Case Report

Immediate Flapless Implant Placement in a Smoker Patient: A Challenge for Optimum Aesthetics and Secondary Stability: A Case Report

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Abstract

The objective of this case report was to restore the young patient with missing teeth and extruded tooth using an immediate implant and synthetic bone graft material for the esthetic and comfort purpose. A 21-year young man reported extrusion of a tooth as well as missing teeth. Clinical examination revealed missing teeth in relation to (irt) 11 and 21, extrusion of tooth in relation to (irt) 12, patient had generalized fluorosis, and localized marginal gingivitis with melanin pigmentation. The patient is a known smoker, and he was advised the cessation of smoking before the treatment. This paper describes a step-by-step approach to different treatment phases, starting with surgical guide fabrication, immediate implant surgical procedures, bone grafting procedure, and later prosthesis fabrication. Follow-up resulted in a satisfactory outcome.

Keywords: *Bone graft, extraction, immediate implant, secondary stability, smoking*

Introduction

After tooth extraction, there will be a certain amount of resorption and remodeling during the healing process. As it is a physiological mechanism of resorption, it is always observed more amount of resorption in the first year. During the postextraction period in the first year, the loss of alveolar bone is calculated at about 4 mm in bone height and 25% loss in total volume.[1] Most of the vertical resorption process occurs in the first 3 months after the extraction. After 1 year, crestal bone levels at tooth surfaces adjacent to the extracted tooth remained almost the same with the amount of 0.1-mm bone loss.[2,3]

In contrast to present protocols, there is a need for faster and more modest treatment. There has been increasing interest in immediate implantation. Immediate implant placement means implantation at the same time immediately after extraction. Literature mentions many advantages of immediate implantation such as reduction in the number of surgeries, shortened treatment time, preservation of the alveolar bone, maintenance of soft tissue contour, decreases morbidity and rehabilitation time associated with crown replacement, and increases patient satisfaction with treatment.[4,5] However, there is also a higher risk for implant failure, unpredictable hard and soft tissue changes, and difficulty with primary stabilization.[6]

For maxillary anterior replacement, there should be sufficient bony walls at the apical and palatal sites of the extracted socket for the implant to achieve primary

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stability.[7] Immediate implantation should be performed in systemically healthy patients without any acutely infected areas, and those who have adequate hard and soft tissues with intact facial plate and thick tissue biotype. To achieve primary stability, it is recommended to use long and wide implants. Care should also be taken that the width of the implant should be not such that the labial plate is perforated; hence, a jumping distance is always recommended in maxillary anterior implant placement in the extracted sockets. If the extracted space is more after the implant is immediately placed, then the space can be filled with bone graft.[8] In clinical practice, the need for second surgery area for autogenous graft collection makes the procedure more complicated, although any synthetic graft material can be preferred for the grafting procedures.

The present case report describes a flapless immediate implant placement in the esthetic zone with a predictable follow-up. The approach uses the hydroxyl apatite synthetic graft material to assist in bridging the osteogenic "jumping distance." This approach also permits good osseointegration and preservation of hard and soft tissue architectures with a predictable outcome.

Case Report

A 21-year-old male patient presented with a mobile tooth which was slightly extruded from the socket (tooth No 12) and missing teeth in relation to (irt) 11, 21 regions. The patient desired to get his missing teeth replaced along with the extruded tooth, which he had lost due to a road accident [Figure 1]. The patient consent form was taken and he was informed that his restorative options included a removable partial denture, a fixed bridge, or a fixed implant restoration. To avoid the preparation of the adjacent teeth, the patient selected the implant-supported restoration. Radiographic and clinical evaluations neither demonstrated any obvious periapical pathology nor signs or symptoms of active infection in the region of implant placement. The patient was a chronic smoker; he was advised to quit or reduce the smoking drastically 4 weeks prior to the surgical procedure. The periodontal evaluation revealed a thick and flat periodontal type, and a red and inflamed marginal gingiva and interdental papilla in relation to (irt) 12, 22. His adjacent teeth showed fluorosis, with a high smile line. Diagnostic probing to the osseous crest of the hopeless tooth at interproximal aspects was 4 mm medially and 3.5 mm distally. The patient was informed that the existing bony destruction might result in open interproximal embrasures (i.e., "black triangles"). Potential risks and benefits of treatment options were discussed with the patient, and an immediate implant with the flapless technique was selected. The primary impression was made for the diagnostic cast. The surgical guide was fabricated with a thermoplastic sheet.

