

Immediate implant in inter-radicular septum area: Case report

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Abstract

Introduction: The purpose of rehabilitation after tooth loss is the optimal healing of soft tissues around the prosthesis so that an adequate emergence profile can be achieved. Excessive handling of these tissues may be avoided by using existing bone. **Objective:** This case report describes the atraumatic extraction of a fractured mandibular first molar and the immediate placement of an implant in the inter-radicular septum. **Methods:** The atraumatic technique and the immediate placement of the implant preserved hard and soft tissues in the extraction site. **Results:** The patient had no clinical evidence of complications, the definitive implant-supported prosthesis was immediately placed. The adaptation of peri-implant tissues was satisfactory; function and comfort were restored, and, above all, tissues were preserved.

Keywords: Mandible. Dental implants. Tooth extraction.

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» The patient displayed in this article previously approved the use of her facial and intraoral photographs.

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Introduction

Implantology has added great predictability to the rehabilitation of lost teeth and given patients treatment alternatives to achieve satisfactory results and a balance between esthetics and function of both posterior and anterior teeth.¹

Immediate implant and loading techniques may help to achieve satisfactory esthetic results, as their purpose is to promote healing of soft tissues around provisional prosthesis, which should already have the correct emergence profile and, therefore, do not require much handling of tissues during definitive surgeries and gingival recontouring. The fundamental preservation of support tissue integrity during extraction has been associated with atraumatic techniques, as well as familiarity with and observation of biological principles of bone repair. The extraction of a tooth triggers natural healing, which inevitably induces bone wall remodeling and resorption.^{3,4,5} The alveolar process, a tooth-dependent tissue, develops at the same time as teeth erupt and is primarily made up of bundle bone. Its volume, as well as its shape, is defined by its format, eruption axis and possible tooth inclination.⁶ After tooth extractions, bone resorbs because of osteoclasts, which results in substantial vertical and horizontal reductions of the buccal crest.⁷

Alveolar bone resorption, in addition to posing an esthetic problem when fabricating the definitive implant-supported prosthesis, also makes it difficult or impossible to place the implant in the correct position. Immediate implants may ensure that the relationship between peri-implant tissues and healing tissue preserves pre-surgical gingiva and bone aspects.⁸ Therefore, a mucoperiosteal flap does not have to be raised; when it is raised, there is additional osteoclastic resorption in the external aspect of the buccal bone plate, particularly when the patient has a thin periodontium.⁹

Case report

This case report describes the placement of an implant in the region of tooth # 46 of a 61-year-old woman in good systemic health. The patient was referred to the clinical service of the Dental Implant Study and Research Center of the Federal University of Santa Catarina (CEPID-UFSC) for extraction and implant placement in the region of tooth # 46 (Fig 1). Clinical examination revealed that the periodontium was healthy. CT scanning showed good bone amount and quality for the placement of an osseointegrated implant. According to surgical and prosthetic planning, rehabilitation included an immediately placed implant and a screw-retained and cemented implant-supported prosthesis placed after osseointegration. Atraumatic extraction of the tooth (Fig 2) was performed by means of root section and use of a periosteal elevator to preserve buccal and lingual bone walls, as well as the interradicular septum. In addition, no mucoperiosteal flap was raised to avoid buccal wall resorption, which may result from periosteal flap



Figure 1 - Tooth # 46.

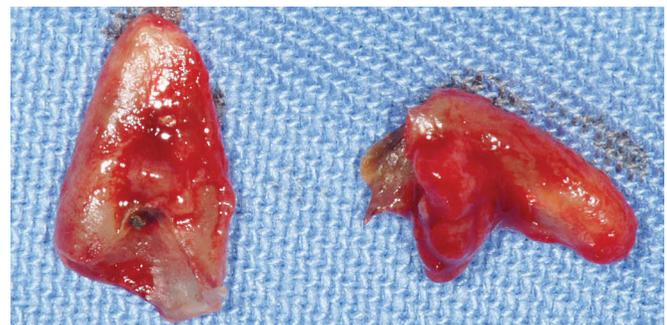


Figure 2 - Tooth extraction.

raising (Fig 3). After extraction, the socket was curetted and perforated for implant placement. The external hex implant had a cylindrical body (Neodent Titamax cortical, Brazil) and a regular platform and measured 4.0 x 11.0 mm. The surgical technique used was anchorage of the implant in the intra-radicular septum (Fig 4) to obtain a good surgical and prosthetic positioning in addition to primary stability (Fig 5). The sequence of drills was the one recommended by the manufacturer, but they were used conservatively to avoid fenestration of the septum walls and the consequent loss of implant primary stability.

After the implant was torqued to 40 N and the cover screw was placed, the extraction sockets were filled with a bovine bone graft composed of an inorganic bone marrow portion and an organic cortical portion. The purpose of this filling was to preserve the architecture of the bone and gingival tissues (Fig 6). To close the surgical wound, the buccal flap

was slightly divided for greater mobility and to achieve primary closure using simple suture.

