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Case Report

Dentistry Section

Foreign Body Giant Cell Reaction with Multi Drug Resistance to Anaerobic Bacteria in Maxillofacial Region: An Unusual Case Report

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ABSTRACT

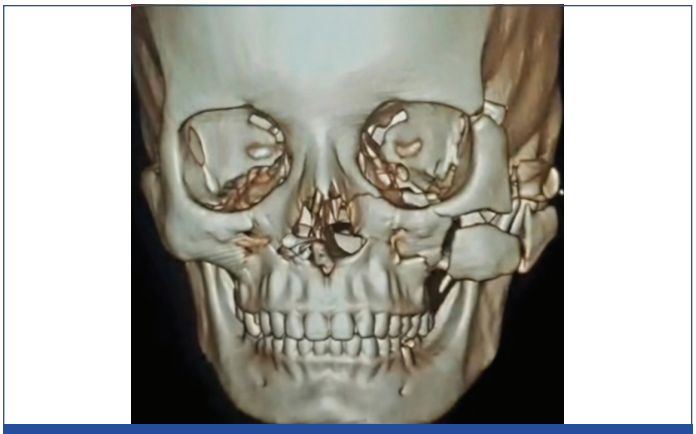
Foreign Body Giant Cells (FBGCs) are most commonly observed at the tissue/material interface, where the size of foreign particulate is too large to permit macrophage phagocytosis. The insertion of foreign bodies into human oral and perioral tissues may originate from traumatic events, postoperative dental procedures. When the infection caused by Pseudomonas aeruginosa occurs in these conditions, it can result in life-threatening conditions due to its variable antibiotic resistance, and the treatment is questionable. Here, we report a case of FBGC reaction with multidrug resistance in a 35-year-old female patient postoperatively, who has undergone Open Reduction and Internal Fixation (ORIF) under general anaesthesia for midfacial fracture.

Keywords: Antibiotic resistance, Infected implants, Midface fractures, Pseudomonas aeruginosa

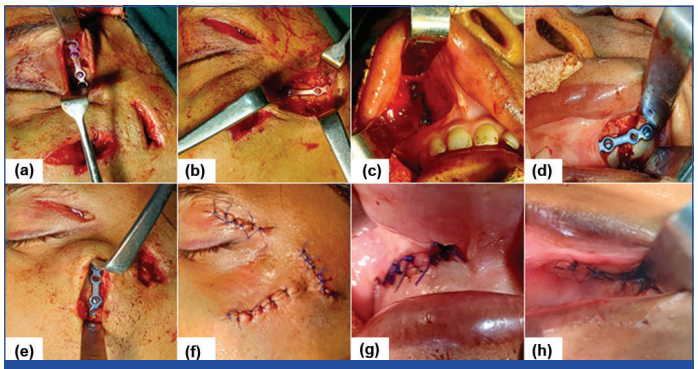
CASE REPORT

A 35-year-old female patient was alleged to have sustained injuries due to a road traffic accident. Necessary investigations were done. A 3D Computed Tomography (CT) scan of the facial bones [Table/Fig-1] showed the fracture line running from the pyriform process to the zygomatic buttress, crossing the lower third of the lateral pterygoid, which was diagnosed as a Lefort I fracture. Blood transfusion was carried out for the patient as her haemoglobin levels were low (<8 g/dL). After achieving adequate haemoglobin levels, open reduction was done under general anaesthesia with oral intubation through the existing lacerations extraorally and through vestibular approach intraorally. Internal fixation by titanium plates [Table/Fig-2,3] and closure was done after achieving haemostasis.

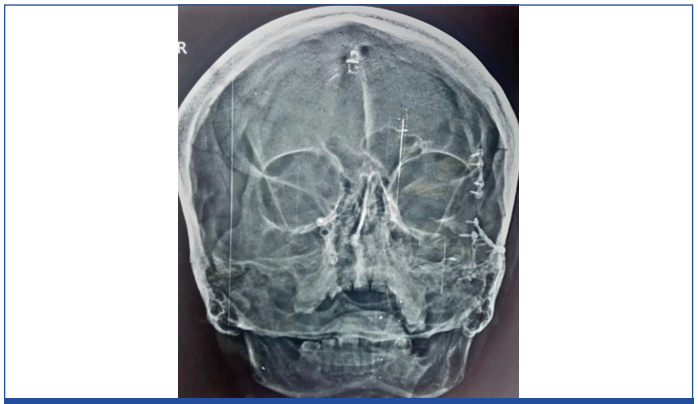
Patient was discharged after one week [Table/Fig-4a] without any complications. In the follow-up period, repeated mouth opening exercises were performed to improve the functional component of the patient. Suture removal was done on the 10th day postoperatively, but 15 days later [Table/Fig-4b], a keloid-like growth was seen over the left frontozygomatic suture and zygomatic regions through which open reduction was done previously and [Table/Fig-4c] shows results after 30 days. The patient complained of pus discharge and mild pain. Infected implant being the



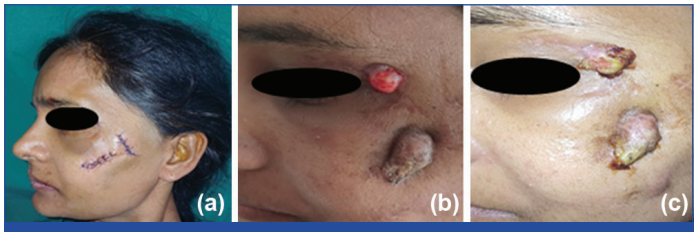
[Table/Fig-1]: 3D CT facial bones – pre op.



