

A Rare Case of Surgical Intervention through Triple Zygoma Implants for Oral Mucormycosis – A Case Report

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Abstract: Oral mucormycosis, which mainly targets those with weakened immune systems, is a rare yet highly aggressive fungal infection. Management frequently necessitates extensive surgical debridement, which can result in serious maxillofacial defects. This case report finds out a distinctive method of employing triple zygoma implants for prosthetic rehabilitation in a patient with a post-surgical maxillary deformity. The patient, a 52-year-old man with diabetes, had a radical maxillectomy due to invasive mucormycosis. Three zygomatic implants were then strategically positioned to ensure sufficient support for a fixed prosthesis. This innovative application of multiple zygomatic implants restored oral function and facial aesthetics, underscoring a successful reconstructive result. This case highlights the importance of advanced implantology in the rehabilitation of extensive maxillary defects.

Keywords: Maxillary defect, Oral mucormycosis, Prosthetic reconstruction, Surgical rehabilitation, Zygomatic implants.

1. Introduction

Oral mucormycosis, an opportunistic fungal infection caused by Mucorales species, is frequently observed in individuals with diabetes mellitus, immunosuppression, or post-COVID-19 complications. The infection propagates quickly, resulting in widespread tissue necrosis, with the maxillofacial region being the main area of impact. The standard approach to management involves aggressive surgical debridement along with antifungal treatment. The maxillary defects that result from this, however, present a considerable obstacle to functional and aesthetic rehabilitation.

In case of significant maxillary bone loss, zygomatic implants have proven to be a dependable substitute for bone grafting in providing prosthetic support. Using multiple zygoma implants, particularly a triple zygomatic implant configuration, represents a new method for thorough reconstruction in complicated cases. This case report describes a successful rehabilitation of a patient with a post-mucormycosis maxillary defect through the use of triple zygoma implants.

2. Case Presentation

A 54-year-old male patient was referred to LBR dental and implant center with history of poorly controlled diabetes mellitus presented with complaints of facial swelling, nasal regurgitation and palatal ulceration. Clinical examination revealed necrotic tissue and black eschar formation in the maxillary region. The patient was placed under general anesthesia and underwent a maxillectomy, which involved the removal of the maxillary dentition which affected both function and appearance. Diagnostic confirmation of invasive oral mucormycosis was obtained through histopathological examination and fungal culture. A Pre-Operative Orthopantomogram (OPG) demonstrated significant maxillary bone destruction, involving the maxillary sinus and palatal perforation. (Figure 1).



Fig. 1. Pre-operative orthopantomogram (OPG)

The strategically placed triple zygomatic implants addressed the defect and facilitated the restoration of function and aesthetics. Insufficient support framework to stabilize a surgical template necessitated the planning of a freehand surgical operation. Extensive bony defects and loss of dentition were evident. Due to the aggressive nature of the infection, the patient underwent a radical maxillectomy an year ago. Any sort of provisional prosthesis had not been placed to restore function and aesthetics. Patient complains of difficulty while drinking and chewing due to nasal regurgitation. Henceforth, a

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Provisional prosthesis was designed to restore function and aesthetics following a healing period of 12 weeks, a definitive fixed implant-supported prosthesis was fabricated.

The zygoma's body was made visible by a vestibular incision, and zygoma had osteotomy created. A Unilateral Triple-zygoma-implant configuration was modified to the placement of three Zygomatic implants of diameters (45×4.2 mm), (40×4.2 mm) and (37.5×4.2 mm) followed by cortical implants of diameter (16×4 mm) in the anterior region and Pterygoid implant of size (18×4.2 mm) in the posterior region, using Bioline Medical Dental Implant Solutions and Multiunit abutments (Bioline Medical Dental Implant Solutions) were connected to the implants.

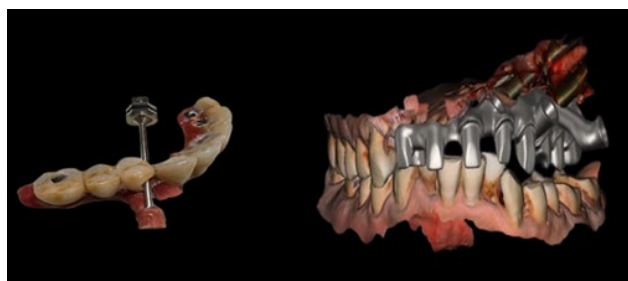


Fig. 2. 3D Printed Titanium framework using CAD-CAM technology

A 3D-rendered maxillary arch showcasing zygomatic implant placement on the left, along with the associated full-arch prosthetic design was fabricated along with titanium framework as shown in the (figure 2). Later the zirconia teeth were placed on the titanium bar ensuring the completed prosthetic arrangement, along with functional performance and aesthetic appeal (Figure 3). These digital planning methods improve accuracy, shorten treatment duration, and enhance the fit of the prosthesis for enduring success in implant-supported full-arch restorations.



