



Role of ozone therapy in the management of post traumatic infection: A case report with review of literature.

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ABSTRACT-The 21st century dental practice is quite dynamic. New treatment protocols and new materials are being developed at a rapid pace. Ozone dental therapy falls into the category of new treatment protocols in dentistry, yet ozone is not new at all. Here is a case report, where diagnosis was refractory infection, as this did not respond to any traditional interventions. Hence, use of ozone gas as a novel method was employed. The results of this present case report give evidence of successful usage of ozone therapy.

KEYWORDS- Infection, Maxillofacial fracture, Ozone therapy, Post-Traumatic Injury.

I. INTRODUCTION

Maxillofacial fractures accounts for 93.3% of total injuries(1).Amongst these, mandibular fractures account for around 30% to 60% (1,2). Such fractures usually affect the esthetics and functions of the particular region. This necessitates proper management of such injuries. However, complications and pitfalls are part and parcel of any surgical procedure. One such complication is post-traumatic infection. Infection is managed by traditional methods; however when it becomes refractory, novel methods like ozone, ultrasound and low level laser therapies may be beneficial.

Here is a case report of 36-year old female who complained of pus discharge from lower left region of jaw since 3 months.

II. CASE REPORT

A 36-year old female patient reported to the department of oral and maxillofacial surgery with pus discharge from left back region of lower jaw three months back. She gave a history of road traffic trauma following which, was operated for mandibular body fracture in other institute 6 months back. She also gave a history that a peanut sized swelling appeared on the left submandibular region and has progressed with pus discharge over a period of three months. She did not give any

previous medical history and harmful habits.

In extraoral examination, patient's face was asymmetrical and diffuse swelling present on the left side of the face extend from corner of the mouth to retro-mandibular region (Figure no 1). Multiple sinus tracts seen in submental and left submandibular region (Figure no 2). Intra-oral examination revealed missing 34, 35, 36 and cortical plate was exposed with respect to 36 and 37. Orthopantomogram and computed tomography were done for radiologic investigation (Figure no 3 and 4). According to the clinical and radiological examination, the diagnosis was non- union fracture with secondary infection of plate and screws in left parasymphysis, angle and

anterior border of the ramus region. Treatment plan was extraction of 37 along with removal of titanium plates and screws and curettage of the infected site under anti-microbial coverage. The same treatment was performed under general anesthesia. This patient was followed up regularly. After three months patient again reported with pus discharge from the same region (Figure no 5). According to the clinical findings diagnosis was recurrent infection. In the previous treatment all sources of infection were removed, this time authors decided to go for ozone therapy. Ozone gas was applied extra-orally in left submandibular region (Figure no 6). This gas was applied in three cycles per appointment, each lasting for 5 minutes. This procedure was continued for twice a week for one month without any antibiotics. After one month pus discharge was stopped and extra oral wound was healed adequately (Figure no 7).

III. DISCUSSION

Infection is the most common complication of surgical intervention. The potential for infection is always a consideration when treating mandibular fractures, especially when fractures communicate with the oral cavity The incidence of postoperative infection encountered



with mandibular fractures varies widely among studies and ranges from 0% to 25% (4-8). In this report left mandibular region was affected. Etiology of post-traumatic infection lack of experience of the surgeon, the morphology of the fracture or the presence of unilateral multiple mandibular fractures may lead to the selection of the wrong surgical approach and ultimately the wrong method of fixation (9). Here, patient had history of left side mandibular- parasymphysis, angle and ramus fracture.

Post-traumatic infection usually presents as; extra-oral swelling, draining sinus tracts, missing tooth, malocclusion, dental mobility, bone exposed or plate exposed (9). However, extra-oral swelling with multiple sinus tract were seen associated with exposed bone and mobility of the fracture segments.

Radiographic examination, plain films and computed tomographic (CT) scans should include imaging from any of the previous phases of treatment, for better understanding of the traumatic forces, extent of the original injury, and initial state of the repair (9).

