Original Research

Post Surgical Complications of Mandible Fractures: Role of Substance Abuse And Oral Hygiene

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ABSTRACT

Objectives: This study was designed to evaluate the influence of substance abuse (Tobacco use, alcohol) and role of oral hygiene in the treatment of mandible fractures.

Patients and Methods: This Prospective study was performed over a 3 year period from 2011 to 2013 in the Department of Oral and Maxillofacial Surgery at HKES's Nijalingappa Dental College Gulbarga. The sample was composed of 20 patients with mandible fractures treated by Open Reduction and Internal Fixation. Patient's social histories were reviewed for a history of HIV status, alcohol abuse and drug abuse, oral habits like tobacco chewing and smoking.

Results: 32% of our cases developed minor complications. Among 20 patients, 20% were smokers, 20% were tobacco chewers, and 20% were alcoholic patients. 65%tobacco chewers, 50% alcoholics, 75% smokers developed minor complications after one month. 88% with poor oral hygiene/periodontal status patients developed mild infection.

Conclusion: The results of this study show that chronic substance abuse and poor oral hygiene can significantly affect treatment outcomes in management of mandibular fractures.

Key words : Infection, Mandible Fracture, MMF (Maxillomandibular Fixation), ORIF (Open Reduction and Internal Fixation), Oral Hygiene, Substance Abuse.

INTRODUCTION

Fracture of the mandible is common in patients who sustain facial trauma as the mandible is one of the common targets in altercations [1].The management of this usually involves Open Reduction Internal Fixation (ORIF). This procedure entails certain postsurgical complications the principal reasons for which include inadequate fracture stabilization or reduction, failure to provide antibiotics, delay between trauma and treatment, teeth along the fracture line, inexperience of the surgeon, lack of patient compliance, alcohol, tobacco use, poor oral hygiene and drug abuse [2]. Abusers of illegal substances and alcohol have been reported to be at higher risk for complications after treatment of mandible fractures [3]. Alcohol abuse is considered as a risk factor for the development of fibrous union in mandible fracture and recommended that strong consideration to be given for treating alcohol abusers with rigid internal fixation [4].This study was designed to evaluate the influence of substance abuse (tobacco use, alcohol) and role of oral hygiene in the outcome of the treatment of mandibular fractures.

MATERIALS AND METHOD

The study was conducted in Department of Oral and Maxillofacial Surgery at HKES's Nijalingappa Dental College Gulbarga between periods of 2011-2013. 20 patients operated for maxillofacial trauma with 25 fracture sites in mandible treated by Open Reduction and Internal Fixation with titanium miniplates were selected for this study. Inclusion Criteria's were Fracture involving tooth bearing area of mandible and Cases indicated for rigid internal fixation. Exclusion Criteria was medically compromised patient. Twenty patients who fulfilled the above criteria were selected for the study. Pre-operative assessment and detailed case history was recorded. Patient's social histories were reviewed for a history of alcohol abuse and drug abuse, oral habits like tobacco chewing and smoking. Systemic examination was done to rule out the diseases associated with central nervous system, cardiovascular system, respiratory system and gastrointestinal system. General physical examination was done to ascertain the absence of any associated injury to the thorax, abdomen, genitourinary tract or long bones. In the local examination, inspection and palpation of the extra oral and intraoral soft tissues followed by a detailed examination of the underlying hard tissue was done.

On admission each patient received intravenenous 1gm Cefotaxime every 12th hourly for 5 days or till the surgery day whichever is earlier. 15 out of 20 patients were operated after 5 days. Post operatively patients were continued with antimicrobial prophylaxis Injection Cefotaxime 1 gm/ every 12th hourly for 5 days. Due to limited anaerobic activity of most cephalosporin treatment is supplemented with Metronidazole 100 ml IV infusion over 60 minutes. Injection Gentamycin 80 mg is injected Intravenous 12th hourly for 3 days. Internal fixation was accomplished using titanium mini plating systems via an intraoral or extra oral approach.

