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Status of Zygomatic Implants- A Review

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Abstract:

Treatment for patients with severe atrophy of the edentulous maxillary ridge is a challenge for prosthetic rehabilitation using implants. Hence the clinician has to resort to discover alternative ways to use existing bone or augment autogenous or alloplastic bone materials.The zygomatic implants eliminate the need for onlay bone grafting or sinus augmentation or Le Fort 1 down fracture which are commonly used surgical procedures to facilitate implant procedures.Zygomatic implants show excellent survival rates with various advantages and also a low incidence of complications. With proper case selection,knowledge of the technique, the use of zygomatic implants offers advantages in the rehabilitation of severely resorbed maxillary ridges, especially in areas where there is inadequate bone quality and volume.

Key Words: Zygomatic implants, Atrophy,Grafts, Maxillary sinus

INTRODUCTION:

Dental implants are a common mode of rehabilitaion for partially and completely edentulous patients.Numerous restrictions have arised with the use of these implants and one of it is the lack of sufficient bone volume, especially in the region of the posterior maxilla. This insufficient bone volume could either be due to bone resorption or pneumatization of the sinus or a combination of both. [1] The rehabilitation of patients with atrophic maxilla is a challenge for a clinician as there is a compromise of masticatory function and speech that can have a severe impact on the quality of life of the patient. The poor bone volume makes it difficult for conventional treatment with fixed prosthesis as well as dental implants [2].Different surgical techniques have been previously described in the literature to deal with such cases. Major reconstructions using bone graft from the iliac crest associated with or without Le Fort I osteotomy, sinus floor augmentation and onlay bone grafting were the most common ones used with the goal of enabling placement and integration of implants .[3]-[6] However, these techniques require long periods of treatment and are more prone to complications[7],[8]. The morbidity of these techniques includes the possibility of sinusitis, neurosensory disorders, contamination or exposure of the graft, post operative pain, mobility , and insufficient bone after the healing period .[9] While most of these procedures mentioned involve direct augmentation of the deficient site, numerous efforts have been made to pursue alternatives in achieving osseointegrated implant anchorage using the remaining native bone.

ZYGOMATIC IMPLANTS:

Based on animal research and human experiments, Branemark et al,[10] knowing that the introduction of an implant in the sinus could jeopardize sinus health, the zygomatic bone can be used as anchorage for prosthetic rehabilitation in hemimaxillectomypatients as well as for other defects. Because these reconstructions [11] were successful and long-termstability of these implants was established, in 1997 Branemark developed a specific implant called the zygomaticus fixture to provide fixed rehabilitation in the posterior maxilla. This development offers alternatives to bone grafting or sinus-lift procedures, which involve invasive surgery.[1]The emergence of the zygomatic implants from Brånemark[12] paved way for the clinicians the possibility to obtain a firm anchorage from zygomatic bone, making the rehabilitation of an atrophic maxilla possible with two or four implants in the anterior maxilla [13].

DISCUSSION:

Malevez et al1 described zygomatic implants as self-tapping screws in commercially pure titanium with a well-defined machined surface and are available in eight different lengths, ranging from 30 to 52.5 mm. They present a unique 45 degree angulated head in order to compensate for the angulation between the zygomatic bone and the maxilla. The portion of the implant that engages the zygoma (the apical two thirds) has a diameter of 4.0 mm,[1],[14]and the portion that engages the residual maxillary alveolar process (alveolar one third) has a diameter of 4.5 mm1 to 5 mm.[14] Bedrossian et al [14] in their study placed 44 zygomatic implants and 80 premaxillary implants in 22 patients. Zygomatic implants were placed inthe second premolar area, traversing the maxillarysinus, and were fixated into the body of the zygoma.

INDICATIONS AND CONTRAINDICATIONS:

Zygomatic implants can be placed in patients with severe resorption of maxilla, Maxilla with insufficient bone height, in cases where there is a Pneumatization of maxillary sinus. They are used along with grafts to reduce the dimensions of bone grafts needed. General

contraindications are the same as for conventional implants and also sinus lift procedures such as local infection in sinus, Caldwell Luc operations, narrow sinus, Underdeveloped septa, severe sinus floor convolutions .

NEED FOR ZYGOMATIC IMPLANTS:

Zygomatic implants offer various advantages such as a reduced need of hospitalization and bone grafting during this procedure, Use of remote bone anchorage helps in reducing cantilever stress and enhancing the cross-arch effect ,[11] presence of a multi cortex stabilization, eliminates donor site morbidity and has a reduced treatment time**.** In addition to this Zygoma fixtures reduce preoperative risk, which suggests that older patients and patients with more severe general health problems can be rehabilitated compared with traditional methods of bone grafts.[13] They have few disadvantages .It is a more invasive procedure compared requires an experienced operator, risk of oro-antral fistula formation, more technique sensitive and are difficult to place in patients who have limited mouth opening, they project in divergent angles that complicate prosthesis construction, could lead to impediment in articulation.

