



Case Report

The Socket Science of Immediate Implants - Case Report

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Received: 23/04/2013

Revised: 21/05/2013

Accepted: 28/01/2014

ABSTRACT

A waiting period of 12 months or longer to allow total socket healing used to be the accepted protocol for placing implants. This paradigm has been challenged within the last decade by reducing the time between tooth extraction and implant placement, thereby to shorten the treatment time. Recently, implants are placed at the time of extraction of the tooth, or soon after, before significant bone resorption occurs, known as immediate implants. This case report describes a case of immediate implant placed in a maxillary central incisor followed by evaluation of soft and hard tissue changes occurring during post-operative period followed by discussion of advantages and disadvantages of immediate implant.

Keywords: Immediate implant placement, atraumatic extraction, fresh extraction sockets, primary stability, osseointegration,

INTRODUCTION

The original Branemark protocol advocated placing implants into existing edentulous ridges or extracting severely diseased teeth and placing the implants 6 to 12 months later, thereby permitting bone to form in the extraction sockets. However, starting in the 1980's clinicians and researchers began to report the successful placement of titanium root form implants into bone sockets immediately after teeth were extracted.

In 1985 Anne Roth et al published results of titanium implants placed into the mandibular incisor sockets of 4 monkeys. ^[1]

Histologically, the authors demonstrated the formation of immature bone that was replaced by more mature bone in close approximation to the implants. In 1989 Woolfe presented the successful results of immediate implantation in dogs. ^[2] In 1990, Barzilay published an abstract that reported good results in monkeys. ^[3] In 1992 Lundgren et al presented the results of placing implants immediately in beagle dogs. After histomorphometric analysis, they reported 31% bone-to-implant contact after 2 months, 65% after 12 months, and 68% after 36 months. They indicated the bone to implant interface was the same

when the implant was placed immediately and when the implantation occurred 2 weeks after root extraction.

Advantages of Immediate Placement: ^[4]

When an implant is planned for an area currently occupied by a tooth that must be removed, it may be advantageous to immediately place the implant when the tooth is extracted. Immediate placement offers several advantages compared to extracting a tooth, allowing the bone to heal and then subsequently placing the implant.

The advantages are the bone that originally surrounded the tooth is more likely to be preserved. Thin bone such as the facial bone of maxillary teeth and interproximal bone can rapidly disappear after tooth extraction. Placing an implant at the time the tooth is extracted helps preserve the remaining bone and decrease the need for subsequent ridge augmentation procedures, more ideal implant positioning is possible. For single rooted teeth, the implant is positioned where the root of the tooth was located which is advantageous unless the position of the tooth prior to extraction was undesirable. When implants are centered beneath the crown, there is more favorable loading. Also, screw access holes are more likely to be centrally located, with in the peripheral crown dimensions which facilitates the fabrication process, there is a shorter time period when the patient is subjected to the challenges of being edentulous /wearing a provisional removable prosthetics, treatment time and number of surgical procedures are reduced, soft tissue contours and height are better preserved in esthetic zones and prevention of the bone loss in both vertical and horizontal directions.

Disadvantages of Immediate Placement: ^[5]

The disadvantages are the ideal modality for the treatment of marginal voids is subject to considerable controversy, the additional cost of associated grafting and use

of barrier membrane offsets the perceived advantage that the cost is lower due to a lesser number of surgeries, more extensive soft tissue manipulation is required if the submerged healing protocol for immediate implants is to be used and also the procedure may be technically more demanding.

Soft Tissue Closure after Immediate Implants: ^[5]

Four important factors are to be considered for closure over immediate implants

- (1) Position and width of attached gingiva,
- (2) Configuration and level of the gingival margin,
- (3) Buccal contour/volume of alveolar process,, and
- (4) Shape and size of the interdental papilla.

The following techniques have been reported in the literature to achieve closure over immediate implants are coronally repositioned flap, free gingival graft, subepithelial connective tissue graft, pedicle island flap, pedicle palatal flap, and membranes.

Immediate implantation has provided implant dentistry the opportunity to achieve better and faster functional results and a predictable treatment strategy with a very high-rate of success followed by reduction of treatment time, prevention of bone resorption, and preservation of alveolar ridge in terms of height and width. In order to, provide these benefits to the patient, immediate implant were placed.

