

Efficacy of Immediate Loading Cortical Implants in Fresh Extraction Sockets

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Abstract

Background: Cortical implants are those implants that achieve better stability and immediate loading can be done. The study aims to evaluate the efficacy of immediate loading cortical implants in fresh extraction sockets.

Methods: 20 implants were inserted in patients willing for immediate extraction and implant rehabilitation. All the implants were inserted in anterior and premolar regions; provisional restoration was given within 48 hours. The operator’s comfort of instrumentation, primary stability, postoperative pain in the implant site, postoperative inflammation, mobility of the implant, and radiolucency around the implant neck were assessed.

Results: The ease of instrumentation for the operator ranged from good to satisfactory, primary stability ranged from excellent to good and average in many cases, the patients experienced minimal pain intra-operatively and postoperatively as well. There was minimal inflammation of the mucosa around the implant after long term follow-up, mobility of few implants was present after 3 months and 6 months which became absent after 1 year of follow up, radiolucency around the implant was seen in few patients owing to the crestal bone loss which was minimal.

Conclusion: Immediate implantation with early loading provides advantages like fewer surgical procedures, less trauma, shorter treatment time, decrease in hard and soft

tissue resorption, improved aesthetics along with better function and better patient acceptance.

Keywords: Fresh extraction sockets, cortical implants, immediate loading, primary stability

Introduction

The osseointegration concept was introduced by Branemark in 1985, where a healing period of six months has been recommended between tooth extraction and implant placement. Implant placement was done by raising a full-thickness mucoperiosteal flap by assuming that the implant should remain submerged in a load-free environment during the healing period, which is 3-4 months in the mandible and 6 months in the maxilla. After the surgical exposure of the implant, the abutment connector and the restoration has been placed. ^[1]

It was shown that after extraction of natural teeth, the greatest reduction of the alveolar bone occurs in the first 6 months to 2 years. ^[2,3] For this reason, within the last decade, the 'gold standard' implant protocol has been challenged by experiments, which aimed at shortening the treatment period by reducing the number of surgical procedures. ^[4] New protocols have been developed in which implants are placed at the time of extraction of the tooth, known as immediate implants. ^[5] The general key factor to consider for the successful implant before attempting immediate loading is the implant stability. ^[6] The surgeon should consider that during the first 4-6 weeks after surgery, primary stability actually decreases due to the remodeling phase of necrotic bone, caused by surgical trauma, and hence the implant has to be firmly anchored to the bone immediately after its surgical placement. Primary stability depends on the surgical technique of implant installation and proper implant selection. ^[7,8] Cortical implants are those implants that achieve better stability and immediate loading can be done. ^[9] So, the present study aims to determine the

efficacy of immediate loading cortical implants in fresh extraction sockets.

Materials and Methods

Twenty implants were inserted in patients who visited the Department of Oral and Maxillofacial Surgery, Krishnadevaray College of Dental Sciences and Hospital, Bangalore. Patients aged between 18-70 years and those who were willing for extraction and immediate implant placement with prosthetic rehabilitation were enrolled in the study. Patients with adverse habits like smoking and alcohol consumption were excluded. Patients with immunocompromised diseases, underlying metabolic or endocrine diseases, those who have recently undergone radiation therapy, underlying bone diseases like Paget's disease, osteoporosis, and non-willing patients were also excluded from the study.

The implant system used for the study was Titanium (Ti-Al6-V4-ELI). Cortical implants are designed to have a smooth surface at their "Neck" followed by a non-threaded, Resorbable blast media (RBM) Or Sand Blast Media (SBM) treated surface. All the patients were informed about the study and consent was taken for the same. Routine hematological investigations and preoperative orthopantomographs and intraoral periapical radiographs were taken. All the patients were subjected to immediate extraction followed by immediate implantation, followed by immediate loading with provisional prosthesis within 48 hours postoperatively.

