

EFFICACY OF TWO DIFFERENT ANTIBIOTICS IN MANAGEMENT OF POST-OPERATIVE COMPLICATIONS OF IMPACTED THIRD MOLAR

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ABSTRACT

Objective: To determine the efficacy of two different antibiotics in reducing the postoperative complications of impacted third molar.

Materials and Methods: Total of 48 participants were included in this randomized control trial conducted in Feb 2019 to Feb 2020, which were divided into two groups by block randomization where group A was prescribed with amoxicillin while group B was prescribed with metronidazole. On 3rd and 7th post-operative day after the extraction pain was assessed using a 10mm visual analogue scale (VAS) while, maximum mouth opening was assessed using a Vernier caliper. Wound infection and alveolar osteitis were documented as dichotomous variable. Pain and mouth opening were evaluated using t-test or Mann-Whitney U test while alveolar osteitis and wound infections were compared using Chi-square and Fischer's exact test. SPSS version 22 was used for analysis. P value <0.05 was taken as significant.

Results: The results of individual groups revealed no difference in decreasing the postoperative complications after surgical extraction. There was no statistically significant difference between the groups in terms of mean age, VAS score and mouth opening at 3rd and 7th postoperative day ($p>0.5$). We found no significant association between antibiotics and incidence of wound infection and alveolar osteitis ($p>0.5$).

Conclusion: Antibiotics have no significant role in reducing the postoperative pain, limited mouth opening, wound infection and alveolar osteitis. Hence, the use of antibiotic should be limited to surgeon's choice.

Keywords: third molar; complications, antibiotics

INTRODUCTION

When a tooth does not reach the normal occlusal functional position in the oral cavity, despite fully developed with in the jaw is termed as an "impacted" tooth. Since third molars are last teeth to erupt in oral cavity they can remain unerupted due to insufficient

space between the distal part of second mandibular molar and the anterior border of the ascending ramus of the mandible.¹ Common pathologies seen in association with impacted teeth includes caries, pericoronitis, cysts, tumors and root resorption of the adjacent tooth but most of the times they remain asymptomatic.²

Surgical management of wisdom teeth is a common procedure undertaken by oral surgeons in clinical settings and is associated with a variety of complications such as pain, swelling, hemorrhage,

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limited mouth opening, alveolar-osteitis (AO), sensory disturbances, wound infection, involvement of critical facial spaces and lymph nodes.^{3,4} The principle microorganisms responsible for postoperative complications such as wound infection are Streptococci, Bacteroides and Fusobacteria and Prevotella.⁵

Traditionally, antibiotics have been used to reduce bacterial load in order to reduce complications as a result of third molar surgery. There is some evidence in the literature that supports the routine use of antibiotics in minor surgeries^{6,7} but there are studies that have shown that the use of prophylactic antibiotic may have limited role in reducing postoperative complications.^{8,9} In order to reduce chances of antibiotic resistance clinicians should prescribe antibiotics in clinical situations where the patients may have depressed immune responses, or may have bacterial infections or have significant risk of developing wound infections.¹⁰

Therefore, the purpose of this research was to assess the efficacy of two antibiotic prescribed postoperatively in minimizing complications such as pain, limited mouth opening, alveolar osteitis (AO) and wound infection, after the removal of impacted mandibular third molars.

MATERIALS AND METHODS

A prospective research was conducted at department of Oral & Maxillofacial Surgery, University Dental Hospital, University of Lahore and patients with chief complaint associated with impacted mandibular third molars were included from February 2019 to February 2020. A total of 48 patients with impacted third molars that required surgical extraction were recruited via purposive sampling technique.

Healthy, non-smoker patients from both genders undergoing impacted third molar surgery were included in the study. There was no age restriction in the study. Patients were excluded if they had taken antibiotics and/or painkillers within the past 14 days, were pregnant or breast feeding, allergic to amoxicillin or metronidazole, had any pathology associated with third molars or had a history of tumoricidal radiation of the jaws. Patients were divided into two groups A and B, each with 24 patients by block randomization using Microsoft Excel. Group A was prescribed with amoxicillin 500mg thrice daily for 5 days postoperatively while

