

Immediate Implant Placement Following Tooth Extraction: Guidelines for Successful Outcome

Yosra Gassara^{1*}, Mohamed Chebil², Imen Kalghoum¹, Sarra Nasri¹, Belhassen Harzallah³, Mohamed Ben Khelifa⁴, Mounir Cherif⁵ and Dalenda Hadyaoui⁶

¹Department of Fixed Prosthodontics, Faculty of Dental Medicine, Monastir, Tunisia

²Assistant Professor, Department of Fixed Prosthodontics, Academic Dental Clinic of Monastir, Tunisia

³Professor, Department of Fixed Prosthodontics, Faculty of Dental Medicine, Monastir, Tunisia

⁴Professor, Head of Department of Dentistry Hospital Fattouma, Monastir, Tunisia

⁵Professor, Head of Department of Fixed Prosthodontics, Faculty of Dental Medicine, Monastir, Tunisia

⁶Professor, Department of Fixed Prosthodontics, Faculty of Dental Medicine, Monastir, Tunisia

***Corresponding Author:** Yosra Gassara, Department of Fixed Prosthodontics, Research Laboratory of Occlusodontics and Ceramic Prostheses LR16ES15, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia.

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Abstract

Background: Immediate implant placement has become an increasingly common treatment modality, despite potential risks associated with the primary stability of implants. The primary stability of implants placed immediately was proved to be lower compared to implants placed in healed sites.

To achieve a successful outcome with placing implants immediately after tooth extraction, the practitioner should know the indications of this approach, make the correct diagnosis and choose the adequate treatment planning.

Case Presentation: A patient was referred to the fixed prosthodontic department to replace his missed mandibular teeth with implant-supported prostheses. He refuses the removable prostheses even as a temporary solution. The decision of placing two immediate implants on the site of the 31, 32 and a delayed implant on the site of the 43 was retained.

Conclusions: Immediate implant placing in fresh extraction sockets, in combination with bone grafting and barrier membrane could represent a reliable strategy to replace compromised teeth in both jaws, with high implant survival rates. However, careful case selection and respect of the surgical steps are critical to achieve successful outcome.

Keywords: Immediate Dental Implant Loading; Tooth Socket; Surgery; Alveolar Bone Grafting

Introduction

Implant supported prosthesis has provided a realistic treatment alternative for rehabilitation of patients with partially or fully edentulous ridges [1].

Focusing on the extraction-socket healing time, three different implant insertion protocols have been used:

- **Immediate implant placement:** Implants are inserted in dental sockets at the same session of tooth extraction.

- **Early implant placement:** Implants that are placed after weeks up to about a couple of months to allow for soft tissue healing;
- **Delayed implant placement:** Implants that are placed there after in a partially or completely healed bone, with a healing period of 6-12 months [2].

Some patients consult with compromised teeth, which require extraction, if the surgeon choose the delayed implant placement; he must wait 3 months for bone healing in order to place the implant.

The decision to proceed with immediate implant placement is driven by a desire to reduce morbidity and treatment time.

On the last 16 years, several studies have shown the reliability of implants placed at the time of tooth extraction [3].

The study of Becker and Goldstein confirmed that immediate implants found a 2- to 3-year cumulative survival rate of 97.8%, and a mean stability of all implants at the time of tooth extraction of 62.0 ± 9.8 ISQ and at 1 year of 64.0 ± 9.8 ISQ [1].

This concept has several benefits, such as the reduction of the total treatment time without compromising the clinical and esthetic outcomes, preservation of bone around the extraction socket and shortened treatment time [4].

Further, immediate implant placement has become an increasingly common treatment modality [5], despite potential risks associated with the primary stability of implants. The primary stability of implants placed immediately was proved to be lower compared to implants placed in healed sites [4].

Therefore, to achieve a successful outcome with placing implants immediately after tooth extraction, the practitioner should know the indications of this approach, make the correct diagnosis and choose the adequate treatment planning [6].

Case Presentation

A 62-year-old patient with unremarkable medical history was referred to the fixed prosthodontic department to replace his missed mandibular teeth with implant-supported prostheses (Figure 1). The patient refuses the removable prostheses even as a temporary solution.