Complications related to fixation devices are multifactorial. It can be screw loosening, breakage, metal sensitivity, thermal sensitivity, tooth injury, nerve injury, malocclusion or growth restrictions. Common infringements of rigid fixation principles include, e.g. a plate that is too small, one plate instead of two, placement of a screw into the line of fracture, too few screws per side of fracture and inadequate plate bending (10-13). In this case, infection had occurred due to loose screws due to which stability of fracture was insufficient. In the presence of multiple fractures, inadequate reduction and stabilization of one of the fractures may hinder the reduction and stabilization of the other. Therefore, both fractures should be reduced before application of the fixation. Segments that are not properly reduced may lead to nonunion, malunion/ malocclusion, or facial asymmetry (9,10).

This is a case of refractory infection, as this did not respond to any traditional interventions. Hence, use of ozone gas as a novel method was employed. The use of ozone (O₃) in medicine and dentistry is well documented. The main use of ozone in dentistry is relies on its antimicrobial properties. It is proved to be effective against both Gram positive and Gram negative bacteria, viruses and fungi (14-16). Ozone has a positive influence on bone metabolism and reparative process of the bone (17). The results of present case report give an evidence of successful usage of ozone therapy in postoperative rehabilitation of the patient who

underwent the surgical interventions on the facial bones. The background for the ozone positive action is the modulative effect upon the immunity and antioxidant system. Ozone was effectively used as an antibacterial agent to treat oral infections caused by *Actinomyces naeslundii*, *Lactobacilli casei* and *Streptococcus mutans*. Exposure of about 60 s exhibited 99.9% killing efficiency, but exposure for such a long period showed degradation of saliva proteins. So exposure of 10s to 30s was proved effective to kill significant number of bacteria (18).

IV. CONCLUSION

Ozone therapy is quite promising as it is less invasive, has potent disinfectant property and has minimal adverse effects. It also allows reducing treatment time and patient discomfort, thus increasing patient compliance. In future, emphasis should be done on well controlled clinical trials to determine the precise guidelines about the use of this therapy.

REFERENCES

- [1]. Singaram M, Vijayabala S, Udhayakumar RK. Prevalence, pattern, etiology, and management of maxillofacial trauma in a developing country: a retrospective study. *J Korean Assoc Oral Maxillofac Surg*. 2016;42(4):174-81.
- [2]. Agnihotri A, Galfat D, Agnihotri D. Incidence and pattern of maxillofacial trauma due to road traffic accidents: a prospective study. *J Maxillofac Oral Surg*. 2014;13:184-8.
- [3]. Rattan V, Rai S, Yadav S. Complications and Pitfalls in Maxillofacial Trauma. *J Postgrad Med Edu Res* 2014;48(2):91-7.
- [4]. Lamphier J, Ziccardi V, Ruvo A, Janel M. Complications of mandibular fractures in an urban teaching center. *J Oral Maxillofac Surg*. 2003;61:745-9.
- [5]. Czerwinski M, Parker WL, Correa JA, Williams HB. Effect of treatment delay on mandibular fracture infection rate. *Plast Reconstr Surg*. 2008;122:881-5.
- [6]. Bochlogyros PN. A retrospective study of 1521 mandibular fractures. *J Oral Maxillofac Surg* 1985;43:597-9.
- [7]. Malanchuk VO, Kopchak AV. Risk factors for development of infection in patients with mandibular fractures located in the tooth-bearing area. *J Craniomaxillofac Surg*. 2007; 35: 57-62.
- [8]. Moreno JC, Fernández A, Ortiz JA,



- Montalvo JJ. Complication rates associated with different treatments for mandibular fractures. *J Oral Maxillofac Surg* 2000;58:273-80.
- [9]. Vega Reoperative Mandibular Trauma: Management of Posttraumatic Mandibular Deformities. *Oral Maxillofac Surg Clin North Am*. 2011;23(1):47-61
- [10]. Zachariades N, Papademetriou I, Rallis G. Complications associated with rigid internal fixation of facial bone fractures. *J Oral Maxillofac Surg*. 1993;5:275-8.
- [11]. Prein J, Kellman RM. Rigid internal fixation of mandibular fractures: basics of AO technique. *Orthop Clin North Am*.1987;20:441-56.
- [12]. Ardary WC. Prospective clinical evaluation of the use of compression plates and screws in the management of mandibular fractures. *J Oral Maxillofac Surg*. 1989;47:150-3.
- [13]. Theriot BA, van Sickels JE, Triplett RG, Nishioka GJ. Intraosseous wire fixation versus rigid osseous fixation of mandibular fractures. *J Oral Maxillofac Surg*. 1987;45:577-82.
- [14]. Nogales CG, Ferrari PA, Kantorovich EO, Lage-Marques JL. Ozone therapy in medicine and dentistry. *J Contemp Dent Pract*. 2008;9:75-84
- [15]. Azarpazhooh A, Limeback H .The application of ozone in dentistry: a systematic review of literature. *J Dent*. 2008;36:104-16
- [16]. Greene A. K., Few B. K., Serafini J. C. A comparison of ozonation and chlorination for the disinfection of stainless steel surfaces. *J. Dairy Sci*. 1993;76(11):3617-20.
- [17]. Das S. Application of Ozone Therapy in Dentistry. *Rev Ind J Dent Adv*. 2011;3:538-42.
- [18]. Johansson E, Claesson R, Van JW. Antibacterial effect of ozone on cariogenic bacterial species. *J Dent*. 2009;37(6):449-53.

