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Zygomatic Implants- An Innovative Treatment Approach

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Abstract:- A zygomatic implant is one of the treatment modality undertaken for specific compromised situations for oral rehabilitation where there is inadequate bone in the maxillary arch, which conventionally is managed by hard tissue pre-prosthetic surgeries like superior border augmentation with bone grafts. Treatment with zygomatic implants is found to be more accepted by a patient as complex surgical methods are eliminated. This modality of oral rehabilitation uses tilted implants on the zygomatic bone and immediate loading of the placed implant is to be followed.

Keywords:- *Zygomatic Implants, Atrophic Maxilla.*

I. INTRODUCTION

In many patients the conventional mode of oral implant treatment cannot be attempted on edentulous maxillary arch as the availability of residual bone is not adequate for a predictable longevity. This can be attributed to excessive resorption of maxillary bone and the hindrance from pneumatized massive maxillary sinuses, which leads to less than adequate quantity of bone for osseointegration and stability of the implants. In such handicapped situations, the treatment option was to increase the bone volume of the edentulous jaw by some pre-prosthetic surgical modalities like only graft and bone augmentation that requires general anesthesia. Studies reveal that implant failures happen more in bone which has been grafted than in those without the use of any grafts. Zygomatic implants are an innovative way of utilizing bone anchorage for oral reconstruction in specific large and extensive maxillary defects.

➢ *Indications for Zygomatic Implants*

Generally, zygomatic implants are done in those patients having full or partial tooth loss of maxillary arch with less than adequate bone volume distal to the canine tooth region for placement of regular implants. Zygomatic implants may be used along with regular root form implants in the anterior region. When used in combination with conventional root form implants in the inter premolar region, the zygoma implant gives stability for a fixed partial denture using a very conservative approach compared to invasive pre-prosthetic surgeries. Resorption pattern of the maxilla post extraction occurs in two dimensions – height and width. Zygomatic implant is ideal to be placed in patients exhibiting excessive resorption of the posterior maxilla (i.e. <4 mm height of maxillary bone distal to the canine tooth) and with adequate bone quantity in the premaxilla area, such that a minimum of three implants can be anchored in each quadrant.1

An advantage with zygomatic implants is that this procedure can be carried out as an outpatient procedure in a dental clinic with local anesthetic techniques and conscious sedation, if required. But routinely, zygomatic implant placement is performed under general anesthesia in a hospital setting for patient comfort and post-operative healing.

➢ *Fixture Designs*

The Branemark system's zygomatic fixture by is a self-tapping implant fabricated in titanium with a subtractive surface prepared by machining and its available in varying lengths 30 to 52.5 mm. The apical part of the embedded surface has a diameter of 4 mm and the crystal part has a diameter of 4.5 mm. The head of the implant is tilted at an angle of 45° for a favorable axial prosthetic loading.

Newer zygomatic implants are manufactured with a roughened oxidized surface which may favor osseointegration. But still the design and surface of zygomatic implants has been in debate, as the connection between bone and implant, sinus and oral mucosa is highly complex where in the design and usage of a threaded implant surface may be questioned. Though the osseointegration of surface treated implants may be accentuated with a rough surface topography, the non-submerged threaded surfaces can harbor plaque.2

➢ *Biomechanical Considerations*

In comparison with conventional implants, the Zygomatic implants are much longer and thereby having a greater possibility to bend under flexural loads. The flexure which may happen can be due to

- Lengthier design of Zygoma implants (40–52.5 mm)
- Limited bone quantity in the alveolar crest of maxilla.

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The chance of flexure of zygoma implants can be minimized by rigidly connecting to anchored regular implants in the maxillary anterior site. An ideal combination for a maxillary full-arch rehabilitation in the edentulous maxillary arch is 2 Zygomatic implants (one per quadrant), and 2 conventional implants in the anterior maxilla.3

➢ *Guidelines for Prosthodontic Rehabilitation*

The principles for prosthetic restoration with Zygomatic implant include:

- Incorporating adequate stability and accuracy in the prosthetic restoration
- reduce flexural movements
- harmonious balance between, esthetic, phonetic, functional and hygiene requirements
- maintain oral hygiene adequately

➢ *Pre-Surgical Evaluation*

Anatomic studies of the pyramidal zygomatic bone have shown that the average length of bone available in area, where zygoma implants are placed, is around 14 mm. Computed tomography is the diagnostic modality for precise identification and planning of the zygoma site.

Clinical examination may not be sufficient for understanding bone architecture and hence radiologic assessment has to be considered. CT scan makes two and three dimensional imaging possible. The status of maxillary sinus can also be assessed in a CT scan and pathologies like sinusitis, polyps can be excluded.

Based on radiological outputs, surgical guides for placing the zygoma implants can be prepared on stereo-lithographic models for a Guided Surgery where orientation, angulation and position of the zygomatic implants are precisely planned. The operator should also evaluate, the probable emergence site and the relationship of the implant surface to the maxillary sinus and lateral wall.4

➢ *Guidelines for Surgical Placement*

Very often the Zygomatic implants emerge into the oral cavity at the premolar region and usually the angulation is slightly in a palatal direction, compared to the routine implants in a maxillary arch. So it is better if the surgeon can precisely plan the position of implant head at the time of surgical placement of zygoma implants.

➢ *Surgical Technique*

- Conventional zygomatic implant (2 implants)
- 4 zygomatic implant technique

The four-implant protocol, the procedure involves placement of two zygomatic implants are using the original technique, (emerging at the posterior maxilla) and extra two zygoma implants are placed in such a way that they emerge at the canine or lateral incisor region facilitating immediate loading with a fixed prosthesis.5

➢ *Prosthetic Procedure*

The prosthetic protocol may be adapted for cemented or screw-retained implant-supported fixed partial dentures. In most of the situations, the zygomatic implant seem to emerge approximately 10–15 mm medial to the edentulous maxillary ridge which demands precise design of the prosthesis.

The prosthesis can be fabricated of gold/C- Cr and acrylic or gold/Co-Cr and porcelain for a screw retained type of reconstruction on regular implants. Screw retained prosthesis offers a better retrievability and adjustment of occlusion intraorally. Another option is to plan for an overdenture retained by rigid bars which connects the implants. The bar and clip offers stability and may be utilized in cases where there is a chance for cantilever action due to palatal positioning of zygoma implants.6

II. COMPLICATIONS

➢ *Soft Tissue Complications*

The placement of the implant through the maxillary sinus cavity have not found to initiate any severe soft tissue reactions or changes, as verified by sinuscopy studies. However, some clinical studies and follow-up on zygomatic implants report on soft tissue complications intraorally or in the maxillary sinus

Becktor et al. in his studies states that of 31 implants had to be removed in spite of the implants being clinically stable with sufficient osseo-integration. They suggested two explanations:

- the internal threaded abutment screw chamber of the zygomatic implant created a communication from the oral cavity into the maxillary sinus, which may have caused inflammation of sinus mucosa
- a failure of osseo-integration occurred at the crystal level in the palatal area, which resulted in transversal mobility of the zygomatic implant.7

III. CONCLUSION

The zygomatic implant emerges as a treatment option which gives hope for severely compromised situation. It is an alternative solution to complex surgical procedures for maxillary arch reconstruction. The utilization of longer implants which are anchored on zygomatic bone definitely will serve as the ideal alternative for oral rehabilitation.

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