

IMMEDIATE IMPLANT COMBINED WITH DOUBLE - CROSSED SUTURE IN THE ESTHETIC ZONE DUE TO ROOT FRACTURE: A CASE REPORT

IMPLANTE IMEDIATO ASSOCIADO A SUTURA EM CRUZ DUPLA NA ZONA ESTÉTICA
DEVIDO A FRATURA RADICULAR: RELATO DE CASO

RAIMUNDO RÔMULO MARTINS JUNIOR^{1*}, VICTÓRIA DE BARROS², BRENNER RIBEIRO EMERECIANO³, LARISSA LEONARDIS⁴, DEYNE WYLIE DAMASCENA SOUGEY⁵, STEFANNIE LOPES DE FREITAS⁶, SERGIO CHARIFKER RIBEIRO MARTINS⁷, LEANDRO LÉCIO DE LIMA SOUSA⁸

1. Implantology, Prosthodontics and Endodontics Specialist; Master in Materials Science; Faculty Member at the Maurício de Nassau University Center – Recife, PE; 2 Doctor of Dental Surgery (DDS); 3 Specialist in Implant Dentistry and Prosthodontics from FUNORTE, and in Public Health from Anhanguera University. 4 Doctor of Dental Surgery (DDS), graduated from CTA 5 Specialist in Prosthodontics and Implant Dentistry, currently pursuing a Master's degree in Implant Dentistry at Iowa University. 6 Doctor of Dental Surgery (DDS), graduated from Tiradentes University Center; 7. Doctor of Dental Surgery, Oral and Maxillofacial Surgery and Traumatology Specialist; Master in Implant Dentistry; Doctor in Implant Dentistry. 8. Specialist in Implant Dentistry; Master in Implant Dentistry; Doctor in Periodontology.

* Street Pio XII, Getúlio Vargas, Ribeirão, Pernambuco, Brazil. ZIP-CODE: 55523-314 stefannielopesdefreitas@gmail.com

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ABSTRACT

The root fracture associated with intraradicular posts is a challenging clinical condition, especially when located in the aesthetic zone. Proper planning and careful execution of immediate implants can minimize bone and soft tissue loss while preserving aesthetics and function. The present study reports a clinical case of root fracture in tooth 21, previously rehabilitated with an intraradicular post, treated through atraumatic extraction followed by immediate dental implant placement. After extraction, a 13mm Neodent implant was placed 3mm infraosseously, associated with bone grafting and immediate provisional prosthesis manufacturing. The double-crossed suture technique was applied aiming the enhancement of soft tissue stability and preservation of the gingival contour. Clinical follow-up showed satisfactory healing, maintenance of tissue volume, and favorable aesthetic outcome, indicating the proposed approach as a predictable alternative for immediate rehabilitation in aesthetic zones.

KEYWORDS: Double-crossed suture; Immediate implant placement; Root fracture.

RESUMO

A fratura radicular associada a pinos intrarradiculares representa uma condição clínica desafiadora, especialmente quando localizada na zona estética. O planejamento adequado e a execução criteriosa de implantes imediatos podem minimizar a perda de tecido ósseo e mole, preservando a estética e a função. O presente estudo relata um caso clínico de fratura radicular no dente 21, previamente reabilitado com pino intrarradicular, tratado por meio de exodontia atraumática seguida pela instalação imediata de implante dentário. Após a exodontia, um implante

Neodent de 13 mm foi instalado 3 mm abaixo da margem óssea (posição infraóssea), associado a enxerto ósseo e à confecção de prótese provisória imediata. A técnica de sutura em "duplo cruzado" foi empregada visando aumentar a estabilidade dos tecidos moles e preservar o contorno gengival. O acompanhamento clínico demonstrou cicatrização satisfatória, manutenção do volume tecidual e resultado estético favorável, indicando a abordagem proposta como uma alternativa previsível para a reabilitação imediata em zonas estéticas.

PALAVRAS-CHAVE: Sutura em cruz dupla; Instalação imediata de implante; Fratura radicular.

1. INTRODUCTION

In the esthetic zone, oral rehabilitation requires meticulous planning, particularly in situations involving structural dental failure as result of previous endodontic treatments. Vertical root fractures are frequently linked to the presence of intraradicular posts, especially in anterior teeth subjected to functional and parafunctional loads¹.

The loss of a maxillary central incisor can significantly compromise the patient's phonetics, aesthetics and psychological well-being². In this sense, the immediate post-extraction implant placement emerges as a predictable therapeutic alternative with the potential to preserve alveolar bone volume and peri-implant soft tissues³.

Previous studies have shown that placing the implant in an infraosseous position, combined with bone grafting and immediate provisionalization, can promote gingival tissue stability and long-term

aesthetic outcomes⁴. Moreover, advanced suturing techniques, such as the double-crossed suture, have been employed to optimize tissue coaptation and primary healing⁵.

