Immediate Placement, Immediate Loading of Single Implant in Fresh Extraction Socket

Abstract
Smile is an important factor which enhances our beauty. A well-formed complete smile is the basis for facial esthetics. To bring out a beautiful smile, a full set of dentition is necessary. The replacement of missing teeth with implant-borne restorations has become the treatment of choice these days. According to recent reports, the successful implant placement in fresh extraction socket is made possible by modifying the surface of implants. The present case report highlights on the high survival rate of immediate implant loading placed successfully in fresh extraction socket which was confirmed by implant stability quotient (resonance frequency analysis) to assess implant stability noninvasively.

Keywords: Dental implant, immediate loading, implant stability quotient

Introduction
Loss of tooth in the esthetic zone is a traumatic experience with or without compromise in phonetics. Therefore, the most challenging situation bothering a clinician is the implant-supported single tooth replacement at the earliest.

Conventionally, 3–4 months of healing period is required for the maturation of extraction socket. Taking into account the prosthetic treatment, patients have to wait for >6 months for the replacement of a lost tooth.[1]

Efforts have been made to decrease the treatment period by focusing on the approaches such as early or immediate loading following implant placement,[2] immediate implant placement in fresh extraction site,[3] and immediate implant placement and early or immediate loading.[2]

Implant placement in postextraction sites in a single-session surgery shows high success rates, ranging from 92.7% to 98%, depending on the observed clinical records.[4,5] A Cochrane review shows that patients have higher satisfaction levels in case of placement techniques in postextraction implants, when compared to conventional techniques in which complete healing is expected in postextraction sites. As the alveolar bone is preserved, enhanced esthetic results can be guaranteed. Postextraction implants are biologically and functionally efficient as they also reduce treatment time.

Primary implant stability still remains an essential requisite to obtain implant success both in delayed and postextractive methodologies.[6] During the osseointegration process, primary mechanical stability is gradually replaced by biological stability. When the healing phase is completed, primary mechanical stability is totally replaced by biological stability.[7]

In this case report, the harmony of soft and hard tissue was preserved by immediate implant placement and immediate loading in the anterior maxilla in fresh extraction socket.

Case Report
A 38-year-old female patient came to our clinic with a history of trauma 4 days back in the upper front tooth region, and mobile tooth segment was splinted by composites on affected and adjacent crowns by local dentist [Figure 1]. X-ray revealed that tooth fractured at the middle third part of root [Figure 2]. The patient was conscious about her esthetics and wanted the earliest possible solution. Because of the inability of the patient to come back frequently, he asked for immediate implant fixation. Hence, immediate implant placement and loading was planned and performed successfully in the fresh extraction socket.

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various options of the implant-retained prosthesis were discussed, upon which the patient gave consent for immediate implant placement and immediate loading in fresh extraction socket.

Following administration of local anesthesia, the fracture tooth was atraumatically removed with the help of periotomes [Figures 3 and 4]. The resulting extraction socket was evaluated for osseous defects. All four walls were found intact [Figure 5]. The extraction socket was thoroughly cleaned. As there was limitation of time and resources, surgical template could not be prepared.

Certain factors which were important for the better prognosis of immediate placement and immediate loading were:

1. Atraumatic extraction: Extraction has to be done in minimal invasive manner, both at hard and soft tissue levels so as to restore the natural esthetics in very short span of time. Therefore, periotomes were skillfully used for the same.

2. Strategic implant placement is necessary to achieve adequate amount of primary stability: Insertion torque is the key factor in deciding whether or not to load immediately. The implant should be well anchored in the bone and able to withstand a torque minimum of 35 Ncm for the abutment screws securing, etc.

3. Implant selection: Tapered-screw implant with enhanced or modified grooves, an osseoconductive surface, and of sufficient length (a minimum of 10–13 mm)

4. Retrievable prosthesis: To compensate for any soft tissue recession, we might need to alter the crown at later stages, and for that, we need to place screw hole to be lingually so that the crown can be retrieved, modified, and placed back, if at all required.

Considering above-mentioned points, osteotomy was started in the fresh extraction socket. A periodontal probe was kept on the incisal edges from the lateral incisor of the same side to the central incisor of the other side. Osteotomy was started from the lingual side of the probe so as to check the angulation of drills, which will result in favorable position of the screw hole in prosthesis. For achieving good primary stability, osteotomy was done around 2.5 mm apical to the extraction socket to gain anchorage from nasal cortex. Length of the extracted root was around 11 mm [Figure 6].