Five months later, the cover screw was exposed and a healing cap was placed to keep separation from the peri-implant mucosa. Seven days later, procedures for definitive prosthesis were started. As the implant was at a posterior site with low esthetic demands, no tissue recontouring was necessary. One month later, the implant-supported prosthesis was placed, and the adaptation of peri-implant tissues was satisfactory (Fig 7).

Discussion

The thickness of the buccal bone wall may significantly affect its resorption pattern. A minimum thickness of 2 mm of buccal bone seems to be necessary to keep a stable vertical dimension of the alveolar crest and ensure support to soft tissues. If this minimum requirement is

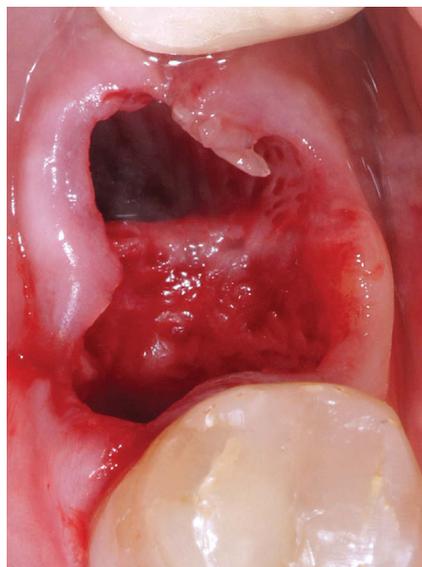


Figure 3 - First molar extracted without sectioning or damaging the inter-radicular bone.

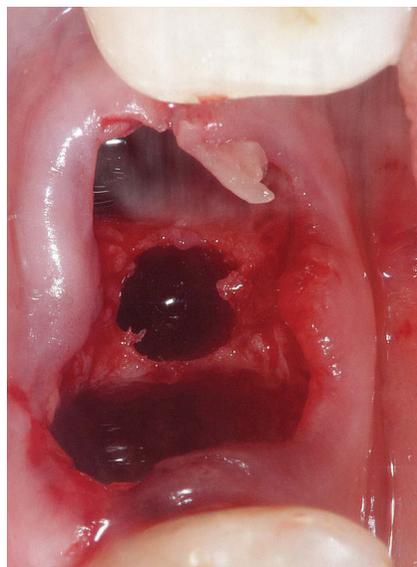


Figure 4 - Preparation and osteotomy of inter-radicular bone for later implant placement.

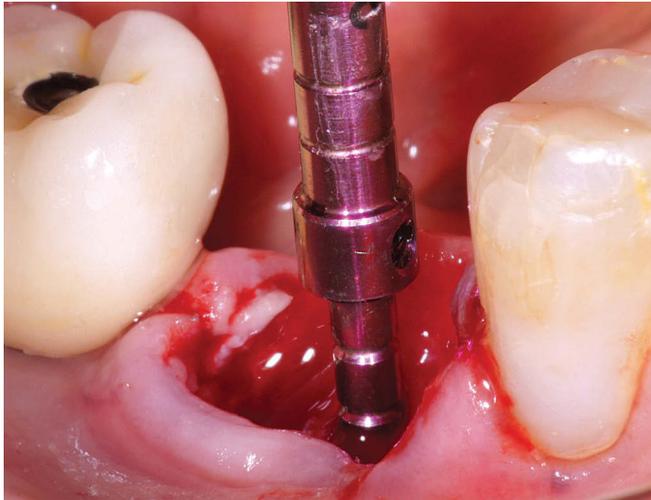


Figure 5 - Placement of surgical guide.



