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Zygomatic and Conventional Implants for Management of Severe Alveolar Atrophy in Partial Edentulous Maxilla and Completely Edentulous Mandible

Dr. Anshuman Dwivedi [α], Dr. Manmeet Kour [σ] & Dr. Amit Sarkar [ρ]

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I. Introduction

TO rehabilitate the atrophic maxilla is very challenging for the oral and maxillofacial surgeons. Restoration is not possible in majority of patients of atropic maxilla with conventional implants due to lack of alveolar bone caused by pneumatization of the maxillary sinus. From the past few years, these cases had been treated with cortical-medullar bone grafts from the iliac crest performed under general anesthesia.[2.] Zygomatic implants offer a satisfactory function, improves aesthetic results, costs low, execute time and also provide low morbidity for patients as it is less invasive surgery as compared to other treatment options for atrophic maxilla such as reconstructions with autologous grafts. For the very first time, zygomatic implants were used in cancer patients who underwent maxillectomies or tumor resections, trauma and congenital defects by Professor P-I Branemark in 1987. An excellent alternative in the rehabilitation of the atropic maxilla was proposed by Aparicio, et al in 1993 that Zygomaticmalar bone can be used as an anchorage for oral implants[5]. Zygomatic implants are immediately loaded as their length is enough to provide anchorage as there is a larger contact between the surface of the implant and the bone; therefore, the stability is also greater[5].

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II. Case Presentation

An 85- year- old male patient with the chief complaint of missing teeth and difficulty in chewing food for 10 years visited our maxillofacial hospital opd. (Figure 1) A preoperative CBCT (Cone Beam Computed Tomography) was performed which showed atropic maxilla on both the left and right posterior region. (Figure 2). The operation was performed under local anesthesia with adrenaline (1; 2,00,000) and a prescription of pre and post-operative antibiotics and analgesics was made.

III. Surgical Procedure

A palatal incision along with a bilateral posterior vertical incision more of like Le fort exposure was performed on the maxillary crest. A full muco periosteal flap was reflected to expose the alveolar bone, the piriform aperture in the center and the posterior part of the zygomatic complex. The superior dissection was limited to the infra orbital nerve which emerges from the lateral wall of the maxillary sinus. The L shaped retractors were used to elevate the muco periosteal flap superiorly and posteriorly. The osteotomy marking was done on the maxillary crest till the zygomatic complex. One ditch was made on the crest of the maxillary alveolus and another on the zygomatic complex. A connection was made in between the ditches with the help of long drills which comes under three configurations (fine, medium, coarse). The osteotomy site was copiously irrigated during surgical preparation; grooves were prepared on the lateral wall of the maxillary sinus with the long drills until Sheridan membrane was visible. Elevation of Sheridan membrane was done with the help of sinus lift instruments .Drilling was done with the help off long zygomatic implant drills from the alveolar crest to the zygomatic complex. The zygoma complex was drilled until the tip of the drill could be felt on the index finger of the contralateral hand which is placed on the cheek bone. Then after the zygomatic implant is inserted in the prepared osteotomy from the maxillary crest to the zygomatic complex. Then we proceeded towards the maxillary anterior region

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towards piriform aperture then the nasal floor was lifted carefully then after osteotomy was performed from the anterior maxillary crest and implants placed simultaneously and bovine bone graft was used to graft the deficit site. (Figure 9). Interrupted 3-0 silk sutures were placed on the incision line and post-operatively a prescription of Xylometazoline nasal spray (to reduce swelling and congestion), and antibiotics was made. The patient was instructed to strictly follow the oral hygiene, and regular follow-ups. A placement of Eleven freehand implants were done in both the arches in which six ADIN Implants were placed in mandibular arch and five implants were placed in the maxillary arch out of which two were Zygomatic, and three were conventional of NORRIS MEDICAL ITALY. Delivery of the provisional prosthesis was made possible on the same day of surgery, and the final prosthesis was given 12 weeks post-operatively. CBCT scans were performed post-operatively, which showed excellent integrated implants with new bone formation at the region of nasal floor lift. (Figure 9). The patient was followed up for two years; on CBCT all implants were osseointegrated with no marginal bone loss.

