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Rehabilitation of single edentulous space with bicortical implants in anterior maxilla

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Abstract
Immediate loading implants with fixed partial denture is a good option of edentulous ridge especially in restoration partially edentulous ridge. However, the cost, time, ideal ridge,bone quality and quantity became a problem in implant dentistry, but bicortical implants minimize these drawbacks and present an alternative choice especially in esthetic zone.

Keywords: bicortical implant, self-tapping screw, immediate loading implant, osseointegration

Introduction

Implantology is a field in dentistry that was introduced in the 1970s. Dental implants that were initially introduced, took the support of alveolar bone. The alveolar bone gets debilitated faster once the natural tooth or teeth are lost. When implants are placed in this region, it takes months for the bone to interlock with the dental implant.

Dental implants are a viable solution for the restoration of single-tooth gaps, with high survival and success rates. Nowadays, the placement of an implant-supported single crown allows the rapid and predictable restoration of function (mastication) and aesthetics [1].

The history of intraosseous implantology, as a whole, begins with the introduction of the Formiggini screw. Single-piece implants were subsequently derived from titanium bars.

It was in the early 21st century when implantology took a step further. The bony area under the alveolar bone is called the basal bone. This is the bone that is present throughout our skeleton and bears all the stress exerted on the body both internally and externally. Since it has a dense structure consisting of two cortical plates the region is tagged as bicortical. Dental implants along with the tooth structure were then aimed at being placed in the basal bone. The resulting implant was much sturdier. Further advancements in material technology gave rise to two types of basal implants: Basal Osseo Integrated (BOI) or Lateral Basal Implants and Basal Compression Screw (BCS).

The intrinsic function of the emerging stump was immediate loading. The great stability of the implant in the bone thus demanded was eventually achieved by means of the self-tapping screw and bicortical support [3].

These implants are that they have a polished surface that does not allow the bacteria and debris to attach to. This reduces the chances of inflammation around the implant (peri-implantitis). Moreover, these implants are a single entity unlike conventional implants that have separate components that mimic the tooth's crown (abutment) and root (implant). The thinner bodies of these implants and the wider screws allow faster formation of blood vessels around the tooth. Finally, these implants have a flexible neck which allows them to be moved 15 to 25 degrees in the desired direction.

The placement and fixation of these implants in the bicortical area in both vertical and horizontal directions ensure their stability. Bicortical implantology is advantageous as it can be carried out even in medically compromised patients like diabetics and chronic smokers. The biggest challenge after placing implants in the bicortical area is the distribution of masticatory forces. Bicortical implants are a cost-effective and quality choice for replacing lost teeth. Apart from the fact that they can be placed in both the extraction and healed sockets, they are highly resistant to bone resorption unlike the alveolar bone. The number of instruments needed in the surgical process is minimal while opting for basal implants.

Case Report

A 27 year old female patient reported to the department of prosthodontics in government dental college Trivandrum with a chief complaint of grossly damaged right upper front teeth and wants a permanent replacements. (fig-1, 2)

Preoperative evaluation revealed root canal treated broken tooth structure in relation to 13. (fig-3)

Preoperative radiographs showed sound bone and adequate space for placement of a bicortical implant in the maxillary right canine region. After thorough evaluation of the history, clinical condition, radiological evaluation, other necessary investigations, considering the patient's need for an immediate fixed restoration, it was decided to place a 3.5 mm diameter and 38 mm insertion-length bicortical screw implant in relation to 13. (FIG-4)

Procedure

Strict infection control measures were followed before and during the implant placement surgery to avoid any contamination of the placement site or the Implant

1st extraction of root stump in relation to 13 with minimal loss of bone especially facial bone.(fig-5) Then osteotomy using k wire.(fig-6) The said diameter and length implant was screwed into the osteotomic site with the help of a hand driver with moderate apical pressure to the desired height.(fig-7,8) The flap was then covered and sutured. The implant was checked for sufficient occlusal clearance and position. (fig-9) Occlusal clearance was done with airotor handpiece and with bur.(fig-10,11) A temporary crown was placed over the implant and splinted to the adjacent natural teeth on the same day. (fig-12) Temporary crown was given in slightly out of occlusion to avoid disturbance to the integrating implants. Cement was avoided as any overhanging could cause irritation while the gingiva is healing. Postsurgical instructions were given and medication was advised and the patient was recalled after one week for evaluation. Post-operative radiographic evaluation was also done. (fig-13)

