

Immediate implant placement in conjunction with a DFDBA graft and resorbable membrane: A 1–10 year retrospective clinical study

R. C. Patil, S. Kanchan, K. Ramanathan

Smile Care Clinic (P) Ltd., Bandra (W), Mumbai - 400 050, India

For correspondence

Patil Ratnadeep C, Smile Care Clinic Pvt. Ltd., 13, Geetanjali, 234 S.V. Road, S. V. Road, Bandra (W), Mumbai - 400 050, India.

E-mail: smile@bom7.vsnl.net.in

Context: The use of immediate post-extraction implants presents several advantages in terms of reduction of surgical steps and time required to conclude the therapy. Particularly important is the possibility to minimize the bone loss that otherwise would occur in the physiologic healing of the alveolus. **Aim:** The purpose of this paper is to evaluate immediate implants placed with DFDBA grafts and resorbable membrane over a 10-year period based on parameters of stability, success rate, esthetics and functional integrity to evaluate predictability of this surgical technique. **Settings and Design:** Unicentric, randomized clinical study. **Methods and Materials:** From Jan 1995 to Jan 2005, 81 immediate extraction implants were placed for 68 patients. 75 Stepped screw Frialit2, Friadent, GmbH, Mannheim, Germany) implants and 7 Straight, Swiss-Plus self-tapping threaded implants (Zimmer, Centrepulse) were placed. Observation period ranged from minimum 6 months to maximum 10 years. **Statistical analysis used:** Descriptive statistics, Chi-square test and One-way Anova test were used for assessing survival rates by comparing various variables like bone quality, bone quantity, implant sizes, implant site and problems encountered during and after surgery. **Results:** The 10-year survival rate was 98.76%. Majority of the implants placed showed diameter and length equal to or more than root size. **Conclusions:** Immediate implant placement has helped solve issues with regard to bone quantity, quality and esthetics as also treatment time, as opposed to delayed implant placement. Needless to mention is the instant gratification it provides the patient.

Key words: Aesthetics, dental implants, immediate implants, osseointegration, DFDBA

INTRODUCTION

Implant Dentistry has come a long way from skepticism to being accepted as the best modality to treat complete or partial edentulism. In the last two decades a great deal of activity in the field has occurred with the development of better materials and newer techniques that have resulted in improved clinical performance of implants. The advent of immediate extraction implants and immediate loading has however proved to be an interesting point in implant dentistry.

Following extraction, a healing period of four to six months has been considered mandatory for implant placement. This time-frame was established using clinical observation of machined-surface dental implants of the first generation, caution being taken to avoid fibrous encapsulation and overloading of peri-implant necrotic bone with subsequent implant failure.^[1] This procedure however leads to some volume of crestal

bone resorption, loss of interpapillary volume and eventual compromise in esthetics - 'black triangle effect'. Also due to labial bony plate being resorbed at a faster rate than the remaining bone, a gradual diminishing of the emerging profile is noticed.^[2] New implant surfaces have been developed since, and research shows evidence of enhanced osseointegration capabilities for an increased bone-to-implant contact.^[3]

Controlled clinical studies have demonstrated an average of 4.4 mm of horizontal and 1.2 mm of vertical bone resorption 6 months after tooth extraction.^[4]

Experimental animal researches and clinical studies demonstrated that the immediate implant placement reduces alveolar resorption.^[5-7]

In short, implant size and angulation are equal to or more than the tooth. Literature reviews have proved beyond doubt that wider and/ or longer implants are desirable for better stress distribution.^[8]

In cases where implants are immediately placed into

extraction sites, there is often a void adjacent to the head of the implant due to discrepancies in size and shape between implant and extraction orifice. A number of researchers have reported on barrier membranes or grafting materials used for exclusion of epithelium so that bone could fill up the void.^[9]

The application of the proposed protocol is considered in clinical situations such as root fractures, endodontic - periodontal complications and periodontal failures. Documented success rates exceeding 95% after three to ten years of function suggest favorable long-term prognosis for immediate single tooth replacement with implant supported restoration.^[10,11]

MATERIALS AND METHODS

This was a unicentric, retrospective, randomized clinical study with the purpose of evaluating the efficacy of a surgical protocol using immediate implants for a single tooth implant replacement.

