

ROLE OF PREOPERATIVE ANTIBIOTICS IN PREVENTION OF POSTOPERATIVE INFECTION AFTER IMPACTED MANDIBULAR THIRD MOLAR SURGERY

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ABSTRACT

The aim of the study was to determine the role of preoperative antibiotics in prevention of postoperative infection among patients undergoing impacted mandibular third molar surgery. A randomized controlled study was conducted at the Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry / Punjab Dental Hospital, Lahore from January 2018 to June 2018. A total of one hundred fifty patients, randomized into two equal groups A and B by using lottery method, having impacted mandibular third molar of similar difficulty index were operated for surgical extraction. Group A (without antibiotic cover) did not receive prophylactic antibiotic cover, whereas group B (with antibiotic cover) received preoperative antibiotics, 2 gram amoxicillin capsule one hour prior to surgical intervention. Data concerning patient's demographics, preoperative antibiotics and status of postoperative infection was obtained and analyzed. Among 150 patients, 58(38.7%) were males and 92(61.3%) were females with average age of 25.36±5.01 years. The infection rate in group A was 28.0% as compared to 6.7% in group B, and the difference was highly significant statistically with p-value 0.001. The results of this study confirmed that a preoperative antibiotic reduces the chances of postoperative infection in impacted third molar surgery.

Key Words: Antibiotics, Infection, Third molar surgery

INTRODUCTION

The surgical extraction of third molars impacted in mandible is a routinely performed procedure among the minor surgical procedures done in oral and maxillofacial surgery department and is associated with multiple inflammatory complications postoperatively like infection, trismus, swelling and pain.^{1,2,3,4} Extraction

of third molars is among clean contaminated group of surgeries, but complications following such procedures ranges from 1.0% to 27%.^{2,3,5,6,7,8} Surgical extraction of mandibular third molar may range between easy to extremely difficult depending on multiple factors, like tooth angulation and location in relation to distal second molar tooth and ascending border of the mandibular ramus, the bone density and proximity to inferior alveolar nerve.^{5,9}

The mouth is populated with almost 400 different types of bacteria both anaerobic and aerobic.^{2,6} Regarding infections when the third molars are surgically removed the organisms most often outlying includes bacteria like gram positive and gram negative anaerobic cocci.^{2,5,6,10} Correct use of prophylactic antibiotics needs consideration of multiple aspects like what kind of surgical procedure is going to be conduct, which organisms need to be targeted, particular antibiotic efficacy and considering the amount of dose and time of administration.^{5,10} The conclusive objective of remedy is to use the antibiotic which particularly target the causative organisms.⁵

Preventive antibiotics administration in impacted third molar surgery in normally fit patients is debatable.^{3,11} Single dose antibiotic administration at proper time in preoperative period is equitable efficacious as compared to multi dose antibiotic administration in

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postoperative several days.^{3,10,11,12} As a first line therapy in treatment of oral cavity infections conventionally beta lactamic group of antibiotics were used due to their bactericidal outcome on causative bacteria, rare incidence of drug reactions and comparatively low price.^{1,6} But due to their extensive use in the past many bacteria strains have become resistant to these antibiotics.^{6,10} Currently antibiotics with a B-lactamase inhibitors are considered as preferred available treatment modality.^{1,5,6,8,11} Controversy exist in literature, regarding the usage of antibiotics preoperatively before impacted mandibular third molar extraction in prevention of postoperative infection. Frequency of infection differs in patients with and without antibiotic administration and ranges from 5.9% and 25% respectively following impacted mandibular third molar surgery.^{6,12}

The objective of this particular study was to determine the frequency of infection in patients undergoing impacted mandibular third molar extraction with and without preoperative antibiotics.

PATIENTS AND METHODS

This study was based on a randomized controlled clinical trial¹ conducted at Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry/ Punjab Dental Hospital Lahore. The duration of study was six months from January 2018 to June 2018. A total of 150 patients were incorporated in this study. All the patients were treated on out-patient basis. Patients with 17 years and above age having level B and class II third molars according to classification described by Pell and Gregory, requiring extraction of their mandibular impacted third molars due to pain, swelling or pericoronitis were included in the study. Patient's with bleeding disorders and other medical conditions that can jeopardize healing, infection and any bony pathology around the tooth going to be extracted, patients who have taken preoperative antibiotics and patients who were known allergic to beta lactams (confirmed through history) were excluded from the study.

