

Efficacy of Postoperative Prophylactic Antibiotic Therapy in Third Molar Surgery

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ABSTRACT

Introduction: Surgical extraction of mandibular third molar is the most frequently performed procedure in oral surgery. This procedure is associated with significant postoperative sequelae such as trismus, swelling, pain and infection. The need of antibiotic therapy during the removal of mandibular third molar has been a contentious issue.

Method: This study investigated a regimen by using amoxicillin and metronidazole in one group and without using antibiotics in the other. Both the groups were assessed postoperatively on

the 1st, 2nd, 5th, 7th and 10th days by the same observer for post operative mouth opening (interincisal distance), presence of a purulent discharge at the site of surgery, pain and swelling.

Result: Overall, no statistically significant difference was seen between both the treatment groups when interincisal distance, pain, swelling and purulent discharge were considered.

Conclusion: The results of this study failed to show any advantage which was associated with the routine postoperative use of antibiotics in asymptomatic third molar surgeries.

Keywords: Antibiotics, Trismus, Swelling, Pain, Dental

INTRODUCTION

Surgical removal of mandibular third molars is one of the most frequently performed procedures in oral and maxillofacial surgery. The wound infection rate seen after the removal of mandibular third molar is higher than that which is seen after a routine tooth extraction, although the exact incidence of infection is difficult to assess [1]. The use of antimicrobial prophylaxis in third molar surgeries is widespread, but it is controversial. While there is some evidence on the fact that these drugs can reduce the incidence of postoperative complications, there is equally convincing evidence that they do not [2].

The most frequent complication which follows the removal of impacted mandibular third molars is 'Alveolaris Sicca Dolorosa'. Some degree of swelling, trismus and pain, unless they are related to infection or excessive trauma, must be regarded as a normal response to surgery. However, in addition to preventing infection and reducing the incidence of dry sockets, general postoperative morbidity is reduced with antibiotic prophylaxis [3].

Guidance in the use of antibiotic administration is eagerly sought in professional publications, as antibiotic influenced bacterial resistance has become a major crisis in healthcare.

We evaluated the need of postoperative prophylactic antibiotic treatment after the removal of asymptomatic mandibular third molars.

MATERIALS AND METHODS

This prospective study was approved by the Human Studies Review board, after which 100 healthy adult patients who were aged 18–55 years, gave their written consents to participate in it. They were among patients who were scheduled to undergo surgical removals of their mandibular third molars under local anaesthesia.

All patients who were selected were evaluated for their physical statuses and patients with systemic diseases that contraindicated surgical removal of lower third molars under local anaesthesia were excluded from the study. Patients were randomly divided into two groups of 50 each by using a simple, random sampling technique. Both the treatment groups underwent surgical removals of asymptomatic mandibular third molars under local anaesthesia

by using strict aseptic techniques, with only minimal trauma being caused to the surrounding tissues.

Treatment group I was prescribed Cap Amoxicillin 500 mg thrice daily for 5 days and Tab Metronidazole 400 mg thrice daily for 5 days after the surgical removal of mandibular third molars. Treatment group II was not prescribed any antibiotic postoperatively. However, both the groups were prescribed anti inflammatory drugs and analgesics. Both the groups were assessed postoperatively on the 1st, 2nd, 5th, 7th and 10th days by the same observer for post operative mouth opening (interincisal distance), presence of a purulent discharge at the site of surgery, pain and swelling.

Post operative mouth opening was recorded in millimetres by using vernier calipers. Post operative pain was assessed by using a four-point Visual Analogue Scale (VAS): 0 = no pain, 1 = mild pain (pain being reported only in response to questioning and without any behavioural signs), 2 = moderate pain (pain being reported in response to questioning and accompanied by signs, or pain being reported spontaneously without questioning), and 3 = severe pain (a strong vocal response or a response which was accompanied by grimaces, withdrawal of the arm, or tears). Swelling and purulent discharge at the site of surgery were recorded as present or absent.

Data for post operative mouth opening were analyzed by using Student's t-test. Data for pain, swelling and presence of a purulent discharge were analyzed by using Chi square test. Probabilities of less than 0.05 were accepted as significant.