Clinical examination revealed poor oral hygiene with three defectives crowns on the 44, 45 and 33. The 31, 32 present a mobility degree 3 with healthy gingival margins (Figure 2). The radiological examination showed that the bone support was insufficient.

The 33, 44 and 45 presented an endodontic treatment.

The radiographic evaluation using Cone Beam Computed Tomography (CBCT) revealed the feasibility of implant placement in the posterior edentulous ridge. It revealed thick cortical bone and

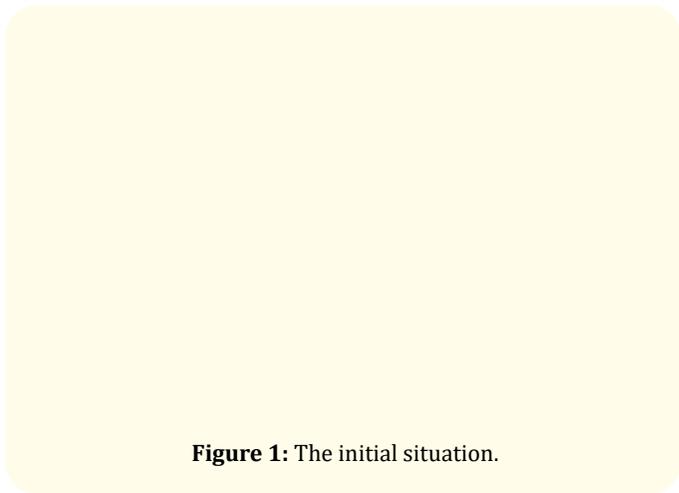


Figure 1: The initial situation.

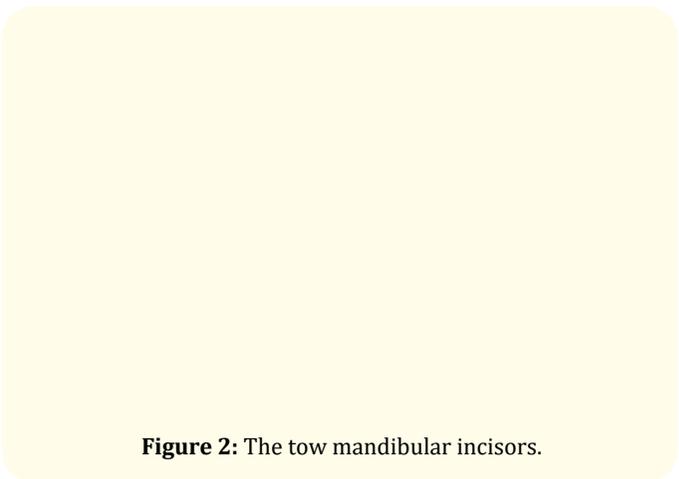


Figure 2: The tow mandibular incisors.

adequate bone of type 2 quality in the premolars and molars site based on the classification of Lekholm and Zarb. However, there was an alveolar ridge resorption on the anterior sector (Figure 3).

The 32 and the 31 were indicated for extraction. The patient was given the option of immediate implant placement which he selected among different treatment alternatives.

The decision of placing two immediate implants on the site of the 31, 32 and a delayed implant on the site of the 43 was retained. After administration of local anesthesia with a 2% Lidocaine hydrochloride solution containing epinephrine at 12.5 ug/ml, the two incisors were extracted (Figure 4).

Following atraumatic extraction, flap elevated, extending to one tooth mesially and distally. The papillae were bisected midcrest-