The study approval was obtained from ethical review board of de'Montmorency College of Dentistry, Lahore and informed consent was acquired from patients before their inclusion in the study.

All the patients who came to the oral & maxillofacial surgery department for the removal of mandibular third molar were subjected to complete history taking followed by clinical examination. Routine pre-operative investigations were advised and relevant radiographs were taken. All the patients were examined and treated by the single surgeon.

All patients were divided into two batches by using lottery method of 75 patients each. Batch A was treated without preoperative antibiotics and batch B were given preoperative antibiotics.

All patients were operated under local anesthesia (2% lignocaine with adrenaline 1:100000) using a

mandibular, lingual and buccal nerve blocks.^{2,8} Batch B received 2 gram amoxicillin capsule one hour prior to surgical intervention. Batch A received no antibiotic therapy before procedure. In both groups envelop flap was used for the extraction of third molars impacted in mandible followed by closure of surgical wound with 3-0 silk sutures.^{1,8} All patients were prescribed 400mg ibuprofen; one tablet 8 hourly for four days whereas none of the group received any antimicrobials postoperatively. Instructions for the maintenance of oral cavity hygiene were given to all the patients in postoperative period by employing 0.2% chlorhexidine mouthwash rinses.^{1,4,8}

Postoperative evaluation of both study groups for infection was done clinically on third and seventh day and recorded in specially designed Performa.^{5,8} Diagnosis of infection was made on the visual evidence of existence of pus in the socket from where impacted tooth was removed. In order to eliminate the intra-observer error analysis and follow up were performed by the same surgeon.⁸ Infections when appeared was managed accordingly with postoperative antibiotics.⁵

All collected data were analyzed through Statistical Package for Social Sciences (SPSS) version 20.0 software (SPSS, Inc., Chicago, IL, USA). The qualitative variables like gender and infection was demonstrated in form of frequencies and percentages while quantitative data that is age was demonstrated as mean with standard deviation. Chi Square test was applied to test the significance of difference between the two groups. Odds ratios were presented with 95% confidence interval and adjusted odds ratios determined by binary logistic regression were also presented with 95% confidence interval. $P \leq 0.05$ was regarded significant.^{1,6,8}

RESULTS

There were 150 patients who presented with third molars impacted in mandibular impactions with a mean age of 25.36 ± 5.01 year (Figure-1). Among 150 patients 58(38.7%) were males and 92(61.3%) were females with an overall ratio of male to female of 1:1.67. The batch A was without antibiotic cover and batch B received antibiotic cover. The age distribution after randomization was almost same in two groups with insignificant difference (p -value=0.741). The infection rate in batch A was 28.0% as compared to 6.7% in batch B, and the difference was greatly notable with p -value 0.001 (Table-1). In this study, right side third molar was impacted in 81(54%) patients, whereas 69(46%) were on left side thus showing more frequency towards right side.

Later the Odds ratio was calculated for infection by taking gender, age and antibiotic cover as independent risk factors and the adjusted odds ratios by using binary logistic regression analysis by taking age and gender as confounding variables. The males were more prone to infection by odds ratio of 2.16 (0.92-5.09) and adjusted Odds ratio of 1.82(0.73-4.51) though not significant. Similarly the cases with age > 27 years

TABLE1: DISTRIBUTION AND COMPARISON OF CASES FOR GENDER, AGE AND INFECTION FOR TWO GROUPS.