Here, a clinical case of a root fracture in tooth 21 treated by atraumatic extraction, immediate infraosseous implant placement, bone grafting, immediate provisional prosthesis and double-crossed suture is reported.

2. CLINICAL CASE

A 30-year-old female patient presented to the dental clinic complaining of discomfort and mobility in the anterior maxillary region. Upon clinical and radiographic examination, a root fracture in tooth 21 was identified, which had been previously treated and restored using an intraradicular post and prosthetic crown. As result of the previous treatment, the preservation of the dental element was rendered unfeasible (Figure 1).

Following clinical and tomographic planning (Figure 2), a decision was made to perform an atraumatic extraction of tooth 21, aiming for maximum preservation of the alveolar bone walls. The extraction was carried out meticulously, avoiding damage to the buccal bone tissue.



Figure 1. (a) Initial clinical appearance of the anterior maxillary region showing disability of tooth 21, previously rehabilitated with an intraradicular post. (b) Associated with a root fracture and alteration of the gingival contour. **Source:** The authors.

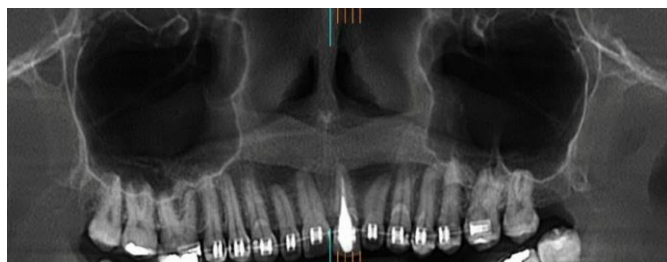


Figure 2. Panoramic reconstruction of the maxilla revealing a root fracture in tooth 21, obtained via cone-beam computed tomography (CBCT). **Source:** The authors.

Following dental extraction (Figure 3), a Grade IV titanium osseointegrable implant with conical macrogeometry and a hydrophilic surface (Helix GM Acqua®, 3.5 × 13 mm, Neodent, Curitiba, PR, Brazil) was placed, approximately 3mm subcrestally relative to the alveolar crest, to achieve an improved emergence profile and stability of the peri-implant tissues (Figure 4). The implant promoted satisfactory primary stability, with an insertion torque exceeding 45 N·cm, ensuring secure and predictable anchorage for immediate loading.



Figure 3. Intraoperative view following atraumatic extraction of tooth 21, with preservation of the alveolar bone walls and maintenance of the buccal plate. **Source:** The authors.



Figure 4. Placement of the Neodent dental implant immediately after tooth extraction (a), positioned 3 mm subcrestally relative to the alveolar bone crest, (b) aiming to optimize the emergence profile and tissue stability. **Source:** The authors.



Figure 5. Details of the primary anchorage of the implant. Filling of the space between the implant and the alveolar walls with particulate bone graft, providing support to the peri-implant bone tissue. **Source:** The authors.

The space between the implant and the alveolar walls was filled with particulate xenogeneic bone graft of bovine origin (Lumina-Bone Porous Grosso®, Critéria Biomateriais, São Carlos, SP, Brazil) to preserve peri-implant bone volume (Figures 5 and 6).

Subsequently, an immediate provisional acrylic resin prosthesis was manufactured and placed, attached to the cylinder component of the 4.8 mm Neo anti-rotational abutment (Neodent, Curitiba, PR, Brazil) without occlusal load, to promote prosthetic sealing of the surgical site while also acting as a customized healing agent (Figure 7). This approach enabled blood clot stabilization, protection of the bone graft and guidance for soft tissue healing, obviating the need for a collagen membrane.



Figure 6. Provisional acrylic resin prosthesis attached to the provisional abutment. Placement of the immediate provisional prosthesis on the implant, without functional occlusal contact, for aesthetic purposes and gingival conditioning. **Source:** The authors.

The soft tissue suturing was performed using the double-crossed suture technique, which involved crossing the sutures to stabilize the interproximal papillae around the immediate provisional prosthesis, thereby ensuring better tissue adaptation and promoting healing.



Figure 7. Performance of a double-crossed suture, promoting clot stabilization, adequate soft tissue coaptation and sealing of the surgical site. **Source:** The authors.

Clinical follow-up confirmed appropriate healing in the absence of postoperative complications, and satisfactory maintenance of both gingival contour and the aesthetics of the anterior region.

3. DISCUSSION

Root fractures in endodontically treated teeth remains one of the leading causes of late tooth loss, particularly when associated with the presence of rigid intraradicular posts, that concentrate stress along the root and reduce its structural strength, predisposing it to irreversible failure^{7,8}. In anterior teeth, this condition represents a even greater clinical significance due to the aesthetic, functional, and psychological impact that results from the loss of the dental element⁹.

