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Immediate Non-Functional Loading of Dental Implant in Maxillary Esthetic Zone - Case Report

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Abstract: ***Earliest possible restoration to achieve proper form and/or function is a hallmark of all dental specialties. This principle underlies the foundation of immediate functional and non-functional loading of dental implants. Nonfunctional immediate loading refers to implant prostheses placed within 2 weeks of implant placement with no direct functional occlusal loading. This article describes case reportof implant placement with two different techniques to fabricate an immediate non-functional provisional restoration in aesthetic zone.***

Keywords: Dental implants, non-functional loading, provisionalisation

1. Introduction

Branemark's scientific foundation in the field of implantology revolutionised the practice of dentistry.Presently, it is opted asthe most preferable and reliable method for functional and esthetic rehabilitation. Formation of a direct bone to implant contact without soft tissue interface is a consistent treatment goal in implant dentistry[1]. Traditional protocol for predictableosseo integration process demanded a stress-free healing period of 3-6 months[2]. Adherence to Branemark protocol, which leads to prolonged interval between initial surgical appointment and prosthesis fabrication, remainone of the maindrawbacks especially when replacing tooth in the esthetic zone.

Modernizationhas forced clinician to deliver esthetics along with expidated functional rehabilitation. Loss of maxillary anterior teethhas major detrimental social implications compromising the patients' quality of life.This emphasized the concept of immediate implant loading in the treatment of missing tooth in esthetic zone, particularly the maxillary arch, where, the patient concern and demandare of paramount importance. Since then, extensive literature has been gathered making immediate implant loading a viable treatment approach in selected cases[3],[4].

As immediate functional loading could be associated with increased rate of implant failure, an alternative approachhas been designed in order to reduce the early risks of mechanical overload caused by functional or parafunctional forces[4]. This technique, also called the immediate nonfunctional loading (INFL) or immediate non-occlusal loading, consists of alteration in the immediate temporary restoration to avoid occlusal contacts in centric and lateral excursions[5].The possible preservation of tissue architecture surrounding the crown also emphasizes the concept[6],[7]. This article describes two different techniques of implant placement and immediate provisionalization with non-functional loading in esthetic zone using two case reports.

2. Case Report

2.1 Case-1

A 25 year old male patient reported to the Department ofProsthodontics for replacement of missing anterior tooth [Fig.1 (a) and (b)]. On examination, patient had missing right central incisor which was treated with a removable partial denture. History revealed that the tooth was lost in a road traffic accident 3 years back. Medical history was insignificant .Clinical and radiographic examination revealed local and systemic factors conducive to implant placement. Treatment options were explained to the patient after assessing clinical and radiographic data. Patient concern for esthetics and desire for a durable and fixed restoration for the missing teeth, endorsed implant supported rehabilitation.Implant placement followed by immediate provisionalisation and non -functional loading was planned.Averbal and written informed consent was obtained from the patient.

From bone mapping and radiographic findings, a 3.75 x 13mm implant was selected for placement in right maxillary central incisor region.Prior to implant surgery, preliminary impressions were obtained using irreversible hydrocolloid impression material. Diagnostic casts of both arches were fabricated in type III dental stone and mounted in maximal intercuspal position on a semi-adjustable articulator. A diagnostic wax-up was made for missing tooth.Putty index was then fabricated from the diagnostic wax up, which is used to facilitate chairside fabrication ofprovisional restoration.

Figure 1: Pre-OP (a)Facial and (b) Occlusal

During the surgical appointment, local anesthesia with 2% lidocaine (1:100,000 epinephrine) was administered. Papilla preserving incisions were given to expose the flap. After raising the flap, osteotomy procedure was done by sequential drilling. Parallel or depth guiding pin was used to verify the angulation of initial drill. A 3.75 x 13 mm implant was placed using 20 rpm at 40 Ncm, such that the shoulder ofimplant was at a depth 2mm apical to buccal and cervical aspect of prospective clinical crown supporting surrounding soft tissue and develop adequate emergence profile [Fig 2].

Figure 2: Osteotomy using sequential drilling

Following implant placement, an autoclaved open tray impression coping was tightened to implant. Open tray impression was made and cast poured using Type III dental stone [Fig 3]. Temporary plastic abutment was screwed on to implant analogue on cast [Fig.4]. Temporary plastic abutment was customized. Provisional restoration was fabricated from pre-selected shade of bis-acryl material. Putty index obtained from the diagnostic wax up was used for this purpose.

Figure 3: Open tray impression coping and impression made with addition silicone

Figure 4: Master cast with temporary plastic abutment attached to implant analog

Figure 5: Provisional restoration after 2 weeks of healing period

Provisional restoration was hollowed out by preparing an access hole palatally. Finished and polished restoration was tightened onto implant by a torque driver with a 15 Ncm torque. Any additional bulge required to support the soft tissues was made with composite restorative material and polished to high gloss. The palatal access hole was closed with light cure composite material. Occlusion was relieved in centric and eccentric contacts. The flap was closed with 3-0 vicryl. Postoperatively, the patient was prescribed 625 mg of amoxicillin/clavulanate potassium thrice a day for 5 days and the nonsteroidal analgesic 100 mg, twice a day for 5 days. A 0.2 % chlorhexidine rinse was also prescribed and the patient was instructed to use it three times a day for 14 days. Patient was placed on a soft diet for 6 weeks. Sutures were removed after 10 days of healing [Fig. 5 and 6].