CASE REPORT

A 42 years old female patient in good health, reported to the Department of Periodontics and Implantology, Dr. Syamala Reddy Dental College and Research Center, Bangalore. The patient's complaint was broken tooth in the upper front tooth region since 3 years and wanted replacement of the tooth. On probing the dental history, patient revealed that she met with an accident and her broke. No relevant medical history was

obtained. Pre-operative IOPA was taken to assess the bone levels of 11. Informed consent was obtained. The patient was scheduled for surgery and prescribed Amoxicillin 500 mg T.I.D 1 day

preoperatively. The extraction was performed under local anesthesia using periostomes with appropriate precautions to ensure that the labial plate of bone was not traumatized (Figure 1).



Fig. 1 showing atraumatic extraction of 11 using periostomes.



Fig. 2 showing extracted root stump of 11.

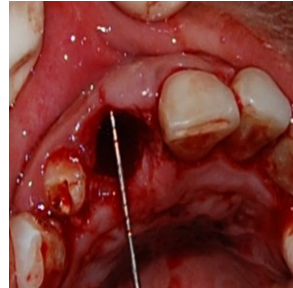


Fig. 3 showing the 6 mm width of socket.



Fig. 4 showing the 19 mm length of socket.

Figure 2 shows the extracted root stump of 11 with intact root following which the extraction socket was carefully examined for dehiscences and fenestrations and measurement of extraction socket was done which were 6 mm in width and 19 mm in height as shown (Fig 3 and Fig 4). After careful inspection of the extraction socket, the walls are thoroughly debrided.

The extraction socket was assessed using the Socket Seal classification developed by Krauser and Hahn (2004) who describes the extent to which an implant fills the extraction socket.^[6] The extraction socket was classified as Grade II where particulate grafts are to be used to fill the void between socket and implant and using Extraction Defect Sounding classification by Caplanis et al (2004), it was assessed to be EDS-1 where ideal soft tissue was predictable and gingival biotype was thick and was ready for immediate implantation into the socket.^[7]

A tapered self-thread implant of 4.3 mm diameter and 15 mm length (Uniti implants from Equinox, Holland) was placed after drilling an osteotomy along the palatal wall of the socket and the drill should be extended 3 mm beyond the apex of the socket to ensure palatal orientation of the

implant. There should not be any contact between the implant and the labial bone plate. The implant must be stable within the osteotomy with no mobility. A study done by Kohal et al have shown that the pressure of the implant on the bony walls of the alveolus can result in microfractures and early crestal bone loss.^[8] Torque resistance of 40 Newton centimeters is indicative of initial implant stability. Excessive torque should not be applied to the implant because this may strip the implant threads or exert excessive compression on the adjacent bone, potentially leading to compression necrosis and implant failure.^[9] The ideal situation would be for the implant to be in contact with the socket without putting undue pressure on the socket walls unless the alveolus is very thick, leaving no gap between the head or neck of the implant and surrounding socket walls. In other words, the radiographic appearance of an ideal immediate implant placement should look identical to a standard implant placement.

Studies have shown that close adaptation of the implant to the socket wall promotes greater osseointegration.^[10,11] When a gap exists between the socket wall and the implant fixture, a bone graft and/or membrane can be used to prevent epithelial

migration into the space and aid in healing. As there was a gap of about 2 mm between the implant crest and the labial plate as shown (Figure 5 and 6), it was decided to use Sybograft-Plus (Eucare pharmaceuticals , India) to fill the gap. Primary closure was achieved by interrupted 4/0 silk sutures and the patient was asked to continue amoxicillin 500 mg TDS for 1 week and to use chlorhexidine mouthwash for the next 3 weeks. Sutures were removed after 2 weeks.

The immediate postoperative period was uneventful and the patient returned after 4 months for the definitive implant restoration. Stage II surgery was done to uncover the implant. The implant was found to be stable to hand tightening of the healing abutment. A Platform switch was performed using a standard abutment of the 3.5 mm platform as shown (Figure 7) and the occlusal view of the abutment is also shown (Figure 8) to assess the proximity to adjacent tooth.

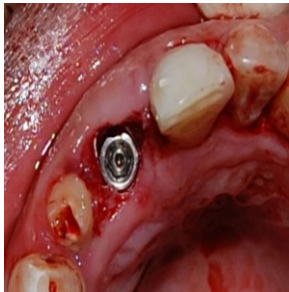


Fig. 5 showing placement of implant.