Tooth extraction followed by immediate implant placement has been extensively evidenced as a therapeutic alternative capable of preserving alveolar bone volume and peri-implant soft tissues, when compared to delayed implant placement^{10,11}. Systematic reviews had shown that immediate implants display survival rates similar to those of implants placed in healed sockets, provided that rigorous case selection criteria, adequate primary stability and correct three-dimensional positioning are observed¹².

In the case reported here, the decision to perform immediate implant placement following atraumatic extraction was primarily driven by the objective of minimizing post-extraction alveolar bone remodeling, particularly of the buccal bone plate. This structure is well documented as being thin and highly susceptible to resorption in the anterior maxilla¹³. Foundational studies have demonstrated that substantial horizontal and vertical bone loss may occur within the first months following tooth extraction, even in sites that were initially intact¹⁴.

The placement of the implant at an infraosseous level, at approximately 3 mm apical to the bone crest, adheres to contemporary recommendations for rehabilitations in the esthetic zone^{15,16}. This strategy aims to compensate for physiological bone remodeling and promotes the long-term stability of the marginal soft tissue^{15,16}. Clinical evidence indicates that implants positioned more apically exhibit a lower incidence of gingival recession and better maintenance of the prosthetic emergence profile, especially when associated with immediate provisional restorations¹⁷.

The use of particulate bone graft in the peri-implant gap represents another relevant aspect of the adopted approach. Studies had demonstrated that filling the space between the implant and the alveolar walls contributes to the preservation of buccal bone volume and the reduction of postoperative resorption, especially when the space exceeds 2 mm^{18,19}. Furthermore, the graft acts as an osteoconductive scaffold, promoting bone neoformation and peri-implant stability²⁰.

The placement of an immediate provisional prosthesis, performed without functional loading, plays a fundamental role in preserving gingival architecture in the esthetic zone. Unlike approaches that utilize collagen membranes to protect the graft in immediate implant cases, here, the provisional prosthesis was used as a prosthetic seal for the surgical site. It served as a customized healing abutment, promoting progressive conditioning of soft tissues, supporting the formation of interdental papillae and the establishment of a more natural emergence profile^{21,22}. Clinical studies had shown that the absence of an immediate provisional restoration can result in gingival collapse, even when the implant is correctly positioned²³.

A significant technical advantage of this case report was the employment of the double-crossed suture. Advanced suturing techniques have been increasingly valued in contemporary implant dentistry, particularly

in immediate procedures, where the stability of the blood clot and graft, as well as soft tissue adaptation, are critical determinants of aesthetic success²⁴. When compared to simple interrupted or continuous sutures, the double-crossed suture promotes superior containment of the graft and clot, reduces tissue micromovement and ensures efficient sealing of the socket²⁵.

Comparatively, conventional sutures display a higher risk of tissue displacement, graft exposure, and gingival collapse in post-extraction sockets, principally when associated with immediate implants²⁶. Thus, the double-crossed suture technique combined with an immediate provisional prosthesis proves biomechanically superior for procedures in the esthetic zone, contributing to healing by primary intention and the maintenance of the peri-implant gingival contour²⁷.

The clinical findings observed in this case corroborate data from the literature, demonstrating that the combination of atraumatic extraction, immediate infraosseous implant placement, bone grafting, immediate provisionalization and advanced suturing constitutes a predictable, biologically favorable, and clinically effective approach for anterior aesthetic rehabilitation²⁸.

The infraosseous placement of the implant, performed in this case, is widely recommended in esthetic zones as it facilitates the formation of a natural emergence profile and reduces the risk of future gingival recession⁸. The application of a supplementary bone graft contributes to the maintenance of alveolar volume, particularly in the buccal plate, which is frequently thin in this region⁹.

The placement of an immediate prosthesis, when performed without functional loading, plays a fundamental role in stabilizing soft tissues and maintaining gingival architecture¹⁰. Additionally, unlike conventional sutures employed for direct socket closure, the primary intention of using the double-crossed suture in the case reported was to stabilize the interproximal papillae surrounding the immediate provisional prosthesis. The sutures were interwoven around the provisional restoration, thereby promoting tissue containment, maintaining papillary positioning and ensuring the intimate adaptation of soft tissues to the prosthetic emergence profile, all of which contribute to the aesthetic predictability of the outcome¹¹.

4. CONCLUSION

The proposed treatment represents a predictable and safe alternative for the immediate rehabilitation of root fractures in the esthetic zone. The combination of atraumatic extraction, immediate infraosseous implant placement, bone grafting, immediate provisional prosthesis and the double-crossed suture technique resulted in appropriate healing, preservation of tissue volume and a satisfactory esthetic outcome. The proper indication and execution of the technique are critical determinants for long-term clinical success.

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