Restoration of Anterior facial cortical bone defect with grafts and placement of immediate implants for restoring facial esthetics: A Success story

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ABSTRACT

Purpose: To describe a protocol for immediate placement of endosseous implant into debrided infected dentoalveolar socket.Patient and methods: A total of 2 implants were placed in a patient with infected dentoalveolar socket in relation to 11. The Immediate placement protocol emphasized the meticulous debridement of the infected tissue in combination with periapical osteotomy of socket. Bone grafting along with Collagen membrane was accomplished to support bony healing of alveolar defects surrounding implantation site. Pre-surgical and postsurgical antibiotic therapy was administered.Results: This is a case report demonstrating the benefits of immediate implant placement coupled with bone grafting for esthetic rehabilitation of an anterior missing teeth & anterior facial cortical bone defect. Both the implants osseointegrated after 6 months follow up and were functional 6 months postoperatively.Conclusion: Successful immediate implantation in debrided infected alveolus depends on complete removal of all contaminated tissue and the controlled regeneration of the alveolar socket.

Key words: Immediate implants, Infected socket.

Introduction

The advent of implant dentistry changed our ideas about tooth replacement therapy for our patients. The placement of dental implants is a well-established treatment option for replacing missing teeth, allowing the restoration of chewing function, speech, and aesthetics. Traditionally, before placing dental implants, the compromised teeth were removed and the extraction sockets left to heal from months to one year.[1],[2] Tooth extraction can actually lead to alveolar ridge resorption, compromise the favourable positioning of the implant and reduce residual bone volume even further.[2-4] The solution is immediate placement of implants into the extraction sockets, which might avoid this undesirable resorption. Placement of Implants into fresh extraction sockets was introduced as a treatment modality in the late 1970s.[5] The advantages of immediate implant placement includes, a reduced operative time, preservation of esthetics, shorter treatment time, maintenance of socket walls, better actual implant placement, better patient satisfaction & reduces the number of surgeries.[6,7] Disadvantage of immediate implant placement is that if remnants of infection remain after extraction of the natural teeth, it may contaminate the initial healing site, resulting in implant failure.[8] Immediate placement

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of implant in chronic pathologies has always been questionable. Clinical reports suggest that periapical infections are a predictive marker for implant infection and failure.[9-12] Clinicians tend to avoid the immediate implant placement at the infected site and consider infection as contraindication for immediate implant placement. However, successful immediate implantation in infected alveoli can be obtained, depending on complete removal of all contaminated tissues and controlled regeneration of the alveolar defect.[13,14] Literature suggests three methods to augment the site before immediate implant placement. One method includes placement of a bone graft and/or a scaffold or a combination of both followed by implant placement.[15] Newer techniques suggested using autogenously harvested bone rings[16] & placement of protein rich plasma followed by implant placement.[17] However, long term studies with larger number of samples are required to substantiate these treatment protocols. This clinical report describes an immediate implant placement protocol after bone grafting to restore anterior esthetics.

Clinical Report

A 21 year old male patient **(Figure 1)** reported to the Prosthodontic clinic with a complaint of inadequate esthetics. On clinical examination it was found that 11 & 21 was missing, with patient giving a history of broken[11]. Orthopantamograph **(Figure 2)** revealed that patient had root stumps in relation to maxillary anterior [11]with loss of one-third of the labial cortical plate. Intra oral periapical X-ray showed radiolucency at the apex of [11]. Resorption of the facial cortical plate thus required bone grafting. A restoration driven treatment plan was developed which included extraction of infected root stumps followed by through debridement of the socket, augmentation of the defective socket with bone graft & subsequent placement of implant followed by prosthetic rehabilitation. Diagnostic casts were prepared & bone mapping was done by measuring the ridge width in the patient's mouth utilizing endodontic reamers & subtracting soft tissue width on the diagnostic cast by scraping. A patient was initiated on a daily dose of 500mg amoxicillin and 400mg of metronidazole, 8 hourly, orally, 2 days prior to surgical procedure. Strict aseptic protocol was followed. Pre-operative Intraoral and extraoral scrubbing and draping was done. Infiltration anesthesia was given in relation to maxillary 11 and 21. A papilla preserving full thickness incision **(Figure 3)** was given and tissue reflected which showed loss of bone. Atraumatic extraction of the root stumps was carried out **(Figure 4)**. The sockets were then completely debrided with curettes to remove any infected granulation tissues. Thorough irrigation of the socket was carried out using a combination of Sodium hypochlorite solution (2.5%) with Chlorohexidinegluconate (0.2%).[18] Length of the root and diameter of the radiolucency present at the apex of the tooth was then measured and 2mm was then added to the above value so as to determine the length of the implant to be inserted. The site was initially prepared with implant drills & subsequently with osteotomes **(Figure 5 & 6)** for receiving the implants of chosen dimensions. Two ADIN implants of size 3.75 x 11.5 mm were carried to the site with the help of an implant carrier **(Figure 7)** and wrenched into place with a Torque wrench till primary stability was achieved **(Figure 8)**. Cover screws were then placed over the implants.Hydroxy apatite bone powder (Osseograft; Advanced Biotech Products (P) Ltd) was then packed into the extraction socket area **(Figure 9)**. A scaffold sheet comprising of Sterile Demineralized bone matrix xenograft (type 1 collagen) granules with Calcium sulfate hemihydrates (Osseomold; Advanced Biotech Products (P) Ltd)of appropriate dimension was used to stabilize the bone graft **(Figure 10)**. Surgical site was then closed with the help of self resorbablepolyvicryl sutures **(Figure 11)**. Primary (water tight) closure of the soft tissue is usually recommended so as to prevent the dislodgement of the graft material. An immediate removable partial denture **(Figure 12)** was given