Fig. 3. Virtual planning and occlusal design with final zirconia teeth

Post-Operative Orthopantomogram (OPG) was obtained to evaluate the implant positioning and integration (Figure 4). The OPG showed three well-anchored zygomatic implants along with one cortical and a pterygoid implant with proper angulation and depth. The upper left arch had three implants (Triple Zygoma) placed into the zygomatic bone. No evidence of sinus involvement, implant mobility, or peri-implant radiolucency was observed. The radiograph confirmed successful osseointegration and satisfactory bone adaptation around the implants. The patient reported significant improvements in mastication, speech, and overall facial aesthetics. Follow-up at 6 months demonstrated stable prosthesis retention with no complications.

Post-surgical evaluation revealed inadequate residual bone for conventional implant placement. Consequently, a decision was made to proceed with triple zygomatic implant placement. Under general anesthesia, three zygomatic implants were inserted using a minimally invasive approach. Proper angulation and primary stability were ensured through intraoperative CBCT guidance. Post-operative follow-up demonstrated successful implant integration and excellent prosthetic stability, with no signs of infection, abscess or implant-related complications.

3. Discussion

The use of zygomatic implants is a well-established solution for maxillary reconstruction in patients with severe bone loss. In cases of post-mucormycosis defects, traditional implant placement is often unfeasible due to compromised bone quality and quantity. Triple zygoma implants provide reinforcement and enhanced stability for prosthetic rehabilitation, eliminating the need for complex bone grafting procedures.

This case report emphasizes the advantages of using multiple zygomatic implants, including reduced treatment time, improved functional outcomes without the need for bone grafting and enhanced patient satisfaction. The strategic implant placement ensured even load distribution, reducing the risk of implant overload and subsequent failure. Additionally, careful preoperative planning and the use of advanced imaging modalities played a crucial role in ensuring safe and desirable outcome.

Long-term success with implant-supported prostheses depends on an understanding of their biomechanics. Implant biomechanics are different from that of native teeth, which have a distinct feedback mechanism for occlusal awareness^{9,10}

Following a maxillectomy, zygoma implants are a crucial backup option for secure support when a micro surgically revascularized bone flap restoration is not feasible to achieve quickly. Because of their design, which offers bi-cortical support through the malar bone, zygoma implants can be inserted even in situations where there are complete defects in the maxillary bone.

The final prosthesis insertion was completed and a torque of 20 Ncm was given for screw-retained prosthesis. Occlusal adjustments were performed. The patient was scheduled for regular recall (Figure 3).

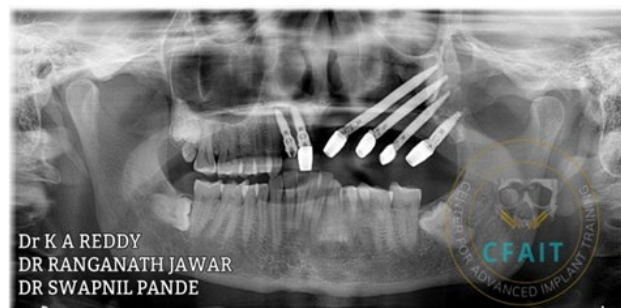


Fig. 4. Post operative OPG after 3 months follow up

Zygomatic implants have demonstrated better clinical results

than bone grafting, which may create a new gold standard procedure for treating compromised maxillary bone⁷. The variations can be attributed to variations in prosthesis types (fixed versus detachable). A detachable prosthesis requires more time to adjust and frequent adjustments throughout the follow-up phase.

4. Conclusion

It is clear that zygomatic implants have been the focus of many studies carried out in recent years. With benefits such as prosthetic rehabilitation of the atrophic maxilla and rehabilitation in post-resection cases or congenital conditions, a Graftless protocol utilizing minimal tools and immediate loading can be implemented, resulting in a significant number of clinical cases exhibiting prosthetic function. Zygomatic implants could be best suitable treatment option when the maxillary arch does not have enough bone quality or quantity.

For individuals who are completely edentulous, particularly those with post-COVID-19 mucormycosis, zygomatic implants

serve as a reliable alternative treatment with a high success rate that can be used alongside traditional implants.

References

- [1] Cornely OA, Alastruey-Izquierdo A, Arenz D, et al. Global guideline for the diagnosis and management of mucormycosis: an initiative of the European Confederation of Medical Mycology. *Lancet Infect Dis.* 2019;19(12):e405-e421.
- [2] Chrcanovic BR, Albrektsson T, Wennerberg A. Survival and complications of zygomatic implants: A systematic review. *Oral Maxillofac Surg.* 2016;74(1):127-136.
- [3] Hoxha V, Olivares J, Canas X, et al. Rehabilitation of severe maxillary defects using multiple zygomatic implants: A case series. *J Oral Implantol.* 2021;47(6):447-453.
- [4] Singh AK, Gupta P, Chakraborty S, et al. Post-COVID mucormycosis: A case series and review of literature. *J Maxillofac Oral Surg.* 2022;21(1):20-25.
- [5] Minase DA, Sathe S, Borle A, Pathak A, Jaiswal T, "Less is more: A case report on all-on-4 prosthesis," *Cureus.* 2024, 16:e54873.
- [6] Beri A, Pisulkar SG, Mundada BP, Borle A, Dahihandekar C, Bansod A: Quad zygoma: A graftless solution in post-mucormycosis maxillectomy. *Cureus.* 2023, 15:e50014.