IV. Discussion

The latest scientific technology had provided a huge benefit for recuperation of maxilla in patients. Various possibilities like traditional implants, bone reconstruction, or zygomatic implants were used for the rehabilitation of totally edentulous patients with severe atrophy of the maxilla.[2] Out of various treatments, zygomatic implants have been in clinical use for 20 years and is an excellent treatment plan for patients with severely resorbed fully or partially edentulous maxillary arches.[9] When direct alveolar support for conventional implants is lacking; Zygomatic implants offer a relatively measured approach to restore missing upper dentition. Parel et al developed the concept of remote implant anchorage from which the zygomatic implant is derived. In many studies, the zygomatic implant has been demonstrated a high survival rate of 97% after more than 12 years of follow-up. Malevezand Bedrossian reported a 100% survival rate using 2 stage protocols. [3]

In our case report, the patient was partially edentulous with the severely atrophic maxilla. Besides placing the zygomatic implants, the nasal floor of the patient was also lifted, and placement of conventional implants in the maxillary anterior and mandibular region was also done. According to El- Ghareeb et al. Nasal Floor Lift is the most reliable method for reconstruction of the anterior atrophic maxilla when the residual height is less than 10 mm for implant- supported overdentures. The use of osteoconductive bone graft substitutes with simultaneous implant placement is a predictable approach for augmentation of up to 5 mm in height, and eliminates the need for more invasive procedures such as Le Fort I osteotomy, as well as donor-site morbidity associated with autogenous bone graft harvest.[6]

Using a fixed prosthesis to connect all implants with adequate anteroposterior spread provides cross-arch stabilization and allows the transmission of masticatory forces on the zygoma bone. Thus cross-arch stabilization from the prosthesis, just after placement of the implants, could alleviate the load on the anterior implants and could be one of the reasons to explain the loss of only three implants in such atrophied sites. This loss of implants may be related to the fact that they were placed in an area with an extensive bony defect since immediate loading itself does not seem to preclude osseointegration[7].

With the use of zygomatic implants either in combination with or without conventional implants in anterior atrophic fully or partial edentulous maxilla may be considered as the replacement to osseous grafting for providing bone formation for conventional implants. It has been reported that the success and survival rates of the zygomatic and conventional implants are equally same. Zygomatic implants provide short treatment time which would be normally required for osseous graft maturation and until maturation occurs it also subsequently delays the implant placement. Therefore, the treatment costs are also lowered as the complex grafting procedures are eliminated. As the use of CBCT, virtual planning, and surgical guides' progresses, it is anticipated that these implants may be utilized more readily and would result in the reduction of potential complications associated with prior placement techniques.[4]

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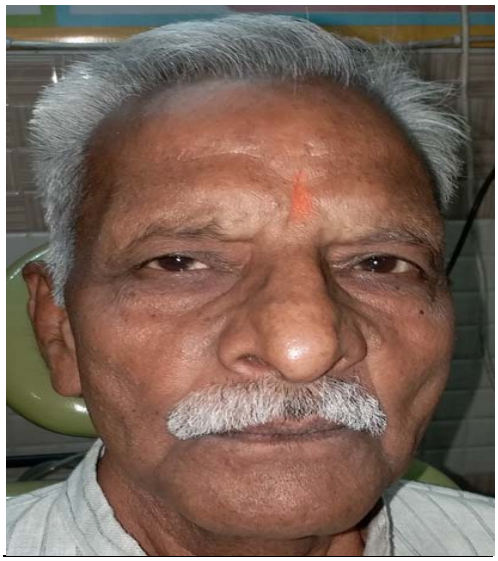


