Efficacy of Post-Operative Antibiotics in the Management of Facial Fractures: Single Day Against Five Day Regimen

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ABSTRACT

Based on the duration of antibiotics received post-operatively, 56 patients with maxillofacial fractures were divided into two groups, Group A patients received antibiotics for not more than 24 hr. in the post-operative period whereas Group B patients received antibiotics for duration of five days post-operatively. They were then followed up at 7th, 14th, 28th, and 42nd day for signs of infection such as pus discharge, fever etc by using a standardized form. Patients having any signs of infection were counted as infected.

In the Group A, 8 out of 25 subjects (32%) developed infection. In Group B, 10 out of 31 subjects (32.2%) developed infection. Statistical analysis using chi-square test distribution showed that this difference in proportions was not significant.

This study showed that the use of postoperative prophylactic antibiotics does not have a statistically significant effect on postoperative infection rates in the surgical management of facial fractures.

Keywords: Facial Fractures, Prophylactic Antibiotics, Maxillo-Facial Trauma,Infection.

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INTRODUCTION

In the present scenario no specific protocols exist for the duration in prescribing antibiotics following surgery. Establishing the duration of therapy is important in order to gain maximum treatment benefit while minimizing the development of resistance and other adverse effects. As far as possible, antibiotics should be administered for the shortest duration possible and many studies show that short-duration therapy is as effective as longer durations, and helps to minimize inadvertent sequelae of antibiotics[1-3].

Prophylactic use of antibiotics has shown to decrease postoperative morbidity, reduce hospitalization, and cut overall costs attributable to infections[4]. The most important interventions to prevent surgical site infections are optimum timing of prophylactic antibiotics so that administration occurs within one hour prior to surgical incision, selection of most efficacious antibiotic, and duration of postoperative antibiotic administration[5].

MATERIALS & METHODS

METHODS OF DATA COLLECTION

56 patients with maxillofacial fractures requiring Open Reduction and Internal Fixation (ORIF)were enrolled. Participants were informed about the purpose of the study and the risks involved.

ELIGIBILITY CRITERIA

I. Inclusion

1. Patients with maxillofacial fractures to be treated by ORIF.
2. Patients with ASA I & II status.
3. Patients who agree to return at regular intervals for follow up.

II. Exclusion

1. Patients with comminuted fractures.
2. Patients with grossly contaminated fractures.
3. Patients who are already on more than 3 days of antibiotics before surgery.
4. Polytrauma patients

STUDY DESIGN

Based on the duration of receiving postoperative antibiotics, the participants were randomly divided into Group A (25) & Group B (31)

Group A: Patients received only Amoxicillin (1g) parenterally eighth hourly for not more than 24 h in the postoperative period.

Group B: Patients received Amoxicillin (500mg) and Metronidazole (500mg) parenterally eighth hourly for five days in the postoperative period.

Loading dose of Amoxicillin (1g) was administered 1 hour prior to surgery in both groups of patients. Patients in both the groups who were allergic to amoxicillin were administered parenteral Ciprofloxacin (200mg) accordingly. All patients also received three doses of dexamethasone perioperatively and anti-inflammatory drugs post-operatively.

Treatment modality used was Open Reduction and Rigid Internal Fixation using stainless steel miniplates and screws, stainless steel transosseous wire and stainless steel lag screws. All patients were advised chlorhexidine oral rinse post-operatively. The subjects in both the groups were followed up at 7, 14, 28 and 42 days postoperatively and the findings were recorded in self-designed format.

CRITERIA TO ASSESS INFECTION

The operative site was classified as infected if following signs or symptoms were observed within 6 weeks of surgery postoperatively.

1.Local evidence of infection.

2.Purulent discharge from surgical site.

If any infections occurred during the follow up period, the patient was treated for the same by prescribing empirical antibiotics.

From all the patients, data related to demographic factors and other variables like

1. Fracture location
2. Adverse habits like substance abuse were counted as present or absent.
3. Oral hygiene status was assessed and patients were categorized as having good, fair or poororal hygiene. The absence of any debris/calculus rated as good, the presence of debris/ mild calculus rated as fair. Presence of tenacious calculus rated as poor oral hygiene.
4. Tooth in fracture line.
5. Duration between injury and surgery (in days).

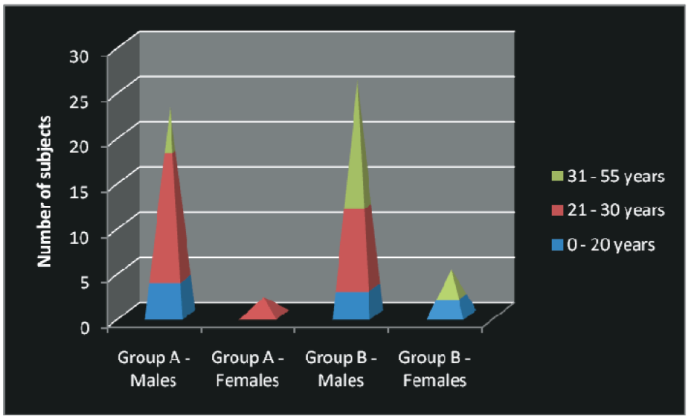
STATISTICAL PROCEDURES

For comparing categorical variables between two groups Chi-square test was applied and for comparing continuous variables Mann Whitney test was used.

