



PRIMARY STABILITY – A CRITICAL PARAMETER FOR THE SUCCESS OF BASAL IMPLANTS

Prosthodontics

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ABSTRACT

Basal / cortical implantology is an advanced implantology system which relies on the remaining basal/cortical portion of the jaw bones for retention and achieving adequate amount of primary stability and further prosthetic rehabilitation of the patients with atrophic ridges. For the success of this implant system, it is very critical to achieve sufficient amount of mechanical/ primary stability. The purpose of the present case report, is to put forward all those parameters which play an essential role in achievement of the primary stability like the role of operator skill, surgical technique, selection of implant and cutting tools, and role of patients bone quality and quantity. At the same time report also aims to rehabilitate a completely edentulous case with combination of BOI (Basal Osseointegrated Implants) and BCS (Basal Cortical Screws)

KEYWORDS

Basal Implant, Primary stability, Atrophic ridges, Basal Cortical screws.

INTRODUCTION

Endosseous rootform implants offer an optimal way of restoring those segments of maxilla and mandible where implants can be placed and restored without delay. This includes the cases with adequate amount of bone quantity and quality present with no need for additional ridge augmentation procedures which are associated with their own risks and complications, apart from making the treatment more expensive both in terms of time and finance.

Unfortunately, many patients do not present for implant treatment with these ideal bone conditions. Hence, in these situations where oral conditions are not ideal for rehabilitation with rootform implants, basal implants (Basal osseointegrated implants (BOI) & basal cortical screws (BCS) play a significant role as they rely upon the remaining highly mineralized bony cortices and basal cortical bone, which is highly resistant to resorption and infection, to achieve high amount of primary stability [1,2,3].

Primary stability is the absence of implant mobility once surgically placed into the bone. It plays a major role in the success of basal implantology. Primary stability if achieved optimally, these implants can be immediately loaded with a fixed prosthesis [4]. Among the various factors which affect the achievement of adequate amount of primary stability with any implant in general, includes the operator skill, the surgical technique for implant placement, patients bone quality and quantity, the selection of appropriate size & shape of implant and the selection of proper thickness & size of disk cutters and implant drills [5].

Basal implants differ from crestal implants morphologically, with respect to the surgical technique and armamentarium needed for their insertion [1]. The present case report rehabilitation of edentulous maxillary and mandibular arches using BOI and BCS implants for full mouth rehabilitation of a case with fixed prosthesis.

Case Report

A 65 year old male patient, teacher by occupation reported to the Department of Prosthodontics and Crown & Bridge with the chief complaint of loose and unstable denture causing him difficulty in chewing food and speech. Patient gave history of gradual loss of teeth due to mobility indicating Chronic generalised periodontitis as the main cause for loss of teeth. Patient's gait and stature were normal and there was no significant medical history. After clinical examination of the case various treatment options were presented to the patient including replacement with set of newly fabricated conventional complete dentures, endo-osseous rootform implants supported overdentures, Endo-osseous rootform implant retained fixed prosthesis and Basal implant supported fixed prosthesis. The patient opted for basal implant supported fixed prosthesis after weighing the pros and cons of all the treatment options explained to him in terms of time, number of surgical appointments involved, finances and comfort of fixed versus removable prosthesis.

In routine haematology investigation all the parameters were within

normal limits. Diagnostic mounting was done to evaluate inter-occlusal space, ridge parallelism and ridge relationship. The CBCT was done out to evaluate bone in terms of both quantity and quality.

After anaesthetizing the region with local anaesthesia, a full thickness flap was reflected. Lateral osteotomy sites were prepared with disk cutters for placement of single disk or double disk implants depending upon the amount of bone available (Fig 1a & 1b). Wherever bone width was inadequate but there was sufficient amount of vertical bone height available, basal cortical screws were inserted after preparation of the implant sites with flapless technique with corresponding drills (Fig 1c). HA bone graft was placed over the lateral osteotomy sites and flap closer was performed with interrupted sutures. All the implants in a single arch were splinted together with 2 mm titanium wire using intraoral welding unit to further enhance the primary stability (Fig 1d & 1e). The implants were loaded immediately with fixed provisional prosthesis within 48-72 hours of implant placement (Fig 2). Follow up of the case was done after 04 weeks, 03 months, 06 months, 01 year, 02 years, 03 years and 04 years. Patient is comfortable and satisfied with the prosthesis and is functionally doing well.

