

CASE REPORT

Atraumatic Extraction, Implant Placement and Immediate Provisionalization

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ABSTRACT

Front tooth extraction typically results in significant loss of hard and soft tissue volume, both in the vestibular-lingual and mesiodistal directions. As these changes can compromise the esthetic results of prosthetic rehabilitation, extraction techniques that cause minimal trauma to the remnant tissues are applied in combination with immediate implant placement to minimize such alterations. The case reported in the present article illustrates a therapeutic plan consisting of atraumatic extraction followed by immediate implant placement and provisionalization. When carefully indicated and planned, our results indicate that this technique may provide promising immediate results relative to the maintenance and stability of the peri-implanted tissues.

Keywords: Tooth extraction, Dental implant, Osseointegration.

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INTRODUCTION

Significant alveolar process resorption occurs during the first months after tooth extraction and compromises the rehabilitation of the edentulous area.^{1,2} As the loss of bone height and thickness can affect the three-dimensional implant position, the rehabilitation of esthetic areas by means of osseointegrated implants can be quite complex.³

Bone loss often occurs along with significant loss of soft tissues, and several factors are known to influence the behavior of such tissues following extraction,³⁻⁶ including morphological changes in the extraction area, type of flap, procedure for extraction and condition of the root remnant.⁶ Therefore, the maintenance of hard and soft tissues and the preservation of the local topography have become highly relevant matters in front-tooth restoration using esthetic treatments.

Several resources and techniques have been proposed for tissue preservation and/or minimization of residual ridge resorption and soft tissue loss following tooth extraction.^{4,7} For example, atraumatic extraction using the Benex device was suggested to avoid or minimize the trauma caused to tissues, and immediate implant placement following tooth extraction has been described as a predictable and conservative resource^{8,9} that can minimize the resorption and collapse of tissues.¹⁰⁻¹² Tissue preservation is of paramount importance, as maintenance of the gingival architecture and preservation of the interdental papilla hinder the appearance of black triangles between the teeth.^{9,13} By means of a specific case report, the aim of the present study was to analyze the relevance of atraumatic extraction and immediate implant placement for the preservation and stability of oral tissues to achieve satisfactory esthetic results.

CASE REPORT

A 40-year-old female patient presented with the right maxillary central incisor exhibiting temporary crowns



Fig. 1: Initial appearance, with the upper maxillary central and lateral incisors exhibiting temporary crowns

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Fig. 2: Initial appearance, with a fracture in the upper right maxillary central incisor remnant involving the crown and root

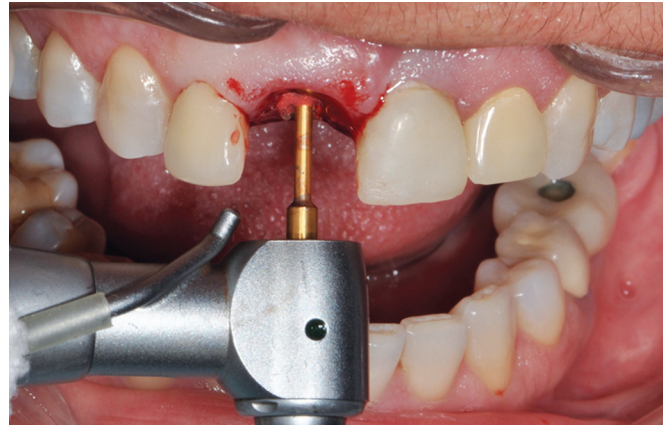


Fig. 3: Preparation of the root canal for placement of the tractioning pin

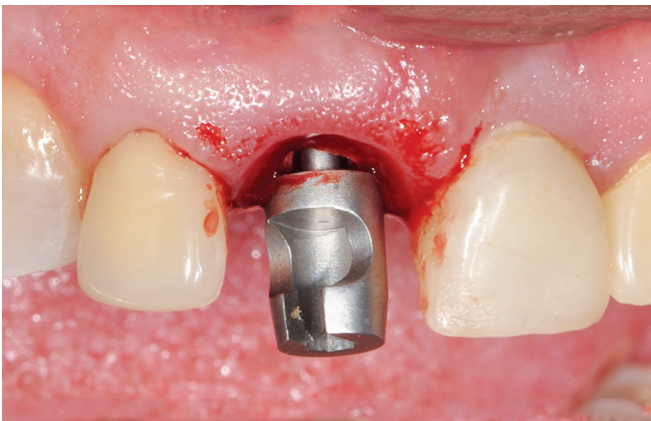


Fig. 4: The tractioning pin in position



Fig. 5: The dental extractor in position for root extraction



Fig. 6: Dental extractor and root fixated to the tractioning pin following extraction

on the right and left lateral and central incisors (Fig. 1), with the left central tooth having received an implant. On clinical examination (Fig. 2), an oblique fracture was found at the root of the right central incisor, which started at the cervical third and finished at the level of the bone crest. The root remnant was weak, and the prognosis for prosthetic rehabilitation was unfavorable.