Figure 1: Preoperative image showing missing teeth irt 11, 21 and extrusion of tooth irt 12

Stage I implant surgery

Minimally, invasive extraction is the first and one of the most critical steps of immediate implant placement. A sulcular incision with transeptal fiberotomy was performed using the periotome (Nobel Biocare, Yorba Linda, CA, USA) to separate the tooth from the periodontal tissue. The tooth was atraumatically removed without flap reflection, which preserved gingival and osseous architectures. A periodontal probe was used following a tooth extraction to verify the integrity of the bony plate, and the socket was thoroughly debrided to eliminate infection if any ([Figure 2]. The initial drill surgical guide was made of thermoplastic material on the diagnostic model. In the anterior maxilla, it is crucial to avoid placing the implant directly into the extraction socket. The axis of the implant should be even with the incisal edges of the adjacent teeth or slightly palatal to this reference. Implant placement in this way could greatly reduce the risk of buccal plate perforation and implant failure. The presence of fully circumferential walls of bone is important for the osseous support of a dental implant. Standard drilling procedures were performed according to the manufacturer's instructions. An MIS tapered implant (3.75 mm_ 13 mm) was placed into the prepared. A full-thickness muco periosteal flap was raised adjacent to the 12 for the placement of the implant in relation to (irt) 21a; MIS tapered implant (3.75 mm_ 13 mm) was placed into the prepared site [Figure 3].

The bone-to-immediate implant gap was about 3 mm. Primary implant stability was achieved by engaging the palatal wall and the bone approximately 3.5 mm beyond the apex of the extraction socket. The implant platform was placed 3-mm apical to the facial-free gingival margin to achieve the appropriate emergence profile.

