A Comparative Clinical Evaluation of the Effect of Preoperative and Postoperative Antimicrobial Therapy on Postoperative Sequelae after Impacted Mandibular Third Molar Extraction

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ABSTRACT

Objectives: To compare the effect of preoperative and postoperative antibiotics therapy on postoperative sequelae after impacted mandibular third molar extractions.
Material and Methods: This was a prospective study conducted at Department of Oral and Maxillofacial Surgery of the Lagos University Teaching Hospitalon consecutive patients with impacted third molar extractions for a 12 month period. Group I (n = 31) had administration of 1 gram of oral metronidazole and 1 gram of amoxicillin capsules 30 minutes preoperative and Group II (n = 31) had 500 milligrams of amoxicillin capsule 8 hourly and 400 milligrams of metronidazole tablets administered post operatively for 5 days. Pain, facial swelling and mouth opening assessment were done postoperatively and on days 1, 3 and 7.
Results: The general pattern of postoperative pain, regardless of antimicrobial use revealed that pain increased from day 1 to day 3 postoperatively and began to decrease in intensity subsequently up to the seventh day. There was however a statistically significant difference (P = 0.0001) between the two groups on the 7th postoperative day with the subjects in Group I showing lower pain intensity. The mean difference of the facial width on days 1 and 3 was significant (P = 0.04 and P = 0.0001 respectively) with subjects in Group II having a reduced facial width compared to those in Group I.
Conclusions: This study suggested that the administration of preoperative or postoperative antibiotics showed no marked differences in the degree of postoperative sequaele that occur after impacted mandibular third molar extractions.

Keywords: clinical research; drug therapy; sequelae; third molar; tooth impacted.

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INTRODUCTION

The removal of impacted mandibular third molar is one of the most commonly performed procedures in oral and maxillofacial surgery, and most of the surgeries are performed under local anaesthesia on outpatient basis [1-4]. Pain, trismus and swelling are the most common postoperative complaints after third molar surgery and they have been reported to influence the patients in the immediate postoperative period [5,6]. Mandibular third molar surgical extraction is generally classified as part of the 'clean-contaminated' group of surgeries with infectious complications reported to range from 1% to 15% [7,8]. Published clinical rapports concerning the rates of postoperative complications following surgical extraction of impacted mandibular third molar are not conclusive. While some have reported a higher incidence others have reported lower rates [9]. Different strategies have been proposed or employed by surgeons in an attempt to reduce the incidence of sequelae and infections after third molar extractions. These include pharmacological and non-pharmacological methods [10,11].

Pharmacological methods, which include use of Non-Steroidal Anti-inflammatory Drugs (NSAIDS), steroids and antibiotics, however are the mainstay of treatment [12]. The use of antibiotic therapy is well established in the treatment of identified infections caused by susceptible microorganisms, for prophylaxis in contaminated surgery, and in the prevention of infection in the immune compromised patient [13]. Although third molar surgery is considered to be a clean-contaminated or occasionally contaminated surgery the use of routine antibiotic prophylaxis is still a controversial practice in the surgery [13,14].

A postoperative administration of antibiotics is routinely prescribed to patients who have had surgical extraction of mandibular third molar in our centre. The aim of the present study was to evaluate and compare the effect of preoperative and postoperative use of antibiotics on postoperative sequelae following surgical mandibular third molar extraction.

MATERIAL AND METHODS

This is a prospective study carried out amongst consecutive patients who presented for surgical extraction of impacted mandibular third molars at the Lagos University Teaching Hospital (LUTH) for a 12 month period from May 2011 to April 2012 who met criteria for the study. Criteria for inclusion were as follows: 1) only patients with impacted mandibular third molar that required bone removal were included in this study; 2) all surgeries were done through the buccal approach using bur guttering technique; 3) all surgeries were carried out under local anaesthesia (lignocaine hydrochloride 2% with adrenaline 1:80,000), and by the same surgeon, within the same 12 month period, under the same clinical settings. Criteria for exclusion were as follows: patient who had received recent radiotherapy prior to presentation, those with inflammatory symptoms e. g. swelling, hyperemia or decreased mouth opening at the time of surgery, and patient already taking antibiotics before presentation. Approval for the study was obtained from the local ethics committee and informed consent was obtained from all participating patients. A proforma was completed by the patient preoperatively with the assistance of the surgeon.

The study was done by employing consecutive recruitment sample selection method in placing patient into two treatment groups. But the first patient to be placed in one of two groups was done by balloting by the patient into either Group I or II with subsequent placement by consecutive recruitment sample selection method in to the groups.

The groups were as follows: Group I - patients were given metronidazole tablets 1 gram and amoxicillin 1 gram orally 30 minutes preoperatively; Group II - patients were given metronidazole tablets 400 mg and amoxicillin capsules 500 mg orally for a five days post operatively starting immediately after surgery.