Figure 1: Shows Preoperative profile of patient

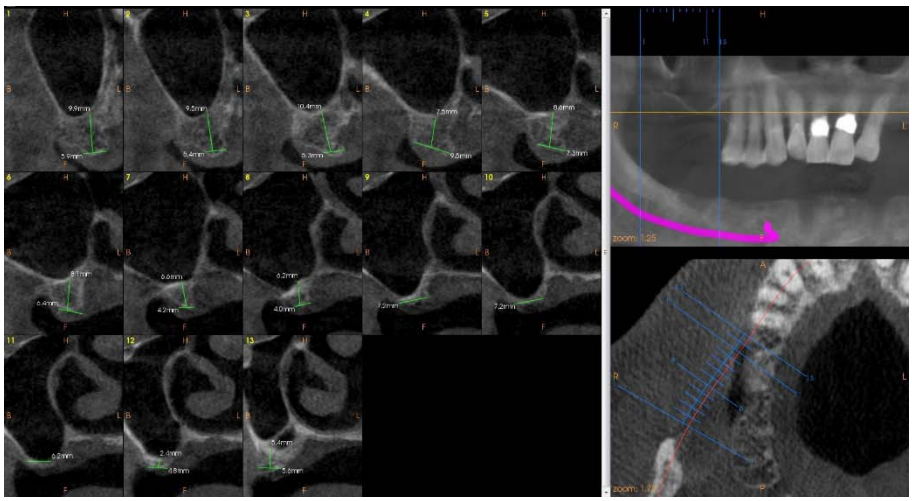


Figure 2: Shows the CBCT scan of maxilla preoperatively

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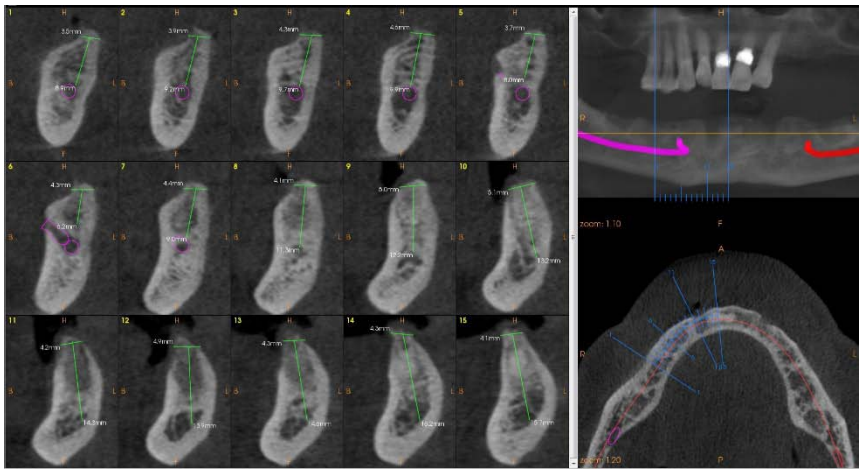


Figure 3: Shows the pre operative CBCT scan of mandibular arch with measurements



Figure 4: Shows fine bur with lateral osteotomy of the right maxillary sinus.



Figure 5: Shows osteotomy in the zygomatic complex with long zygomatic implant drill

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Figure 6: Shows +50 torque on placement of zygomatic implant.



Figure 7: Shows bilateral zygomatic implants insitu.