Nobel Biocare active implant measuring 4.5 mm × 13 mm in dimension was placed with insertion torque of 50 Ncm [Figures 7 and 8]. Immediately after this, implant level impression was made and healing abutment was placed [Figures 9 and 10].

After 48 h, stability of implant was measured by Osstell implant stability quotient (ISQ) meter and 79 readings were obtained which state it to be highly stable [Figure 11]. Cement-retained porcelain-fused metal crown was delivered with screw hole present on the lingual side [Figures 12 and 13]. Satisfactory final outcome was achieved in short span of 2 days in a perceive manner.

The patient came back after 1 year of follow-up. Clinical examinations revealed excellent soft tissue harmony. X-ray also revealed minimal amount of bone resorption around the implant [Figures 14 and 15].

Discussion

For missing anterior teeth, immediate implant and early loading is a good treatment option because its success
rate in the maxilla is 90%–95.5% and in the mandible is 93%–99%.[8]

Indication for placement of the immediate implant is extraction due to trauma, endodontic lesion, root fracture, root resorption, root perforation, unfavorable crown-to-root ratio (not due to periodontal loss), and bony walls of alveolus are still intact.[9] Contraindications include presence of active infection, insufficient bone (<3 mm) beyond the tooth socket apex for initial implant stability, and wide and/or long gingival recession.

Implant placement site was properly evaluated and assessed before extraction. A proper plan was made which included soft tissue treatment protocol and set of well-defined esthetic goals.[10] After the treatment, the soft tissue architecture remained stable with preservation of adequate attached gingiva throughout the healing period of the implant as well as after final prosthesis delivery. It was esthetically pleasing and biologically sound results were obtained.

Unlike the conventional scenario, we do not have to follow the traditional drills and protocols in fresh extraction socket. This is easily explainable when considering the dimensional discrepancies between the implant itself and the implant bed prepared with the two different drilling protocols.[11] The results showed that implant installation with the drill only protocol resulted in increased primary stability with high ISQ values as evaluated with resonance frequency analysis and significantly increased average maximum insertion torque values compared with implant installation with the standard drilling protocol.
Under three parameters, the prospective implant site was evaluated to predict the peri-implant esthetic outcome; these are tooth position and shape, form and biotype of the periodontium, and position of osseous crest.[12]

A surgeon may wish to consider loading the newly placed implant immediately or early when any one of the following conditions exists at implant site: (a) When primary stability is obtained. (b) Site can accommodate implant with a length of at least 13 mm or minimum 3 mm of apical bone present. (c) Diameter of head of the implant closely matches the mesiodistal width of coronal aspect of the socket. (d) No need of bone augmentation procedures. (e) Once placed, the implant can be completely protected from functional and occlusal forces.[13]

The initial stability of the implant is essential for early/immediate loading. The minimum insertion screw should be equal or superior to 32 N/cm with micro-movement not exceeding 150 µm.[14] In this case report, primary stability was achieved with proper insertion torque and bone grafting was not required as the implant diameter closely matches the socket dimension.

In the present scenario, implant stability (ISQ value) was determined by the Osstell apparatus. A substantial increase or decrease in implant stability could be detected with this method that otherwise could not be clinically perceived. The factors affecting the readings are effective implant length, bone quality and quantity, implant length, diameter, and shape. Effective implant length is the length of the exposed threads and abutment height.[15]

Figure 10: Healing abutment placed on the day of surgery and after 48 h

Figure 12: Uneventful healing with excellent soft tissue architecture

Figure 14: Follow-up after 1 year

Figure 11: Implant stability quotient-Osstell

Figure 13: Screw retained crown delivered

Figure 15: X-ray at the time of delivery and at 1-year follow-up with minimal bone resorption

The gingival esthetic achieved was satisfactory. Studies have confirmed that immediate loading will produce excellent gingival esthetics. Although in this study only two patient visits were needed to achieve this result, our real goal is to show the potential to reduce time and improve patient satisfaction.

**Conclusion**

The present study achieved its early result with the immediate implants placed in the extraction socket. The minimal surgery used in this study enabled slight postoperative discomfort and uneventful healing. The complications were mild and statistically nonsignificant. Hence, this case report supports successful implant
place the desired stability by immediate loading in the fresh extraction socket.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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