IMMEDIATE FLAPLESS IMPLANT PLACEMENT AND PROVISIONALIZATION: CHALLENGE FOR OPTIMUM ESTHETICS AND FUNCTION: A CASE REPORT

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This report presents a case of tooth extraction and immediate flapless implant placement followed by fabrication of transitional restoration. The tooth was extracted atraumatically with the use of a periotome followed by careful debridement. An osteotomy was performed up to 5 mm beyond the base of the socket and depth using the alveolar crest as a landmark, following a slightly palatal direction. The implant shoulder was inserted 3 mm below the cementoenamel junction of the adjacent tooth. The interproximal distance from the neighboring teeth was 3 mm. No membranes and/or grafts were used. Initial impressions were taken immediately after implant placement; 6 hours later a well-polished and slightly overcontoured (at the distal-mesial aspect) acrylic crown was fixed onto the implant. There were no contacts in the centric and lateral positions. Five months later, the occlusion was modified allowing slight contacts in the centric position for an additional 2 months. The final prosthetic restoration was placed 2 months later (7 months after surgery), consisting of a full ceramic crown cemented on a customized metal ceramic UCLA abutment. The technique maintained the integrity of hard and soft tissues and created a very favorable esthetic result. It also provided the patient with a transitional fixed restoration and reduced the time required for therapy completion.

Because research on this field is limited, further investigation is required to support the results of this report, despite the promising clinical outcome.

Key Words: immediate provisionalization, flapless implant placement, nonfunctional loading, papilla, esthetics

INTRODUCTION

Implant prosthetic rehabilitation in the anterior maxilla is a demanding procedure in terms of preserving the integrity of hard and soft tissues and attaining a good esthetic result. Immediate implant placement, which has the advantage of reduced surgical steps and time required to complete the therapy, has been proven to provide a predictable approach. However, clinical experience revealed that certain problems associated with the final esthetics had to be addressed: Immediate placement after tooth extraction requires transposing the flaps to totally cover the surgical site. This is not always attainable without flap lengthening, especially if a large-diameter implant is to be inserted, resulting in alteration of gingival morphology. The delayed (6–8 weeks after tooth extraction) implant placement allows complete coverage of the surgical site, and in this respect is advantageous over the previous technique; however, even small-range bony or soft-tissue changes may affect the esthetic result. The extent of the changes may dictate soft-tissue management, free gingival grafts, or even guided...
regenerative procedures, making the operation less predictable and more complicated. Besides, neither of these techniques preserves the morphology of interproximal hard and soft tissues and, therefore, in most cases the whole outcome leaves much to be desired from an esthetic point of view (Figures 1 and 2). Moreover, most patients demand an immediate fixed transitional restoration to meet their personal, social, or professional needs. For the aforementioned reasons, a protocol of immediate, flapless implant placement and temporary tooth restoration has been developed, and promising results are reported.7–11

**Goal**

This case report describes a case of immediate, flapless implant placement and same-day delivery of a fixed transitional restoration. It explores problems and concerns related to this treatment concept.

**Case Report**

A 23-year-old white woman presented to our clinic with a history of trauma to the right central incisor. Clinical examination revealed signs of mobility of the tooth and slight swelling of the surrounding tissues. The radiographic picture showed a horizontal radiolucent line below the alveolar crest. (Figure 3). The patient was diagnosed with a root fracture at the cervical level.

The treatment plan consisted of extraction of the tooth and immediate implant placement.

The tooth was extracted with an atraumatic flapless technique and the use of a periosteome (Medesy, Maniago, Italy) and an endodontic instrument to preserve the osseous structures surrounding the socket. The crestal diameter was 6.5 mm. Then, an osteotomy was performed, beyond the apex of the socket, to a depth of 5 mm using the alveolar crest as a landmark and following a slightly more palatal direction. The integrity of the socket walls was verified with the use of a periodontal probe. A root-form implant of $5 \times 15$ mm (Osseotite NT, 3i Implant Innovation, Palm Beach, Fla) was inserted (Figures 4 and 5). The implant shoulder was located 3 mm apical to the cementoenamel junction of the adjacent left central incisor. The distance between adjacent teeth and implant was 3 mm. The initial stability of the implant was excellent. No graft and/or membranes were used. Immediately after the surgical phase was completed, an impression was taken and a temporary healing abutment was placed. The patient was prescribed amoxicillin 500 mg every 8 hours for 7 days and instructed not to brush the surgical site, but only to rinse with 0.12% chlorhexidine gluconate. Six hours later, a well-polished and slightly overcontoured (at the mesial and distal aspect) provisional acrylic crown (UCLA single-tooth abutment, 3i Implant Innovation, Palm Beach, Fla) was fixed onto the implant. Caution was taken to prevent the provisional restoration from exerting pressure on the labial gingival margin (Figure 6). The occlusal scheme did not allow contacts in centric and lateral excursions (nonfunctional loading). The patient was frequently reminded not to load the site by mastication, and a soft diet was recommended.