The procedure was carried out in aseptic condition under local anesthesia (2% lignocaine with 1:200000 adrenaline. A flap was raised for the extraction of the tooth and removal of the tooth without any fracture of the root or damage to the cortical plate. To avoid damaging of the buccal and lingual/ palatal plate, care has been taken to avoid the luxation of the tooth buccal-lingually after tooth removal. Irrigation of the socket with povidine

iodine was performed. The surgical guide was placed over the surgical site and a sharp precision drill was used to penetrate the basal bone of the extraction socket, the drill guided the initial preparation of the osteotomy and sequential drilling was done for the preparation of the site in the extracted tooth region to attain a minimal of 3 to 4mm of basal bone with speed ranging from 500 to 1200 rpm with copious irrigation of saline. The implant of bigger diameter was taken and then placed in the osteotomised site and fixing it to the hand wrench and the torque was measured which gives the account of primary stability. Abutment was placed at the same time and primary closure of the flap was done. Impression was taken within 48 hours using regular body putty. Provisional restoration is fabricated. Permanent restoration was given after the soft tissue healing takes place. Postoperatively antibiotics & analgesics were prescribed. Patients were kept under observation up to the follow-up period of 1 year. Evaluation of criteria was done by assessing the ease of instrumentation and assessment of pain was done by using the Visual Analogue Scale.

Statistical Analysis

The data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) for Windows 26.0 (SPSS, Inc. Chicago, Illinois). Confidence intervals were set at 95%, and a p-value \leq of 0.05 was considered as statistically significant. Chi square test was used to find the efficacy of immediate loading cortical implants in fresh extraction sockets.

Results

A total of 20 implants were inserted in different patients, which included 60% males and 40% females with age range of 20-40 years. At the time of immediate implantation, around 60% of the operators felt to have good ergonomics and 40% of them felt it was satisfactory. After 48 hours at the time of provisional restoration, 85%

felt it was satisfactory and 15% felt it was poor. (Table 1) In the assessment of peri-implantitis, the inflammation of mucositis showed statistically significant results at 3rd months, 6th months, and after 1 year.

The overall response on intra-operative and post-operative pain on the visual analogue scale was highly significant at baseline till the 2nd week. (Table 2) There was mobility in the implant at the 3rd month and 6th month, but after a 1-year follow-up, no mobility was seen which showed statistically significant results. (Table 3) Radiolucency around the implant was seen in few patients owing to the crestal bone loss which showed non-significant results at 3rd month and 6th month and also after 1-year follow-up. (Table 4)

Discussion

The more missing teeth in the patient's mouth lead to a more challenging task. The results of continued research, diagnostic tools, treatment planning, implant designs, materials, and techniques showed predictable success which is a reality for the rehabilitation of many challenging clinical situations. A dental implant (also known as an endosseous implant or fixture) is a surgical component that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, bridge, denture, facial prosthesis or to act as an orthodontic anchor.^[10] Authors offered several classifications of implant loading which includes Immediate occlusal loading refers to fully functional occlusal loading of an implant within 2 weeks of placement,^[11] Early occlusal loading refers to functional loading between 2 weeks and 3 months of implant placement, Nonfunctional immediate restoration refers to implant prosthesis placed within 2 weeks of implant placement with no direct functional occlusal loading, on-functional early restoration refers to implant prostheses delivered between 2 weeks and 3 months from implant placement and Delayed occlusal

loading refers to the restoration of an implant more than 3 months after placement.^[12]

Prior to extraction of the tooth, it was evaluated aesthetically to comprehensively assess the potential implant placement site. A proper plan was made which included soft tissue treatment protocol and a set of well-defined aesthetic goals. Under three parameters the prospective implant site was evaluated to predict the peri-implant aesthetic outcome which was, tooth position, shape, form, bio-type of the periodontium, and position of osseous crest. The surgeon may wish to consider loading the newly placed implant immediately or early when anyone of the following condition exists at implant site when primary stability is obtained for bone type I or II, where the site can accommodate implant with a length of at least 13 mm or minimum 3 mm to the apical bone, the diameter of the head of the implant closely matches to the mesiodistal with the coronal aspect of the socket when there is no requirement for bone augmentation procedure and once the implant placed it can be completely protected from function and occlusal forces.^[13]