CONSIDERATIONS:

Based on the studies by Gosain et al, [15] Champy et al, [16] Parel S et al [11], melson et al [17] and Van Steenberghe, [18]: the zygoma shows regular trabeculae and compact bone and can be used for the insertion of mini plates in maxillofacial fractures, can be used for fixed anchorage for dental arch retractions and to anchor a screwed prosthesis, Surgical drilling guides ought to be encouraged for zygomatic implant placement. A study was done by Rossi et al [19] to obtain anatomic information by means of measuring the angular and linear dimensions of the maxilla and the zygomatic bone in dry skulls for the safe insertion of 4 zygomatic implants.

PLACEMENT TECHNIQUES:

Different authors have advocated different techniques for zygomatic implant placement. Nevertheless, the original and most commonly used technique is the conventional technique. The two other techniques are the modified zygomatic implant placement technique and the extra-sinus zygomatic implant placement technique.

CONVENTIONAL METHOD:

Although the operation can be carried out with ease under local anaesthesia, for the patient's comfort it can be done out under total anaesthesia as mentioned by Higuchi [20] in his paper on indications and clinical applications of zygomatic fixtures. As given by to Malevez et al, [1] after a palatal 45 degree incision of the soft tissue along the maxillary crest, the soft tissue is reflected from the crest to the zygomatic buttress, and the suborbital nerve is identified. A window is then made by drilling using a fissure bur at the upper limit between the zygoma and the sinus in order to determine the orientation of the zygoma and so as to reflect the Schneiderian membrane. This window willbe helpful during the surgical procedure for cooling the drills. The proper axis path extends from the premolar region traversing the maxillary sinus, entering the midportion of the zygomatic body. If the entry point in the zygomatic body is anterior tothis path, there is a potential orbit penetration. If the axis is posterior to this path, the implant could be entering the infratemporal fossa, causing soft tissue embedment and a lack of osseointegration, unexpected haemorrhage. [21]Different drills with increasing diameters are used. The length of the implant is carefully chosen by means of a special gauge. Initially round burs are used followed by a twist drill. A pilot drill is used to thus allow stabilization of the twist drill, which completes the zygoma osteotomy. Bedrossian et al [14] recommended that the entire path of surgical drill should be visualised prior to implant placement and at all times during preparation of the osteotomy. The zygomatic implant has a 45 degree angulated head that allows for the platform of the implant to be in the same plane as that of the conventional implants in the premaxilla. Premounted implant carriers could be used to facilitate implant placement . The implant is placed into the osteotomy site. Once the hand piece stalls after insertion into 2mm of the dense zygomatic bone ,manual driver is used to seat the remainingportion of the implant.

MODIFIED TECHNIQUE:

In an effort to provide a graft-free procedure for patients with atrophic maxillae and severe bone resorption in the anterior maxilla, a modified technique using multiple implants in the zygoma was advocated by Kahnberget al[22] and Keller et al [23].After incision and retraction of the overlying soft tissues, a window is made in the lateral sinus wall along the infrazygomatic crest and the alveolar crest. Sinus mucosa is removed from the area wherethe implants will pass, thus ensuring a cleared entrance at the crestal site as well as the zygomatic site.

SINUS SLOT TECHNIQUE:

The sinus slot technique described by Stella and Warner [24] makes sinus window formation unnecessary. A crestal incision is made extending from one maxillary tuberosity to the contralateral tuberosity.A traditional LeFort I exposure is accomplished, with a periosteal elevator. The palatal mucosa is reflected only to expose the crest of the ridge.

EXTRA SINUS APPROACH:

The conventional surgical protocol for zygomatic fixtures prescribes an intrasinus approach maintaining the sinus membrane intact and the implant body traversing through the sinus while gaining access to the zygomatic bone. However, in the presence of a pronounced buccal concavity, the implant head must be placed far from the alveolar crest in a palatal direction, which could result in a bulky bridgeconstruction. In 2010, Aparicio et al [25] published their study with zygomatic implant placement in patients with pronounced buccal concavities in edentulous maxilla with anew extra-sinus technique in order to have the implant head emerging near the top of the alveolar crest. No pain, discomfort, or complications were recorded after the initial healing period and up to the 36-month

check-up.Theimplant site is prepared, drilling from the palatal crest towards the zygomatic arch without making an opening to the maxillary sinus nor taking into account the schniderian membrane integrity, and following the standard drilling steps for zygomatic implants as described.[26] As a result, the zygoma implant enters the crestal bone from the palate ,crest of the premolar/molar area, comes out through the lateral maxillary sinus wall close to the maxillary basal bone. Then, the implant goes in an extra-sinus path.

CONCLUSION:

The zygomatic implants appears to be a more promising development in implantology.It offers an interesting and a unique alternative to bone grafting in the severely resorbed posterior maxilla. It has been in use for more than ten years and gives a predictable outcome in the rehabilitation of completely as well as partially, edentulous patients.[1]The functional and aesthetic results are considered excellent. The problems reported so far that are related to the zygomatic implant procedure are not severe and are within the magnitude of the issues commonly experienced with other methods. Experience till-date supports its effectiveness in the rehabilitation of challenging patient population, nevertheless, more published reports are needed and more follow-up has to be provided in order to enhance the scientific evidence in this choice of treatment and also to asses and ascertain its final goal , success and predictability.[1]

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