Five months later, the provisional restoration was removed, and the clinical condition was assessed. The papillae distal and mesial to the implant were maintained with papilla index scores of 2 and 3, respectively. The gingival labial margins were retained at the same level to that of the left central incisor. No signs of acute or chronic inflammation were observed. The radiographic picture did not essentially differ from the immediate postoperative one. The restoration was
FIGURES 3–7. 


FIGURE 4. Flapless immediately placed implant. 

FIGURE 5. Radiographic picture after flapless immediate implant placement. 

FIGURE 6. Transitional acrylic crown. 

FIGURE 7. Metal ceramic permanent customized UCLA abutment.
repositioned and the occlusal scheme was modified, permitting contacts in the centric position. The final prosthetic restoration was placed 2 months later (7 months after surgery); it consisted of a full ceramic crown cemented on a customized, metal ceramic, UCLA abutment. (Figures 7 and 8). The final margins of the crown were located 1.5 mm below the soft-tissue contours. The occlusal scheme allowed contact only in the centric position. Five months later (12 months after surgery), the follow-up examination revealed a 1.5 mm depth increment of the peri-implant sulcus at the mesial-distal aspect, and the periapical radiograph showed a slight angular resorption of interproximal bone (Figure 9). The proximal bone loss was estimated at 0.3 mm (after correction for magnification in the radiographs) compared with the postoperative radiograph (Figure 5). Despite these findings, the esthetic parameters as described earlier remained unchanged. The implant, abutment, and crown had been functioning for 24 months after surgery, and, to date, the esthetic outcome has been preserved; no new clinical or radiographic signs were observed, and no symptoms were reported by the patient.

**DISCUSSION**

The outcome of this case demonstrates that flapless immediate implant placement is an excellent treatment option in areas with high esthetic demands, such as the anterior maxilla. The main advantages of this concept are the preservation of hard and soft tissues surrounding the implant, the reduced time for therapy completion, and the immediate fixation of a transitional restoration. However, not all cases can be treated following this protocol; in fact, certain prerequisites need to be met for a functional and esthetic result to be achieved.

Socket wall integrity, especially at the labial aspect, is ensured with the use of a periodontal probe; because this technique is blind, the possible existence of fenestrations, uneven crestal resorption, or trauma could jeopardize implant survival. In this respect the extraction has to be atraumatic. The use of the periotome facilitates the procedure by enlarging the space between root and socket walls and, thus, eliminating the need for conventional elevators. Once proper root mobility is achieved, the extraction may be easily performed with the use of an endodontic instrument instead of forceps. Conventional instruments could impinge on the papillae and cause damage to this area. If the root appears dilacerated and the extraction is anticipated as difficult or complicated, a more conventional approach might be preferable.

In the present case, the soft-tissue trauma was minimal and no further signs of acute or chronic infection were traced. Although preexisting periodontal disease or periapical pathosis in animal studies did not impair bone remodeling around implants if
properly treated, we, among others think it is prudent to avoid immediate implant placement into infected sockets because of the potential risk of future implant periapical lesion development.\textsuperscript{14,15}

The implant selected was a wide-diameter root form instead of a cylindrical one. This shape allowed for almost complete filling of the socket by the fixture and limited the peri-implant space to less than 2 mm in the coronal part. Under these clinical conditions it was estimated that the use of grafts and/or membranes, as proposed by previous protocols,\textsuperscript{1,16–19} was not necessary. Some clinical studies reported successful functional and esthetic outcomes when this concept was followed.\textsuperscript{20–24} Furthermore, this concept is supported by the human histologic findings of Wilson et al\textsuperscript{25} and Paolantonio et al.\textsuperscript{26} These findings revealed no greater bone-implant contact in membrane-associated immediate implants, compared with controls, when the distance between implant and socket was limited to 1.5 mm. Chen et al\textsuperscript{27} summarized the current guidelines in the literature, which designate that sites with horizontal defects of 2 mm or less can heal by spontaneous bone fill when implants with rough surfaces are used; therefore, grafts or membranes are not necessary. When horizontal defects are larger than 2 mm, augmentation procedures with membranes and/or grafts are required.