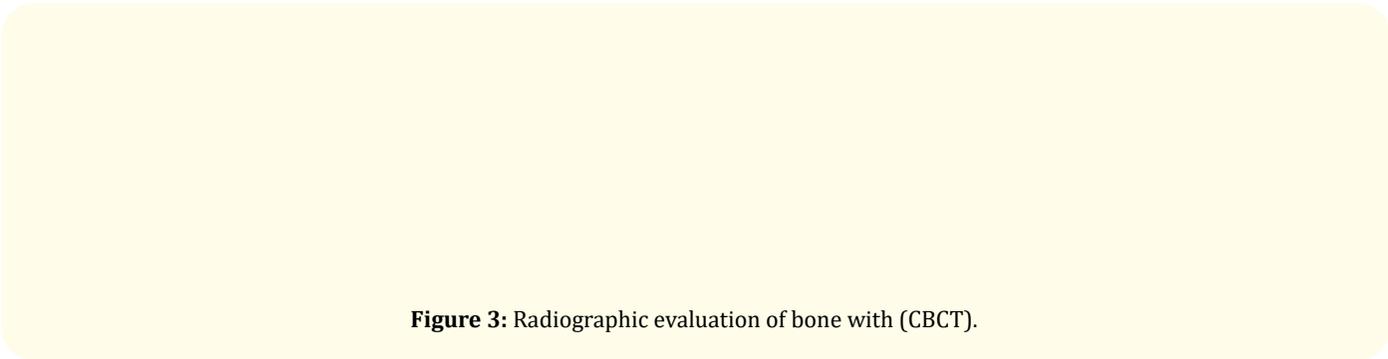


Figure 3: Radiographic evaluation of bone with (CBCT).

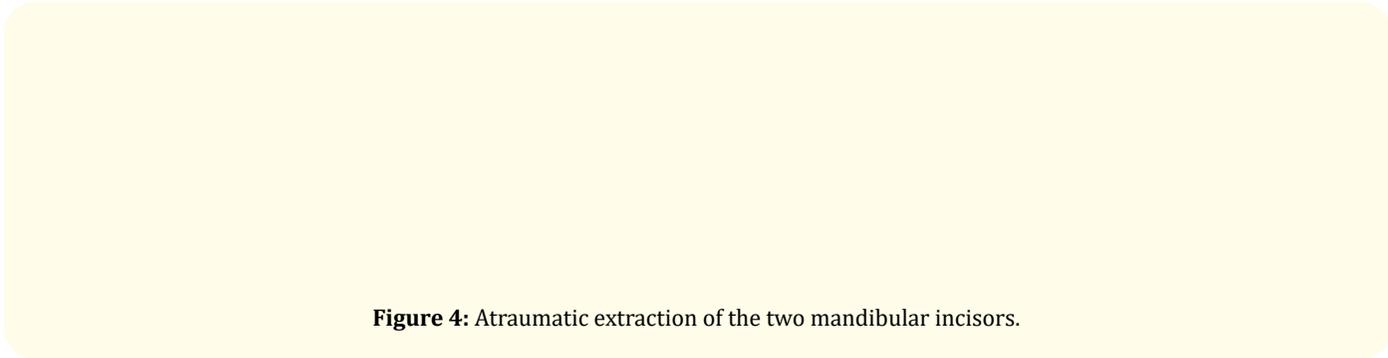


Figure 4: Atraumatic extraction of the two mandibular incisors.

ally. The lingual and vestibular flap were pushed back to expose the bone-crest only (Figure 5).

on the site of the 43 (Figure 6), then they were covered by cover screws.



Figure 5: Flap-assisted surgery.

The tooth socket was measured with a graduated periodontal probe, the length of the socket from crestal bone was found to be 11 mm whereas the bucco-palatal and mesiodistal widths were found to be 6mm and 4mm, respectively. After sequential osteotomies, two immediate implants of size 3.4 x 12 mm were placed on the site of the 31, 32 and an implant of dimension 3.4 x 10 mm

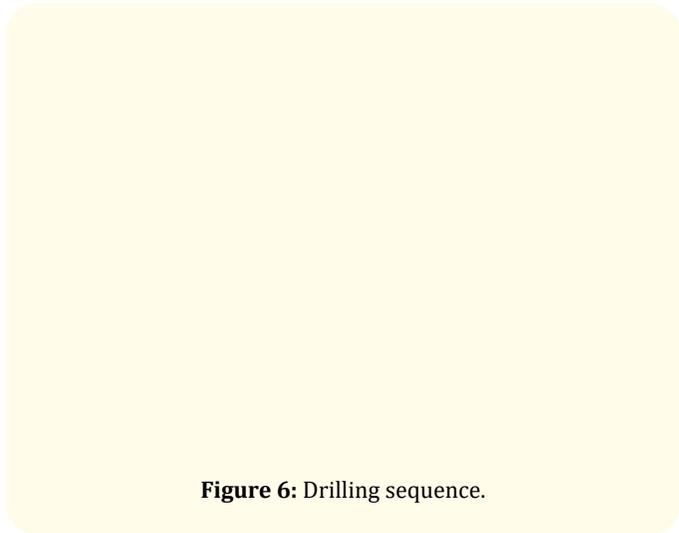


Figure 6: Drilling sequence.

