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Survival and Success of Immediate Implant Placement Followed by Tooth Extraction a Retrospective Study

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Abstract

Background: Dental Implant originally utilized for aesthetic and functional rehabilitation, this treatment option have transformed oral rehabilitation techniques and are now regarded as the gold standard of treatment for replacing single, partial, and full-arch teeth. With improvements in osteotomy technique, implant macro- and micro-geometry, surface treatment, types of implant prosthetic connections, and other aspects, the overall treatment duration has also been greatly shortened. **Material & Methods:** This study was carried out in two implant centers and is retrospective and descriptive. It was done in the Implant Surgery Centers of Banasree Dental and German Dental, Dhaka, Bangladesh. The research was carried out from January 2010 to June 2022. 63 people made up the entire sample for this study. **Results:** Most of the patients 21(33.3%) were aged between 51-60 years where most of the patients 36(57%) were female and 27(43%) were male. Maxilla was done in 45(71.4%) patients, mandible was done in 48(76.2%). 69(74.2%) implants were done on the anterior site and 24(25.8%) was done on posterior site. All the patients had a good primary stability of implant with an insertion torque of 30 N/cm or more. There were 100% survival rate after the implants and in good functional condition. All patients were happy with their implant. **Conclusion:** This approach of osteotomy preparation's greater primary stability appears to have a minimal detrimental effect on implant success.

Keywords:- Immediate Implant Placement, Ridge Splitting Techniques, Osseointegration, Osseodensification, Survival and Success, Tooth Extraction.

INTRODUCTION

With improvements in implant macro- and micro-geometry, surface treatment, types of implant prosthetic connections, and other aspects, the overall treatment duration has also been greatly shortened.[1,2,3,4,5,6,7,8] However, in most implant investigations, bone instrumentation for the placement of dental implants has been neglected.[9,10,11] Originally utilized for full-arch mandibular rehabilitation, dental implants have transformed oral rehabilitation techniques and are now regarded as the gold standard of treatment for replacing single, partial, and full-arch teeth.[1,2,3] Under-sized osteotomies have been used to enhance initial bone to implant contact, particularly in areas of low bone density, to increase implant primary stability because the success of implant Osseointegration is closely correlated with implant primary stability.[12,13,14,15] Due to severe bone compression and ischemia, this method, however, may have an impact on secondary

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stability.[16,17] Additionally, methods for performing piezosurgery during osteotomies may enhance the initial stability of implants. Using ultrasonic instruments may stimulate the bone during site preparation and increase osseointegration even with the risk of overheating.[18,19] Through lateral bone compression, the use of bone compactors in low density bone may also improve dental implants' primary stability.[20] Additionally linked to an elevated risk of implant failure is persistent periodontal disease.[21,22,23,24,25,26] As a result, many doctors view infected areas as a contraindication to quick implantation.[27] Clinical studies have indicated that the past presence of endodontic or periodontal infections is a risk factor for implant infection and failure.[28,29] The enhanced success rates in quick and early loading protocols, which lead to higher patient satisfaction, are the therapeutic significance of our findings. The ridge splitting procedure, another treatment option, which was first described for enlargement of the bucco-lingual dimension of the alveolar ridge from Tatum.[30] The method of "ridge splitting" entails a using a longitudinal osteotomy on the remaining ridge, using a hand tool, a microsaw, or an ultrasonic device.[31,32,33] The alveolar wall undergoes controlled greenstick fracturing. Ridge has two divisions. Horizontal osteotomes, chisels for ridge, spreaders or screw spreaders might be utilized. Buccal bone growth and lateral repositioning a plate to make a bigger implant bed. Internal bony the gap between the two bone plates fills on its own analogous to how bone heals, freshly created extraction socket process.[34,35] Although, filling the area with either individual or multiple bone transplants. On the other hand, the Osseodensification approach is based on the preservation of bone bulk by compacting signatures of bone pieces while also deforming cancellous bone due to viscoelastic and plastic deformation.[36] As a result, the bone recovery to the osteotomy's center may also aid in obtaining larger insertion torques, which would then enable the use of more instantaneous loads than would otherwise be possible with standard bone instrumentation approaches.[37,38,39,40] According to a study, PDL fibroblasts actively multiply following tooth extraction, go into the coagulum, produce dense connective tissue, and then develop into osteoblasts, which create new bone during socket repair.[41] This retrospective study's objective was to assess the success and survival of 63 dental implants that were inserted using Ridge splitting techniques and Osseodensification bone instrumentation.

Objective of the Study

The objective of this study was to assess the success and survival of 63 dental implants that were inserted using Ridge splitting techniques and Osseodensification bone instrumentation.

MATERIAL AND METHODS

This study was carried out in two implant surgery centers and is retrospective and descriptive. It was done in the Implant Surgery Centers of Banasree Dental and German Dental, Dhaka, Bangladesh. The research was carried out from January 2010 to June 2022. 63 people made up the entire sample for this study.