It is interesting to note that a human histologic study reported bone regeneration and osseointegration in horizontal defects of 4 mm or more, regardless of whether collagen membranes were used or not.\textsuperscript{28} It must be mentioned here that in the aforementioned studies the surgical procedures included flap elevation and primary wound closure and, therefore, are not fully comparable to the flapless approach advocated in this and other reports.\textsuperscript{7–11} In this case it was estimated that the minimal peri-implant gap, in combination with the transitional prosthetic restoration, provides a barrier that could mimic primary wound closure. Despite the successful clinical outcomes of these reports, including this case, to our knowledge there is a lack of controlled scientific data comparing the implant osseointegration process between immediate flapless and conventional immediate 1- or 2-stage protocols.

The 3-dimensional implant position and angulation were determined as follows: the implant shoulder was located 3 mm from the neighboring teeth. According to the findings of Esposito et al,\textsuperscript{34} a minimum distance of 2 mm is critical to preserve the interproximal papilla. Additionally, the implant was inserted 3 mm apically from the cementoenamel junction to create an esthetic emergence profile.\textsuperscript{35,36} Finally, the implant was positioned in a slightly palatal direction and along the palatal wall to avoid excessive encroachment onto the labial bone. Spray et al\textsuperscript{37} reported that there is a positive correlation between failure of osseointegration and thin or resorbed labial bone plates.

The impressions were taken immediately after implant insertion using the proper impression copings. The absence of flaps and sutures and the minimal peri-implant space facilitated the whole procedure. The provisional restoration was fabricated in the laboratory, fixed onto the implant as late as 6 hours after implantation, and kept in place 7 months after surgery, following the concept of progressive loading, although shorter healing periods have been reported.\textsuperscript{7,8} This time period allowed the authors to monitor any possible alterations of the soft-tissue contours before final impressions.

The temporary crown was slightly overcontoured at the mesial-distal aspect. This concept, according to Bichacho and Landsberg,\textsuperscript{33} results in successive compression and relief of papillae fibers, enhances the microcirculation and the regenerative process, and subsequently prevents the shrinkage of this sensitive tissue. No overcontouring was incorporated at the labial aspect, as it could have created overextension and resulted in gingival recession.

The rationale for immediate implant provisionalization is easily understood if the periodontal and peri-implant soft-tissue architecture is taken into consideration. The normal distance between free gingival margin and the underlying bone is approximately 3 mm in the labial aspect of a tooth and 4.5 mm at the interproximal aspect.\textsuperscript{29–30} This difference is attributed to the existence of adjacent teeth and the gingival embrasure form.\textsuperscript{31} It is logical, therefore, to speculate that in the absence of adjacent tooth support, the interproximal gingival dimension tends to collapse to a dimension similar to that of the labial aspect.\textsuperscript{31} It has also been reported that papilla can be maintained up to 4 mm from the underlying bone with appropriate prosthetic support.\textsuperscript{32}

The permanent abutment selected was customized and not prefabricated. Although it may not be necessary in all cases, this design was thought to offer some advantages, such as eliminating the possible need of excessive buildup or preparation of the abutment and providing a more predictable esthetic emergence profile and angulation of the restoration. In addition, to avoid possible mucosal discoloration, the abutment was porcelain fused to metal. The all-ceramic permanent crown greatly enhanced the esthetics of the region, and it was considered that, even in case of future gingival
recession, the whole esthetic outcome would be maintained within acceptable limits.

The level of bone resorption noted in this case after 1 year did not diverge from what is normally found in 2-step protocols.\(^{38,39}\) It must be noted here that at the 24-month follow-up the peri-implant sulcus found in 2-step protocols.\(^{38,39}\) It must be noted here after 1 year did not diverge from what is normally required for the final restoration. However, more research in this field and long term clinical studies are necessary to corroborate the results of this report.

**Conclusion**

Tooth extraction, immediate flapless implant placement and provisionalization with progressive loading, is a treatment option which offers several advantages compared to the conventional immediate two stage protocols such as: simplicity, superior esthetic outcome, immediate fixed restoration and reduced time required for the final restoration. However, more research in this field and long term clinical studies are necessary to corroborate the results of this report.

**Acknowledgment**

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**References**


