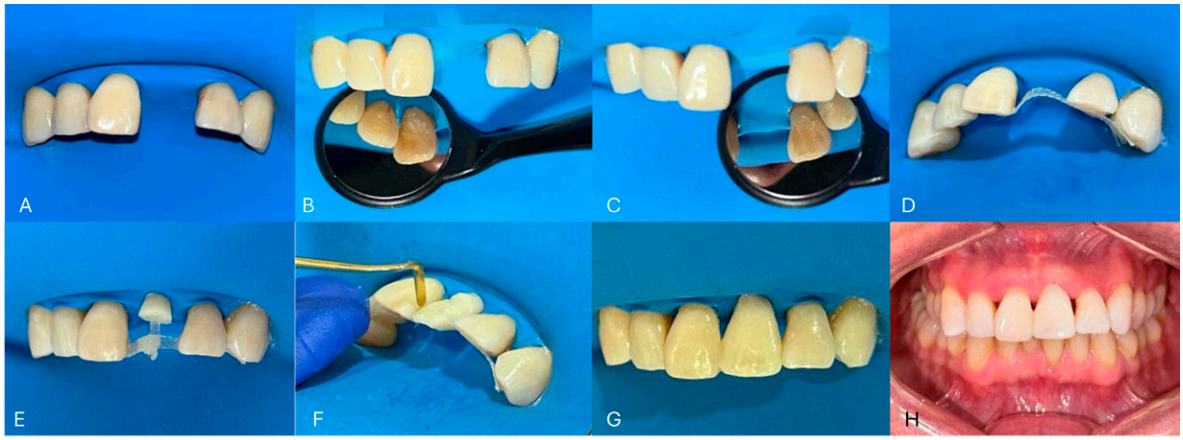

Figure 2. Procedure. A. Absolute isolation of teeth #13-23; B and C. Selective wear on the palatal side of teeth #11, 22 and 23, minimally invasive to avoid occlusal interference; D. Placement of fiberglass on palatal surfaces; E. Placement of fiberglass vertically, with cervical portion of resin; F. Reconstruction of tooth #21 with resin (stratified technique); G. Tooth #21 at the end of sculpting; H. Clinical photograph, immediate result once polishing and occlusal adjustment have been performed.

Figure 3. Final. A. Clinical photograph after 1 month of postoperative evolution, that shows that the gingival contour of tooth 21 has been maintained preserving the papillae; B. Dentoalveolar radiograph of the operative region showing the shape of the oval pontic.

DISCUSSION

Tooth loss at the cultural level has little visibility as a health problem; it is believed to be part of a natural process during life, i.e., people perceive their oral issues as inevitable as they grow older. In addition, in some cases, there are barriers to accessing health services, losing the opportunity for a timely dental consultation[11]. Other times, the fear of dental care is a collective imaginary that influences early dental loss. This public health problem can negatively impact

the patient's state of mind, their confidence, how they relate to their work and school environment, and interpersonal relationships. Suppose the patient considers that his/her smile is not aesthetically acceptable. In that case, it can influence their behavior in front of others, avoiding social contact and being apathetic, with disinterest in personal care[3,12]. The feeling of insecurity or low self-esteem can increase in the case of dental loss in the anterior sector, which is the most visible part when speaking or smiling.

In the patient's case, due to a trauma 10 years ago, she probably suffered a dislocation or subluxation, which led to external root resorption (ERR) of an inflammatory or replacement type at the apical level[13]. Several factors can cause root resorption. These include dental trauma, bacteria, orthodontic treatments, periodontal diseases, tooth whitening procedures, and certain viruses[14]. In some cases, resorption may occur without an identifiable cause, i.e., idiopathically. In addition, certain systemic factors such as endocrine problems and vitamin and mineral deficiencies have been linked as predisposing factors to this phenomenon. RRE is generally asymptomatic, making it difficult to detect; it occurs due to periodontal ligament and/or dental pulp lesions. In dentoalveolar radiographs, it is possible to recognize external root resorption; however, it is imprecise at the moment of locating the place, extension, and/or type of resorption[14,15].