Variables		Group A		Group B		P value
		n	%	n	%	
Gender	Male	29	38.7	29	38.7	1.000
	female	46	61.3	46	61.3	
Age	>27	30	40.0	33	44.0	0.741
	≤ 27	45	60.0	42	56.0	
infection	Infected	21	28.0	5	6.7	0.001
	Non infected	54	72.0	70	93.3	

TABLE 2: COMPARISON OF GENDER, AGE AND ANTIBIOTIC ADMINISTRATION BETWEEN INFECTED AND NON-INFECTED CASES BY SIMPLE AND ADJUSTED ODDS RATIOS

		Infected N=26		Non infected N=124		Odds ratio (95 % CI)	Adjusted Odds ratio (95 % CI)
		n	%	n	%		
Gender	Male	13	50.0	45	36.3	2.16 (0.92 – 5.09)	1.82 (0.73 – 4.51)
	Female	13	50.0	79	63.7		
Age	>27	15	57.7	48	38.7	1.76 (0.75 -4.11)	2.47= (0.99 – 6.17)
	≤27	11	42.3	76	61.3		
Group	Group A	21	80.8	54	43.5	5.44 (1.93 – 15.37)	6.24 (2.13 – 18.25)
	Group B	5	19.2	70	56.5		

had more infection with an Odds ratio of 1.76 (0.75-4.11) and adjusted Odds ratio of 2.47(0.99-6.17), very close to significant difference. The Odds of those not given antibiotic cover were recorded 5.44(1.93-15.37) times higher to have infection as compare to those with antibiotic cover. The Odds ratio adjusted for age and gender to have infection against antibiotic cover was recorded 6.24 (2.13-18.25) and was found highly significant (Table-2).

DISCUSSION

Mandibular third molar surgery is among the most frequent surgical procedures carried out by oral and maxillofacial surgeons.⁶ Infection of hard and soft tissue in a postoperative period is a common complication that can be reduced by adhering to surgical principles and adequate sterilization.^{5,6,13}

Contamination of bacteria at surgical wound occurs either from the host microbial flora or environmental factors.⁵ Antibiotic prophylaxis is considered mandatory before oral surgical intervention in patients with valvular heart disease and total hip joint replacement to prevent infection.^{3,6} Currently antibiotic prophylaxis for various surgical procedures account for over 30% of antibiotic prescriptions globally. Prophylactic application of antibiotic use in third molar surgery is controversial.^{6,14}

The mean age of patients in this study was 25.36 (SD± 5.06). Similar studies by Rohit et al² and Marcussen et al⁷ reported 27.3 years and 28.2 years mean

age respectively whereas Xue et al⁶ observed 25.4 years mean age among their patients. Unlike the current study, mean age reported by Rohit et al² and Marcussen et al⁷ was greater. Majority of the patients (34%) in the study belonged to 18-22 years of age. Managutti et al¹⁵ reported 39% patients belonging to age range of 20-24 years, whereas Ramos et al¹⁰ found 43.8% from 16-25 years age range in similar studies.^{10,15}

Females formed the predominant gender of the current study (63%) and males were 37%. Female predominance was also observed by Sivalingam et al¹⁶ 80% and Marcussen et al⁷ 59%. Incidence of third molars impaction in mandible in females was more frequent that may be due to their small size jaw relative to males that fails to accommodate third molar in their normal anatomical relationship and remain buried in bone.^{7,16,17}

Postoperative infection, a major complication following third molar surgery was observed in patients with age range from 28-38 years. Sayd et al¹³ and Park et al¹⁸ were also of the opinion that chances of infection are higher with increasing age.^{13,18}

Overall infection rate in all female patients of the study was 13.82%. Increased cases of infection were also noticed in those female patients who did not receive antibiotics (23.4%) as compared to those who were given prophylactic antibiotics (4.25%).

In the study, among 75 patients who were given preoperative antibiotics, only 5(6.7%) patients showed

infection. Patients who underwent surgical procedure without preoperative antibiotics showed infection in 28%, while 54 patients (72%) remained free of symptoms. The study clearly showed decreased chances of infection in the surgical extraction of third molar impacted in mandible following prophylactic antibiotic cover.

CONCLUSION

The incidence of infection was 28% when no preoperative antibiotics were given while 6.7% when preoperative antibiotics were given. Thus results of this study confirmed that there was higher incidence of infection when no preoperative antibiotics were given, showing a significant association between the infection and antibiotic regime used for extraction of impacted mandibular third molars.

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| 4 Omer Sefvan Janjua: | Data collection and data analysis. |
| 5 Muhammad Mustafa Ch: | Drafting of article and tabulation of results. |
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