From Jan 1995 to Jan 2005, 81 immediate extraction implants were placed for 68 patients. 48 male and 20 female patients entered the RCT clinical trial. Observation period ranged from six months to ten years post loading. Data collection for patients included the following parameters - Patient details, medical history, bone quality and quantity, non loading period, post loading recall (absence of pain, discomfort, peri-implant infection, peri-implant radiolucency, mobility) esthetic results were evaluated based on Keratinised Mucosa Width (KMW) and emergence profile or the Esthetic Line (EL) of the implant crown with respect to the soft tissue and emergence profile of neighboring teeth and patient satisfaction regarding esthetics and comfort with treatment outcome (based on German school grading system wherein 1 - very good, 2 - good, 3 - satisfactory, 4- sufficient, 5 - unsatisfactory, 6 - insufficient) Patient selection was restricted to patients who showed a need and motivation for the implant procedures. Chief criteria were absence of severe systemic problems and acute local infection, no alcohol or drug dependency. Additional local criteria were good oral hygiene, stable occlusion of the existing teeth and adequate vertical dimension.

75 Stepped screw Frialit 2 (Friadent, GmbH, Mannheim, Germany) implants and 7 Straight Swiss-Plus self tapping threaded (Zimmer Centrepulse) implants were placed.

Clinical case

Figures 1 and 2 illustrate an endodontically treated upper left 1st molar with root resorption and mobility in a female patient aged 26 years. Following atraumatic extraction to preserve labial and lingual bony plates, the socket was cleaned and checked for presence of

granulation tissue. [Figure 3] The length of the extracted root was determined with the help of a scale and the available bone depth was measured. The osteotomy was deepened with at least 30% more depth and enlarged till maximum contact of bone is attained wherever possible. A stepped screw root form Frialit-2 (Friadent, GmbH, Mannheim, Germany) implant size 3.8 mm x 15 mm was placed into the immediate extraction socket. The open spaces especially at the neck of the implant fixture were filled up with DFDBA and sutures were placed to attain complete closure of the wound. [Figure 4] A fiber splint (Polydentia SA, Switzerland) was used to act as a palatal splint for the provisional fabricated from the patient's extracted tooth. [Figure 6], [Figure 7] Following a healing period of 4-6 months the second stage surgery was performed and a healing abutment kept in place for a period of 2 weeks. [Figure 8] Final impressions following soft tissue healing were taken and final metal ceramic prosthesis was cemented [Figure 9].

Statistics

Descriptive statistics, Chi-square test and One-way Anova test were used for assessing survival rates by comparing various variables like bone quality, bone quantity, implant sizes, implant site and problems encountered during and after surgery.

RESULTS

Of the 81 implants 44 were placed in the maxilla and 37 in the mandible. Age of the patients ranged between 19-69 years. One out of the 81 implants showed delayed failure five months post loading due to periimplantitis. The 10-year survival rate was 98.76%. Of the 68 patients one had history for smoking and 12 for hypertension. Bone quality (BQL) was sufficient in 41 cases, good in 13 cases and poor in 27 cases. Bone quantity (BQT) was sufficient in 77 cases, height was less than ideal in one case, width was less than ideal in one case and labial plate was fractured in 2 cases.

13 mm x 4.5 and 5.5 mm were the most preferred implant sizes (28%). Only three diameter values 3.8 mm, 4.5 mm and 5.5 mm cover 83% of cases. There was no case with diameter less than 3.3 mm. In case of length 13 mm was most frequently used (48% cases). Lengths 10 mm and 15 mm were used in equal number of cases and together covered about 43% cases. There was only one case with implant length below 10 mm.

65.3% cases showed KMW optimal (more than or equal to 2 mm) and 34.8% cases showed KMW < 2 mm. All prosthetic crowns showed optimal EL.

Patient satisfaction measured with German School Grading system showed that out of 68 patients 41 said



Figure 1: Discolored, endodontically treated 11 with root resorption



Figure 3: Implant Osteotomy preparation following atraumatic extraction of tooth

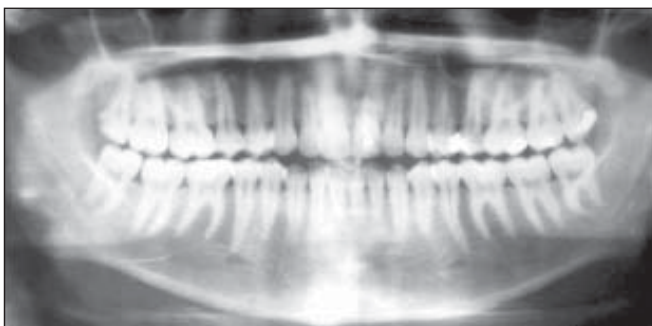


Figure 2: Pre-operative OPG



Figure 4: Placement of stepped - screw tapered root form implant

treatment outcome was very good, 20 said good, 6 said satisfactory and one said unsatisfactory.