group B received metronidazole 400mg twice daily for 5 days postoperatively. Both groups were given Non-steroidal anti-inflammatory drugs (NSAIDs) after surgery for three days. The research conducted was approved by the Institutional Ethical Committee, University of Lahore. Informed consent was taken from all patients. All procedures were performed according to the relevant standard guidelines and regulations. All patients were anesthetized. Inferior dental nerve, lingual nerve and buccal nerve blocks were administered for the surgical procedure using 2% lidocaine hydrochloride (1:100,000 epinephrine) anesthetic solution. One surgeon performed all the surgical extractions of impacted third molars in order to minimize variation in standard surgical protocols. A traditional method was used to extract all the impacted teeth. The incision design for all cases was Ward's incision. After raising mucoperiosteal flap, bone guttering on buccal and distal aspect of the tooth was performed with round bur on slow speed hand piece, tooth sectioning was done if required with a straight fissure bur on slow speed hand piece. The tooth was elevated and delivered with the help of a straight elevator. After thorough irrigation sharp edges of bone were checked and smoothed if any. Later repositioning of the soft tissue flap was done. Flap was approximated by using 3-0 Silk suture in all the patients. Before suturing, flap was repositioned and kept under digital pressure to allow initial adaptation of bone. The patients were seen on 3rd and 7th postoperative day and all the outcome variables were recorded accordingly in a post-surgical examination form. The intensity of pain was recorded on a 10mm visual analogue scale (VAS) where 0 was 'no pain' and 10 being 'worst possible pain' on 3rd and 7th postoperative days. Mouth opening was also measured on 3rd and 7th postoperative days by using a Vernier caliper. The patients were asked to open their mouth to the maximum and the inter-incisal distance was noted. Patients were diagnosed with alveolar osteitis if they had severe pain 3-5 days after the surgery and the extraction socket had exposed bone without any clot (11). Alveolar osteitis was recorded as either being 'present' or 'absent'. Wound infection was also recorded as either being 'present' or 'absent'. Patient had wound infection if there was pus discharge with or without localized inflammation at the surgical site (11). All data were statistically analyzed using SPSS software, version 23 (SPSS Inc.; IL, USA). Normality of the data

was assessed using Shapiro-Wilk test and t-test and Mann-Whitney U test were used to compare the outcome variables such as pain, mouth opening and age of the patients in both the groups. Chi-square or Fischer's exact test were used to analyze variables such as wound infection and alveolar osteitis. p value of ≤ 0.05 was considered significant.

RESULTS

Out of total 48 individuals, the most commonly found impaction was a mesio-angular impacted third molar (56.2%) while the least common was distoangular impaction (2.1%) (Table 1). The study sample included 28 male and 20 female patients. Group A had 13 male and 11 female patients while Group B had 15 male and 9 female patients (Table 2).

The mean age of patients in Group A was $28.83 \text{ year} \pm 5.55$ while in group B was $26.46 \text{ years} \pm 6.90$. The difference between the mean age of the patients between the two groups was statistically not significant $p=0.081$ (Mann-Whitney U test)

The mean VAS score for pain on 3rd postoperative day in Group A was 5.83 ± 1.58 while in Group B was 5.13 ± 1.62 . On the 7th postoperative day, it was

2.50 ± 0.89 for Group A while for Group B it was 2.23 ± 0.96 . The difference between the mean VAS score for pain between the two groups was statistically not significant at 3rd ($p=0.71$) or 7th postoperative day ($p=0.52$) (Table 3).

The mean mouth opening of patients in Group A and B at 3rd day was $25.17 \text{ mm} \pm 4.9$ and $27.29 \text{ mm} \pm 5.98$ while at 7th postoperative day it was $30.38 \text{ mm} \pm 3.94$ and $31.04 \text{ mm} \pm 4.9$. The difference in the mean mouth opening between the two groups was statistically not significant at 3rd ($p=0.24$) and 7th postoperative day ($p=0.89$) (Table 4).