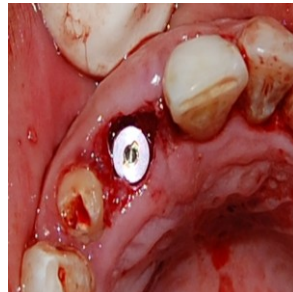


Fig. 6 showing placement of bone graft.



Fig. 7 showing the abutment.



Fig. 8 showing the occlusal view of the implant placed.

Using a closed tray impression technique, the impression was made and sent it to laboratory for making final restoration. A week later, final crown was seated and checked by taking IOPA to evaluate the exact fit between implant and abutment so as to avoid micro-gap as shown (Figure 9 and 10).

Recall appointments were made 3 months after insertion of final restoration and the necessary clinical and radiological findings were assessed at regular intervals so as to monitor the implant

DISCUSSION

There seems to be a general agreement that the immediate placement of implants into fresh extraction sockets could offer advantages over the classic protocol and should have the potential to increase the patients' acceptance of the procedure. ^[12,13]

Elimination of the waiting period for socket consolidation, fewer surgical sessions, a shorter edentulous period and total treatment time, reduced over-all costs, preservation of alveolar bone height and width for optimal functional and aesthetic results as well as reduction of heat generation during the implant placement procedure has been mentioned as possible significant advantages. ^[14]

Ever since Lazzara ^[16] reported on the surgical advantages of immediate implant placement, it has become an increasingly popular treatment modality particularly with teeth of poor prognosis in



Fig. 9 showing the final prosthesis.



Fig. 10 showing IOPA of implant to evaluate the fit between abutment and implant.

an otherwise healthy setting of the anterior maxilla. The potential benefits include maintaining the integrity of the labial plate of bone and if adequately temporized, maintaining the volume and position of the soft tissues. Hence, in the present case report, immediate implant was preferred.

In preceding case report, the concerned teeth was extracted atraumatically using periostomes so as to avoid the fracture of labial plate of alveolar bone. Clinical research support these suggestions; the immediate placement of implants into fresh extraction sockets has proven as successful as the original protocol as to implant survival.^[15-18] Furthermore, clinical radiographic and histologic data has shown no significant difference between immediate and delayed implant placement.^[16]

Frequently, when implants were placed into extraction socket, a partial incongruency between the outer surface of the implant and the bony walls of the socket is often seen. This space is known as jumping distance or critical space.^[19] There is strong evidence to suggest that bone augmentation procedures are effective in promoting bone fill and defect resolution in peri-implant defects with both surgical approaches—immediate (type 1) and early (type 2) placement.^[20] A human histologic study confirmed that spontaneous bone regeneration occurred in experimental peri-implant defects that were less than 2 mm in width, and that the newly regenerated bone became integrated with the previously exposed implant surface.^[21]

There is evidence to show that peri-implant defects with gaps of less than 2 mm following type 1 and type 2 implant placement may heal with spontaneous bone regeneration and defect resolution. However, gaps of 2 mm or more in the orofacial dimension show clearly reduced predictability for spontaneous bone regeneration.^[20]

Schwartz and Chausa^[22] discussed the protocol of immediate implants as shown below.

1. Immediate implants have a high-rate of survival, ranging from 93.9 to 100%.
2. Implants must be placed 3 to 5 mm beyond the apex to achieve maximum initial stability.
3. Implants must be placed as close to the alveolar crest as possible (0 to 3 mm).
4. The use of a membrane does not imply better results
5. There is no consensus regarding gap filling or the best grafting material.
6. The absolute need for primary closure is to be established.

CONCLUSION

It is concluded that implant placement in fresh extraction sockets is a viable treatment option and may serve to reduce overall treatment time. Predictable healing may be achieved in cases of submerged as well as transmucosal implants placed in fresh extraction sockets.

The role of bone substitutes in the healing of marginal voids seems to be controversial. While adequate osseointegration is achieved with or without guided bone regeneration, evidence does suggest that the use of bone substitutes and barrier membranes may serve to maintain the level of gingival tissues and thus improve esthetic outcomes.