Figures-



Figureno1-Extra-oralswelling



Figure no 2-Multiple sinus tracts seen in submental and left submandibular region



Figure no 3- Orthopantomogram showing two 3 hole with gap titanium plate in parasymphysis, angle and anterior border of ramus region. Non- union fracture line seen alveolar ridge to inferior border of mandibular region (red arrow).

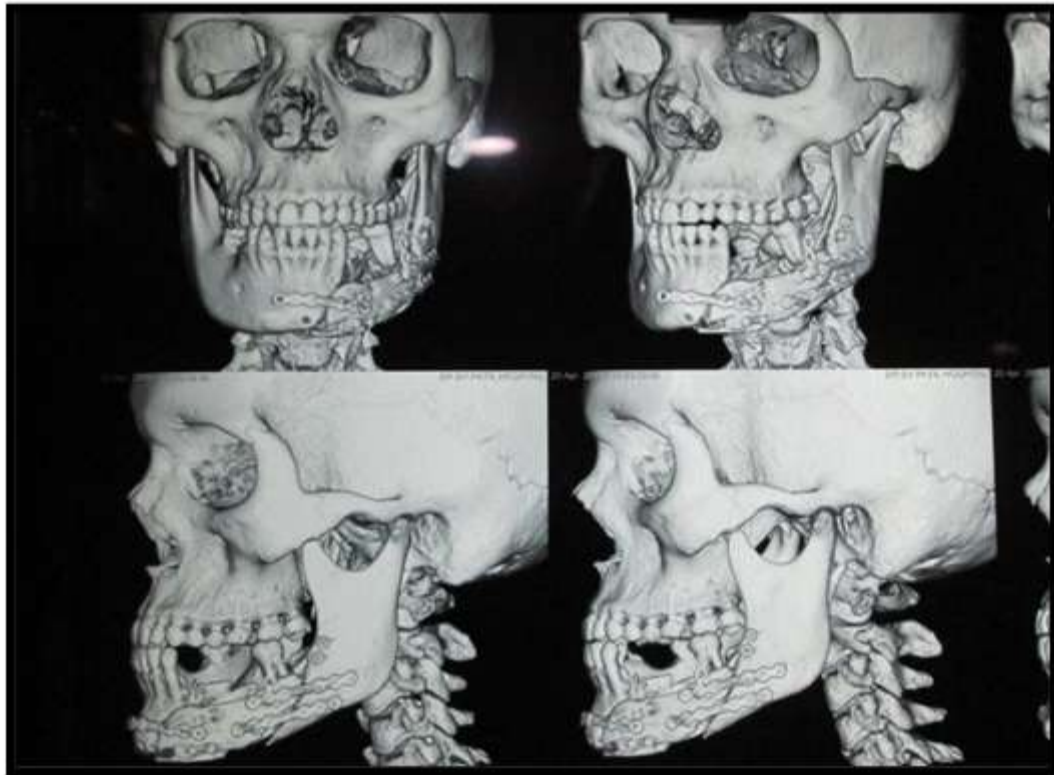


Figure no 4- 3D reconstruction computed tomography showing the titanium plates and screws in various facial angle.



Figure no 5- Pus discharge from the operating region after three month



Figure no 6- Ozone gas was applied extra-orally in left submandibular region



Figure no 7- Pus discharge was stopped and extra oral wound was healed adequately after one month applied ozone gas.