[Table/Fig-2]: Open Reduction and Internal Fixation (ORIF) with titanium mini-plates. a) Fronto-zygomatic process fixation; b) Zygomatic arch fixation; c) Right piriform fixation; d&e) Left zygomatic buttress fixation; f) Extraoral closure; and g) Intraoral right & left maxillary vestibular closure



[Table/Fig-3]: PNS View.



[Table/Fig-4]: a) After 1 week; b) After 15 days; c) After 30 days.

suspectable cause, initial treatment regimen started with adequate antibiotics, but the infection did not subside, so later, pus culture tests were carried out, revealing the Pseudomonas aeruginosa infection, which was confirmed by the repeated tests. Multi-drug resistance was observed in the reports where Amoxiclav, some 3rd generation Cephalosporins showed resistance, Ceftazidime, Meropenem, Tazobactum as intermediate, and Tobramycin, Colistin exhibited sensitivity to P. aeruginosa.

Since the patient was resistant to multiple drugs [Table/Fig-5], a few more drugs were added to the treatment chart, considering the general physician's opinion. Based on the minimum inhibitory concentration values of 2 mg/L for Tobramycin (sensitive) and 3.2 mg/L for Meropenem (intermediate), which are less resistant to the Pseudomonas, a drug regimen was prepared and followed accordingly three days before the secondary surgery. In this case of postoperative surgical skin infection, with multidrug resistance to P. aeruginosa, two classes of antibiotics were included in the medical treatment prior to the secondary surgery: Aminoglycosides + β-lactams (Tobramycin 80 mg in 100 mL of NS) + (Sulbactum + Cefoperazone) 1.5 gm for three days, followed by the surgical excision of the lesion under general anaesthesia. Postoperatively, supplemental medication, Tetracyclines + Carbapenems (Doxycycline 100 mg + Meropenem 1 gm in 100 mL NS) was advised for three days to this patient. Reduction of the infection was seen in the seven-day follow-up period.

S. No	Tablets/Injections	Frequency	Duration (Days)
1.	Inj. Taxim 1 gm (IV)	BD	10
2.	Tab Metrogyl 400 mg Inj. Metrogyl 500 mg (IV)	TID	6 4
3.	Inj. Dexamethasone 4 mg (IV)	BD	10
4.	Inj. Justin AQ (IV)	BD	10
5.	Inj. Pantoprazole 40 mg (IV)	OD	10

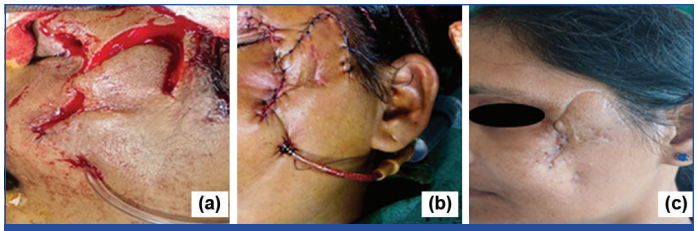
[Table/Fig-5]: Initial treatment regimen.

After effective subsiding [Table/Fig-4c] of the superimposed infection and secondary symptoms like pus discharge, the case was planned for implant removal under General Anaethesia (GA).

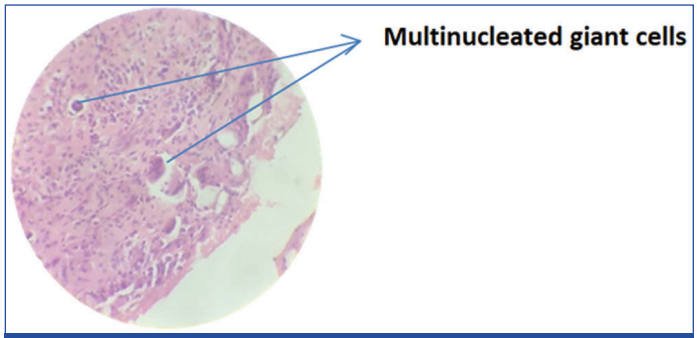
The patient was shifted to the operation theatre. This was followed by the successful induction of anaesthesia with oral intubation, under all aseptic conditions, betadine painting and draping. Local anaesthesia i.e., lignocaine with adrenaline of 1:80,000 solution, was infiltrated over the left cheek and eyebrow region. Through the existing infected operated sites, after excising the lesion, it was further extended with no. 15 blade on the left lateral eyebrow region and zygomatic arch region extraorally and the titanium implants were exposed and removed with preventive measures.