All the patients that took part in the study received diclofenac potassium tablet 50 mg every 8 hours for a four days postoperatively or alternatively paracetamol 1 g every 8 hours for a four days in patient with peptic ulcer disease [1].

Preoperative and postoperative measurement of pain, facial width, and mouth opening were recorded as follows:

Pain was assessed using a verbal rating scale as no pain = 0, mild/moderate pain = 1 and severe pain = 2.

Mouth opening was measured in mm using the maximum interincisal distance and the difference between the recording on the review days and the preoperative measurement. References point was the mesio-incisal angle of lower central incisor and mesio-incisal angle of lower central incisor at maximum mouth opening ability [1].

Facial width measurement (in mm) was done using a measuring tape and the difference was calculated between the recording on the review days and the preoperative measurement. Reference points were from the tip of tragus of one ear measuring over the centre of chin to the tip of the contra lateral ear tragus [9].

Postoperative healing complications were also assessed in both treatment groups.

The diagnosis of socket healing complications was based on the following criteria:

Dry socket: persistence or increases postoperative pain around the extraction site not adequately relieved by mild analgesic, accompanied by a partially or totally disintegrated blood clot or an empty socket with or without halitosis within in 48 - 72 hours postoperative.

Acutely infected socket: painful socket with suppuration, erythematic and oedema with or without fever.

Statistical analysis

Patients were reviewed 1st, 3rd and 7th day postoperatively for wound healing assessment. Acquired data from different groups was analysed using SPSS for windows version 11.0 (SPSS Inc, Chicago, Illinois, USA). Descriptive statistic and tests of significance (Independent sample t-test, one way and ANOVA) were used for the analysis where appropriate. Parametric data were expressed as mean and standard deviation (M [SD]). Statistical significance level was defined at P = 0.05.

RESULTS

Sixty two impacted mandibular third molars were extracted from sixty-two patients within the period of the study. There were 39 females and 23 males (male to female ratio of 1:1.7) (Table 1). The ages of the patients ranged from 17 to 55 years with a mean 26.6 (7.3) years. Majority of the patients (65.6%) were in the age range of 17 - 25, the most common type of the impaction (41 [66.1%]) was mesioangular impaction and recurrent pericoronitis (45 [72.5%]) was the most common indication for extraction. 31 patients were registered in both treatment groups. Comparability of treatment Groups I and II was established by comparing variables such as sex, age range, type of impactions and indication for extractions, the differences in these variables were not statistically significant (P = 0.52). The mean total operating time was 8.4 (2.3) minutes (8.2 [22.4] for Group I and 8.8 [2.6] for Group II) this was also comparable in both groups.

The general pattern of postoperative pain, regardless of type of antibiotic use revealed that pain increased from day 1 to day 3 postoperatively and began to decrease in intensity subsequently up to the seventh day. No statistically significant difference was noted in the median pain intensities between Group I and Group II (P = 0.55 and P = 0.86 respectively) on days 1 and 3 postoperatively. However, on day 7, the observed difference reached a statistically significant level (P = 0.0001) between Group I and II (Table 2) with the subjects in Group I showing lower pain intensity than those in Group II. The mean difference of the facial width (difference between post and preoperative measurement) showed no statistically significant difference (P = 0.56) on the 7th postoperative review day. In contrast, the difference on days 1 and 3 was significant (P = 0.04 and P = 0.0001 respectively) with those in Group I being statistically less than those in Group II. There was however no statistically significant difference in the maximum mouth opening between the two groups. There was only one case of alveolar

Table 1. Comparisons of variables in the treatment groups

Variables	Group I	Group II	Total
Sex			
Female	20	19	39
Male	11	12	23
Age range			
17 - 25	19	21	40
26 - 36	8	8	16
> 35	4	2	6
Type of impactions			
Mesioangular	19	22	41
Vertical	6	5	11
Horizontal	3	2	5
Distoangular	3	2	5
Indication for extraction			
Pericoronitis	21	24	45
Caries and sequelae	8	4	12
Orthodontics	2	3	5
		P value = 0.52	

Table 2. Comparison of preoperative and postoperative mean pain intensity, facial swelling and maximum mouth opening between the two groups

Parameters		Group I (n = 31)	Group II (n = 31)	P value
Pain intensity (Mean difference of pain scores)	Day 1	0.52	0.62	0.55
	Day 3	0.59	0.62	0.86
	Day 7	0.03	0.28	0.0001[a]
Facial width (Mean difference in mm)	Day 1	1	5.71	0.04[a]
	Day 3	0 .16	4	0.0001[a]
	Day 7	0.42	0.61	0.56
Mouth opening (Mean difference in mm)	Day 1	-10.05	- 8.16	0.93
	Day 3	-8.16	- 6.8	0.82
	Day 7	- 5	- 4.71	0.83

[a]Statistically significant, Independent sample t-test.

osteitis in the whole of the study and it occurred in a subject in Group I.

