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Review Article

Single piece basal implants

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***ABSTRACT*:**
Basal implantology is a modern implantology system which utilizes the basal cortical portion of the jaw bones for retention of the dental implants which are uniquely designed to be accommodated in the basal cortical bone areas. The basal bone provides excellent quality cortical bone for retention of these unique and highly advanced implants. Hence; the present review was planned for overviewing single piece basal implants.
Key words: Basal implant, Bone, Jaw

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INTRODUCTION

The most common cause of teeth loss is periodontitis, and other causes include dental caries, trauma, developmental defects, and genetic disorders. The use of dental implants to rehabilitate the loss of teeth has increased in the last 30 years. Before dental implants, dentures and bridges were used, but dental implants have become a very popular solution due to the high success rate and predictability of the procedure, as well as its relatively few complications. Dental implantation is a surgical process of the jaw bone to support a crown, bridge, denture, and facial prosthesis. The basis of modern dental implantations is called osseointegration, it is the direct structural and functional connection between living bone and the surface of a load-bearing implant. Osteointegrated implants have been used to treat various condition ranging from edentulism to head and neck reconstruction. Dental implants are used to facilitate retention of auricular mandibular, maxillary, nasal, and orbital implants, and for bone-anchored hearing aids. The implant fixture is first placed so as to osseointegrate, and then a dental prosthesis is added.[1,2]

Since the use of dental implants has a long history, there are many factors that have been recognized as critical for the successful performance of the implants. One of the most important factors is biocompatibility; which not only involves compatibility of the material with the tissue but its ability to perform a specific function. Therefore, this property is not dependent just on the physical, chemical and mechanical properties of the material, but also by the application in which the material is used. In the case of dental implants, the biocompatibility of materials is evaluated by studying the direct interactions between the implant and the tissues, which is a measurement of the degree of osseointegration.[2-4]

Basal implantology is also known as bicortical implantology or just cortical implantology. It is a modern implantology system which utilizes the basal cortical portion of the jaw bones for retention of the dental implants which are uniquely designed to be accommodated in the basal cortical bone areas. The basal bone provides excellent quality cortical bone for retention of these unique and highly advanced implants. Because basal implantology includes the application of the rules of orthopedic surgery, the basal implants are also called as “orthopedic implant” to mark a clear distinction between them and the well-known term “dental implant.” These basal implants are also called as lateral implants or disk implants.[5-7]

HISTORY OF THE BASAL IMPLANTS

First single-piece implant was developed and used by Dr. Jean-Marc Julliet in 1972. Because no homologous cutting tools are produced for this implant, its use is fairly demanding. In the mid-1980s, French dentist, Dr. Gerard Scortecci, invented an improved basal implant system completed 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 basal osseointegrated implant or lateral basal implants.[8]

DEFINITION OF CORTICOBASAL IMPLANTS

Corticobasal implants are implants which are osseo-fixated in cortical bone areas with the intention to use them in an immediate loading protocol. The "Consensus on Basal Implants" (2018) of the International Implant Foundation applies to such corticobasal implants.[9]

CONCEPT OF THE TECHNOLOGY OF THE STRATEGIC IMPLANT®

From technical point of view, the concept of treatment associated with the Strategic Implant® (corticobasal implantology) is identical to the concept of treatments performed during osteosynthesis, maxillofacial traumatology, and orthopedic surgery. In contrast to conventional dental implants which are inserted in order to "osseo-integrate", corticobasal implants are osseofixated in cortical bone by the surgeon; their success does not depend on "osseointegration." However, "oseointegration" may and will occur over time along with all endosseous implant parts.[9]

Therefore, we cannot expect that the rules, indications and contraindications of conventional dental implantology are applicable to the treatment with corticobasal implants. It is more logical to adapt the rules of traumatology and orthopaedic surgery to the field of corticobasal dental implantology. Once this is done, new and very clear and logical rules and guidelines become evident, and should be applied with these types of implants.[9]

Review of literature

Matarasso, *et al*. studied the dimensional ridge alterations following immediate implant placement in molar extraction sites. Twelve subjects received 12 immediate transmucosal implants in molar extraction sites. Peri-implant defects were treated according to the principles of GBR by means of a de-proteinized bone substitute and a bio-resorbable collagen membrane. Changes in vertical and horizontal distances of alveolar bony walls to the bottom of the defects and to the implant surfaces were compared between implant placement and surgical re-entry at 6 months. The implant survival rate at 6 months was 100%. Statistically significant differences were observed in the mean changes in vertical distances between baseline and re-entry. At re-entry, all peri-implant marginal defects assessed from the internal socket wall to the implant surface were healed. The authors concluded that the marginal defects around immediate implants placed in molar extraction sites were completely filled after 6 months of healing through *de novo* bone formation.[10]

Garg R et al compared implant survival in atrophic jaws for full mouth rehabilitation between endo-osseous IL versus endo-osseous delayed loading (DL) versus basal IL during 3-year follow-up. Fifty-two (34 endo-osseous and 18 basal) implants were placed in 4 patients requiring full mouth rehabilitation in atrophic jaws. Case 1: Endo-osseous DL implants in upper and lower arch, Case 2: Endo-osseous IL implants in upper and lower arch, Case 3: Basal IL implant in upper and lower arch, and Case 4: Endo-osseous DL in upper arch and basal IL implant in the lower arch. Intraoperative evaluation was done on the basis of pain (visual analog scale [VAS]), operative time, and initial primary implant stability. Postoperative evaluation was done on pain (VAS), infection, radiographically successful implant (orthopantomogram), and patient satisfaction (Grade 0–10). All cases showed satisfactory results but more amount of intra- and post-operative pain was felt with immediate basal implants. They believed that clinicians should comply with patient requests, and for this reason, we agree with some authors to use minimally invasive techniques and to avoid when possible esthetic or functional problems associated with the use of removable prosthesis after teeth extractions.[11]