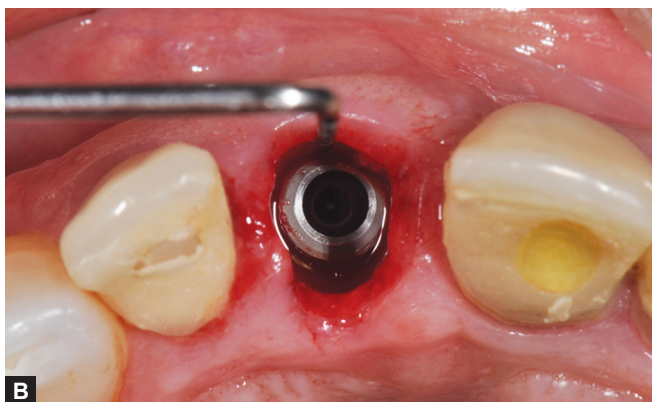
Various therapeutic options were discussed with the patient, and it was decided to perform root extraction with immediate implant placement and immediate provisiona-

tion. Following assessment of the patient's systemic condition, diagnostic wax-up and elaboration of the surgical guide, atraumatic extraction of the root using a Neodent extractor (Neodent, Curitiba, PR, Brazil) was planned. The procedure began with syndesmotomy, and then the root canal was prepared for fixation of the extraction screw (Fig. 3), which was selected based on the diameter of the root canal. A digital wrench was used to position the screw inside the drilled root canal (Fig. 4).

Next, the conical tip of the steel wire was fitted to the screw, and the wire was stretched until it could be fitted into one of the hooks of the extraction axis of the dental extractor (Fig. 5). Tractioning was applied along the tooth in the longitudinal axis, which broke the periodontal ligament and allowed for subsequent root extraction (Fig. 6) with maximal preservation of the alveolar bone vertical level and surrounding soft tissues.

A 4.3 × 11.5 mm Cone Morse Alvin (Neodent, Curitiba, PR, Brazil) dental implant was immediately placed with a torque greater than 50 Ncm. The implant was placed according to the surgical guide 3 mm above the amelocemental junction of the neighboring teeth (Figs 7A and B).

A universal titanium post (Neodent, Neodent, Curitiba, PR, Brazil) was placed on the implant (Fig. 8), and a



Figs 7A and B: The implant was placed immediately following root extraction 3 mm below the cement-enamel junction of the neighboring teeth



Fig. 8: Placement of a universal post on the implant



Fig. 9: Manufacturing of the immediate provisional restoration



Fig. 10: Provisional restoration 15 days after extraction and immediate implant placement

provisional crown was immediately made (Fig. 9), which was reassessed 15 days later (Fig. 10). Molding and manufacturing of metal-ceramic crowns were performed 4 months later, together with the remainder of the incisors (Figs 11 to 13).