to the patient as an interim denture for temporary esthetic rehabilitation. After 3 months, a periapical radiograph **(Figure 13)** was taken, which showed satisfactory implant-bone integration along with bone regeneration in the region of facial cortical bone defect area. Cover screw were removed and Gingiva formers **(Figure 14)** were placed. After two week, gingiva formers were removed &screw retained standard abutments for the ADIN implants were placed onto the implants. Impressions were made using direct technique with elastomeric impression materials. Two separate metal ceramic crowns were then fabricated and cemented using Zinc phosphate cement. Excess cement was removed. Care was taken to keep the crowns out of contact during centric & eccentric movements of the mandible. Oral hygiene instructions were reinforced to the patient.

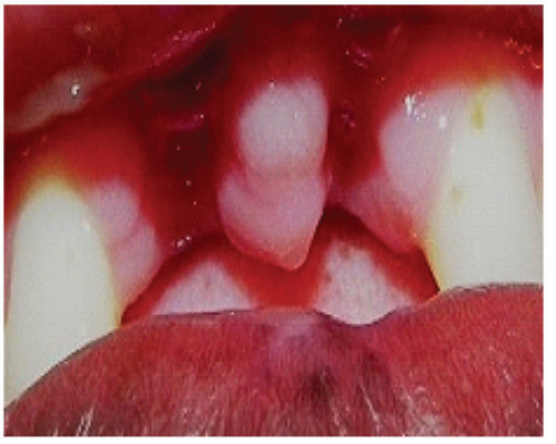

Figure 1: Pre-operative picture

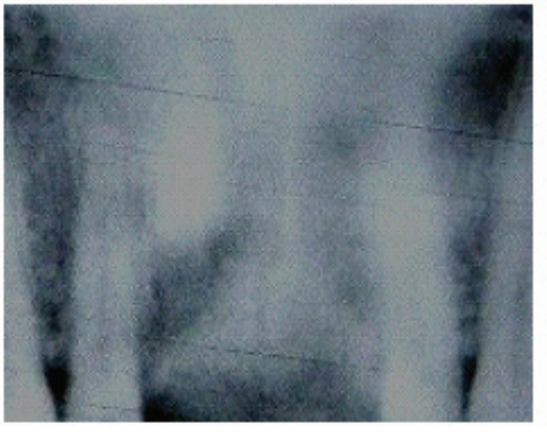

Figure 2:- Pre-operative OPG

Figure 3: Incision on surgical site

Figure 4: Extracted infected root stumps

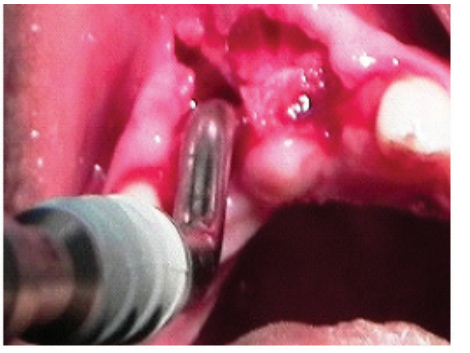

Figure 5: Preparation of the surgical site using osteotomes

Figure 6: Preparation of the surgical site using implant drills

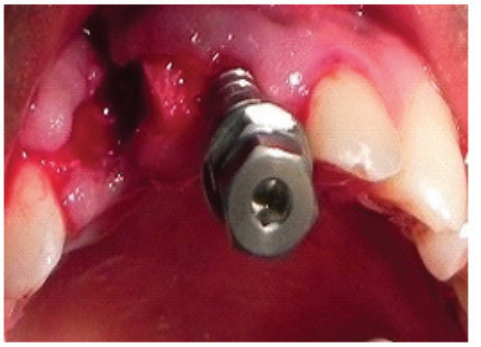

Figure 7: Implant being carried to the site with implant carriers

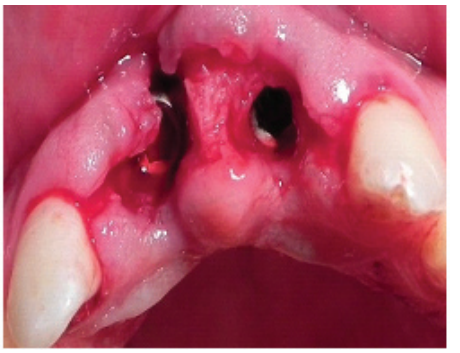

Figure 8: Subsequent placement of the implants

Figure 9: Bone graft placement

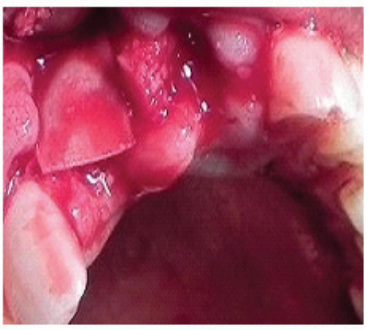

Figure 10: Scaffold placement to stabilize the graft

Figure 11: Sutures placed

Figure 12: Immediate R.P.D Placement

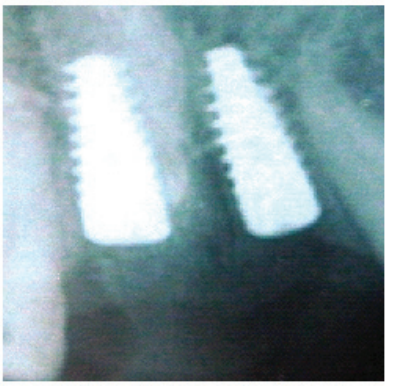

Figure 13: Intra Oral Periapical Radiograph after 3 months

Figure 14: Gingiva formers in place

Figure 15: Porcelain fused metal ceramic crowns placed in relation to 11 and 21

Results

A review was done after 3 months **(Figure 15)** which showed that patient was satisfied with the esthetics and functional rehabilitation with no signs of abutment or crown loosening or soft tissue defect. A Periapical radiograph taken, showed no signs of recurrence of periapical pathology or bony defect re-emerging. Osseointegration of both the implants was found to be satisfactory.

Discussion

According to conventional protocol, implant placement should be delayed upto one year after tooth extraction to allow complete alveolar bone healing[2-4]which is one of the major disadvantages of implant surgery.Many studies on immediate placement of dental implant in freshly extracted socket has been conducted with success of almost 90% in all clinical studies and has now become a well-established protocol.