All teeth in the line of fracture were preserved unless it was fractured. Post operative assessment was done, immediately, 1 week, 2 week , l month, 3months and 6 months to assess occlusal status , stability of fracture fragments and any signs of infection. MMF (Maxillomandibular Fixation) was kept for similar duration of 2-3 weeks among all patients. All patients were given proper

instruction and Betadine Mouthwash for achieving good oral hygiene during MMF period. Criteria for the diagnosis of post operative infections at the site of the fracture were the swelling or pain, presence of purulence with or without drainage, signs of nonunion or mal-union with associated pain and swelling. For our convenience and to bring objective readings, swellings were graded as

Grade0	No swelling
Grade1	Mild soft swelling with no pus discharge
Grade2	Moderate swelling with no pus discharge
Grade3	Swelling with pus discharge
Grade4	Severe firm diffuse swelling on face(cellulites)

Table 1 – Grading of swelling

Sl. No	MMF period (week)	Oral Hygiene Status (Poor/Fair)	Habit	Complication Present
1	2	Fair	Absent	Absent
2	2	Fair	Absent	Absent
3	3	Fair	Absent	Absent
4	3	Poor	Present	Present
5	2	Fair	Present	Absent
6	2	Fair	Absent	Absent
7	3	Poor	Absent	Present
8	3	Fair	Absent	Absent
9	3	Poor	Present	Present
10	3	Fair	Present	Absent
11	3	Fair	Absent	Absent
12	3	Poor	Absent	present
13	3	Poor	Present	Present
14	3	Poor	Present	Present
15	3	Fair	Present	Absent
16	3	Fair	Absent	Absent
17	3	Fair	Absent	Absent
18	2	Poor	Absent	Absent
19	3	Poor	Absent	Present
20	2	Poor	Present	Present

Table 2 – Master chart of 20 patient

The data were managed and analyzed using the SISA statistical analysis system. To assess the association between possible risk factors and postoperative infection, univariate analyses were performed using chi-square analysis [5].s

RESULTS

The sample size was predominantly male (95%) with a mean age of 28.5 years and range of 14 to 40 years. The majority of fractures were caused by road traffics accident (90%).

The time that elapsed between the injury and surgical repair ranged from 2 to 14 days with an average of 8.1 days. 12% patients had symphysis fracture, 66% patients with parasymphysis fracture, 16% with angle fracture and body fracture 6%. Major post operative complication necessitating a second surgical intervention was 0%, 8 out of 25 fracture site (32%) had minor complications like, pain and tenderness, Grade1 swelling observed roughly after one month of surgery. Among those 20 operated patients, 20% were smokers, 20% were tobacco chewers, 20% alcoholic. 75% smokers developed mild infection, 65% tobacco chewers had pain and tenderness at fracture site after one month. 50% alcoholic patients showed minor complications. 88% with poor oral hygiene/periodontal status patients developed mild infection. This corresponds to a significant correlation in the rate of infection with patient periodontal status and social status. All data were statistically analyzed using chi-square test. (Table 3) demonstrates strong relation between patient oral habits against the potential etiology as P value = 0.03, $P < 0.05$. Smokers and tobacco chewers are at higher risk of complication compared to non smokers and tobacco chewers.

	Complication Present	Complication Absent
Patient with habits	5	3
Patient without habits	2	10
P value =0.0352		

Table 3 - Patient Habits Vs Complication

Among 20 operated cases, 9 were having poor oral hygiene. 8 out of 9 developed minor complications like pain, tenderness and Grade1swelling one month after surgery. (Table 4) suggests Poor oral hygiene and Poor periodontal status are one of the major contributing factors of complications. Since P value is less than 0.05.

	Complication Present	Complication Absent
Oral hygiene-Fair	0	11
Oral hygiene-Poor	6	3
P value =0.0012		

Table 4: - Oral Hygiene Vs Complication

15/20 patients were operated after 5 days of admission in hospital. (Table 5) We observed Delay in treatment does not lead to increased risk/complication. Since p value of 0.9999 is greater than the conventionally accepted significance level of 0.05

(i.e. $p > 0.05$) we conclude that there is no significant correlation between delay in treatment and complication rate.

	Less than 5 days	More than 5
Complication Present	3	9
Complication Absent	2	6
P value =0.9999		

Table 5: - Delay In Treatment Vs Complication

DISCUSSION

With an increasing understanding of the biomechanics of the mandible and the dynamics of healing, there has been a growing acceptance of fact that susceptibility to infection is directly depending on mobility of fracture fragments. Most commonly occurred complication associated with mandible fracture can be classified into Major complication and Minor Complication [6, 7] Major complications are infection required incision and drainage, IV antibiotics, debridement of non-vital bone, removal of bone plate. Minor complications are swelling without discharge of pus, pain in the area of bone plate. Passeri classified Post operative Inflammatory complications as recurrent swelling with fever, pain and trismus, wound dehiscence with purulent drainage, exposed or infected hardware, abscess formation, radiographic evidence of osteomyelitis, presence of fistula [8].Clinical advances in oral surgery and advent of antibiotic therapy proved that reduction of bone gap and absolute rigidity promoted primary bone union, expediting the healing time [9, 10, 11]. As long as fixation has remained stable, union will occur even if an infection was present [12]. The risk of potential infection of these wounds without use of prophylactic antibiotics ranges from 22%-50% [13].The risk can be reduced to as low as 10%with use of prophylactic antibiotics [14].