The initial stability of the implant is essential for early/immediate loading. The minimum insertion screw has to be equal or superior to 32 N/cm. Bruxism and the lack of primary stability of the implants are contraindications for the immediate loading. In this study, good, primary stability was achieved and the need bone augmentation has not required the reason behind this was, that the implant diameter was closely matching the socket dimension.^[14,15] Authors carried out a prospective study in which 20 implants were placed immediately after tooth extraction and early provisional loading was done within 48 hours. The following parameters were checked; primary stability, pain, inflammation/mucositis, and operators comfort. All the operators felt the ease of instrumentation was good to satisfactory. Primary stability

was good to average in most of the cases. There was a significant reduction of pain post-operatively. Inflammation/mucositis around the implant after long term follow-up was minimal. Five implants showed the presence of mobility after 3 months and 6 months which were minimal after 1-year follow-up.

Five implants showed radiolucency around the neck after 6 months and 1 year, owing to initial crestal bone loss which was similar to the study done by Smeets R et al.^[16] Similar study was done by De Rouck T et al^[17] to assess the implant survival rate, hard and soft tissue response and aesthetic outcome in 1 year after immediate placement and provisionalization of single tooth implants in the premaxilla. 30 patients were treated for single implants in the aesthetic zone by means of immediate placement and provisionalization. Implant survival rate was 97%, patient's aesthetic satisfaction was 93%. This shows immediate implantation with early loading has many benefits such as only one surgical procedure, shortened treatment time, immediate restoration of function, less crestal bone resorption, less soft tissue recession, and fewer chances of peri-implantitis. In response to overall market demand by reducing the overall time of the implant procedure and immediate loading may represent a new treatment option.

Conclusion

Immediate implantation with early loading provides advantages like fewer surgical procedures, less trauma, shorter treatment time, decrease in hard and soft tissue resorption, improved aesthetics along with better function and better patient acceptance. The present study encourages further research with larger sample size and follow-up for a longer duration. However, the technical approach used in this study requires careful selection of cases; proper treatment plan, and follow-up of surgical

and prosthetic protocols which will consider as the keys to success.

References

1. Bra-nemark, Per-Ingvar; Zarb, George A.; Albrektsson, Tomas; Rosen, Harvey M. M.D., D.M.D. Tissue-Integrated Prostheses. Osseointegration in Clinical Dentistry, Plastic and Reconstructive Surgery: March 1986 - Volume 77 - Issue 3 - p 496-497.
2. Carlsson GE, Persson G. Morphologic changes of the mandible after extraction and wearing of dentures. A longitudinal, clinical, and x-ray cephalometric study covering 5 years. *Odontol Revy.* 1967; 18(1):27-54.
3. Araújo MG, Sukekava F, Wennström JL, Lindhe J. Ridge alterations following implant placement in fresh extraction sockets: an experimental study in the dog. *J Clin Periodontol.* 2005; 32(6):645-52.
4. Lazzara RJ. Immediate implant placement into extraction sites: surgical and restorative advantages. *Int J Periodontics Restorative Dent.* 1989; 9(5):332-43.
5. Adell R, Eriksson B, Lekholm U, Brånemark PI, Jemt T. Long-term follow-up study of osseointegrated implants in the treatment of totally edentulous jaws. *Int J Oral Maxillofac Implants.* 1990 Winter; 5(4):347-59.
6. Lorenzoni M, Pertl C, Zhang K, Wimmer G, Wegscheider WA. Immediate loading of single-tooth implants in the anterior maxilla. Preliminary results after one year *Clin Oral Implants Res.* 2003;14(2):180-7.
7. Botticelli D, Berglundh T, Lindhe J. Hard-tissue alterations following immediate implant placement in extraction sites. *J Clin Periodontol.* 2004; 31(10):820-8.
8. Rosenquist B, Grenthe B. Immediate placement of implants into extraction sockets: implant survival. *Int J Oral Maxillofac Implants.* 1996;11(2):205-9
9. Cooper LF, Rahman A, Moriarty J, Chaffee N, Sacco D. Immediate mandibular rehabilitation with endosseous implants: simultaneous extraction, implant placement, and loading. *Int J Oral Maxillofac Implants.* 2002; 17(4):517-25.
10. Romanos G. Basic principles and clinical applications of immediate loading. In: Romanos G, ed. *Advanced Immediate Loading.* Hanover Park, IL: Quintessence Publishing; 2012:11-27.
11. cortecci G. Immediate function of cortically anchored disk-design implants without bone augmentation in moderately to severely resorbed completely edentulous maxillae. *J Oral Implantol.* 1999; 25(2):70-9.
12. Albrektsson T, Brånemark PI, Hansson HA, Lindström J. Osseointegrated titanium implants. Requirements for ensuring a long-lasting, direct bone-to-implant anchorage in man. *Acta Orthop Scand.* 1981; 52(2):155-70.
13. Schnitman PA, Wöhrle PS, Rubenstein JE, DaSilva JD, Wang NH. Ten-year results for Brånemark implants immediately loaded with fixed prostheses at implant placement. *Int J Oral Maxillofac Implants.* 1997;12(4):495-503.
14. Rosenlicht JL. Advanced surgical techniques in implant dentistry: contemporary applications of early techniques. *J Dent Symp.* 1993; 1:16-9.
15. Randow K, Ericsson I, Nilner K, Petersson A, Glantz PO. Immediate functional loading of Brånemark dental implants. An 18-month clinical follow-up study. *Clin Oral Implants Res.* 1999; 10(1):8-15.
16. Henningsen A, Smeets R, Köppen K, Sehner S, Kornmann F, Gröbe A, Heiland M, Gerlach T.