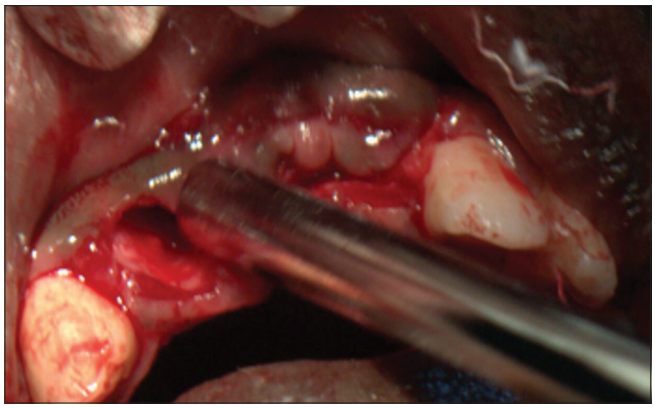

Figure 2: The socket was thoroughly debrided

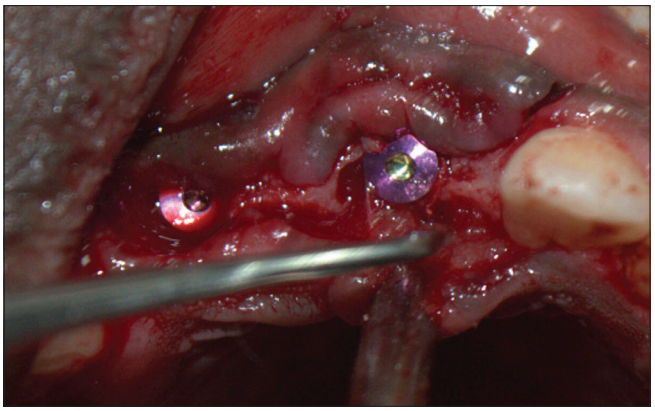

Figure 3: Implants placed irt 12 and 21

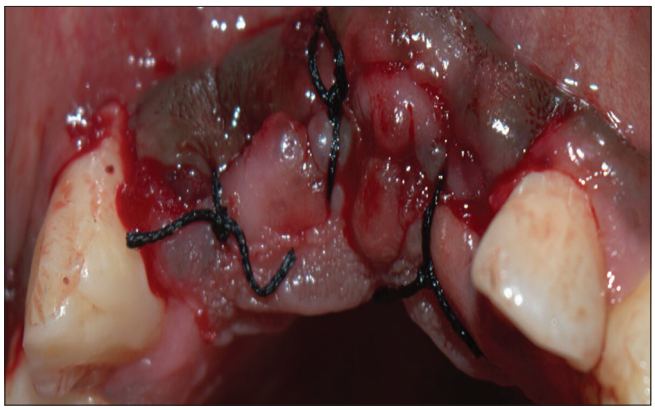

Figure 4: Interrupted sutures placed

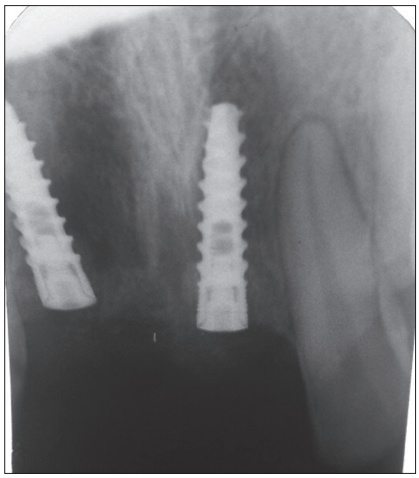

Figure 5: IOPA showing implant irt 12 and 21

A minimal distance of 1.5 mm between the implant and adjacent teeth was recommended to minimize marginal bone loss because of encroachment. The bony gap between the implant and extraction socket was filled with hydroxyapatite synthetic graft to achieve the most predictable aesthetic result. Interproximal papillae adjacent to the implant were adapted with interrupted sutures under minimal tension [Figure 4]. The provisional partial denture was adjusted to not contact the cover screw. The surgical area was closed using nonresorbable sutures. Regular medicine included 1 g of amoxicillin, nonsteroidal analgesics, and chlorhexidine gluconate mouth rinse twice a day for 5 days were prescribed to the patients. Strict instructions were given for the cessation of smoking. When using particulated bone grafting materials, antibiotics may prevent possible infection. One week postoperation, the sutures were removed.

Stage II implant surgery

After a waiting period of 2 months, an intra oral periapical radiograph Intra Oral Periapical Radiograph (IOPA) was obtained to evaluate the bone-to-implant contact percentage [Figure 5]. A secondary stability of both the implants was measured with percussion test, in relation to (irt) 12, i.e., immediate implant; the secondary stability was compromised, and the healing period was extended for further 2 months; the reason may be the patient was a smoker, whereas the secondary stability of the implant in relation to (irt) 21 was good. After 6 months of the healing phase, the secondary stability in relation to (irt) 12 was reviewed, and it was good. Stage II surgery was performed under local anesthesia, cover screws were exposed, and healing abutments were placed.

Prosthetic phase

When the soft tissue has grown around healing abutments, alginate primary impression for both arches was made, followed by the fabrication of an individual tray. Open tray impression copings (MIS Dental Implant System Ltd) were placed and tightened with screws, followed by IOPA being taken. An open tray impression was made using light body and heavy body addition silicone impression material. Customized healing abutments were tightened [Figure 6], and the radiograph [Figure 7] was taken; in the next step, metal try-in was done. Then, final restoration made of a metal-ceramic crown was cemented [Figure 8]. A radiograph taken at 12 months

Figure 6: Customized abutment placed

Figure 7: IOPA showing customized abutment attached to implant

Figure 8: Final prostheses irt 11, 12, and 21(Frontal View)

showed a stable clinical situation in the area around the apices of the implant. During the follow-up period, the implant successfully fulfilled the Buser *et al*.[9] criteria, which include the assessment of plaque and sulcus bleeding indices, probing depth assessment, clinical attachment level, and also the assessment of the width of keratinized mucosa to yield high predictability for successful osseointegration.

Discussion

The young patient opted for immediate implant placement for aesthetic purpose and comfort. The immediate implant placement, first of all, reduces the number of surgical procedures. Immediate implant placement is becoming popular among young patients who prefer few surgical interventions, and acceptance of this procedure is on the increase. According to the clinical way, implants in fresh extractions sites can be placed in the same location as the extracted tooth, minimizing the need for angled abutments and facilitating the positioning of the final restoration. Osseointegration is also more favorable when placing implants immediately following an extraction. The width and height of the alveolar bone are preserved. The procedure keeps contaminants away from the socket. Immediate placement of implants provides better aesthetics for the patient. During the procedure, bony receptors are preserved by preventing atrophy of the alveolar ridge, and preventing recession of the mucosal and gingival tissues. So, generally, it stimulates the preservation of gingival aesthetics. A shorter treatment time, as well as chair time, also offers fewer clinic visits to contribute to the patient's comfort; they do not have to live in a transitional state with or without teeth. The ideal situation for the procedure is where there is an infection-free and intact socket that can be obliterated almost entirely by the implant.[10]

It is a challenge for the clinician to get optimum aesthetics and also secondary stability. However, there is a higher risk for implant failure, unpredictable hard and soft tissue changes, and difficulty at primary stabilization in case of immediate implant placement. The procedure needs a skilled surgeon with experience. A new implant socket must be prepared more palatally and avoid any palatal or buccal perforation. To avoid any perforation risks or malposition of the implant, guided surgery can be performed or the surgeon should be experienced in the procedure. Coronoapically, the implant should be placed deep inside the extraction socket. Here, the distance between the implant shoulder and mid-facial bone crest should be 0.5–1 mm.[11] In our case, this amount reached up to 2 mm. This approach avoids worse esthetic outcomes according to bone resorption. In immediate implant placement during the extraction procedure, sometimes endodontically treated roots and curved roots can make the extraction more challenging and root fracturing can happen.