In the site of the 32 “the jumping distance” was > 2 mm (Figure 7), so the application of biomaterials could interfere with the resorption process, deproteinized bovine bone (Bio-Oss) and a resorbable membrane were used (Figures 8 and 9).

Figure 7: Clinical aspect after the placement of implants into fresh extraction sockets.

Figure 8: Clinical features after filling the remaining defects of the extraction sockets with Bio-Oss particles.

Figure 9: The use of a resorbable membrane.

Finally, the site was sutured (Figure 10) and a Post-operative medication was prescribed: Amoxicillin (1000 mg) thrice daily and Paracetamol (500 mg) twice daily for five days.

Figure 10: Site was sutured.

Sutures were removed after 10 days. During this appointment, the healing process was assessed, and no symptom was detected as mobility, pain, swelling, or suppuration. (Figure 11) Preimplant bone was also subsequently monitored by intraoral periapical radiograph. (Figure 12) Osseo-integration was accomplished and no bone resorption has been observed around the implant.

Figure 11: Clinical evaluation after 5 months.

Therefore, healing abutments were placed for the management of peri-implant soft tissues.

2 weeks later, master impression was performed using mixed pick up technique (prepared teeth and placed implants) (Figure 13).

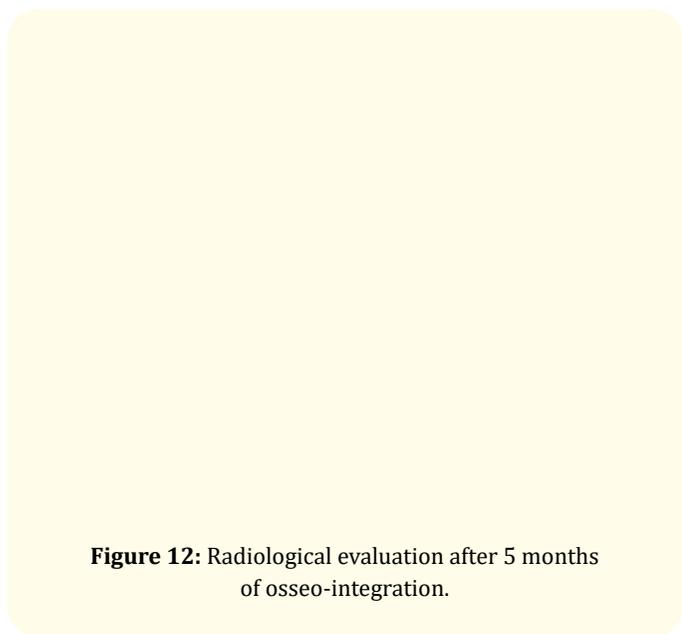


Figure 12: Radiological evaluation after 5 months of osseointegration.

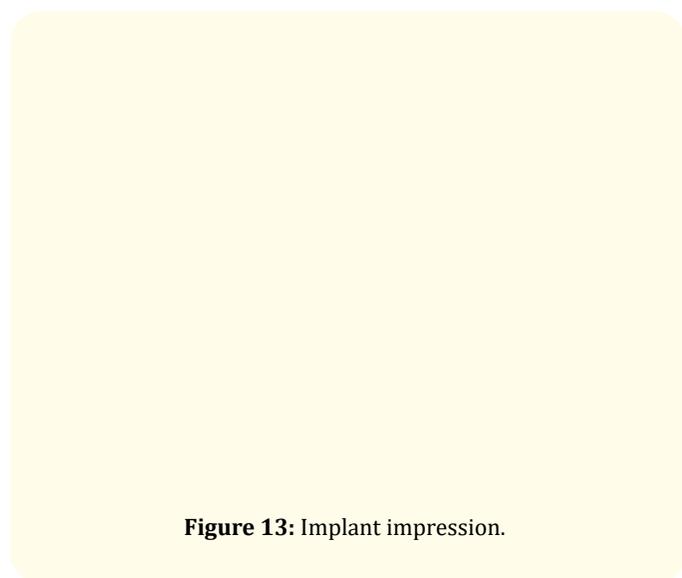


Figure 13: Implant impression.

