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Immediate Implant Placement: A Case Report after Six Years of Follow-Up

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Abstract

Introduction: The insertion of dental implants immediately after tooth extraction has become a routine clinical procedure due to its numerous advantages. However, Implant placement in anterior maxilla is challenging because of esthetic concern and bone topography. Thus, the success of this technique depends on the respect of some conditions.

Clinical Case: A 50-year-old non-smoker male patient presented an asymptomatic apical reaction in addition to root resorption in the central right incisor "11". The extraction of the teeth with immediate implant placement was performed.

Re-entry procedure was programmed 6 months later; the gap was completely filled. After definitive prosthesis, and until 6 years after implant placement, radiographic evaluation did not reveal any resorption or lesion all around the implant. Hard tissue level was correct and stable, and the implant was fully osseointegrated with perfect functional conditions.

Conclusion: Immediate implant placement success depends on many clinical conditions. Thus, to insure long-term implant and bone stability, many rules were respected: The implant position was correct, primary stability was sufficient in the apical portion of the socket, a gap dimension less of 2 mm between the implant surface and the inner buccal bone plate in the coronal portion was maintained. Gingival biotype and buccal bone wall were thick. Those two clinical parameters were advantageous to reduce bone resorption.

Keywords: Immediate implant placement; Anterior teeth; Aesthetic; Fresh extraction socket; Atraumatic extraction

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Abbreviations

ITI: International Team for Implantology; DBBM-C: Demineralized Bovine Bone Mineral with Collagen

Introduction

The International Team for Implantology (ITI) classified immediate implantation as Type 1 implant placement; It refers to placement of an implant on the same day as tooth extraction and as part of the same surgical procedure, with the aim to engage the remaining socket walls with the implant [1,2].

After tooth extraction, dimensional changes in hard and soft tissue occur. Bone modeling has been demonstrated in numerous studies, and can be noticed clinically after 12 to 16 weeks. However, these height (apicocoronal) and width (bucco-lingual) alterations in the alveolar ridge, May influence or compromise the favorable implant positioning. In order to compensate this limitation, the immediate implant placement has been proposed.

Initially described, more than 30 years ago, by Schulte and Heimke in 1976, the aim of this concept is to reduce the number of surgeries, limit the physiological bone resorption and then better esthetic outcomes [2-4]. Therefore, to have a convincing result, the implantation site must respond to some criteria; hence the need of a thorough clinical and radiographic analysis prior to the therapeutic decision.

The insertion of dental implants immediately after tooth extraction has become a routine clinical procedure due to its numerous advantages. However, Implant placement in anterior maxilla is challenging because of esthetic concern and bone topography. Thus, the success of this technique

Figure 1: Clinical and radiographic presentation of the central right incisor [11].

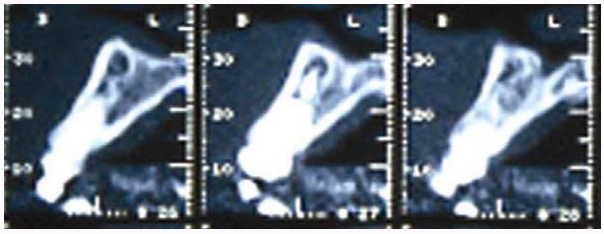

Figure 2: CBCT Showed intact socket walls.

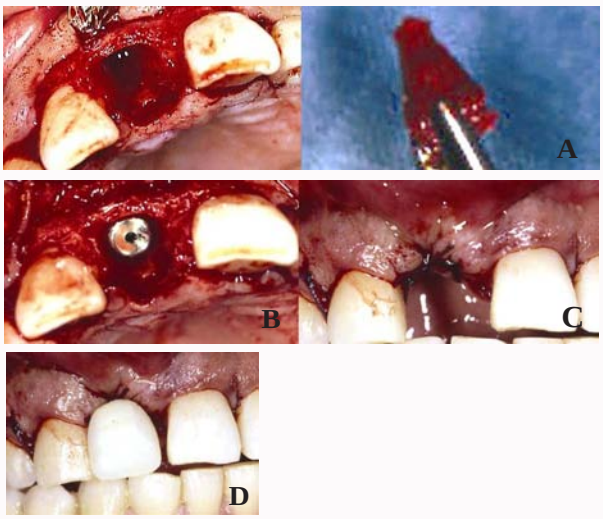

Figure 3: The surgical procedure. A: The extraction site and extracted root; B: The implant placement; C: The flap replacement and sutures; D: Immediate provisionalisation.

depends on implant placement and hard and soft tissue architecture. Therefore, extraction site must respond to some determinant conditions.

The ITI Consensus Conference reported clear recommendations for when to use each treatment option [9]. Immediate implant placement (type I) should only be performed by experienced clinicians, when perfect anatomic conditions are present [6].

There is two factors of major interest, the socket bone walls, their thickness (>1mm) and integrity, in addition to the gingival biotype. It's is concluded that when those both conditions are present, there is a lower risk (<10%) for gingival recession [2,5,6,9] and long-term stable esthetic outcomes. In addition, to allow a good primary stability with a correct 3D implant positioning, the extraction site must present sufficient bone volume apically and palatally with absence of any acute purulent infection [6,9].

Figure 4: After 6 months, at the re-entry procedure: note the horizontal resorption of buccal bone crest and the complete fill of the gap.