RESULTS

56 patients ranging from 18 years to 48 years of age were included, with a mean age of 25.96 years and standard deviation of 6.761 in Group A and with a mean age of 31.81 years and standard deviation of 10.947 in Group B. (Graph No. 1)

Graph No.1: Age & Gender Distribution Of Groups



TYPES OF FRACTURES

The type of fracture in Group A included combination fractures (n=10), isolated mandible fractures (n=7), Zygomatic Complex Fractures (n=6) while in Group B included combination fractures (n=17), isolated mandible fractures (n=8), Zygomatic Complex Fractures (n=6).

STATUS OF ORAL HYGIENE

In Group A Oral hygiene was evaluated to be poor (n=3), fair (n=10) and Good (n=12); and in Group B as poor (n=5), fair (n=18) and good (n=8). The distribution of subjects with relation to levels of oral hygiene was not statistically significant.(Table. 1)

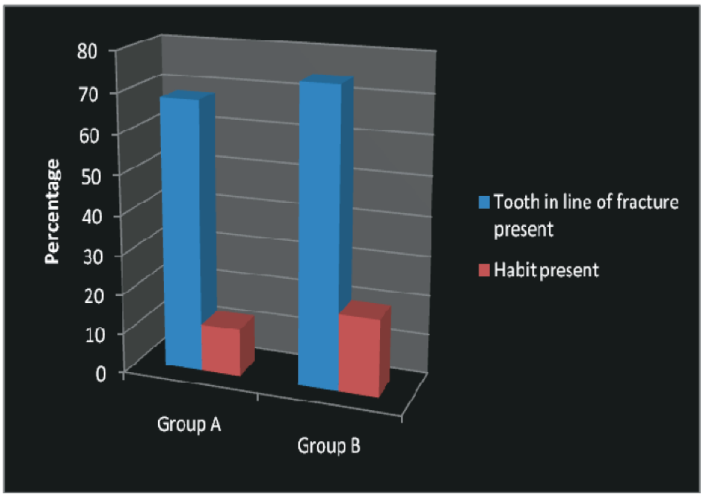
Table 1: Status of Oral Hygiene

Oral Hygiene	Group A	Group B	df	P value
Good (%)	48	25.8	2	0.22
Fair (%)	40	58.1		
Poor (%)	12	16.1		

PRESENCE / ABSENCE OF HABITS

Habits such as alcohol consumption, cigarette smoking and/or chewing paan or gutka were recorded. Of all the patients in the study, adverse habits were recorded in three patients in Group A and six patients in Group B. This difference was not significant statistically. (Graph No. 2)

Graph No.2: Distribution Of Tooth in Fracture & Habits



TOOTH IN FRACTURE

Tooth in line of fracture was present in 17 patients of Group A and in 23 patients in Group B. The distribution of subjects with relation tooth in line of fracture was not statistically significant.

(Graph No. 2)

TIME BETWEEN INJURY & TREATMENT

The duration between time of injury and treatment was recorded in days. Of the patients in Group A the mean duration was 4.27 days and in Group B it was 4.77 days. This difference was not significant statistically. (Table.2)

Table 2: Time between injury & treatment

Groups	Time between Injury and treatment (in days)	Standard deviation	P value
Group A	4.20	4.28	0.70
Group B	4.77	5.62	

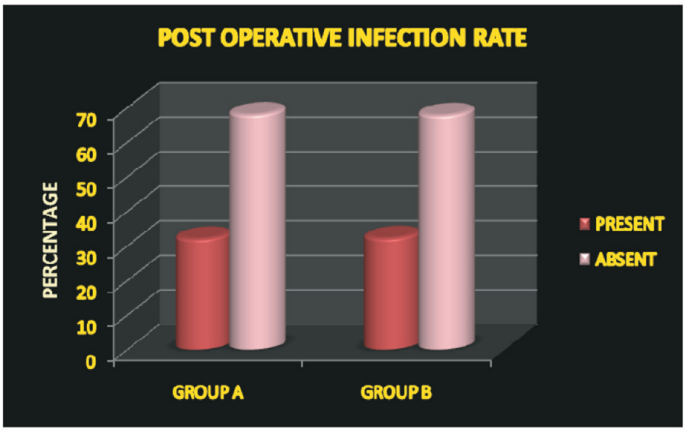
POSTOPERATIVE INFECTION RATES

Of the 25 patients in group A, 8 patients were infected and they accounted for 32% of cases within the group. In Group B, 10 of the 31 patients were infected which accounted for 32.25% of cases within the group. The infection rates between these two groups were found to be statistically insignificant. (Table.3, Graph No.3)

Table 3: Infection Rates

Infection	Group A	Group B	df	P value
Present (%)	32	32.25	1	0.6
Absent (%)	68	67.5	1	

Graph No.3: Rates of Post-Operative Infections between Group



DISCUSSION

To prevent infection the following two factors should be achieved: first, decreasing bacterial load in the surgical wound, and second, improving host defenses in order to prevent the bacteria that inevitably enter the wound from causing clinically evident infection.Antibiotics cannot be administered before bacterial contamination occurs in a traumatically injured patient and thereby an important principle of antibiotic prophylaxis is violated, raising the issue of whether or not antimicrobial administration in these patients truly represents prophylaxis. As a result, both short and long-term regimens have been implemented. Numerous studies have been conducted to identify the optimal duration of therapy in this population[2,3,6].

