



DEMYSTIFYING BASAL IMPLANT

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ABSTRACT

The conventional crestal implants are indicated in situations where adequate vertical bone is present. The crestal implants function well in patients who provide adequate bone when treatment starts, but results are not predictable when augmentation becomes part of treatment planning. Augmentation procedures tend to increase the risks of failure and costs of therapy as well as the number of necessary operations. So, in case of patients with severely atrophied jaw bones with non-preferable condition to support bone augmentation, basal implant is a viable treatment option. This article discusses the different aspects of basal implant including its indication, contraindication, advantage, disadvantage etc.

KEYWORDS : Augmentation, Basal Implant, Crestal Implant.**Introduction:**

Implant supported prostheses have opened new window for rehabilitation of many prosthodontics challenges. It has been many decades that crestal endosseous implant is providing an excellent aid for rehabilitation of both partially and completely edentulous arches. Crestal implants are installed into the alveolar bone to support the superstructure. In these implants success depends on both quality and quantity of available bone. Hence, in clinical situation with severe resorption of alveolar bone crestal endosseous implants cannot fulfill the intended criteria required for successful osseointegration.

Basal implant is a modern implantology system which utilizes the basal cortical portion of the jaw bones to gain primary stability. Basal bone is basically cortical in nature with higher strength and lower remodeling rate compared to alveolar bone which is mainly cancellous in nature. Basal bone remains free of infection with less resorption rate which can provide excellent retention of the dental implants. Because of these advantages basal implants are uniquely designed to be accommodated in the basal cortical bone areas. The concept of basal implant is primarily based on the principles of orthopedic surgery because of which the basal implants are also called as "orthopedic implant" which make them distinct from "conventional dental implant"¹. These basal implants are also called as lateral implants or disk implants² because of their design and mode of placement into the basal bone.

History:

First single-piece basal implant was developed and used by Dr. Jean-Marc Julliet in 1972. This system did not use any homologous cutting tools hence its use is fairly demanding. In the mid-1980s French dentist, Dr. Gerard Scortecchi, invented an improved basal implant system with matching cutting tools. Together with a group of dental surgeons, he developed Disk-implants. Since the mid-1990s, a group of dentists in Germany have developed new implant types and more appropriate tools, based on the Disk-implant systems. These efforts then gave rise to the development of the modern BOI³ (Basal Osseointegrated Implant or lateral basal implants)(Fig-1). Soon Dr. Stefan Ihde introduced bending areas in the vertical implant shaft⁴. In 2005 the lateral basal implants were modified to screwable designs (BCS)⁵(Fig: 2).

Types of basal implants⁴:

The two types BOI (Basal Osseo Integrated) and BCS (Basal Cortical Screw) basal implants are specifically designed to utilize strong

cortical bone of the jaw. Screwable basal implants (BCS) have been developed with up to 12 mm thread diameter can be inserted into immediate extraction socket. BOI /lateral basal implants -Lateral basal implants are placed from the lateral aspect of the jaw bone. Masticatory load transmission is confined to the horizontal implant segments and, essentially, to the cortical bone structures.

Anterior implants -If sufficient vertical space is available, the implants used are usually the ones with two disks. The basal disk has a diameter of 9 or 10 mm, whereas the crestal disk is 7 mm in diameter. The crestal and basal plate (disc) of multi-disc implants used for basal osseointegrated implants has different functions. The main purpose of the crestal plate is to provide additional stabilization of the implant. The crestal plate loses its importance once the basal plate has ossified to full load bearing capacity. If the insertion of double disks fails due to the lack of available bone, a single BOI with a 7- to 9- mm diameter and shafts between 8 and 13.5 mm can be used instead.

Posterior implants -The implants used here are usually of a square shape, having a disk of 9 to 12 mm or 10 to 14 mm with shafts of 10 to 13.5 mm in length, depending on the desired vertical dimension and the available horizontal bone. If the vertical bone available above the mandibular nerve is, 2 mm, infra-nerve implant insertion is done where the disk is introduced below the mandibular nerve and the threaded carrier is located at the side of the nerve.

Fig 1: A typical basal implant for lateral insertion (BOI brand) with a stable base plate, reduced vertical implant portions, two integrated bending areas, reduced and polished mucosal penetration diameter



BCS /screw basal implant- These screwable basal implants are flapless implants and are inserted through gum, without giving a single cut, inserted like a conventional implant. Bicortical screws (BCS) are also considered basal implants, because they transmit masticatory loads deep into the bone, usually into the opposite cortical bone, while full osseointegration along the axis of the implant is not a prerequisite.

Fig 2 : Basal compression screw with large and polished thread for cortical engagement.



Several basal implant systems with different platforms are available now a days-

- Internal systems that can be secured against rotation and that have an internal screw connection (Fig:-3).
- External systems that do not have a rotation-protected external thread (Fig-4).