[19] Most of the teeth that were extracted were due to either periodontal or periapical infection and updated review of literature on immediate implant suggests that this procedure should be avoided in the presence of periapical or periodontal pathosis.[19] Clinical experience has led most clinicians to avoid the immediate placement of endosseous dental implants at infected site and to consider infection contradictions for immediate implantation.

The protocol followed in this patient situation includes:

1. Extraction of tooth
2. Debridement
3. Bone graft and collagen membrane
4. Placement of implants
5. Loading of implants following a healing period of 6 months[20,21]

Erikssonet al[22] suggested that proper antibiotic coverage with immediate implant surgery could minimize the implant failure rate.Various studies on immediate implant placement in fresh extraction socket confirm that healing and osseointegration were simultaneous process and they appreciate repair phenomenon associated with extraction socket healing and osseointegrated dental implants. They suggested that the conditions associated with repair of extraction socket may be favorable for integration of dental implants.[23] As this case had been associated with alveolar defect, adequate healing of the alveolar defects is vital for the osseointegration of the immediately placed implant and for its functional stability.

Therefore we strictly maintained a protocol that completely removes the contaminated tissue and allows successful bone regeneration of the previously infected alveolus. As our main aim is to achieve osseointegration of Implants and as there were high chances in our case for soft tissue ingrowth in between implant surface and bone because of presence of alveolar defect, we have filled the defect with allograft and covered the grafted site using barrier technique.[24,25] These materials will prevent connective ingrowth between implant and bony wall that might interfere with osseointegration of implant.[26] We have used allogenic bone graft material (Hydroxyapatite) and a collagen membrane to stabilize the graft and achieve osseointegration.

Conclusion

Immediate implant along with bone grafting has been discussed as treatment protocol. In this case report, prosthetic goals achieved were satisfactory along with implant-bone integration, good soft tissue healing and esthetically acceptable

prosthetic rehabilitation under a controlled procedure and by following a strict protocol. On the basis of this study it can be argued that implants can be successfully introduced into the debrided dentoalveolar socket immediately after extraction.

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