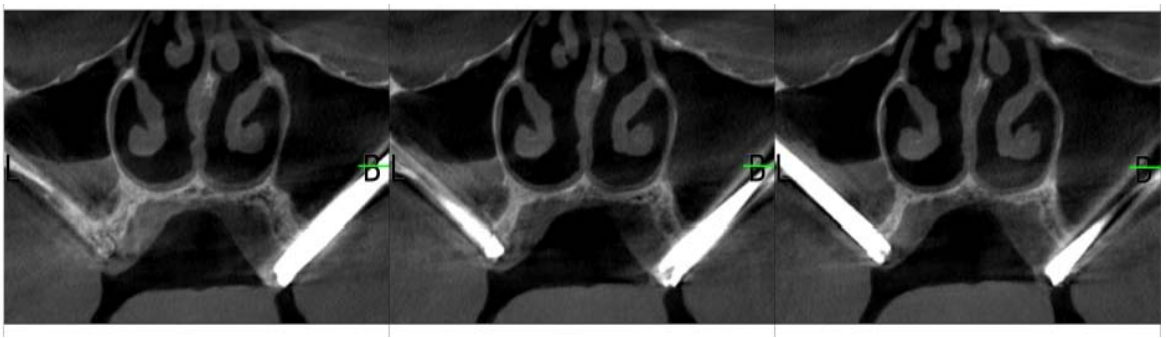


Figure 8: Shows the fully oseteointegrated zygomatic implants bilaterally.

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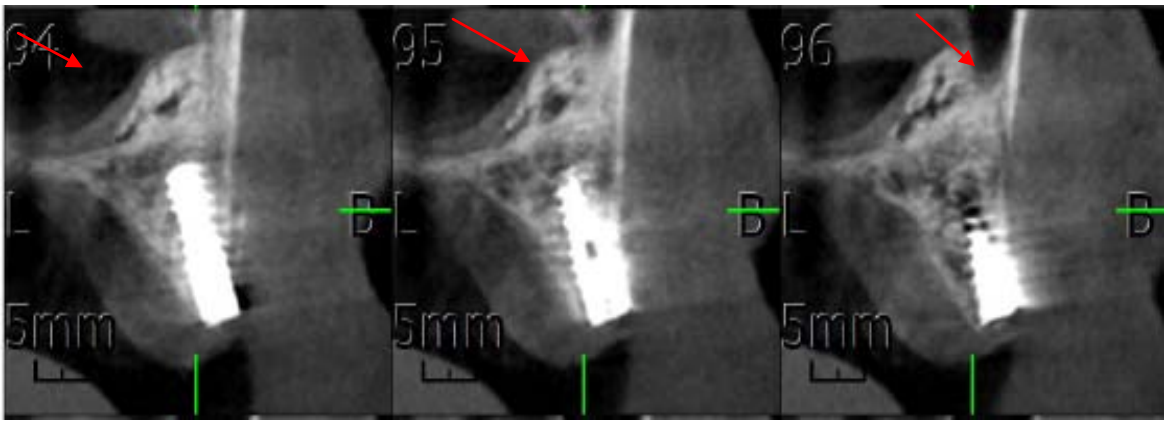


Figure 9: Shows the osteointegrated implants in the anterior maxillary region with excellent bone formation after nasal floor lift (red arrow)

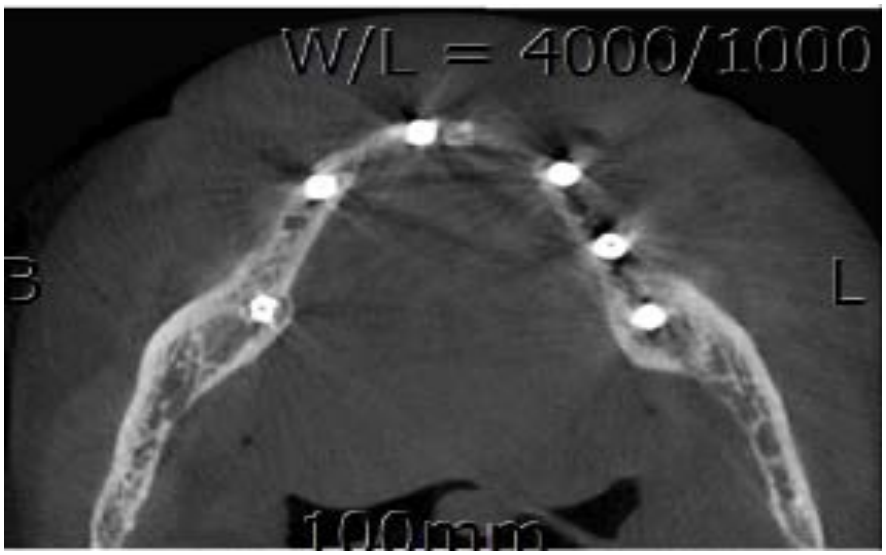


Figure 10: Showing the axial section of CBCT of mandible with osteograted implants.

