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RESEARCH ARTICLE
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QUAD ZYGOMATIC IMPLANT AS REHABILITATION IN POST MUCORMYCOSIS PATIENTS: A CASE SERIES

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Abstract

Introduction: Mucormycosis is an opportunistic fungal infection, which primarily affects diabetic and immunocompromised patients. Surgical excision and debridement of the affected areas can result in significant defects. Reconstruction and rehabilitation of these defects remains a significant challenge for the clinicians.

Case series: In this case series, we present 3 cases of post mucormycosis patients with maxillary defect who underwent rehabilitation by quad zygomatic implants. No complications occurred during the follow up.

Discussion: There are several choices for maxillary reconstruction, such as maxillary prostheses, local and regional pedicled flaps with and without bone grafts, and titanium mesh. Soft-tissue flaps do not provide bony reconstruction of maxillary defects or structural support for osseo-integrated implants hence the quad zygoma proves to be a good treatment choice for treating maxillary defects. The main advantage of patients opting for zygomatic implant is that there is no need for adjunctive surgeries thereby considerably reducing overall treatment duration and cost. Zygomatic implants are fixed into the zygoma and they can be immediately loaded with a temporary prosthesis, followed by a fixed prosthesis after four to six months.

Conclusion: All the patients were followed up after 15, 30, 45 and 90 days and there after every month for evaluation of soft tissue healing, infection, dehiscence, loosening of prosthesis, eating efficiency and aesthetic. Follow-up period for all 3 patients was in the range of 6-12 months. The

design of zygoma implants allows the surgeons to insert these implants even in case of total maxillary bone defect because they obtain a bicortical stability through the malar bone. Zygomatic implants have, in many cases, shown improved clinical results compared with bone grafting and represent a possible new 'gold-standard' procedure in compromised maxillary bone.

Keywords: Mucormycosis, Maxillectomy, Quad zygomatic implant, free flaps

INTRODUCTION

Mucormycosis is a rapidly progressive, fulminant and life-threatening infection. It has been discovered that diabetics and immunocompromised patients who have recovered from COVID-19 infection are more susceptible to mucormycosis.

The disease is clinically characterized by a partial loss of neurological function and a gradual necrosis due to the invasion of the organisms into the blood vessels resulting in thrombosis and tissue infarction/necrosis. The disease may progress to involve the cranium thereby increasing the fatality rate.

Clinical presentation of patient with mucormycosis may include eye or facial pain and numbness are the first signs of rhinocerebral mucormycosis, followed by conjunctival suffusion, hazy vision, and soft tissue swelling. If left untreated, the infection progresses into the sinuses and oral cavity and produce painful, necrotic ulcerations of the hard palate. Treatment includes local or systematic antifungal medications and surgical debridement. Surgical excision and debridement of the affected areas results in defects of varied sizes which affects the functions, aesthetics, morbidity and quality of life. Rehabilitation with implants or surgical correction is used to treat maxillectomy defects. The decision to use either of the options is determined by the site, size, etiology, severity, age and the patient's wishes.[1]

The "quad zygoma" concept involves the insertion of four zygomatic implants, with adequate anteroposterior spread and correct inclination for the distribution of forces, as a means of rehabilitating patients presenting with insufficient bone height in the anterior and posterior maxilla.
Non-alveolar h as zygomatic patients with]

implants offer a predictable alternative to bone augmentation techniques in situations of severe alveolar atrophy.[2] Other alternatives, like bone grafting procedures present certain complications derived from the technique itself and from the waiting time of the patients, which make alternatives suc implants take more strength as a choice in patients with severe maxillary atrophies.[3] In sufficient bone volume in the edentulous or semi-dentate maxilla, rehabilitation of masticatory function with dental implants can be achieved with predictable success and acceptable long-term results.

To ensure acceptable success rates for standard dental implants without any bone augmentation procedures, the minimal bone height in the posterior region of the maxilla needs to be at least 10 mm.[4

CASE SERIES

Total 3 patients who had undergone maxillectomy post mucormycosis in department of Oral and Maxillofacial Surgery, Mahatma Gandhi Dental College and Hospital, Jaipur, Rajasthan, India was included irrespective of age, sex, caste and socioeconomical status. All the patients were disease-free clinically and radiographically for more than 6-month post-resection and was rehabilitated using quad zygoma implant. Exocad software was used for virtual surgical planning (VSP) taking in consideration the surgical and prosthetic aspects of zygoma implant to achieve goal of maximum functionality and sustainability.

CASE 1

A 52-year-old male patient reported to OPD with a complaint of loose teeth and pus discharge from upper maxillary region since 2 and half months. Patient gave history of pain and foul smell since 2-3 weeks. Patient also complained of persistent headache alongwith foul smelling nasal discharge. Biopsy was suggestive of mucormycosis. Patient was a known case of uncontrolled diabetes mellitus and had a paternal history of Diabetes mellitus and hypertension. Maxillectomy was performed under general anaesthesia and quad zygomatic implants were placed for rehabilitation and restoration of function and aesthetics.