Impressions were made for maxillary and mandibular arches. A metal ceramic crown was prepared in the laboratory and cemented over the implant after 6months of the surgery.(fig-14, 15, 16)

Figures

Fig 1

Fig 2

Fig 3

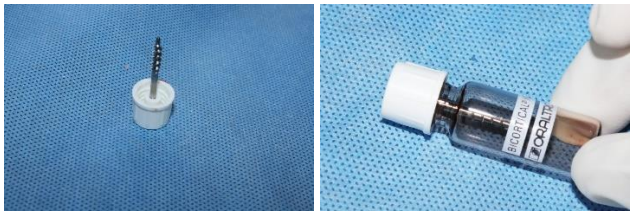

Fig 4

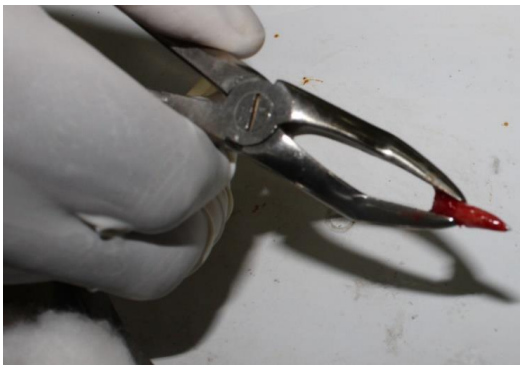

Fig 5

Fig 6

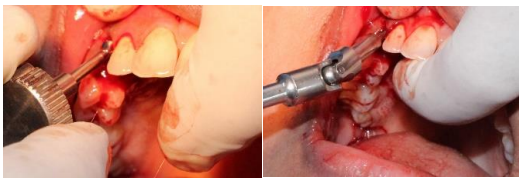

Fig 7-8

Fig 9

Fig 10, 11

Fig 12

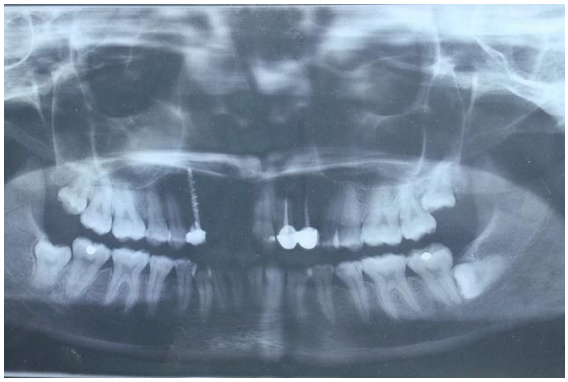

Fig 13

Fig 14, 15, 16

Discussion

Bicortical techniques showed the best biomechanical behavior compared with monocortical technique in the anterior maxillary area. Bicortical screw implants provide an excellent option for restorations in the anterior region especially in cases in which a single tooth is missing. The method consists of self-tapping conical screws inserted obliquely along the major axis of the alveolar process to draw the most benefit from the height and thickness of the bone and to reach the basal bone lamina of the maxilla or the deep cortical of the jaw; from here, the term *bicorticale* is derived. Cortical bone, in fact, withstands the loads imposed by mastication better than spongy bone. [3]
Moreover, they are cost-effective, thus enabling dentists to select the optimal implant for each individual indication. They are mainly designed for maxillary and mandibular anterior regions although there have been claims of their placement in the premolar region without complications.

Conclusion

Anterior maxillary region is the most critical region of the mouth because esthetics, phonetics, function, occlusal pattern. [4] Anterior tooth replacement usually requires ideal bone volume and position for proper implant placement. Bicortical implants are an excellent alternative to traditional two-stage implant systems which require ideal bone conditions and time for osseointegration. [5] These implants are self-tapping, good stability, economical, immediately placed, can even place in compromised ridges

Conflict of Interest

None

References

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