Fig-3: Internal BOI implants. Left- An ITI-compatible Diskos implant. Right- A French Diskimplant with an external hex.



Fig 4: External basal implant for cortical engagement in vertical and horizontal bone morphology.



Parts of basal implants⁶: The basal implants are single piece implants in which the implant and the abutment are fused into one single piece. This minimizes failure of implants due to interface complication, the connections which exists in conventional two and three piece implants.

- Implant Surface: Polished surface-- Stops bacteria and plaque from adhering to the implant neck or body.
- Implant body: Thin implant body combined with wide thread turns --Enhance increased vascularity around the implant and increased mechanical bone implant contact.
- Implant neck: Depending on the length of the implant the abutment can be bent from 15 – 25 degrees, provided the implant is placed in dense corticated bone.

Surgical procedure⁵: Before insertion the oral mucosa is laterally elevated under local anesthesia. Lateral basal implants are placed from the lateral aspect of the jaw bone. A vertical and a horizontal precision slot are cut into the jawbone to allow placement of the implant. BOI implants are inserted horizontally & transosseously, i.e. their base plate (disc) is designed to touch the outer and inner cortical bone. Basal implants changed treatment options in the upper jaw. Sinus lift procedures have become avoidable because all patients have sufficient horizontal bone naturally, even if vertical bone is missing. Screw able basal implants are flapless implants and are placed through gum, without giving a single cut. Indications and contraindications⁷

Indications-

- Situations when several teeth are missing or periodontally compromised which have to be extracted in future.
- Condition where bone augmentation is not possible or history

of unsuccessful bone augmentation.

- In cases with severely atrophied jaw and in cases of very thin ridges.

Contraindications-

- Medical condition which precludes invasive surgical procedure as well as adversely affect bone healing.
- Severe skeletal deformities of maxilla and mandible which don't permit proper occlusal relation.

School of thoughts related to basal implants⁴:

1. The French school of Scortecchi and others favours restoring severely atrophid mandibular ridges by using a large number of basal osseointegrated implants(BOI), usually 7 to 10 implants, both in maxilla and in mandible. The implant systems thus established are immobile and do not allow jaw regions to change their relative orientation.
2. In German-speaking countries there is a tendency to favor restoring the edentulous mandible by using only a few BOIs, usually inserting four implants in regions 47,43,33 and 37, even when providing fixed dentures. This type of implant system is referred to as flexible because it permits mandibular shifts and flexion below the fixed superstructure, despite the fact that the load transmitting segments of basal implant osseointegrate. The long threaded pins between the load transmitting osseointegrated disks and bridge serve as flexible interfaces.

Advantages and disadvantages⁶:

Advantages of basal implants-

- Immediate Loading – prosthesis is fixed within 72 hours of implant surgery saving time and costs considerably. The need for interim dentures / provisionals is totally eliminated.
- One piece implantology – Basal implants are one piece implants that minimizes the failure of implants due to interface problems between the connections that exist in conventional two and three piece implants
- Basal cortical bone support – These implants require support from the basal bone which is a lot more resistant to resorption, unlike the conventional implants that mostly take support from the crestal bone. Basal cortical bone has a much faster and stable repairing capacity
- Better distribution of masticatory forces – The basal implants are imbedded in high quality basal bone. Hence, the masticatory forces get distributed to the cortical bone areas that are highly resistant to resorption and have a very high repairing capacity. Works well in compromised bone situations – Bone augmentation / grafting, sinus lifting and nerve transpositioning procedures can be avoided. These implants particularly take advantage of the bone available to avoid bone augmentation procedures. Whereas for conventional implants, the available bone has to be modified by augmentation procedures to suit the implants.
- Medically compromised situations – Basal implants work well in controlled diabetics, in smokers and patients suffering from chronic periodontitis
- Peri-implantitis incidence – The monobloc smooth surface basal implants are used to eliminate the threat of peri-implantitis by around 98%.

Disadvantages of the Basal implants⁷-

- The technique poses substantial surgical challenges and subsequently prosthetic phases.
- Functional overload osteolysis⁸ can occur due to excessive masticatory forces exerted in bone. This condition is reversible when excessive occlusal forces are relieved through occlusal adjustment.

Conclusion:

Basal implants are the excellent means of oral rehabilitation in deficient bone conditions. Bi-cortical engagement of basal implants provides excellent stability as well as it permits an infection resistant environment for the implant. However, a thorough understanding

of the maxillofacial anatomy is recommended as this modality requires a proper surgical set up. Also with respect to the accepted principle "primum nihil nocere", *i.e.*, limiting treatment, basal implants are the devices of first choice, whenever (unpredictable) augmentations are part of an alternative treatment plan⁹. The technique of *basal* implantology solves all problems connected with conventional (crestal) implantology fulfilling patients' expectations.

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