Figure 6: (a) Pre-treatmentand (b) Post-treatment

2.2 Case-2

A 23-year-old healthy man reported with missing maxillary left central incisor. The clinical examination revealed, a discrepancy of soft tissue contours between the two central incisors, sufficient width of keratinized tissue in the maxillary anterior area and a scalloped thin periodontium[Fig 7]. Medical history was insignificant. Clinical and radiographic examination suggested no contraindication for implant placement. Among the different treatment options presented, the patient wished to restore the missing tooth with an implant-supported restoration.

Maxillary and mandibular preliminary impressions were obtained by using irreversible hydrocolloid impression material. Diagnostic casts of both the arches were fabricated in type III dental stone and were mounted in maximal intercuspal position on a semi-adjustable articulator. A diagnostic wax up was made for the missing tooth. Putty index was then fabricated from the diagnostic wax up. A provisional restoration was then fabricated by using bis-acryl resin. Finally, the provisional restoration was hollowed out and an access hole was opened palatally.

Figure 7: Pre treatment

On the day of the surgery, local anesthesia with 2% lidocaine (1: 100,000 epinephrine) was administered and a full thickness flap was raised. The osteotomy started with a lancet drill [Fig.8(a)] and progressed with the 2.3 mm twist drill, the pilot drill, and the 3.75 × 13 mm shaping drill at 500 rpm, with the drill torque test set at 50 Ncm.

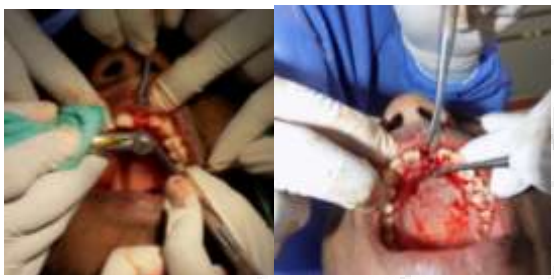

Figure 8: (a) Initial osteotomy(b)After implant placement

The osteotomy was performed under copious saline irrigation. A 3.75 × 13 internally hexed implant was placed using 20 rpm at 40 Ncm torque. The platform of the implant was placed 2 mm apically to the cement-enamel junction of the right maxillary central incisor [Fig.8(b)].

A temporary plastic cylinder was fastened with a titanium screw on the implant and marked in order to be reduced to the proper length [Fig 9]. Light cure composite resin was added into the putty index and placed intraorally over the temporary plastic cylinder for the fabrication of provisional restoration. On completion of polymerization, the provisional restoration was removed and screw aceesss hole was drilled palatally [Fig 9(b)].

Figure 9: Temporary abutment in position

More light cure composite resin material was added to support the adjacent soft tissues. It was then shaped using laboratory carbide burs and polished with abrasive rubber points and pumice. The provisional restoration was fastened on the implant with a torque driver with a 20 Ncm torque. The palatal access hole was closed with light cure composite. Occlusion was checked and any centric and eccentric contacts were eliminated. The flap was sutured in place. [Fig 10]

Postoperatively, the patient was prescribed 625 mg of amoxicillin/clavulanate potassium thrice a day for 5 days and the nonsteroidal analgesic 100 mg, twice a day for 5 days. A 0.2 % chlorhexidine rinse was also prescribed and the patient was instructed to use it three times a day for 14 days. Patient was placed on a soft diet for 6 weeks. The sutures were removed after 10 days. This provisional restoration was fabricated in order to provide better soft tissue contour and to provide a better esthetic result [Fig 11].

Figure 10: Post-treatment

Figure 11: Provisional restoration after 2 weeks of healing period

3. Discussion

Consensus statement based on literature of loading protocols suggests that three main factors influence the procedure of immediate implant loading. They include *(1)* the amount of primarybone contact, *(2)* the quantity and quality of bone at the implant site, and *(3)* the rapidity of bone formation around the implant[8]. These factors are directly or indirectly influenced by characteristics of implant surface, bone modeling factors used, and occlusal scheme designed for immediate loading of implants.

In the cases described above, implant was placed and immediate provisionalisation done with bis-acryl material. ADS (Advanced double-grip surface) treated implants(Ilerimplant-GMI Frontier model), which increases bone-to-implant contact and allow for shorter healing time, were used in both the cases. The notion behind keeping provisional restoration out of contact in centric and eccentric positions was to avoid any micro-motion of implant, creating a milieu that allows undisturbed healing [5].

As the provisional restoration is placed during initial surgical stage, crestal bone loss during the 2nd stage surgery could be avoided. Moreover, soft tissue attachment on the implant body below the micro-gap connection might heal with an improved connection. Immediate provisional restoration guides the soft tissues developing proper emergence profile and establishes proper tooth form

[9].Provisional restoration also allowed the patient to visualize and evaluate the end result, thus assisting in acceptance and guiding of modifications required for the definitive restoration[10].

4. Conclusion

Single-tooth rehabilitation patients can be predictably treated with a favorable esthetic outcome using implants and non-functional immediate provisionalisation. This case report describes two different techniques that can be employed for immediate restoration of single tooth implant in healed alveolar ridges.

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