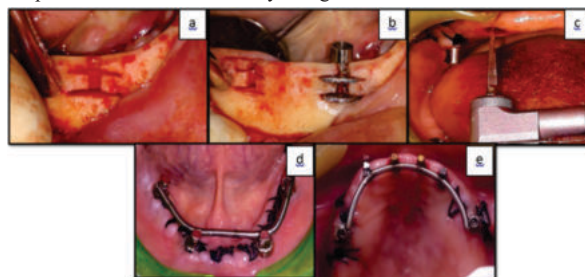


Fig 1 a, b – Osteotomy preparation for Basal Osseointegrated Implants (BOI)

Fig 1c – Osteotomy preparation for Basal Cortical Screws (BCS)

Fig 1 d,e – Implants splinted using Titanium wire & Intraoral welding unit



Fig 2 : Prosthesis insitu

DISCUSSION

Basal implantology carries various advantages over the conventional endosseous rootform implants with its low degree of invasiveness, need for very simple armamentarium, single-step surgery, ability to be restored immediately with a fixed prosthesis [6] etc. Success of this implant system mainly relies on the achievement of adequate primary stability.

During the surgical procedure we observed the following situations which can directly affect the achievement of adequate amount of primary stability.

1) Operator skill

The operator should have enough of expertise in preparation of lateral osteotomy sites for BOI and also implantation sites for BCS. One should be able to engage the three cortices with disk implants i.e. the labial/ buccal, the palatal/ lingual and crestal cortices of remaining bone. Similarly with BCS operator should be able to engage two opposite bony cortices i.e. crestal cortex and nasal floor/ basal bone. (Fig 3a & 3b)

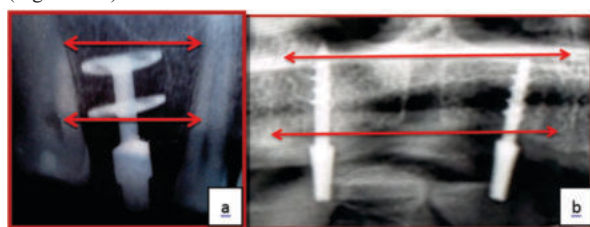


Fig 3 a,b- Radiographs depicting cortical bone engagement by BOI & BCS Implants

2) Surgical technique

For the operator to perform the surgery more efficiently, adequate accessibility and visibility of surgical site should be present. Thus there is always a need to reflect a full thickness flap of adequate dimensions. The operator should try to make the lateral osteotomy for disk implants as perpendicular to the bony cortex as possible, as later on any attempt to correct and achieve this orientation will lead to over-preparation of the site and thus loss of primary stability. The change in orientation of disk cutters can also lead to fracture of the cutters.

3) Selection of appropriate implant size

This is one of the most critical steps in the basal implantology while one is trying to achieve adequate primary stability. While selecting the implant size, three dimensionally anatomy to be evaluated using CBCT. Implant disks should be large enough to engage the opposite bony cortices. The minimum size suggested in literature for success with this implants is 9 mm². Wherever the available bone width is less, one can select a basal implant with asymmetrical. Similarly with BCS, selected implant length should be long enough to engage opposite cortices.

4) Selection of appropriate size of disk cutters and implant drills

The thickness of each disk of a lateral disk implant is 0.6 mm. The corresponding disk cutters for respective implant sizes are available in three different thicknesses that is 0.4 mm, 0.6 mm and 0.8 mm. While selecting the thickness of disk cutters one should keep in mind the density/ quality of available bone. In cases where bone density is less, one should go for under-preparation of the osteotomy site by selecting 0.4 mm thickness of disk cutter. If the adequate bone density is present then use a 0.6 mm cutter and if bone is very dense select a 0.8 mm thickness disk cutter for adequate cortical engagement and to achieve adequate primary stability. Similarly, for a BCS implants one should go for under-preparation of the osteotomy for less dense bone by using one size smaller implant drill as compare to the selected implant size for the region [2].

5) Bone quality and quantity

The amount of bone quality and quantity present is not critical for basal implants unlike endosseous rootform implants, provided there should be at least 3mm of bone height available to accommodate single disk implants which needs a minimum bone height of 2.9 mm and a 3mm of bone width at the crest of the ridge to accommodate the implant neck diameter of 1.9 to 2.3 mm. But as applicable to all dental implants, more the bone quantity and better quality of the available bone, primary stability can be easily achieved [7].

In order to further enhance the primary stability one can go ahead with the splinting of the implant abutments placed in an arch. In case the implant is loose, replace it with a larger size implant. Thus one should have enough stock of various implant sizes as compare to conventional endosseous rootform implants.

CONCLUSION

Basal implantology offers a unique opportunity for oral implantologists to rehabilitate all those cases which cannot be rehabilitated with conventional implant systems provided operator is skilled enough to work with this implant system and with the ability to achieve adequate amount primary stability. Every treatment plan should begin with a clear idea of the end result which should be able to fulfil the functional and aesthetic needs of the patient.

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