The incision over the left malar prominence lengthened superiorly and curved back, ending at the point, 5 cm from the tragus of the ear [Table/Fig-6a]. The skin flap was elevated by blunt dissection and advanced to close the defect. Haemostasis was achieved. Thorough irrigation was done with metrogyl solution, betadine, and saline. Drain was placed in the position subcutaneously, followed by the layer-wise closure of the operated sites extra and intra-orally. Drain was secured with 2-0 silk [Table/Fig-6b]. Extraoral dressing was done. Postoperatively, the drain was removed when the collected fluid was nil. Pressure dressings were given subsequently with adequate medical treatment. Extraoral sutures were removed after 10 days. Progressive healing of the wound was observed in regular follow-ups [Table/Fig-6c].

The excised lesion was sent for histopathological investigations and the report came as an infected lesion with Foreign Body Giant Cell (FBGC) reaction with Hematoxylin and Eosin stain under 10x magnification [Table/Fig-7].



[Table/Fig-6]: a) Secondary surgery intraoperative; 1; b) secondary surgery intra-operative 2; c) Post operative (after 2 weeks)



[Table/Fig-7]: Histopathological view showing giant cells (Haematoxylin-eosin stain, magnification 10x)

DISCUSSION

Surgical Site Infection (SSI), defined as a nosocomial infection following a surgical procedure that occurs near the surgical site within 30 days following surgery (or up to 90 days when a medical implant is involved), is associated, according to several studies [1]. Ribeiro M et al., conducted studies on bacterial-material interactions found that Staphylococcus species is the most common microorganism associated with the infected site [2]. The patients who had infections within three months of ORIF had a greater chance of Escherichia coli susceptibility. Pseudomonas species and E. coli were found in association with osteomyelitis and bone infection. Among infections caused by Gram-negative rods, P. aeruginosa has a leading role, especially in critically ill and immunocompromised patients. Antimicrobial resistance has led to a serious restriction in treatment options for P. aeruginosa infections, which has become a critical and deadly issue [2]. Multidrug Resistance (MDR) has increased dramatically in recent years and is now recognised as a major threat worldwide. It can cause a variety of soft tissue and skin infections, which can range from benign (e.g., cellulitis, postsurgical infections) to life-threatening conditions. Empirical antibiotic therapy, as explained in Matteo Bassetti's review, should include two agents from different classes for all serious infections known or suspected to be caused by P. aeruginosa [3]. The rationale of the so-called 'double coverage effect' is to increase the likelihood that antibiotic treatment will be active against P. aeruginosa. El Zowalaty ME et al., referred to this P. aeruginosa as an arsenal of resistance mechanisms [4]. The understanding of this prevalence and the mechanisms of antimicrobial resistance by P. aeruginosa is important in optimising treatments against pseudomonal infections. A limited number of efficacious antibiotics in the pipeline, several evolving translational strategies are being explored for the control and therapy of P. aeruginosa. The areas of immunotherapy and vaccinology are promising fields of research that could pave the way to explore alternative new therapeutic approaches using antibodies and vaccines, like adenovirus-based and DNA vaccines, to control the long-standing clinical therapy challenge of P. aeruginosa. Discovery and development of traditional antibiotics (Parvome), nanotechnology-based therapeutics, nanoantibiotics and nanoantimicrobial agents (use of materials with one dimension less than 100 nm) are the other new research directions to prevent and control the increasing resistance to P.aeruginosa.

In this case, the excised lesion, which was sent for biopsy, was revealed as the "Infected lesion with FBGC reaction. Granuloma

formation is a specific type of chronic inflammation initiated by infectious and non-infectious agents with an aggregation of multinucleated giant cells [5]. da Costa Miguel MC et al., reported a case where an adverse reaction was found to the cosmetic fillers, which acted as a foreign body in the host and was diagnosed with FBGC reaction [6]. The origin and development of this FBGC reaction is unpredictable and its establishment is based on the host response variability and infection. It is due to the usage of different biomaterials causing trauma and their presence in the body [7]. In these lesions, the inflammation and nodules can be noticeable. Histopathologically, the FBGC reactions present as multinucleated giant cells resulting from the fusion of various macrophages acting on the biomaterials implanted, asteroid bodies, lymphocytic inflammatory infiltrates [8].

Anderson JM et al., explained the reaction of foreign bodies to biomaterials [9]. Once a biomaterial is introduced into the body, a sequence of events occurs in the surrounding tissue and ultimately ends in the formation of FBGCs at the tissue/material interface. The consequences of the reaction to the material surface can be devastating. In a case report by Rai H et al., a 21-year-old male patient experienced FBGC reaction after a root canal treatment [5]. Surgical complete removal of the FBGC granuloma is the first choice of treatment. Prognosis is good and recurrences are rare with effective treatment.

CONCLUSION(S)

The postoperative complications of ORIF with mini plates include infection as the most common. FBGC's reaction, along with the multidrug resistance of P. aeruginosa increases the severity of the patient's condition and sometimes may be life-threatening. These should be handled with careful measures before surgical management. Immediate and correct diagnosis of the aetiology with adequate treatment measures can prevent further occurrence of the complications.

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