Clinical Procedure

A 50-year-old non-smoker male patient was referred to the Department of Periodontology, at the Casablanca Dental University. He presented an asymptomatic apical reaction in the central right incisor "11", in addition to root resorption (Figure 1); the extraction was advised by endodontists.

The patient desired fixed replacement to preserve the adjacent teeth healthy. So, the extraction of the teeth 11 with immediate implant placement was proposed.

On examination, oral hygiene was good and the periodontal status was healthy. Gingival biotype was thick (Figure 1). CBCT showed intact socket walls (Figure 2); facial bone wall was thick. Apical and palatal to the root, bone was available and sufficient to insure implant stability.

After clinical and radiographic examination, the possibility of immediate implant placement could be performed.

The tooth was extracted with minimal tissue damage to preserve gingiva as well as bone, the socket was debrided following the extraction (Figure 3A).

The osteotomy site was prepared on the palatal wall and a cylindrical implant (4.5mm in diameter and 11mm in length) was placed. Primary stability in the apical portion of the socket was achieved and a gap between the implant surface and the inner buccal bone plate in the coronal portion was obtained. Implant was at 1mm apical to the buccal ridge (Figure 3B). No graft material was used in the socket to fill the gap. Bone formation would take place in the gap between the socket and implant [2,10].

Sutures were required following the flap replacement (Figure 3C) and immediate provisionalization was carried out (Figure 3D).

After the surgical procedure, the antibiotic therapy (amoxicillin 500mg, 3 times/day, for 7 days) and analgesics were prescribed. The use of 0.2% chlorhexidine was indicated for 7 days, as a mouth wash with no dilution.

Re-entry procedure was programmed 6 months later; the gap was completely filled (Figure 4) and radiographic control showed good osseointegration of the implant (Figure 5).

After the healing period, definitive prosthesis has been set up. The patient was satisfied with the aesthetic result, as he didn't present a gummy smile (Figure 6).

During the follow-up, and until 6 years after implant placement, radiographic evaluation did not reveal any resorption or lesion all around the implant. Hard tissue level was correct and stable, and the implant was fully osseointegrated with perfect functional conditions (Figure 7).

Figure 5: Re-entry procedure 6 months later; Radiographic control showed good osseointegration of the implant.

Figure 6: Definitive prosthesis. Keratinazed gingival height is sufficient, but the gingival margin at the implant reconstruction is asymmetric. The patient was satisfied with the aesthetic result, as he didn't present a gummy smile.

Figure 7: Radiographic control 6 years after the implant placement: hard tissue level is stable; there was no bone resorption and the implant still osseointegrated.

Discussion

Many authors have studied bone changes occurring around an implant type I. Botticelli & al. reported significant horizontal resorption in both buccal (56%) and palatal (30%) bone plates, after placing the implant in the upper maxilla [11]. The most relevant factor for horizontal bone-restorative changes is the thickness of the buccal bone wall [2]. However, Sanz & coll. demonstrated, in their randomized clinical trial, that placing bone graft consisting of demineralized bovine bone mineral with 10% collagen (DBBM-C) in the gap between the implant surface and the inner bone walls, significantly reduced the horizontal bone restorative changes occurring in the buccal bone after immediate implantation [12].

Otherwise, the amount of vertical changes is significantly influenced by both the implant position and the thickness of the buccal bone wall [2].

In this clinical case, gingival biotype and buccal bone wall were thick. Those two clinical parameters were advantageous to reduce bone resorption. In addition, to insure long-term implant success and maintain the maximum of bone, many rules were respected. The implant position was correct; facial malposition was avoided. Primary stability was sufficient in the apical portion of the socket, and a gap dimension less of 2mm between the implant surface and the inner buccal bone plate in the coronal portion was maintained. Besides, implant shoulder was placed 1mm apical to the buccal ridge, in order to compensate for approximately 0.5–1.0 mm of crestal bone resorption.

Less ridge reduction and then less recession of the mid-facial mucosa has been shown to be associated with flapless implant placement [7].

However, when proper 3-dimensional implant position is achieved and bone graft is placed into the implant socket gap, the use of subepithelial connective tissue graft in conjunction with immediate tooth replacement in the esthetic zone may be beneficial to prevent or minimize facial gingival tissue recession [11].

In this case, no soft or hard tissue graft was done in adjunction to implant placement. However, gingival biotype was thick and height of keratinized tissue was correct; implant soft tissue could afford long term clinical stability.

Nevertheless, gingival margin at the implant reconstruction was asymmetric with the adjacent teeth; gingivectomy on left incisor "21" was advisable to improve the esthetic outcomes.

Immediate implant placement and provisionalization afford the patient a tooth-like restoration, and avoid a removable temporary prosthesis; so the major benefit is patient comfort rather than gingiva and papilla morphology [14]. Besides, re-establishment of a papilla is difficult when there is no tooth involved [15].

The use of platform-switching concept (implant systems with a discrepancy in diameter between the implant and the abutment) has also been studied. It is reported that recession of the midfacial mucosa would be significantly less when this concept is applied.

ITI publications recommended the use of provisional implant-retained restorations in the esthetic zone. They should be anatomically and functionally adapted, and should respect the emergence profile of the restoration apical to the planned mucosal margin [9].

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