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Cortical implants: An alternate treatment modality for atrophied ridges

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Abstract

Rehabilitation of an atrophied/resorbed edentulous jaws by placing implants is a challenging procedure. Although various bone augmentation procedure like ridge augmentation, sinus lift are in practice but it may lead to the morbidity of donor's site. Sometimes patient is not willing for such extensive surgical procedures. In such cases Cortical/basal implants is a viable treatment option. Basal implants gives support from the basal bone area which usually remains free from the infection and less prone to resorption. In this case we have done full mouth rehabilitation with twenty cortical implants and immediate loading is done within 72 hours. A lot of patients remain untreated because of several reasons. Many patients refuse Conventional implant treatment due to multiple surgical steps and long waiting period. A large number of patient refuse bone augmentation procedures due to large costs involved and still the outcome of success is uncertain. Majority of the patients will refuse treatment due to either underlying medical conditions like Diabetes etc or due to habits like Smoking etc, which prevent Bone Augmentation Procedures. Cortical Implantology can address such problems and gives a satisfactory solution to the most compromised patient group.

Keywords: Cortical implants, atrophied ridges, compressive implants, endo-osseous implants

1. Introduction

The skill to reintegrate an amputated limb or tooth by means of a bone-anchored replacement or prosthesis is a traditional treatment ^[1]. cortical implantology also known as bicortical implantology, basal implantology, statergical implant placement or keyhole surgery in modern implant system which utilize 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 ^[1]. Cortical implants are one piece implants in which the implant and the abutment are fused into one single piece. Conventional dental implants involves placement of Endo osseous implants into the jaw bones. The position of Implant is determined by position of the teeth & not the shape of the Bone. In most of such cases shape and quantity of bone is not sufficient to place a Endo osseous implants. Implant placement in severely resorbed jaws is especially challenging and difficult because of the poor quality and quantity of the future implant bed that is remaining residual bone.² In this situation bone can be modified by bone augmentation, maxillary sinus lift, inferior alveolar nerve repositioning to receive the implant ^[3, 4, 5]. Cortical Implants belongs to a class of non Osseo-integrated Implants, with introduction of the term "Osseo integration of dental implant" by Branemark, advancement in implantology from 1957 to 2019 has come a long way with changes and modification in implant type and in loading time ^[1]. The load transmitting portion of the cortical implant is placed in the Basal Cortical bone and it is always resistant to resorption and is away from Crestal cortical bone which is susceptible to resorption induced by Bacterial attack. The crestal part of the implant emerging out of the mucosa is thin and polished which prevents Bacterial Colonization. Immediate macro-mechanical anchorage in Cortical bone and Gradual Osseointegration along the entire surface of the Implant may be seen. The most important fact is the Possibility of Immediate loading without any bone augmentation procedures. Immediate loading can be achieved by two ways Multi cortical bone engagement i.e to Basal bone & Corticalisation or densification of cancellous bone i.e Compressive implants, most of these implants take support from the basal bone which are a lot more resistant to resorption, very much unlike the conventional implants

which mostly take support from the crestal bone and medullary bone. Basal cortical bone also has a much faster and stable repairing capacity.

2. Materials and Methods

2.1 Case Report

A female patient aged 34 years visited to our department with the chief complaint of loose teeth in her entire dentition and patient was very much depressed about her smile. Patient gives alleged history of periodontal surgery being done 6 months back and the condition of her teeth did not improve. She was teacher by profession it was very much necessary for her to get the treatment done. Patient was been diagnosed with chronic generalized periodontitis and unfortunately had to undergo full mouth extraction because of the poor prognosis. Patient had been explained about the different treatment modalities before undergoing full mouth extraction, and we suggested her one of the best treatment option i.e, full mouth rehabilitation with cortical implants within 72hrs. Preoperative Basic blood investigation along with the serology was done. Preoperative, Orthopantomogram is been taken along with Preoperative CBCT of maxilla and mandible. Under aseptic condition, all remaining natural teeth were removed in two sittings according to patient's convenience and then we carried out cortical implant placement procedure. On the day of surgery preoperative prophylactic antibiotics was given, first and foremost implant placement was planned in the OPG and strategically markings were made. Patient was painted and draped aseptically. Entire surgery was performed under local infiltration with lignocaine 1:80,000 adrenaline. Osteotomy drill are started with pathfinder drill to perform osteotomy in cortical bone, then followed by twist drill. Second cortical perforation is the most important step, If basal bone is not perforated, engagement of second cortical does not happen in anterior and posterior maxilla and posterior mandible. In maxilla, nasal floor and sinus floor, pterygomaxillary junction acts as a basal cortical bone. In mandible in posterior region, lingual or buccal cortical acts as a second cortical bone whereas in anterior mandible if bone is dense, there is no need to perforate any bone especially avoid lingual perforation in interforaminal region, if anterior mandible bone is hollow it is better to perforate base of mandible and engage implant. Corticalisation of cancellous bone is achieved by preparing under-osteotomy and placing an implant of diameter wider than the osteotomy site. In this case we have placed 2 compressive cortical implants in first quadrant and third quadrant posterior most 4 implants are engaged to Mylohyoid ridge. In Maxilla 3 implants to the pterygoid junction 9 implants in the anterior engaging the nasal cortex and sinus floor. Once all the implant placement is done implants are bent for abutment angulation. Post-operative OPG is taken to reassure the implant placement done according to the proposed plan. Same day impression was made, and started with the prosthetic work. Postoperatively analgesics and antibiotics were prescribed. Patient was recalled next day for the trial placement of metal bar and all the correction were made. Third day patient was called for the insertion of prosthesis. Postoperative OPG was made after the insertion of final prosthesis. Patient was been advised to use electric jet water floss device to maintain the prosthesis and oral hygiene. One of the main advantage of the Immediate Loading cortical Implants is prosthesis are fixed within 72 hrs. Initially patient was recalled once in a week for follow up till one month, then we reviewed her once in a month for 3 months and later she

was called after 6 months for follow up and OPG was made to check on implant and bone healing, then we advised her to visit us once in a year for follow up.