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Inclusion Criteria

- The study comprised adult patients between the ages of 24 and 60 with good oral hygiene.
- Patients having root stumps in the area of their maxillary molar teeth.
- Possessing severely deteriorated and irreparable molar teeth.
- Undergoing unsuccessful root canal therapy.
- Having maxillary teeth with vertical fractures.

Exclusion Criteria

- Participants with a history of cancer were not included in this study.
- Patients who have ever received radiation therapy.
- Any pathology in the region of implant placement.
- Patient absent in recall follow-ups.

By looking through the clinic's implant surgery unit nominal record, the patients for this study were chosen. The clinic's course of care and treatments were accurately documented. Before the procedure, all patients received RVG image and CBCT scans to determine the type of procedure to be used based on the amount of sub sinus bone that was available, the interradicular sinus floor invagination, inferior alveolar nerve, vital structures and the height of the interradicular bone septum. The following radiographic criteria were used to identify distinct implant placement methods in patients. The center's ethical review committee authority granted the approval. The statistical program "Statistical Package for Social Sciences (SPSS) version 21" was used for the statistical analysis.

RESULTS

[Figure 1] shows the age distribution of the study patients. Most of the patients 21(33.3%) were aged between 51-60 years and followed by 11(17.5%) were aged 24-30 years, 14(22.2%) were aged 31-40 years and 17(27%) were aged 41-50 years.

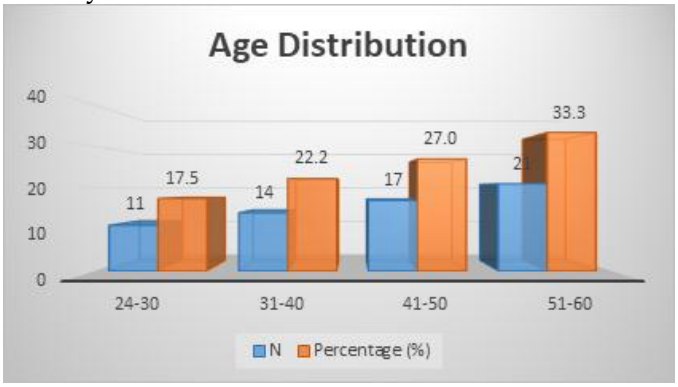

Figure 1: Age distribution of the study patients

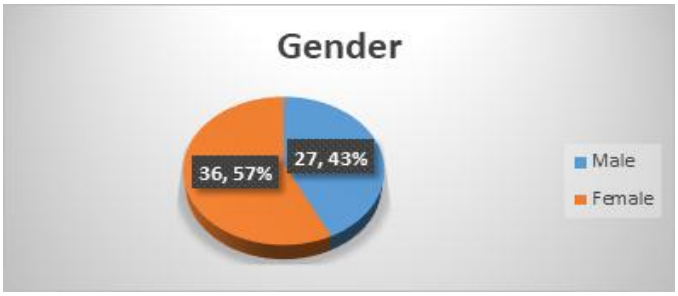

Figure 2: Gender distribution of the study patients

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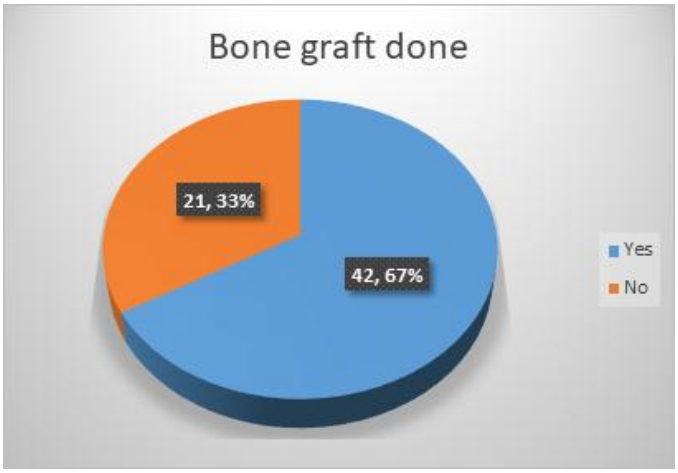

Figure 3: Bone graft done among the study patients

[Figure 2] shows the gender distribution of the study patients where most of the patients 36(57%) were female and 27(43%) were male.
[Table 1] shows the total number of implants among the study patients. Maxilla was done in 45(71.4%) patients, mandible was done in 48(76.2%). 69(74.2%) implants were done on the anterior site and 24(25.8%) was done on posterior site. All the patients had a good primary stability of implant with an insertion torque of 30 Ncm or more.
[Figure 3] shows the bone graft done among the study patients. Among the 63 patients, bone graft was done in majority of 42(67%) patients and not done in 21(33%) cases.
[Table 2] shows the duration of follow up in accordance with bone loss. In cases of 0.5mm to 1.5mm bone loss, the patients were followed up for 3 years, for 1mm to 2mm bone loss the patients were followed up for 6 years and for 1.5mm to 3mm bone loss, the patients were followed up for 9-10 years.