Figure 7 - Definitive prosthesis

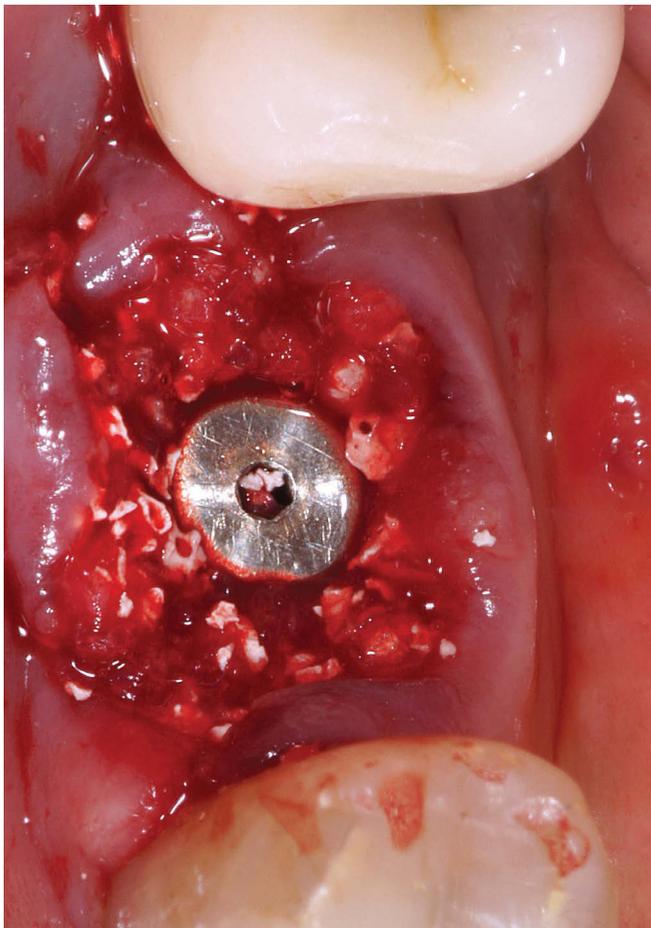


Figure 6 - Implant placed in inter-radicular area achieved primary stability after adequate preparation and filling.

not met, socket filling (before or during implant placement) should be adopted to try to achieve the minimum thickness required.¹⁰

A multi-site randomized controlled trial evaluated the vertical dimensions of the bony walls of 93 patients and used those results as references. The patients had anterior teeth extracted and received immediate implants in the esthetic zone. Results revealed that most buccal bone walls (93.5%) had thickness of 0.5-1.5 mm. Only 6.5% had a thickness of 2 mm or greater. The thickness of lingual bone walls was 0.5-1.5 mm in 79.6% of the sites. However, thickness of 2 mm or greater was found in 20.5%. The authors concluded that a thickness of 2 mm resulted in greater stability of the alveolar bone during the process of resorption after extraction.¹¹

Immediate placement of implants in extraction sockets was first performed over three decades ago and was prescribed in a consensus issued in 2004 about clinical recommendations and procedures for implant placement in extraction sockets. Several advantages were described: reduction in the number of surgeries; bone availability for implant insertion; and reduction in total treatment time. Some disadvantages, however, have also been

reported, namely: the fact that the morphology of the site may hinder implant positioning in the arch. Also, it is difficult to achieve primary stability or anchorage, as the procedure is sensitive to the type of technique adopted.¹²

Immediate implant placement does not prevent dimensional changes in the alveolar ridge after tooth extraction. When placed to preserve the dimension of the hard tissue of the ridge after tooth extraction, it results in physiological resorption of the buccal and lingual bone walls, with the dimensions of the buccal bone wall playing a very important role in esthetics.¹³

Tooth shape, size and inclination determine the shape of the alveolar process. This means that the shape and form of the socket and its bone walls vary substantially. This should be taken into consideration whenever immediate implant placement is planned. The thinner the bone wall at a certain site and the closer to this wall the implant is placed, the greater the risk of bone dehiscence.

Implant placement at the time of extraction of a mandibular molar should never be attempted when it is not clear whether it is possible to use an implant of the ideal size and to position it appropriately to achieve primary stability.

According to some authors, the inter-radicular bone should not have a mesiodistal dimension of less than 3 mm to ensure that the mesial and distal faces of the inter-radicular septum are not lost during preparation of the site.¹⁴ Conical implants are often used in this technique to fill the space between the implant and the bone wall. Recent evidence shows that cylindrical, conical or conventional implants have clinically equivalent results in the short term after immediate implant placement.¹⁵ However, the narrow space between the implant and the socket wall cannot prevent bone loss resulting from tooth extraction. The surface of

large implants may expose the mucosa during healing, which might compromise treatment results.

Immediate implant placement is associated with the formation of a gap between the implant platform and residual bone walls, and the use of membranes and graft materials has been suggested to address this problem. The use of regenerative procedures aims at preventing the migration of cells from the connective and epithelial tissue in the gap between the implant surface and the walls of the surrounding bone, which would favor the production of osteogenic cells in the process of bone healing.¹² The decision to use these material depends on the size of the residual bone defect. However, the use of Bio-Oss collagen in the cavity immediately after extraction serves as a support to shape tissues, and the ridge profile is better preserved at the sites that receive filling or grafting. The amount of Bio-Oss resorption is very limited by the action of osteoclasts and the resorption of exogenous material.¹⁶ Gap filling with biomaterial after extraction may affect shape and decrease the contraction of the buccal marginal bone crest, thus preserving the socket walls.¹⁷

Final considerations

Immediate implant placement is a highly predictable treatment option with considerable success rates, but special care should be taken when indicating this treatment. Tooth extraction should use minimally traumatic techniques; flaps should be avoided; and possible gaps should be filled with biomaterial whenever possible. Immediate implant placement in the region of mandibular molars should have more than 3 mm of inter-radicular bone so as to facilitate implant positioning. The anatomical shape of this region is a challenge to clinicians, who should always seek good primary stability and parameters within the acceptable limits, as reported in this study.

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