OPERATIVE PROCEDURE

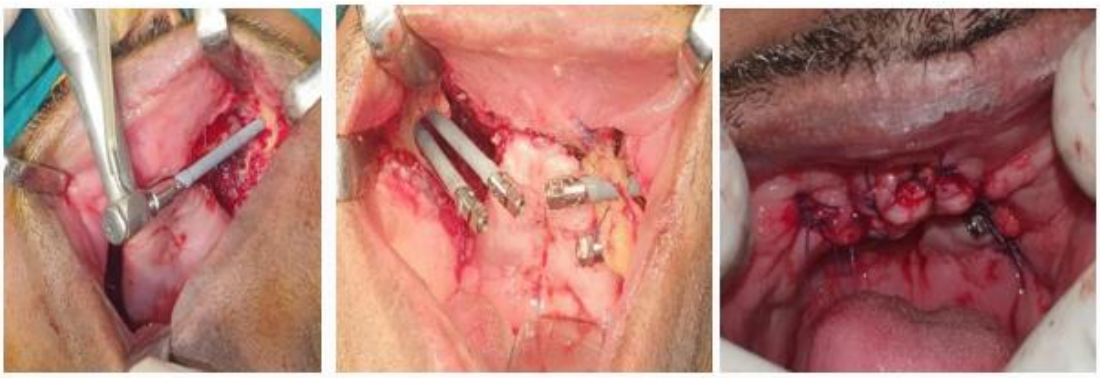

Fig 1. Surgical placement of four Zygoma implants

Following all haematological investigations, the patient was planned for surgery under general anaesthesia. Crestal incision was given in the maxillary arch bilaterally. Full thickness mucoperiosteal flap was raised and subperiosteal dissection was done palatially and labially to expose the zygomatic bone. 4 zygomatic implants were placed of 40 mm (1) and 50 mm (1) at 45-degree angulation after osteotomy. Haemostasis was achieved and closure was done using vicryl 3-0 intraorally. Antibiotics and analgesics were prescribed for a 1-week course. Post operative follow up visits were scheduled 1 and 2 weeks after surgery. 1 month follow up revealed optimal healing of soft tissues.

Fig 2. Post operative radiograph showing quad zygoma rehabilitation.

CASE 2

A 38-year-old male patient reported with a chief complaint of pain and mobility of teeth in the upper left maxillary region since 2 months. Patient also complained of bad breath. There was swelling on the left side of the face along with foul discharge from nose and severe headache. Patient gave history of extraction of 25 around 4 months back. Two months after the operative procedure the patient started experiencing pain and mobility of teeth in the upper left maxillary region. Pain was moderate to severe

in intensity, gradual in onset, throbbing type and continuous in nature. Biopsy was suggestive of Mucormycosis. Maxillectomy was done.

OPERATIVE PROCEDURE

aematological investigations, the patient was planned for surgery under general anaesthesia. Crestal incision was given in the upperlef tanteriorregion. Full thickness mucoperiosteal flap was raised and subperiosteal dissection was done palatially and labially to expose the zygomatic bone. zygomatic implant was placed of 40 mm (1) and pterygoid implant of 50 MM (1) at 45 degree angulation after osteotomy. Cover screw removed and multiunit abutment was placed. Haemostasis was achieved and closure was done using vicry 0-3 intraorally Antibiotics and analgesics were prescribed for a 1-week course. Post operative follow up visits were scheduled 1 and 2 weeks after surgery. 1 month follow up revealed optimal healing of soft tissues.

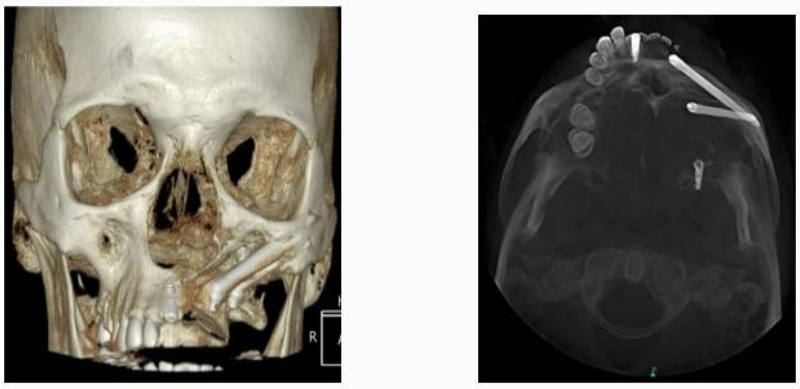

Fig 3. Post operative Radiographs

CASE 3

A 40-year-old male patient reported with a complaint of missing teeth in upper jaw region since a month. Patient had previously reported a year back with a complaint of loose teeth and pus discharge from anterior maxilla. On intra oral examination, mobility of anterior maxillary segment was present. Biopsy revealed Mucormycosis. Therefore, patient was operated for Mucormycosis and maxillectomy was done. Patient was a known case of diabetes mellitus since past 1.5 months and was on medication for the same.