3. Results and Discussion

Cortical Implantology follows the concepts of Orthopedics and Traumatology, the two main principles used in fracture Treatment with Plates and Screws are multi-cortical engagement with non-parallel Screws & Immediate rigid splinting of Screws with Plate & Early functional mobilization. Similarly, in Cortical Implantology, implants are engaged in different cortical bones and are kept non-parallel. They are immediately splinted with a rigid metal based prosthesis and are immediately loaded for function. 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. These implants when placed in this bone can also be loaded with teeth immediately. This science behind them has already been proved in orthopedic implants (Hip/Knee replacements). Once the patient is fitted with the artificial joint, he/she is asked to start on his regular routine work immediately.⁶ Osseointegration is defined as direct contact between the implant surface and the bone. Point to be noted here is that this contact is physical/mechanical only as there is no chemical bonding occurring between implant material and the bone minerals. Principles of Immediate functional Loading are Multi-cortical engagement of Implants, Rigid Splinting & immediate loading of implants, Cross arch Stabilization in Full jaw cases, tilted Implants Macromechanical Retention, Equal loading of jaw segments i.e Prescribed occlusion and treating the case as whole. Advantages of the Immediate Loading cortical Implants over the endo osseous implants are, prosthesis is fixed within 72 hours of implant surgery saving time and costs considerably. In case of conventional implants associated with bone augmentation or grafting procedures, the total treatment time will be about 6 months to 1 year. The need for interim dentures or provisionals are totally eliminated, in addition to avoidance of a second surgery for implant exposure in order to fix the abutment over the implant. Being minimally invasive, they are also associated with minimum post operative edema and healing at the procedure sites are rapid and often non-eventful. Additional surgical risks and complications are eliminated. Bone integrity and perfusion are barely affected as a result, the post operative swelling is minimal in addition to facilitating a fast recovery for the patient after the implant surgery. Cortical implants Works very well even in the most unfavorable bone situations by avoiding of bone augmentation or grafting, sinus lifts and nerve trans-positioning. These implants are unique in that they can be made to utilize the available bone in the best possible manner to avoid bone augmentation procedures. Endo osseous implants, the available bone is modified by bone substitute grafts etc to suit the implants, but the basal implants are selected or adapted to suit the patient's own available bone with respect to quality and quantity. In Atrophied Mandible, implants can be placed transversely mainly the cortical implants are used here above the mandibular canal taking the horizontal bone support or bicortical implants can be placed bypassing the mandibular nerve, engaging the lower cortical border of the mandible. Thus, bone augmentation or grafting procedures and complex procedures such as inferior alveolar nerve trans-positioning are almost completely eliminated. In Atrophied Maxilla with

an unfavorable maxillary sinus situation for implants, the sinus is bypassed with the basal implants, taking support from the bone anterior and posterior to the maxillary sinus thereby eliminating the need for bone augmentation and sinus lifts, almost completely.

Pre-Operative Photographs



Fig 1A: OPG before extraction



Fig 1B: Photo showing compromised state of dentition



Fig 1C: Pre op profile photo



Fig 1D: Pre op clinical photo of post extraction

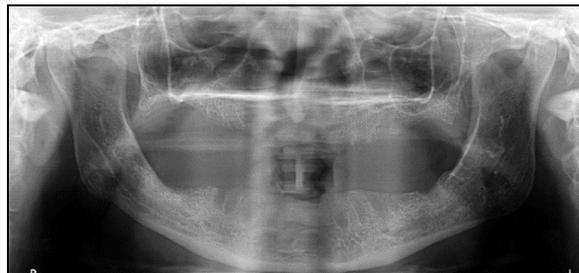


Fig 1E: Pre op OPG of post extraction

Intra Operative Photographs



Fig 2A: After implant placement



Fig 2B: Immediate post op OPG after placement of implants



Fig 2C: Final prosthesis before insertion

Post-Operative Photographs



Fig 3A: OPG after insertion of final prosthesis



Fig 3B: Immediate post op clinical profile photo

Follow Up

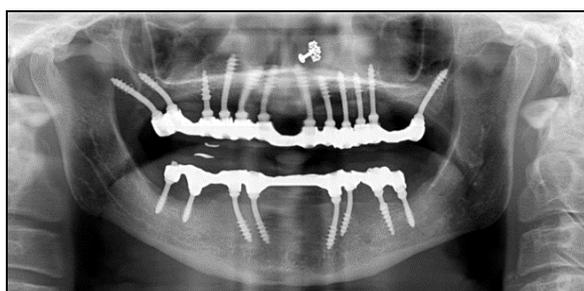


Fig 4A: OPG of 6 months follow up

4. Conclusion

I would like to conclude cortical implant surgery as it is a Fast, Safe & Painless Dental Implant procedure with unique advantages of its own. Immediate loading, Avoidance of bone grafting, Single piece implantology, Cortical bone support, Minimally invasive that is a 'key hole' impantology, Solutions for unfavorable bone situations, Extremely low failure rates, Virtually no incidence of Peri-implantitis as the implant is all smooth surfaced. The treatment of cortical implants solves all problems connected with Endo osseous implants. It is a patient oriented surgical therapy, which meets the demands of the patient bone status ideally.

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