Immediate loading of subcrestally placed dental implants in anterior and premolar sites. J Craniomaxillofac Surg. 2017; 45(11):1898-1905.

17. De Rouck T, Collys K, Cosyn J. Immediate single-tooth implants in the anterior maxilla: a 1-year case cohort study on hard and soft tissue response. J Clin Periodontol. 2008;35(7):649-57.

Legend Tables

Table 1: Ease of Instrumentation

| Ease of Instrumentation (Category) | Baseline (%) | After 2 days (%) |
|------------------------------------|--------------|------------------|
| Good | 60 | 0 |
| Satisfactory | 40 | 85 |
| Poor | 0 | 15 |

Table 2: Overall Response on intra-operative and post-operative pain

| | VAS | | | Total | χ^2 value | p-value |
|----------|-------------|------------|----------------|----------|----------------|---------|
| | No pain (0) | Mild (1-3) | Moderate (4-7) | | | |
| Baseline | 8 (40) | 10(50) | 2(10) | 20(100) | 39.91 | 0.0001* |
| 2 days | 0 (0) | 14 (70) | 6 (30) | 20(100) | | |
| 1week | 8 (40) | 12 (60) | 0 (0) | 20 (100) | | |
| 2 week | 18 (90) | 2 (10) | 0 (0) | 20(100) | | |

*Significant, VAS-Visual Analogue Scale

Table 3: Assessment of implant mobility

| | Mobility | | Total | χ^2 value | p-value |
|----------|----------|---------|-------------|----------------|---------|
| | Absent | Present | | | |
| 3 months | 16 (80) | 4 (20) | 20 (100) | 6.303 | 0.043* |
| 6 months | 17 (85) | 3 (15) | 20 (100) | | |
| 1 year | 20 (100) | 0 (0) | 20 (100) | | |

*Significant

Table 4: Assessment of radiolucency around the implant

| | Radiolucency | | Total | χ^2 value | p-value |
|----------|--------------|---------|-------------|----------------|-------------------|
| | Absent | Present | | | |
| 3 months | 19 (95) | 1 (5) | 20 (100) | 3.562 | 0.168 (NS) |
| 6 months | 15 (75) | 5 (25) | 20 (100) | | |
| 1 year | 15 (75) | 5 (25) | 20 (100) | | |

NS-Non Significant