RESULTS

There was a marked decrease in the interincisal distance on the 1st postoperative day, with mean values of 28.7±4.7 in treatment Group I, and 33.7±6.5 in treatment Group II, with a p-value of <0.001 which was highly significant [Table/Fig-1]. No statistically significant difference was seen in interincisal distance between the groups on the 2nd, 5th, 7th and 10th postoperative days. On the 2nd postoperative day, all the patients of group I had swellings, whereas 78% of patients of group II had swellings, with a p-value <0.001 which was highly significant [Table/Fig-2]. Overall, no statistically significant difference was seen between both the treatment groups when pain, swelling and purulent discharge were considered.

| Assessment time | Antibiotic Group | Non antibiotic Group | t* Value | p-value |
|-----------------|------------------|----------------------|----------|------------------------------|
| | Mean +/- SD | Mean +/- SD | | |
| Pre Op | 41.8+/-4.5 | 42.3+/-5.3 | 0.52 | p> 0.05 |
| 1st Day | 28.7+/-4.7 | 33.7+/-6.5 | 4.42 | p < 0.001 Highly significant |
| 2nd Day | 32.3+/-4.8 | 34.4+/-6.2 | 1.93 | p> 0.05 |
| 5th Day | 36.4+/-4.1 | 38.3+/-5.9 | 1.87 | p> 0.05 |
| 7th Day | 39.2+/-3.7 | 40.5+/-5.4 | 1.38 | p> 0.05 |
| 10th Day | 40.9+/-4.0 | 41.6+/-5.5 | 0.75 | p> 0.05 |

[Table/Fig-1]: Comparison of interincisal distance (mm) in the study groups (Student t-test)

| Pre OP | Yes (%) | No (%) | X ² Value | Significance |
|----------------------|---------|---------|----------------------|----------------------------|
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |
| 1st day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 50(100) | 0 | - | NS |
| Non antibiotic Group | 50(100) | 0 | | |
| 2nd day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 50(100) | 0 | 10.21 | p<0.001 Highly significant |
| Non antibiotic Group | 39(78) | 11(22) | | |
| 5th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 2(4) | 48(96) | 0.17 | p>0.05, NS |
| Non antibiotic Group | 4(8) | 46(92) | | |
| 7th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |
| 10th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |

[Table/Fig-2]: Comparison of swelling in the study groups (Chi-square Test)

DISCUSSION

This study had evolved out of a growing concern on the misuse of antimicrobials in third molar surgeries, which was a controversial practice [2]. It was common practice in third molar surgeries, to use antibiotics as a prophylactic therapy against potential infections which were caused by susceptible microorganisms [4], although their timings and protocols varied widely [1,5]. There is a plethora of studies that have advocated or disapproved the use of antibiotics in third molar surgeries. Since giving antibiotic therapy following third molar surgeries is a very common protocol, we decided to test its validity in a prospective and randomized study. In this study, we evaluated mouth opening (interincisal distance), presence of a purulent discharge, pain and swelling postoperatively between the antibiotic and non antibiotic groups.

The most common form of antibiotic prophylaxis which is still being used is systemic administration, [1,6] although the use of antiseptic mouthwashes and placement of antibiotics in extraction socket have been shown to be partially effective in prevention of postoperative infections. More recently, attention has turned to utilization of drugs which are narrow spectrum and active only against causative pathogens. A specific anaerobicidal, metronidazole, has been shown to be effective in preventing complications which followed third molar surgeries [7,8] In the present study, oral route of administration of antibiotics was used. Cap Amoxycillin 500 mg thrice daily for 5 days and Tab Metronidazole 400 mg thrice daily for 5 days were prescribed for treatment group I.