DISCUSSION

Mandibular third molar extraction is one of the most common procedures performed in oral and maxillofacial surgery units [3]. Postoperative sequelae of an impacted mandibular third molar include pain, temporary restricted mouth opening (trismus), and swelling. Less commonly, late or delayed haemorrhage or sepsis among other things may occur [7]. The reported complication rates for third molar surgery vary significantly. Overall, third molar complication rates range from 2.6% to 30.9% [3].

Many factors associated with third molar surgery complications have been reported in the literature. These factors include non-modifiable ones such as age and gender. Others include the use of medications such as corticosteroids and antibiotics, habits such as smoking, previous radiotherapy and/or infection, periodontitis, poor oral hygiene, surgeon experience, difficulty of extraction, length of extraction, inadequate irrigation, number of teeth extracted, poor patient adherence to postoperative instructions and anaesthesia technique [14,15].

Some investigators consider that complications after surgery are due to the trauma of the procedure itself and not to infectious events, and therefore they do not think that antibiotics will be beneficial, and advocate the use of anti-inflammatory drugs [16]. While others believe that use of antibiotics will leed to a reduction in the incidence of postoperative complications following third molar extraction. Lacassa et al. [17] in a randomized controlled double blind study showed that the use of antibiotics is associated with a reduction in postoperative complications. Proponents of antibiotic use assert that third molar surgery is a clean contaminated surgery and should be treated as such [7,8].

The use of antibiotics for therapeutic and/or prophylactic reasons is well documented in literature. However, the timing and protocol of antibiotic use varies widely [13]. It is common practice in third molar surgery to use antibiotics as a prophylactic therapy against the potential infection caused by susceptible microorganisms [17]**.** Antibiotic prophylaxis has been a hotly debated issue in third molar surgery [13]. The conflicting conclusions from randomized controlled clinical trials have caused long-standing confusion in clinical practice, with advocates and opponents of antibiotic prophylaxis each presenting their own supporting evidence [18].

Our study showed that pain increased progressively from day 1 to day 3 in both groups. This is in consonance with findings by Moore et al. [19] and Bierne et al. [20]. Pain following third molar surgery is believed to correlate in intensity with the process of inflammation. This is in turn dependent on factors such as the difficulty of extraction, surgeon's experience, pre-existing infection, duration of extraction, technique of extraction amongst other things. There was a statistically significant difference (P = 0.0001) between the two groups on day 7 with the subjects in Group I showing lower pain intensity, the reason for this difference is not very clear.

The facial width in the two groups were statistically significantly different on days 1 and 3 (P = 0.04 and P = 0.0001 respectively) with those in Group I being statistically less than those in Group II. This might be due to the fact that antibiotics were given prior to the surgery in this case thus reducing the level of inflammatory process thus having a reduced facial width.

The mean difference of the mouth opening (difference between post and preoperative measurement) showed no statistically significant difference (P = 0.83) between the two groups on the 7th postoperative review day. Reduction in mouth opening is caused by the postoperative oedema which is result of the surgical extraction traumatisation. Since both groups had the comparable amount of intraoperative trauma (comparable operating time) it is expected that similar results will be achieved.

One case of dry socket and no case of acutely infected socket was recorded in present study. This is similar to the report by Halpern and Dodson [21], who reported an incidence of zero in 118 subjects. Lacassa et al. [17] in a study comparing outcomes of use of placebo, prophylactic antibiotics and pre-emptive antibiotics in 225 subjects reported an infection incidence of 16% versus 5.3% in the placebo and antibiotic prophylaxis test groups' respectively. This is supported by the report by Ren [22], who conducted a meta-analysis of randomized controlled trials checking the effectiveness of antibiotic prophylaxis in third molar. Rate of occurrence of alveolar osteitis of 14.4% versus 6.2% in subjects receiving placebo and systemic antibiotics was registered respectively. They also reported a wound infection rate of 6.1% and 4% in subjects receiving placebo and systemic antibiotics respectively.

CONCLUSIONS

The results of this study clearly indicate that the administration of preoperative or postoperative antibiotics showed no marked differences in the

magnitude of postoperative sequelae that occur after impacted mandibular third molar extractions. Hence, the issue of antibiotics resistance does not into play and it is cost effective, if the option of preoperative antibiotic administration is embarked upon in the management of impacted mandibular third molar extractions.

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The authors declare that they have no conflict of interests.

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