DISCUSSION

Immediate implants placed in fresh extraction sockets are a proven and predictable treatment modality. Immediate implant placement has helped solve issues with regard to bone quantity, quality and esthetics as also treatment time, as opposed to delayed implant placement.

Its advantages are evident in that flapless technique and use of implant sizes are more than/ equal to root size, allows lesser resorption and morphological ridge contour preservation. Moreover, this surgical procedure also allows a better final rehabilitation since it facilitates accurate prosthetic fabrication while maintaining the natural tooth angle and emergence profile. Needless to mention is the instant gratification it provides the patient.

Immediate extraction implant however requires careful case selection and careful extraction of the tooth. Achieving good primary stability is the key factor in

success of immediate implants since stability is often achieved with the bone to implant contact in the apical drilled portion of the osteotomy. In the event of buccal plate fracture during extraction, grafts and GBR techniques maybe used to improve prognosis only if sufficient primary stability of the implant maybe achieved.

Studies with patient satisfaction clearly indicate that a substantial number of patients were highly satisfied with immediate implant-supported prostheses over fixed bridges and soft tissue supported prostheses. As research avenues span across newer surgical techniques and materials our constant endeavor as clinicians is to provide our patients with predictable, functionally and esthetically sound treatment.

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Figure 5: IOPA of Implant in position



Figure 8: Prepared abutment in place for final impressions



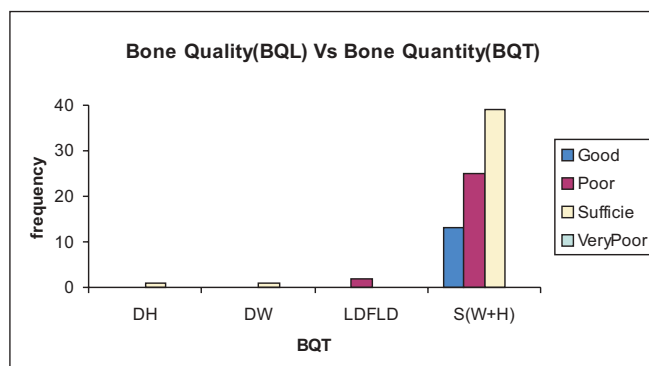
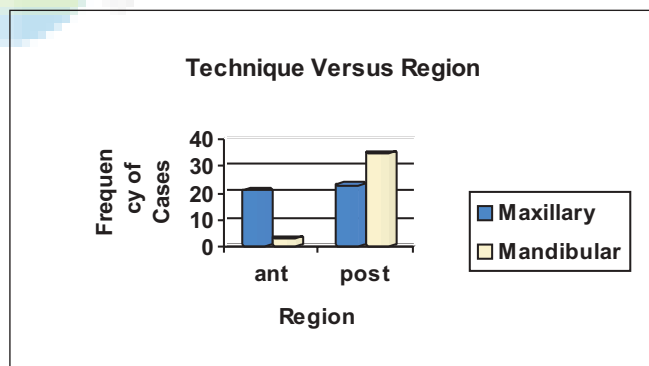
Figure 6: Fiber splint (Ribond) acting as anchor for placement of extracted crown as a provisional



Figure 9: Final ceramo-metal crown cemented in place

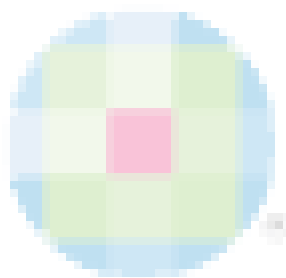


Figure 7: Provisional crown in place after bite adjustments



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Abstracts

Effect of prefabricated metal post-head design on the retention of various core materials

M. Zalkind, S. Shkury, N. Stern, I. Heling

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Retention of various post heads to core restorative materials is an important factor in the selection of prefabricated post systems and restorative materials for the restoration of endodontically treated teeth. This study examines the retention of a post-core prefabricated system in relation to core material and post-head design. A total of 60 samples were prepared using two different post systems (ParaPost Plus® (PP) and ParaPost Unity® (PU), with amalgam, composite or glass-ionomer as one of the core materials. The samples were tested using the Instron testing machine. The PP was superior to the PU prefabricated post with respect to the retention of various core materials. Retention values in descending order of magnitude were found to be: composite, amalgam and glass-ionomer (significantly lower). The rhomboid serrated design of PP was superior in retention to the rounded smooth UP system. Composite material proved to be superior in retention, closely followed by amalgam, with glass-ionomer significantly less retentive.