Inflammation always follows any surgical procedure. Inflammation is a protective response which is expected to eliminate the initial cause of cell injury as well as necrotic cells and tissues which result from the original insult [9].

| Pre OP | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
|----------------------|---------|----------|--------------|----------------------|--------------|
| Antibiotic Group | 50(100) | 0 | 0 | - | NS |
| Non antibiotic Group | 50(100) | 0 | 0 | | |
| 1st day | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 27(54) | 23(46) | - | NS |
| Non antibiotic Group | 0 | 31(62) | 19(38) | | |
| 2nd day | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
| Antibiotic Group | 6(12) | 33(66) | 11(22) | 2.12 | p>0.05, NS |
| Non antibiotic Group | 9(18) | 35(70) | 6(12) | | |
| 5th day | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
| Antibiotic Group | 22(44) | 27(54) | 1(2) | 1.1 | p>0.05, NS |
| Non antibiotic Group | 24(48) | 26(52) | 0 | | |
| 7th day | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
| Antibiotic Group | 41(82) | 9(18) | 0 | - | NS |
| Non antibiotic Group | 47(94) | 3(6) | 0 | | |
| 10th day | No (%) | Mild (%) | Moderate (%) | X ² Value | Significance |
| Antibiotic Group | 49(98) | 1(2) | 0 | - | NS |
| Non antibiotic Group | 50(100) | 0 | 0 | | |

[Table/Fig-3]: Comparison of pain in the study groups (Chi-square test)

| Pre OP | Yes (%) | No (%) | X ² Value | Significance |
|----------------------|---------|---------|----------------------|--------------|
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |
| 1st day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |
| 2nd day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 50(100) | 0 | p>0.05, NS |
| Non antibiotic Group | 1(2) | 49(98) | | |
| 5th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 2(4) | 48(96) | 0.26 | p>0.05, NS |
| Non antibiotic Group | 2(4) | 48(96) | | |
| 7th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 2(4) | 48(96) | 0 | p>0.05 NS |
| Non antibiotic Group | 1(2) | 49(98) | | |
| 10th day | Yes (%) | No (%) | X ² Value | Significance |
| Antibiotic Group | 0 | 50(100) | - | NS |
| Non antibiotic Group | 0 | 50(100) | | |

[Table/Fig-4]: Comparison of presence of purulent discharge in the study groups (Chi-square test)

Trismus caused by inflammation resolves by itself in due course, without need of any intervention. Whereas, when there is infection, trismus persists for a prolonged duration and it may even aggravate. This can be controlled by prescribing antibiotics.

It was found in most of the studies that the antibiotics which were used did not differ in their effects caused on the decrease of maximal opening of mouth, as was calculated from preoperative and postoperative measurements [10].

In studies done by Sekhar et al., [2] and Kaczmarzyk et al., [11] no significant differences were seen among the groups in terms of pain, mouth opening and swelling and hence, they failed to show any advantage which was associated with routine preoperative or postoperative use of antibiotics during removal of third molars.

In the present study, it was seen that pain was maximum following surgery, which was possibly caused by the trauma which was

caused by the surgery. It gradually reduced, with 50% of patients having mild pain by the 5th postoperative day. Only 12 out of 100 patients had mild pain on 7th postoperative day [Table/Fig-3].

In the present study, it was found that swelling was evident postoperatively in all the patients, which was inflammatory in origin. It gradually reduced and, by the 5th postoperative day, there was no swelling in almost all the patients, irrespective of whether antibiotic prophylaxis was given or not.

The prevention of wound infection is one of the major goals of every surgeon. When infection does occur, increased patient morbidity and suffering result, with consequent additional expenses, increased antibiotic usage, and a delayed recovery. Principles of infection prevention have been clearly defined, which, when applied, can reduce infection rates to near zero [12].

Rud proposed that the relative rarity of serious infections which followed third molar surgeries and the improvement of postoperative morbidity, which were observed over the past two decades, were caused more likely due to improved patient management, better instrumentation and surgical techniques, and a greater awareness on the importance of strict asepsis [3,13].

In the present study, only 4% of patients from both the groups showed presence of purulent discharges at the operated site [Table/Fig-4], but there was no incidence of dry sockets. Care was taken to follow strict asepsis during the procedures, which resulted in minimal postoperative complications, which failed to prove the role of antibiotics.

The results of this study indicated that there was no justification for use of systemic antibiotics routinely for third molar surgeries.

CONCLUSION

In conclusion, no difference was found between patients who received postoperative antibiotics and the control group, in incidence of postoperative sequelae. There appeared to be very little

clinical gain, on the administration of postoperative oral antibiotics alone. Prophylactic antibiotics given beyond the immediate postoperative period did not seem to provide additional protection. As health professionals, we must remain vigilant while we prescribe antibiotics.

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