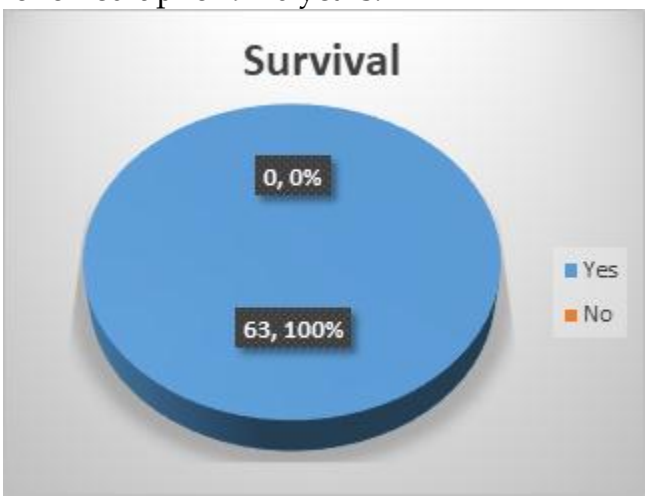

Figure 4: Survival after the implants

There were 100% survival rate after the implants and in good functional condition. All patients were happy with their implant.

Table 1: Total number of implants among the study patients

Total number of implants (93)	**N**	**Percentage (%)**
Number of implants		
Maxilla	45	48.4
Mandible	48	51.6
Site of implants		
Anterior site	69	74.2
Posterior site	24	25.8

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Table 2: Duration of follow up in accordance with bone loss.

Bone Loss	Duration of Follow up
0.5mm to 1.5mm	3 years
1mm to 2mm	6 years
1.5mm to 3mm	9-10 years

DISCUSSION

According to reports in the literature, the splitting and expansion of the alveolar bone can replace traditional augmentations by bone grafts or directed bone regeneration. Alveolar ridge splitting method, ridge (ARST), has the potential to increase the alveolar breadth ridge. This approach is used if the alveolar ridge displays adequate bone height in the vertical but insufficient horizontal when the bone has broken and expanded, a sufficiently large to enable complete anchorage of the implant in the autologous bone, a wide insertion site might be offered.[42,43,44] Comparable success rates for guided or bone-block augmentations, this method can result in bone regeneration.[45] Another benefit of ARST is that a second procedure is averted, and the length of the treatment is shortened because simultaneous implantation of implants.[46] But the recently developed idea about implants emphasized that, the osseodensification has reduced implant survival rates in people.[47,48] The success rate seen in this study (100%) was similar to a prior study's (10 implants) 100% success rate on implants placed by osseodensification, however this study's sample size was 6.3 times larger in comparison. Osseodensification has been demonstrated to increase the initial stability of dental implants,[36,37,38,39,49] despite the limited long-term proof of success. This seems to be especially important when using quick loading methods because these treatments necessitate large insertion torques. Standard drilling sequences and Osseodensification methods were compared in recent in vitro investigations in low-density polyurethane blocks, and it was also found that OD produced higher primary stability values.[50,51] It is well recognized that newly extracted sites offer less insertion torque and, as a result, less favorable primary stability for implant implantation. However, a recent study showed that rapid implant insertion in molar regions with septum expansion instrumented by osseodensification had a 93.1% implant survival rate.[52] In our investigation, regardless of implant size or location in the mouth, all implants that were implanted had an insertion torque of 30 N/cm or more than 30 N/cm. This is a very important finding because it offers more clinical proof that osseodensification boosts predictability and physician trust after rapid implant implantation. Clinician expertise, which must be comparable to Osseodensification burs, is a significant element that might affect the level of primary stability of the implants in various procedures.[53] The posterior maxilla is renowned for having the lowest bone density and the worst implant insertion torque values in the oral cavity. Due to the decreased bone density, traditional osteotomy preparation methods fail more frequently and require more cautious loading regimens. These qualities had earlier been investigated and found to have

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great success rates,[54,55,56,57] in dental implant procedures. Despite the higher primary stability of dental implants, Almutary et al.[58] (2018) showed that osseodensification may not be effective in cortical bone and may work differently from trabecular bone by reducing bone healing and delaying or inhibiting osseointegration. The Osseodensification technique may be limited by the requirement for at least 2 mm of trabecular bone in order to be used, and as a result, it may not be as effective in type I bone as it is in types III or IV.[35]

CONCLUSIONS

This approach of osteotomy preparation's greater primary stability appears to have a minimal detrimental effect on implant success. The effectiveness of the immediate implant placement is mostly dependent on the meticulous hand skills and the experienced surgeon's perception, even though expected outcomes for implant anchorage may be unknown in zero insertion torque of implants. However, in order to come to a firm conclusion regarding the effectiveness and safety of the treatment, randomized controlled clinical trials with sizable sample sizes should be conducted. A standard management procedure for implants that lack primary stability or are movable at the moment of implantation requires additional research using bigger sample sizes and various implant systems.

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