Ghalaut P et al presented case report of full mouth rehabilitation in a severally periodontally compromised patient in which 18 single piece basal implants were inserted and functionally loaded with both maxillary and mandibular cement retained fixed partial denture. Basal implants were loaded immediately, and excellent results were obtained. Bone loss was measured and values were recorded immediately after implant placement and after 6 months. Basal implants are used to support single and multiple unit restorations in the upper and lower jaws. They can be placed in the extraction sockets and also in the healed bone. Their structural characteristics allow placement in the bone that is deficient in height and width. Basal implants are the devices of the first choice, whenever (unpredictable) augmentations are part of an alternative treatment plan. The technique of basal implantology solves all problems connected with conventional (crestal) implantology.[12]

Mariusz Duda et al compared time-dependent outcome of immediately loaded 1-piece (1P) implants with delayed loaded 1P and 2-piece (2P) implants. A cohort of 33 patients divided into 3 groups: group A, 13 patients, 49 immediately placed and loaded 1P implants; group B, 11 patients, immediately placed

and delayed loaded 1P implants; and group C, 10 patients, 39 2P implants delayed placed and loaded in a two-stage procedure. Marginal bone loss (MBL) was analyzed using x-ray radiography every 6 months, 1 year, and 3 years. A statistically significant mean MBL was observed between baseline, 6 months, 1 year, and 3 years in all groups. There was no statistical significant difference in MBL between immediate and delayed loaded 1P implants. MBL around mandibular implants was lower compared with maxillary implants. 2P implants showed less MBL compared with 1P implants in both maxilla and mandible.[13]

Wolfgang Bömicke et al compared outcomes for immediately loaded one-piece implants (OPI), placed flapless, and conventionally loaded two-piece implants (TPI), placed after two-stage flapped surgery. Thirty-eight participants were randomised to receive either one OPI (19 participants, OPI group) or one TPI (19 participants, TPI group) inserted in the posterior mandible with a torque of at least 35 Ncm according to a parallel group design. OPI were immediately loaded with non-occluding temporary crowns. After 3 months, TPI were exposed and implants in both groups were occlusally loaded with zirconia crowns. Outcome measures were implant failure, prosthesis failure, any complication and changes of probing pocket depth (PPD), plaque index (PI), gingiva index (GI), and peri-implant marginal bone level, recorded by unblinded assessors. Three years after occlusal loading, three participants dropped out from the TPI group. Veneer chipping accounted for most prosthesis failures and complications. On average OPI and TPI lost 1.34 mm and 0.67 mm of marginal bone, respectively, the difference between groups being statistically significant (mean difference, 0.66 mm; 95% CI -0.02 to 1.34; P = 0.024) in favour of TPI implants. Both implant procedures might be viable in the short term, but statistically significantly more bone loss might be indicative of future problems with OPI.[14]

Basal Implant Types Based on Morphology[15- 17]

There are four basic types of basal implants available

1. Screw Form.
2. Disk Form.
3. Plate Form.
4. Other Forms.

Both of the types can be further categorized into:

Screw Form

A. Compression Screw Design (KOS Implant)
B. Bi-Cortical Screw Design (BCS Implant)
C. Compression Screw + Bi-Cortical Screw Design
D. (KOS Plus Implant)

Disk Form

Basal Osseointegrated Implant (BOI) / Trans-Osseous Implant (TOI) / Lateral Implant

1) According to abutment connection
i. Single Piece Implant.
ii. External Threaded Connection.
iii. Internal Threaded Connectiona) External Hexagon.

b) External Octagon.

2) According to basal plate design
i. Basal disks with angled edges.
ii. Basal disks with flat edges also called as S-Type Implant.

3) According to number of disks
i. Single Disk.
ii. Double Disk.
iii. Triple Disk.
III. Plate Form

a. BOI-BAC Implant.
b. BOI-BAC2 Implant.

IV. Other Forms
a. TPG Implant (Tuberopterygoid).
b. ZSI Implant (Zygoma Screw).

Advantage of basal implants compared over endo-osseous implants[18- 20]

- Achieving primary stability is easy in basal implant compared to endo-osseous implant as basal implant is cortical engagement implant, but only in mandible whereas in maxilla, both exhibit similar results
- Basal implant placement is less technique sensitive
- No minimal bone width or length required.

Drawback of basal implants over endo-osseous implants[18- 20]

- As basal implant is a single unit prosthesis in the entire arch, it is difficult to replace a basal implant, whereas in delayed implants, it can be done
- Basal implant placement requires more time than endo-osseous implant placement.

CONCLUSION

The basal bone provides excellent quality cortical bone for retention of these unique and highly advanced implants. Because basal implantology includes the application of the rules of orthopedic surgery, the basal implants are also called as “orthopedic implants” to mark a clear distinction between them and the well-known term “dental implants.”

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