"MANAGEMENT OF ATROPHIC ANTERIOR MAXILLA USING RIDGE SPLIT TECHNIQUE, IMMEDIATE IMPLANTATION AND TEMPORIZATION"

Rakshith Hegde\(^1\), Kaiwan Khurshed Shroff\(^2\), Chethan Hegde\(^3\)

1. Professor, Department of Prosthodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore
2. Post-Graduate Student, Department of Prosthodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore
3. Professor and Head of Department, Department of Prosthodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore

ABSTRACT:
The ridge split technique is commonly used in implant dentistry when there is a deficiency in the alveolar ridge in order to avoid extensive hard tissue grafting procedures. Immediate loading of single implants in the esthetic zone is a well-documented and predictable procedure. This case report discusses the replacement of a missing lateral incisor in the maxillary esthetic zone with an implant supported prosthesis in which the alveolar ridge was split to increase the horizontal bone volume, followed by implant placement and immediate temporization.

Key Words: Immediate implantation, Ridge split, Temporization.

INTRODUCTION
One of the greatest challenges in implant dentistry is the replacement of a missing tooth in the maxillary aesthetic zone. Rehabilitation of function and aesthetics have to be taken into consideration during treatment planning. Osseointegrated implants are considered as a time tested and predictable treatment option for rehabilitation of a single missing maxillary anterior tooth. Success rate is estimated at 95% for both immediate and non-immediate loading.\(^{[1,2]}\)

Using immediate loading, an implant can be placed and loaded with a provisional tooth so that aesthetics, comfort and partial function can be restored immediately. Immediate loading depends on two primary factors. The first is the ability of the implant to osseointegrate despite external forces which act on it and second is to maintain and stabilize the soft tissue surrounding the implant fixture. The implant should be loaded within 72 hours of implant placement.\(^{[3-6]}\)

A major problem encountered while placing implants in the maxillary anterior region is the absence of adequate alveolar bone width. This can occur following tooth extraction where the thin labial plate resorbs swiftly leaving only the previous palatal plate intact.\(^{[7]}\) In such situations when the alveolar ridge width is inadequate it is often necessary to carry out guided bone regeneration procedures or autogenous block bone grafting.\(^{[8,9]}\) As
an alternative to these procedures a ridge split technique can be used.

**MATERIALS AND METHOD**

A 41-year-old male patient reported to the Department of Prosthodontics with a missing right maxillary lateral incisor. The tooth had been extracted six months prior due to mobility following which the patient had undergone periodontal therapy for the remaining teeth. The patient refused reduction of his adjoining teeth to place a fixed dental prosthesis. Patient was healthy and had no systemic conditions. An implant placement with immediate loading if possible was planned for the patient.

**TREATMENT PLANNING**

The edentulous maxillary area was examined clinically (Fig 1) following which diagnostic study models were made and used to carry out ridge mapping. An intraoral periapical radiograph was made (Fig 2) and the height of available bone present from the crest of the ridge up to the floor of the nose was measured for implant placement. It was decided to place a 3.5 x 11 mm Ankylos CX (Dentsply Implants, Germany) implant. Since the width of the ridge at the crest was relatively resorbed a ridge split technique was planned.

**SURGICAL PROCEDURE**

The entire procedure was done under local anesthesia, 2% lignocaine with adrenaline was injected in the buccal vestibule and palatal region at the edentulous site. Full thickness mucoperiosteal flap was then raised to expose the crest of the ridge, giving a midcrestal incision. The ridge was split crestally using a BP blade in a mesiodistal movement (Fig 3). Bone expansion was carried out using bone expansion osteotomes up to 8 mm. Once the ridge had been split adequately, a 2mm pilot drill was used up to the full length of 11 mm. Paralleling pin was placed to check for the correct three dimensional position of the osteotomy (Fig 4), following this a 3.2 mm twist drill was used to widen the osteotomy (Fig 5). A 3.5 x 11 mm Ankylos CX (Dentsply Implants, Germany) implant was inserted at 50 Ncm of torque. Primary stability of greater than 35 Ncm of torque was achieved. Judging the angulation of the implant a 3.0 mm regular straight abutment was selected and torqued using a hand ratchet at 15 Ncm torque as per manufacturer’s instructions (Fig 6). The flap was approximated and sutured using 4-0 Vicryl suture and an immediate postoperative radiograph was made (Fig 7).

**RESTORATIVE PROCEDURE**

A mock up of the missing tooth was done on the diagnostic cast prior to surgery and a putty index of the same was prepared. The abutment access hole was sealed using composite. The putty index was loaded with a bis-acryl temporization material and the temporary was fabricated. After initial setting of the material the crown was removed, finished and polished outside the patient’s mouth. The temporary crown was verified to be absent of any centric or eccentric contact with the opposing teeth. The crown was
cemented using a TempBond NE (Kerr Dental) and all the excess cement was removed from the surrounding soft tissue (Fig 8). Patient was given all the required post-surgical instructions and explained maintenance protocol. Suture removal was done after 7 days’ post-surgery with no immediate post-surgical complications. Patient was followed-up at 3, 6, 12-month intervals. At the 3 month follow up the temporary crown was replaced with a permanent porcelain fused to metal crown (Fig 9). No complications were observed in the 1-year follow-up period (Fig 10). One year post-surgical intra oral periapical radiograph (Fig 11) showed healthy crestal bone levels and stable soft tissue levels.

**DISCUSSION**

The use of immediate loading technique may be indicated for all cases in which the immediate application of loads to an implant is possible. However, an initial primary stability of 35 Ncm is required to load a single implant prosthesis. Therefore, it is of paramount importance for the clinician to measure the primary stability at the time of implant placement to judge if the implant can be loaded with a provisional prosthesis. Micro-movements to the implant should be limited as much as possible by keeping the prosthesis out of centric and eccentric contact and also prevent removal of the provisional prosthesis during the healing phase.[10,11] Restoration of function and esthetics is a major advantage of immediate loading. A second stage surgical procedure is also avoided and the adjoining papilla maintained.

An important factor in implant placement in the anterior maxilla is the three-dimensional position of the implant, the implant should be placed slightly palatally, so that the buccal bone wall is preserved. This prevents future gingival recession and implant exposure.

A series of instruments should be used gently to separate the ridge, thus reducing the chances of cortical plate fracture. If there is a fracture of the cortical plate it will not be catastrophic to implant placement but the implant cannot be loaded immediately.[12]

**CONCLUSION**

Within the limitations of this case it can be concluded that when the principles of immediate loading are applied correctly a predictable result can be obtained. The function and esthetics of the patient are restored instantaneously. The ridge split technique also helps prevent the need for guided bone regeneration and is more conservative in its approach. However, studies with more follow-up time and controlled clinical trials should be carried out in order to verify the long-term effectiveness of this technique.

**REFERENCES:**

1. Andersen E et al. Immediate loading of single-tooth ITI implants in the


FIGURES:

Figure 1 - Intra oral pre-operative view

Figure 2 - Preoperative intra oral periapical radiograph

Figure 3 - Deficient alveolar ridge with initial splitting of the ridge done

Figure 4 - Paralleling rod used to verify parallelism of osteotomy

Figure 5 - Final osteotomy prepared

Figure 6 - Abutment torqued
Figure 7- Immediate post-operative radiograph

Figure 8- Immediate temporization

Figure 9- Permanent cement retained prosthesis

Figure 10- One year follow-up

Figure 11- One year follow-up radiograph