When we talk about aesthetics, we seek a treatment with the lowest percentage of variability in evolution. Implant therapy is the most indicated[16]. In the anterior sector, the ideal time for implant placement is in the early stage with soft tissue healing (type 2) and partial bone healing (type 3). In these stages of healing, the outcome of treatment can be better predicted than in immediate placement after tooth extraction (type 1). Since resorption and remodelling of the alveolar ridge at extraction sites can influence the aesthetic outcome, delayed placement (type 4) is compared with type 1[17].

The placement of an intraosseous unitary implant in the anterior sector is the first option as a treatment plan; however, in Mexico, the socioeconomic and cultural level of the patients is a barrier that limits its immediate use. When this occurs, "traditional" treatment alternatives, such as using a fixed prosthesis with three units, are offered. Less invasive options are being sought, such as replacing fixed prostheses with palatal anchorage (wing fixed dental prosthesis)[7], provisional removable prostheses, and *Maryland*-type restorations with resin or ceramics[8].

The use of *Maryland*-type restorations with composite is not new and has demonstrated its effectiveness over time. In their review, Miettinen & Millar[18] found that the survival of resin reinforced resin bridges varies from 64.7% to 100% in a period between 4 months to 8.9 years, reporting that the most frequent problems of this type of treatment were bridge fracture and failure in the bonding process[18]. The anatomical design of the pontic and the correct occlusal adjustment are fundamental for the stability of the restoration. The contact area between the prosthesis and the abutment teeth is the most mechanical stress region, specifically in the incisal region[19]. Considering these aspects in the design, the survival of these restorations in a reasonable term (three years) is reported as 88.5%. Consequently, these treatments are low-cost, with minimum invasion and generally temporary[18]. This allows the patient to recover lost function and esthetics while planning for long-term treatment.

This type of restoration can be performed immediately after the extraction or after a few weeks to allow for the complete recovery of the soft tissues. Chappuis *et al.*[20], performed a three-dimensional analysis of the changes observed in the soft tissues after extraction of an upper central incisor. In their study, the stabilization of the gingival niche is observed after four weeks, with no apparent changes until eight weeks of healing[20]. Placing an immediate restoration implies that the gingival tissue will go through an inflammatory process that may alter

the gingival anatomy if the correct position of the pontic in the area is not well established. In this case, the decision to place the restoration after four weeks was made so that the pontic design of the restoration would have sufficiently close contact with the post-extraction niche, but at the same time allow for hygiene of the area, because the patient did not have a precise date for a definitive restoration.

Harmonize™ is a nanohybrid universal composite (Harmonize™, Kerr™) with a high-filler loading (81%) composed of zirconia (5 nm, positive charge) and silica particles (30 nm, negative charge) bonded together and fused into a reinforced structure (2-3 µm)[21]. This improves the interaction and bonding between the filler system and the resin matrix, making polymerization more efficient and increasing strength. It also has color stability that favors its use in the anterior sector[21,22]. This provides a benefit to the patient because he/she can keep a prosthesis in the anterior sector longer without color changes, which is desirable from an aesthetic point of view. Additionally, flexural strength (142 MPa) and compressive strength (366 MPa)[17,18] are similar to dentin (162 MPa and 240 MPa, respectively)[23,] which confers adequate mechanical properties to recover lost function.

Interling® is a glass fiber, previously silanized and impregnated in light-curing composite resin (Interlig®, Angelus®)[24], with a strength of 282 MPa, ten times stronger than non-impregnated fibers. It is indicated for periodontal splinting, traumatized teeth splinting, extensive restoration reinforcement, and direct adhesive provisional prostheses. This technology allows the fiber to support a resin that can replace a lost tooth, achieving a minimally invasive and resistant prosthesis. The use of Interlig® as a reinforcement of indirect resin prosthesis has been reported with a survival rate of 70.5% in 34.6 months[25].

Immediate attention is essential when receiving dental trauma or any other pathology that compromises the stability of a tooth to prevent complications. An incorrect diagnosis and treatment plan may compromise the prognosis of the affected tooth, reducing the possibilities of treatment. Favorably, the current adhesive materials allow complex restorations with good results. However, they are not recommended for long-term restorations. Controlled studies are necessary to calculate the survival rate of this type of alternative and to be able to offer the treatment with a reasonable survival time.

CONCLUSION

The *Maryland*-type prosthetic restoration made of resin reinforced with fiberglass is an efficient and accessible alternative when teeth are lost in the anterior sector, achieving esthetic and functional results in the short term.

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