For the rehabilitation here, wider implants have been placed to avoid the jumping distance. Jumping distance is a partial incongruency seen between the outer surface of the socket and the bony wall of the socket.[12]

Socket preservation is achieved successfully with immediate implant placement. It involves minimal

traumatic extraction followed by immediate grafting of the extraction sockets using particulate bone graft materials. Hydroxyapatite synthetic graft material is placed in clinical practice; the need for second surgery area for autogenous graft collection makes the procedure more complicated, although any synthetic graft material can be preferred for the grafting procedure. A literature review of the most common biomaterials used for immediate dental implants reported that the appropriate graft material can increase the level of immediate implant osseointergration.[11,13]

For the placement of an immediate implant, the flapless approach was used; this technique provides a minimally invasive approach to extraction with socket grafting. Because the interdental papilla remains intact, there is less disruption of blood supply. As a result, there is a greater potential for the maintenance of soft tissue volume.[10] This means gaining an extra 2–2.5 mm of soft tissue height, which in the aesthetic zone is the difference between not having a recession and maintaining good papilla height. "One mm is one km in the aesthetic zone" — Bhola.[14]

The waiting period for osseointegration healing time of the implants varies between 6 weeks for mandible and 8 weeks for maxilla to 12 weeks postsurgery, depending on the system of the implant. Time can be extended 4–6 months postsurgically.[15] Here, prostheses were fabricated after 6 months of the healing phase as the studies have shown the stability measurements during this period. In their study, the secondary implant stability data were performed after a mean healing period of approximately 2–3 months in the late implant placement protocol (LIP) group and after approximately 6–8 months in the immediate implant placement protocol (IMIP) group. In the latter situation, it was assumed to be justified by the presumed delayed maturation of the grafted material of approximately 6–8 months for procedural simplicity.[16]

The patient was under the smoking cessation protocol, as smoking will affect the success of the implant as well as the healing of bone graft material. The protocol rule is to stop smoking 1 week before and 8 weeks after placing the implants. This protocol is based on the medical literature showing improvement in blood circulation after 1 week of cessation of smoking and histological proof of initial osseointegration taking place in the first 8 weeks after implantation. As evidenced by the data arising from this study, the survival rate rises as more time passes from cessation of smoking to implantation beyond the week advised by Bain's protocol.[17] According to him, there was a statistically significant difference in the failure rates between those who continued to smoke and those who were on the protocol.[18]

Bain also suggested that the patient cease smoking at least 1 week prior to surgery to allow reversal of the increased levels of platelet adhesion and blood viscosity, as well as the shorter-term effects associated with nicotine.[19]

Here, the use of completely limiting surgical guides can best provide an optimum position for an implant, satisfying both the conditions such as the position of the crest module of the implant and the direction of the implant body. The direction of the implant body, in turn, determines the need to use any angulated abutment or customized abutments. Additional components like these would add up to the cost of the procedure. The surgical guide should help in transferring the predetermined angulation and control the position of the drill in all three dimensions while doing the osteotomy preparation.

Today the immediate implant placement procedure has evident increasing success. The immediate implant placement approach has been known and applied since 1970s and has an increasing attraction.[20] Case choice is basic, before like any other surgical approach, a thorough and detailed systemic medical diseases and habit history should be obtained. Patient compliance and expectations should be determined. Patients who have no systemic problems and healing problems, compliant, and thick biotypes of soft and bone tissue have the least risk for any complication. Atraumatic extraction of the tooth with preserving the socket bone and papillae has effects on outcome success. Also, placing the implant in an ideal three-dimensional position is important. When necessary, guided bone regeneration and soft tissue grafting techniques should be well known and applied by the clinician.

Conclusion

Aesthetic rehabilitation of young smoker individuals with immediate implants is difficult. Here immediate implant placement following less invasive tooth extraction is a viable and predictable solution to tooth loss. Minimally invasive surgical technique, bone substitutes, lesser chair side and treatment time involved together with minimum postextraction complications, preservation of gingival aesthetics, and following a smoking cessation protocol are a boon to the patient. However, proper case selection, diagnosis, and treatment planning and meticulous postoperative care preceded by a good surgical and prosthetic protocol are very essential for the long-term success of the immediate implants.

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Conflicts of interest

There are no conflicts of interest.

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