One patient in Group A (4.2%) and 3 patients (12.5%) in Group B developed alveolar osteitis. The frequency of infection was also low as only 1 patient (4.2%) in Group A and 2 in Group B (8.3%) developed infection. Fischer's exact test revealed no association between the type of antibiotic prescribed and rate of alveolar osteitis ($p=0.61$) and wound infection ($p=1.0$)

Table 1: Frequency of different types of impacted mandibular third molars

Type of Impaction	Frequency (n)	Percentage %
Mesioangular	27	56.2
Horizontal	12	25
Vertical	8	16.7
Distoangular	1	2.1%

Table 2: Gender distribution in both groups

	Group A (n)	Group B (n)
Males	13 (54.2%)	15 (62.5%)
Females	11 (45.8%)	9 (37.5%)
Total	24	24

Table 3: Mean VAS score for pain

	Group A	Group B	P Value
3 rd Day	5.83 ± 1.58	5.13 ± 1.62	* $p=0.71$
7 th Day	2.50 ± 0.89	2.23 ± 0.96	** $p=0.52$

*Mann-Whitney U Test

Table 4: Mean mouth opening

	Group A (mm)	Group B (mm)	P Value
3 rd Day	25.17 ± 4.9	27.29 ± 5.98	* P=0.24
7 th Day	30.38 ± 3.94	31.04 ± 4.9	*P=0.89

*Mann-Whitney U Test

DISCUSSION

It is still controversial to prescribe antibiotics to patients following dental procedures.¹⁰ Injudicious use of antibiotics has given rise to antibiotic resistance as well as adverse effects such as allergic reactions.¹¹ Regardless of the literature, dental practitioners prescribe antibiotics for five days believing that it minimizes swelling.³

The current study was done to evaluate the efficacy of two commonly prescribed antibiotics in reducing postoperative complications following mandibular third molar extractions. In our study mean VAS score at 3rd day was higher as compared to the 7th postoperative. Mean mouth opening was less at 3rd day in comparison to the 7th day. This is in accordance to a recent study which reported decreased mouth opening due to pain during the early post-operative phase suggesting a strong correlation between pain and mouth opening following surgical extraction of mandibular third molars.¹² Along with pain other factors such as swelling, hemorrhage, soft tissue injury can also lead to inability to open mouth adequately.¹³

We report no significant difference in the mean VAS score for pain and mouth opening in both the groups at 3rd and 7th postoperative day. Siddiqi et al¹⁴ studied hundred patients and documented the post-surgical complications on 3rd, 7th and 14th day in two groups. The study revealed no remarkable difference between placebo-controlled and antibiotic groups about postoperative complications. Similarly, Lee et al¹⁵ failed to document any significant association between antibiotics and post-operative complication when extractions were carried out in groups with similar difficulty levels however, the investigators reported significant association between the incidence of postoperative complications and difficulty of extraction of third molars. Contrary to the present study, Selimović et al¹ investigated the effects of steroid and NSAIDs and concluded that a combine therapy aids in minimizing trismus postop-

eratively following third molar surgery.

The incidence of postoperative wound infections ranges from 0.9% - 5.8%.⁵ In the present study we found no association between the type of antibiotic and postoperative wound infection $p=1.00$ (fisher's exact test). This has been reported previously in a meta-analysis by Isirdia-Espinoza and colleagues,¹⁶ where the risk of infection in healthy patients who have undergone surgical extraction of third molar was not reduced by amoxicillin. Conversely, a previous report¹⁷ concluded that a single dose of amoxicillin significantly reduces the chances of wound infection. A retrospective study¹⁸ identified certain risk factors which make patients vulnerable to post-surgical infections. These include old age, habit of tobacco use, anatomy of tooth, radiotherapy, periodontitis and poor oral hygiene.

One of the most commonly documented complication of third molar surgery is alveolar osteitis or dry socket the incidence of which ranges from 0.3% – 26%.¹⁹ In the current study 8.3% of the patients developed dry socket. We found no association between the two antibiotics and dry-socket ($p=0.61$ fisher's exact test). In contrast to our results Marcussen et al¹⁷ in their systematic review concluded that a single dose of amoxicillin reduces the risk of developing dry socket in patients with third molar extractions. Several risk factors such as female gender, advanced age, smoking, oral contraceptive use and surgical insults have been recognized as predisposing factors for the development of alveolar osteitis.¹⁹

CONCLUSIONS

Within limitations the results of the study have highlighted that prescribing antibiotics post surgically does not significantly contribute in minimizing pain, limited mouth opening, wound infection and dry socket. Use of proper aseptic technique precludes the routine need of prescribing antibiotics. It should be surgeon's decision when and where to prescribe antibiotics, according to the need. Hence, to prevent

resistance and adverse reactions, frequent prescription of antibiotics should be avoided.

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