Principles of antimicrobial prophylaxis have been well laid out[1]. Class I surgery, also known as clean surgery, occurs when no transection of the respiratory, gastrointestinal (GI), or urinary tracts occurs, and there is no break in surgical-aseptic technique. Clean surgery has an infection rate of approximately 2%.Class II surgery, clean-contaminated surgery, exists when the respiratory, GI, or genitourinary (GU) tract is entered, but when no significant bacterial contamination occurs. Transoral surgery is considered to be in this class. The expected infection rate in clean-contaminated surgery is 10% to 15%.

Class III surgery, contaminated surgery, occurs when there is gross spillage from the GI tract or entry into infected GU or biliary tracts. Fresh traumatic injuries are also considered contaminated surgery. The infection rate in class III surgery is 20% to 30%. Class IV, or dirty surgery, exists when there is established clinical infection, or a traumatic injury more than 8 hours old. It has an infection rate of nearly 50%.

The most important principle in antibiotic prophylaxis is to administer the antibiotic at a time that provides high blood and tissue levels at the time of anticipated bacterial contamination of the wound. This was established by experimental studies of dermal lesions in guinea pigs in which it was found that there is a decisive period of up to 3 hours after bacterial contamination during which antibiotics will prevent an infective lesion from developing[7].

It has been proven that prolonging antibiotic administration post-surgery does not decrease the incidence of wound infection. For short procedures, a single dose of antibiotic preoperatively is sufficient to prevent wound infection. For longer procedures, intraoperative doses are given as necessary, and a final dose in the recovery room is sufficient for maximum infection control[8].

In our study we found infection rates of 32% and 32.2% in groups A and B respectively, suggestive of duration of post-operative prophylactic antibiotics does not have significant role in developing infections in surgical management of complicated or uncomplicated mandibular fractures[3, 6,9-10].

Several systemic alterations occur with substance abuse. Habits such as smoking potentially alter homeostasis and the immune system, causing psychological and physical alterations that affect postsurgical recovery. Trauma patients with substance abuse problems often suffer from malnutrition and behavioural issues, which can be another factor in postsurgical complications.

In our study we found that 67% of the patients who had adverse habits had developed an infection whereas only 25% patients without them had developed infection. This was a statistically significant finding.[11-14]

A major controversy exists regarding management of the tooth in the fracture line.[15] In our study tooth in fracture line was present in 40 patients out of 56. All those teeth which were mobile or interfered with fracture reduction were extracted. Other teeth were left in situ and extracted after 3 months. Theoretically, a tooth in the fracture line can act as a portal of infection and, if the tooth is mobile, has periodontal or periapical pathology, or if carious, it should be removed.[8, 15-16]

We came across patients with inflammatory complications such as persistent/increased swelling beyond the seventh postoperative day, erythema, pain and purulent discharge from the surgical site. Post-operative inflammatory complications after mandible fractures are reported to occur with frequencies up to 30%. In our study we observed a postoperative infection rate of 32% and this is consistent with other studies.[10,17-18]

Another important contributory factor for developing infection is time or duration between injury and definitive treatment.The mean duration between time of injury and surgery was 4 days. Although the main reason for delayed medical care was social status, the number of cases with improper diagnosis and treatment by other non-specialist clinicians was also significant. Patients often present with additional systemic injuries that merit more acute considerations, thus rendering repair of the facial fractures as secondary.

We observed that amongst all those patients whose duration between injury and surgery was less than or equal to 3 days had less chance of developing infection. Only 22.9% of patients who were operated within 3 days of injury had infection whereas 47.6% of the patients who were operated more than 3 days of injury had infection. Delay in treatment can also be attributed to developing infection or postoperative complication. [13, 19- 20] There are certain limitations in our study that should be addressed. Our sample size was not large enough to detect the differences in infection rates necessary to reach statistical significance. The review was biased toward early discovery, so minor or insignificant infections were included.

CONCLUSION

Our results are consistent with previous studies in that the use of postoperative prophylactic antibiotics does not have a statistically significant effect on postoperative infection rates in the surgical management of facial fractures. Although perioperative prophylactic antibiotics have been proven to lower infection rates postoperatively and are in wide use, there seems to be no role for continuation of these antibiotics beyond 24 hours. Larger studies with improved control of confounding variables may still need to be conducted to further prove this hypothesis

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