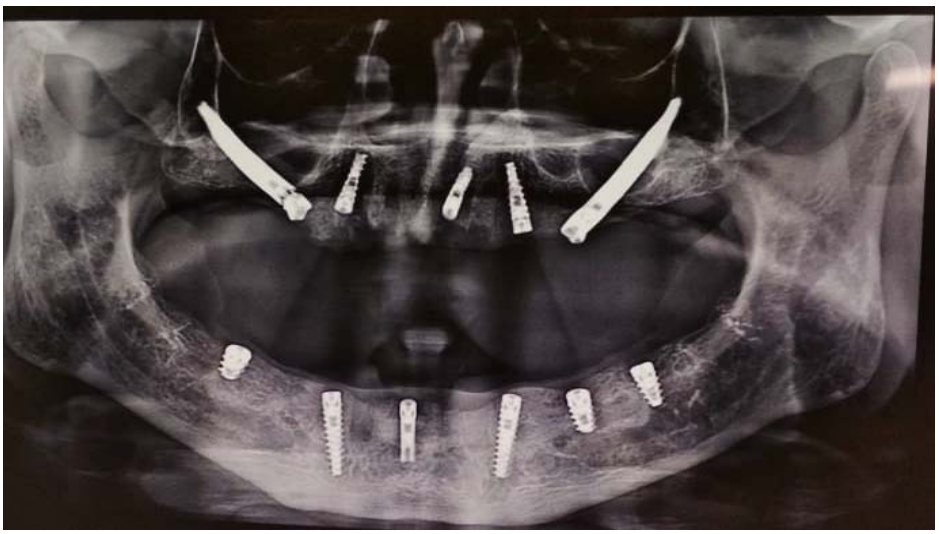


Figure 11: Shows OPG with a total of 11 implants out of which 2 were big zygomatic implants (right : dia 4.2 length 40 left: 42.5 length) and 3 were conventional implants in maxillary arch and rest of the 6 implants were placed in mandible in which 1 implant on the right posterior region was small (5dia 6 length) to avoid nerve impingement.

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Figure 12: Shows intraoral picture with MUA (Multi Unit Abutment)

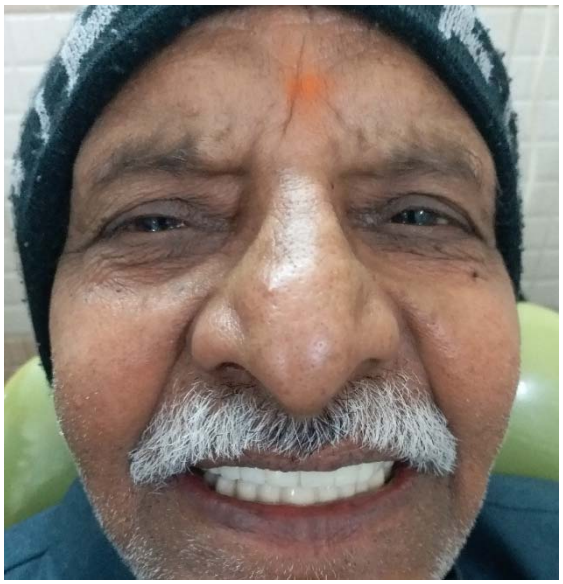


Figure 13: Shows the postoperative profile of patient with prosthesis

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