DISCUSSION

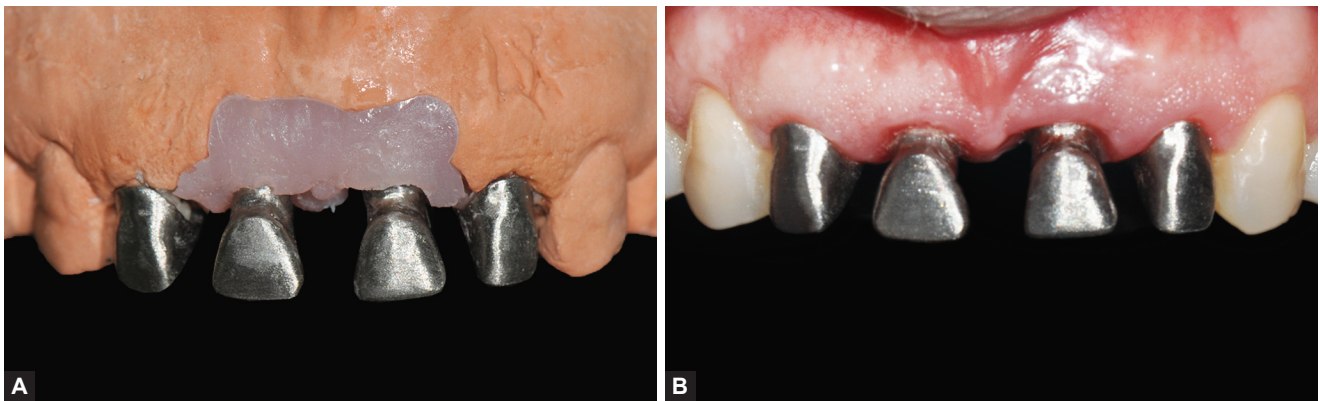
Atraumatic extraction can improve the results of prosthetic rehabilitation by affording greater preservation of the alveolar bone and surrounding soft tissues.¹⁴⁻¹⁶ Tooth extraction generally causes significant loss of the hard and soft tissue volume in both the vestibular-lingual and mesiodistal

directions.^{1,2} The magnitude of such tissue loss is a relevant factor for therapeutic decision-making and treatment planning, and preservation of the alveolar walls and bone crest to maintain the gingival contour and interproximal papillae has a crucial influence on the results of prosthetic rehabilitation. Therefore, the atraumatic procedure is indicated in cases requiring extraction, as well as for front-tooth esthetic rehabilitation.

After tooth extraction, there is a rapid bone resorption during the first 3 to 6 months, reaching up to 29 to 63% in the horizontal direction and 11 to 22% in the vertical direction.¹⁷ Additionally, changes in the mesial and distal bone crest height occur, which represent one of the most critical features in the treatment of front teeth, as the height of the interdental papilla can be esthetically affected.^{17,18}

Several techniques have been proposed to preserve the integrity of the surrounding tissues.^{5,7,10,19} The technique based on the use of an extractor allows removing the tooth in a simple and minimally traumatic manner while maintaining the alveolar integrity.

Immediate implant placement has been suggested to minimize tissue resorption and collapse after extraction,^{11,12} as well as to shorten the length of treatment.⁶ However, the prognosis of the implanted tooth, the cause of the tooth loss, the alveolar length and width and the implant area should



Figs 11A and B: Metallic infrastructures 4 months after implant placement

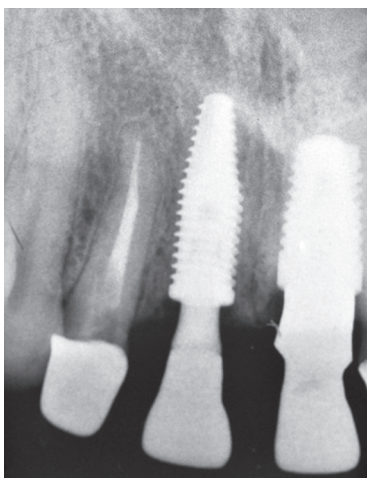


Fig. 12: Radiograph showing the metallic infrastructures



Fig. 13: Metal-ceramic crowns placed on the upper maxillary lateral and central incisors

be assessed before this immediate procedure is indicated. In the case reported here, assessment of the patient’s systemic condition and the results of clinical and radiological exams were relevant for the diagnosis, planning and performance of the procedure.

For cases with immediate implants placed in esthetic areas, the minimal distance from the bone crest to the point of contact should ideally be 5 mm for the papillae to fill the interproximal space.²⁰ The implant platform should be placed at least 3 mm above the cement-enamel line of the adjacent teeth and above the interproximal bone crest. Compliance with these parameters ensures an appropriate emergence profile and satisfactory esthetic results.

One additional relevant issue following immediate implant placement is the manufacturing and placement of the provisional restoration. Immediate provisionalization has been described as relevant for the stability of the peri-implant tissues, as well as for the esthetic outcomes of maxillary single implants.^{11,20-22} Therefore, the success of atraumatic extraction, immediate implant placement and provisionalization requires judicious selection of cases and surgical and prosthetic planning, as well as appropriate postoperative care.²³

CONCLUSION

The results described here indicate that atraumatic extraction and immediate implant placement represent an effective approach for the maintenance and stability of peri-implant tissues, as well as for the esthetic and harmony of the smile.

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