REFERENCES

1. Wong K. Immediate implantation of endosseous dental implant in the posterior maxilla and anatomic advantages for this region. A case report *Int. J Oral Maxillofac Implant* 1996;11:529-33.
2. Woolfe SN, Kenney EB, Keye G, Taylor D, O'Brien M. Effect of implantation of titanium implants into fresh extraction sockets. *J. Dent*

- Res 1989 (IADR Abstract No: 762), 68, Special issue: 962.
3. Barzilay I, Graser GN, Iran pour B, Natiella J, Proskin H. Histologic and clinical assessment of implants placed into extraction sockets, J Dent Res 1990;69 (special issue):1452.
 4. Parel SM, Triplett RG. Immediate Fixture placement. A Treatment planning alternative. Int J oral maxillofac implants 1960;5:337-45.
 5. Khurram Ataullah et al. Implant placement in extraction sockets: A short review of the literature and Presentation of a series of three cases . vol. XXXIV / No. Two / 2008. Journal of Implantology.
 6. Krauser, J, Schetritt, A. - Immediate Implant Placement and the Socket Seal Classification. – Dental Economics, 2008 Dec, 98(12):34-36.
 7. Caplanis N , Lozada JL , Kan JYJ. Extraction defect assessment , classification, and management. Journal of California dental association 2005 ; 33: 83-863
 8. Kohal RJ, Hurzeler MB, Mota LF, et al: Custom-made root analogue titanium implants placed into extraction sockets. An experimental study in monkeys. Clin Oral Implants Res 1997;8:386-392.
 9. Bashutski JD, D'Silva NJ, Wang HL. Implant compression necrosis: Current understanding and case report. J Periodontol 2009 Jun;80(6):1018
 10. William becker and moshegoldstein .Immediate implant placement: treatment planning and surgical steps for successful outcome. Periodontology 2000, Vol. 47, 2008, 79–89
 11. Wilson TG, Jr, Schenk R, Buser D, et al: Implants placed in immediate extraction sites: a report of histologic and histometric analyses of human biopsies. Int J Oral Maxillofac Implants 1998;13:333-341.
 12. Lundgren D, Rylander H, Andersson M, et al: Healing-in of root analogue titanium implants placed in extraction sockets. An experimental study in the beagle dog. Clin Oral Implants Res 1992;3:136-143
 13. Barziley, I. (1993) Immediate implants; their current status. International Journal of Prosthodontics6: 169–175
 14. Arlin, M.L. (1992) Immediate placement of osseointegrated dental implants into extraction sockets. Advantages and case reports. Oral Health 82: 19–26 .
 15. Tehemar, S. (1998) Assessment of heat generation in immediate implant procedure. Journal of Oral and Maxillofacial Surgery56: suppl 4: 36.
 16. Lazarra, R.J. (1989) Immediate implant placement into extraction sites: Surgical and restorative advantages. International Journal of Periodontology and Restorative Dentistry 9: 332–342.
 17. Werbitt, M.J. & Goldberg, P.V. (1992) The immediate implant: Bone preservation and bone regeneration. International Journal of Periodontology and Restorative Dentistry12: 206–217.
 18. Knox, R., Candill, R. & Meffert, R. (1991) Histologic evaluation of dental endosseous implants placed in surgically created extraction defects. International Journal of Periodontology and Restorative Dentistry 11: 365–376.
 19. Botticelli D, Berglundh T, Buser D, Lindhe J. The Jumping distance revisited: An experimental study in

- the dog. Clin Oral Imp Res 2003;141:35-42.
20. Stephen T. Chen, Daniel Buser .Clinical and Esthetic Outcomes of Implants Placed in Postextraction Sites .Int J Oral Maxillofac Implants 2009;24(suppl):186–217
21. Paolantonio M, Dolci M, Scarano A, et al. Immediate implantation in fresh extraction sockets. A controlled clinical and his-tological study in man. Journal of Periodontology 2001;72:1560–1571
22. Schwartz-Arad D, Chaushu G. Placement of implants into fresh extraction sites: 4 to 7 years retrospective evaluation of 95 immediate implants. Journal of Periodontology 1997;68;1110-16.

How to cite this article: Kaul S, Reddy S, Kambali S et. al. The socket science of immediate implants - case report. Int J Health Sci Res. 2014;4(2):184-190.

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