32% of our cases showed minor complications. In all the patients with minor complications, fracture healed uneventfully with oral antibiotics and betadine oral wash. The result of our study indicate that a most important variable in determining treatment outcomes following management of mandible fractures in this population of patients were the association with substance abuse(tobacco use, alcohol) and poor oral hygiene.

Among 20 patients, 20% were smokers, 20% were tobacco chewers, and 20% were alcoholic patients. 65% tobacco chewers, 50% alcoholics, 75% smokers developed minor complications after one month. 9/20 patients were having poor oral hygiene/periodontal status. 88% with poor oral hygiene/periodontal status patients developed mild infection

According to Gomez there is evidently close correlation between substance abuse and post surgical complication in patients with mandible fracture, because of both physiologic alterations and patient behavior [15]. Smoking has its influence on general as well as oral health of an individual. Smoking upregulates the expression of pro-inflammatory cytokines such as interleukin-1, which contributes to increased tissue damage and alveolar bone resorption [16]. Nicotine may have an effect on cellular protein synthesis and impairs the gingival fibroblast's ability to adhere, thus interfering with wound healing and exacerbating periodontal disease [17]. Substances in tobacco and its smoke, particularly nicotine, cotinine, carbon monoxide, and hydrogen cyanide are cytotoxic to those cells that are involved in wound healing, increases platelet adhesiveness and blood viscosity leading to the augmented risk of micro vascular occlusion, increased levels of fibrinogen, carboxyhaemoglobin, and compromised polymorphonuclear leukocyte function [18,19]. Nicotine increases platelet adhesiveness, raising the risk of micro vascular occlusion, and tissue ischemia. Smoking is associated with catecholamine release, resulting in vasoconstriction and decreased tissue perfusion. Studies suggested that in smoker's salivary arginase activity is increased, that lead to less nitric oxide production which consequently increases the susceptibility to bacterial infection [20]. Patients with the combination of smoking and poor oral hygiene had about three times greater bone loss after 10 years than nonsmokers

Heavy alcohol consumption generally defined as daily intake of > 50gm pure ethanol is related to more than 60 medical conditions, both acute and chronic. Head and neck cancers are not only the oral conditions associated with such behavior. Dental abnormalities due to alcohol consumption are abnormal maxillary and mandibular growth, disturbed odontogenesis, sialosis and drymouth due to autonomic dysfunction and fatty infiltration in salivary glands, dental caries, and periodontal disease [21].Chronic alcohol exposure may inhibit fracture healing because of abnormal bone metabolism resulting in hypocalcaemia, hypercalciuria, reduced level of vitamin D metabolites, and suppression of osteoblast function and reduced levels of serum osteocalcin [22, 23].

Numerous medical problems have been associated with substance abusers, including hepatitis, cutaneous infections, malabsorption, and malnourishment [24, 25, 26]. In patients with alcohol induced liver injury serum levels of albumin, prealbumin, transferin are reduced which are commonly associated with postoperative complication [27, 28, 29 30]. Malabsorption and Malnourishment are associated with substance abuse [2, 8, 24, 31]. Folate deficiency in alcoholics manifest as Macrocystic Anemia. A correlation between increased LDH and alcohol exposure was also noted. Consistent with other studies a positive correlation between AST and drink-years exposure was also found [32]. Uncooperative alcoholics were likely to have delayed or nonunion [33]. Eid K noted a 30% more complication among patients with mandible fracture who were intoxicated with alcohol at the time of injury [34]. Preexisting medical problems were associated with increased risk of Post operative complications following treatment of mandible fracture. It seems that patients with combined substance abuse and poor oral hygiene have strong relationship with post operative complications following mandible fracture treatment, increasing them significantly.

CONCLUSION

The sample size of the study is too small to come to a valid conclusion, but abusers of illegal substances and alcohol are at higher risk for complications after treatment of mandible fractures. Increased risk for complications in substance abusers may be multifactorial. Malnutrition has also been cited as a factor in postoperative complications among substance abusers Therefore, identifying substance abusers preoperatively may aid in formulating appropriate treatment plans.

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