Final restoration was performed using metal ceramic implant supported bridge replacing missing teeth.

The bridge was finally cemented using a provisional cement to allow any further removal of the bridge and access to the abutment or the body of the implant (Figure 14).



Figure 14: Final result.

Discussion

Immediate implants placing has provided implant dentistry the opportunity to achieve faster functional outcome.

The decision for placing implants immediately following tooth extraction depends on some criteria, which should be considered when evaluating a patient for dental implants: thorough medical and dental histories, clinical photographs, study casts, periapical and panoramic radiographs as well as Cone Beam Computed Tomography of the proposed implant sites [6].

However, the presence of periapical infection, the morphology of the site, thin tissue biotype, the absence of keratinized tissue, and the lack of complete soft tissue closure over the extraction socket can adversely affect immediately placed implants [7].

Therefore, proper case selection associated with careful evaluation are necessary to achieve successful outcome.

Healthy gingival margins are necessary to the long-term success of dental implants. The attached gingiva helps to maintain patient comfort and resistance to mechanical trauma during oral hygiene procedures and is critical to proper tissue healing around dental implants. Without the attached keratinized gingiva, food impaction may occur as well as bacterial penetration and tissue shrinkage. In addition to that, a non-keratinised tissue may not be able to form a functional junctional epithelium, all of which may affect the prognosis and esthetics outcome [8,9].

If an implant is placed in an infected site, the inflammatory response caused by bacterial colonization will obstruct the osseointegration of the implant, which can lead to periimplantitis and eventual failure of the implant [10].

However, the meta-analysis of Haida Chen., *et al.* reported that immediate implant placement into infected sites and noninfected sites in esthetic zone had similar survival rates, bone level changes, and gingiva level changes [10].

Several systematic reviews clearly stated the morphological alterations of buccal and lingual bone plates after tooth extraction, describing at multiple time intervals during healing phases the dimensional reductions, in both width and height [11].

The systematic review of Marco Clementini., *et al.* showed the following results: after immediate implant insertion alone, on the buccal side, alveolar ridges underwent a horizontal and vertical reduction that was on average 1 mm [11].

According to Hania AlKudmani., *et al.* the use of bone graft biomaterial with or without a membrane has significantly reduced the bone resorption, and the combination of resorbable membrane and bone graft would significantly maintain the overall soft tissue dimensions when compared to placing a resorbable membrane alone [7].

Becker., *et al.* reported a 93.3% implant survival rate after 5 years with clinically insignificant crestal alveolar bone loss for immediate implants that were augmented with barrier membranes [1].

Therefore, to avoid bone loss and maintain soft tissue dimensions, the ideal approach was to use a bone graft with a barrier membrane.

Generally, when placing an implant into extraction socket, a space between the implant and the bony wall is seen. The study of Schropp L., *et al.* has focused on this distance, which is called jumping distance or critical space [12].

If the jumping distance is > 2 mm, the use of bone graft or guided bone regeneration is recommended to fill in this space and to reduce the resorption of bone tissue.

However, if this distance is < 2 , bone augmentation technique is not required and placing a wide diameter implant can compensate this space [13].

At sites, however, where the bone defect has a design that does not promote the retention of the coagulum and the granulation tissue, a barrier membrane fulfills an important role as a space-keeping device [12].

In conjunction with tooth extraction and immediate implant placement, two surgical approaches can be used: flapless or flap-assisted.

According to Janet Stoupel., *et al.* flapless and a flap-involving immediate implant placement and provisionalization in the esthetic zone resulted in comparable remodeling of the peri-implant mucosa, interproximal bone and buccal ridge at 6 and 12 months [14].

Conclusion

Immediate implant placing in fresh extraction sockets, in combination with bone grafting and barrier membrane could represent a reliable strategy to replace compromised teeth in both jaws, with high implant survival rates. However, careful case selection and respect of the surgical steps are critical to achieve successful outcome.

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