RADIOGRAPHIC AND COMPUTED TOMOGRAPHY FINDINGS

Three dimensional (3D) computed tomography (CT) of the face revealed defect involving both sides of hard palate and anterior alveolar margins of maxilla. Bone loss involving left medial and lateral pterygoid plates and anterolateral wall of left sphenoid sinus. Findings were also suggestive of fungal sinusitis with bony erosion and defect.

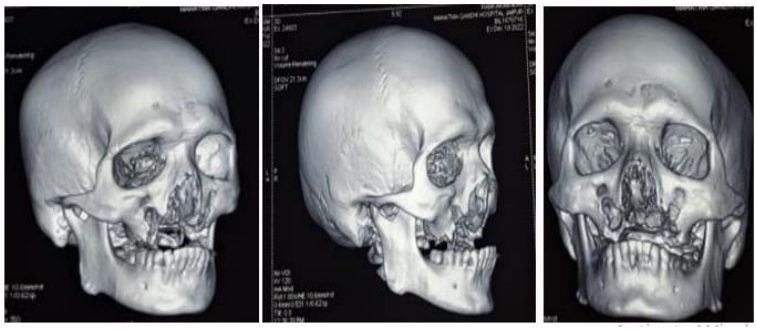

Fig 4. Pre- operative 3DCT

OPERATIVE PROCEDURE

Following all haematological investigations, the patient was planned for surgery under general anaesthesia. Crestal incision was given in the upper anterior region. Full thickness mucoperiosteal flap was raised and subperiosteal dissection was done palatially and labially to expose the zygomatic bone bilaterally. Hard palate stent was fixed as per the model with the help of 2.5 * 16 cm. 4 zygomatic implants (Quad Zygoma) was placed of 40 mm (2) and 50 mm (2) at 45-degree angulation after osteotomy. Cover screw removed and multiunit abutment placed bilaterally. Extraoral incision was given to expose the zygomatic bone and lateral border of the orbit to confirm the placement of implants. Haemostasis was achieved and closure was done using vicryl 3-0 intraorally and extraoral closure done using vicryl 3-0 and ethilon 3-0 in layers.

Post operative care was similar to that of any implant surgery including sinus instructions. Antibiotics and analgesics were prescribed for a 1-week course. Post operative follow up visits were scheduled 1 and 2 weeks after surgery. 1 month follow up revealed optimal healing of soft tissues.

DISCUSSION

The goals of maxillary reconstruction include separation of the oral and sino-nasal cavities, restoration of the maxillary buttress, adequate midface projection, optimal aesthetic appearance, establishment of functional occlusion and dentition, and maintenance of a patent nasal airway. Conventional implant treatment cannot be performed in the edentulous maxilla in some patients because of advanced bone resorption or sometimes the presence of extensive maxillary sinuses, leading to inadequate amounts of bone tissue for anchorage of the implants. In addition to the risks and complications of the graft procedure itself, it also involves a donor site with associated surgical morbidity, additional operating time and extra costs. There are several choices for maxillary reconstruction, such as maxillary prostheses, local and regional pedicled flaps with and without bone grafts, and titanium mesh. With the development of microvascular techniques, various free-tissue transfers have been described for maxillary reconstruction, such as radial forearm, rectus abdominis, anterolateral thigh, scapular, fibula osteomyocutaneous, and iliac crest flaps [5] For maxillary reconstruction, the fibula osteomyocutaneous flap is often used to restore low maxillectomy defects because of limited bone width and soft-tissue volume. Soft-tissue flaps do not provide bony reconstruction of maxillary defects

or structural support for osseo-integrated implants hence the quad zygoma proves to be a good treatment choice for treating maxillary defects. It is technique sensitive and requires advanced surgical skill. The evidence compiled to date suggests that implants placed in the quad zygoma format offer a better rehabilitation modality for the maxilla. Various complications can occur with the placement of zygomatic implants such as oral-antral communication, paraesthesia, infection at the tip of the implant, tissue retraction, and more.[3] Understanding the aetiology of these complications will assist with prevention and management. The main advantage of patients opting for zygomatic implant is that there is no need for adjunctive surgeries thereby considerably reducing overall treatment duration and cost. Zygomatic implants are fixed into the zygoma and they can be immediately loaded with a temporary prosthesis, followed by a fixed prosthesis after four to six months. This immediately restores function and aesthetics for the patient.

CONCLUSION

After maxillectomy, the defect cannot be immediately reconstructed with a microsurgical revascularized bone flap, the zygoma implants represent the only available option to obtain a stable support. The design of zygoma implants allows the surgeons to insert these implants even in case of total maxillary bone defect because they obtain a bicortical stability through the malar bone.[6] Zygomatic implants have, in many cases, shown improved clinical results compared with bone grafting and represent a possible new ‘gold-standard’ procedure in compromised maxillary bone. In the presented cases all the patients were followed up after 15, 30, 45 and 90 days and there after every month for evaluation of soft tissue healing, infection, dehiscence, loosening of prosthesis, eating efficiency and aesthetic. Follow-up period for all 3 patients was in the range of 6–12 months. Post-operative healing and prognosis was good after implant placement with restoration of function and aesthetics.

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