The Use of Antibiotics after Mandibular Third Molar Surgery- Is it Useful in Preventing Post Extraction Complications?

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ABSTRACT

Objective: To determine whether the administration of postoperative antibiotics following extraction of a asymptomatic soft tissue impacted lower wisdom teeth is necessary to reduce the incidence of dry socket, and post operative morbidity such as pain, swelling and trismus.

Method: This study including 441 patients (208 males, 233 females) who required surgical extraction of lower wisdom teeth. Patients were divided into three groups; (G1) patients received Metronidazole, (G2) patients received Amoxicillin, and (G3) patients did not receive antibiotics at all. All patients received the same analgesic regimen. The incidence of dry socket, swelling, and the intensity of pain was recorded. The chi-squared test was employed to compare the results in the three treated groups

Results: No significant difference was found between the three groups regarding the evaluated parameters in the postoperative sequelae, i.e. pain, swelling and alveolar osteitis (dry socket).

Conclusion: This study showed that prescribing postoperative oral prophylactic antibiotic treatment following the removal of soft tissue impacted lower third molars does not contribute to less pain, less swelling, increased mouth opening or a lower incidence of dry socket, therefore it is not recommended for routine use.

Key words: Antibiotics, Dry socket, Pain, Swelling, Third molar.

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Introduction

The routine use of postoperative prophylactic antibiotic therapy in patients undergoing surgical extraction of the lower third molars as an essential measure against infection and postoperative complications such as swelling, limitation of mouth opening and alveolar osteitis is still a widespread practice and a very controversial issue.[1,2]

It is believed now by many surgeons that the advantages of using such prophylaxis seem to be marginal, as shown in the audit undertaken at the University Dental Hospital National Health Service Trust in Cardiff (UK) about the usage of antibiotic prophylaxis practices in case of dental extraction and demonstrated the "potential for saving large sums of money while apparently incurring no clinical disadvantage".[3] Also, Monaco G *et al*, found no difference in patients undergoing surgical third molar extractions between those receiving postoperative amoxicillin and the control group who

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did not receive antibiotics in terms of prevention of postoperative complications i.e. fever, pain, swelling and alveolar osteitis.[4]

Iciar Arteagoitia *et al*, demonstrated clearly in their study that studied the efficacy of amoxicillin/clavulanic acid in preventing infectious and inflammatory complications following extraction of soft tissue vertically impacted mandibular third molar teeth, they found out that antibiotics are probably inefficacious, and they stated that antibiotics might be of value in cases where third molars are partially covered by bone and those in a horizontal position, they concluded this based on the fact that the frequency of postoperative complication without antibiotics was 12.9%, which in all cases was resolved using the rescue antibiotic.[5]

Also, Leslie R *et al* in their question whether prophylactic administration of systemic antibiotics prevent postoperative inflammatory complications after third molar surgery, they hypothesized that only mandibular third molars requiring bone removal are at higher risk for post operative complications and antibiotics are better limited to this group and so limiting the exposure of patients to antibiotics and their associated risks and costs, also they recommended that more multicenter research need to be done in this field to determine the necessity for antibiotics and what type of antibiotics to be administered.[6]

T. Kaczmarzyk *et al* evaluated the significance of administration of clindamycin applied in a single preoperative dose of 600 mg with or without subsequent 5-day therapy in prevention of postoperative complications after third molar surgery; again they could not demonstrate any significance for antibiotic prophylaxis that should affect the post operative sequalae in lower third molar surgery.[7]

In another study, two different types of antibiotics were tested in patients undergoing surgical removal of third molar teeth, two groups of patients given amoxicillin (with calvulanic acid) and clindamycin respectively compared to another group of patients given placebo, no significant difference was found between the three different groups in the potoperative sequel, as no specific postoperative oral prophylactic antibiotic treatment after the removal of lower third molars could prevent the cases of inflammatory problems after surgery, as it did not contribute to a better wound healing, less pain, or increased mouth opening, and therefore a conclusion made that routine use of antibiotics in these cases is not recommended.[8]

From the literature review in the recent years, it is well noted that surgeons tend to avoid using prophylactic antibiotics following the surgical removal of the non infected third molars, and to start focusing on more important local factors that may play an important role in avoiding postoperative complications. The aim of this paper is to evaluate the actual need for the administration of postoperative oral antibiotics following the removal of asymptomatic soft tissue impacted lower third molars, and the efficacy of antibiotic therapy in preventing postoperative complications.

Methods

This study was conducted to assess the clinical efficacy of two antibiotics regimens (amoxicillin 500 mg tds and Metronidazol 250 mg tds) in two groups of patients compared with a third group of patients who were not given antibiotics in the setting of surgical extraction of a soft tissue impaction of third mandibular molar teeth. The study was conducted in accordance with Good Clinical Practice as approved by the ethical committee of the Royal Medical Services in Jordan. A written, dated informed consent was obtained from all patients prior to study entry. The study was carried out in the period between July 2008 till March 2009 at Prince Ali Hospital in Karak, see Table I showing demographic, objective and subjective measurement data.

Four hundred forty one patients, 208 males (47.2%), 233 females (52.8%) requiring surgical extraction of a soft tissue impacted lower wisdom teeth were enrolled in this study. All patients were adults above 18 years old with mean age of 24.6 (age range 19-29 years). All patients were referred to our department by their treating dentists. No patient showed any sign of pain, inflammation, or swelling at the time of surgery. Clinical and radiologic factors were recorded for each case; all patients were medically free, as patients with any chronic illness such as diabetes mellitus or any other medical problem were excluded from the trial. The rationale for assigning the patients to the groups was strictly random and was done after surgery by using prepared randomizations in sealed envelopes. The standard surgical procedure was the same in all

Table I. Demographic, objective and subjective measurement data

	G (1) patients on Metronidazol	G (2) patients on Amoxicillin	G (3) placebo patients
Number of patients	143 (33.4%)	140 (32.7%)	145 (33.8%)
Age (mean)	24.5	24.9	24.1
Gender	65 M 78 F	66 M 74 F	67 M 78 F
Mean duration of surgery (mint)	15.4	14.7	15.9

Table II. Postoperative pain scoring in the three groups of patients

Pain score	Group 1 (143)	Group 2 (140)	Group 3 (145)
Mild	78 (54%)	66 (47%)	73 (50%)
Moderate	45 (31%)	56 (40%)	51 (35%)
Sever	20 (14%)	18 (12%)	21 (14%)

Table III. Postoperative swelling

Group	Group 1	Group 2	Group 3
Number of patients	43 (30%)	38 (27%)	41 (28%)

Table IV. Incidence of dry socket

Group	Group 1	Group 2	Group 3
Number of patients	12 (8%)	14 (10%)	13(8.9%)

cases and only one lower third molar was removed at a time. A mouth rinse of 0.2% chlorhexidine solution for 1 minute was used before surgery.

Patients were divided into three groups, group one (G1) received Metronidazole as 250 mg tds, group two (G2) received Amoxicillin 500 mg tds, and the third group (G3 did not receive antibiotics at all. The first and second groups had their antibiotics for 5 days postoperatively.

All patients in the three groups had the same regimen of analgesia that consisted of 50 mgs tablet of diclofenac sodium taken one hour preoperatively, followed by diclofenac 50 mg of sodium tds orally for five days postoperatively. Also patients were asked to review the oral surgery clinic or in case of any emergency regarding pain or any other postoperative complication. Patients were asked not to take any other drugs during the trial and not to seek any other medical help except from our oral surgery clinic.

The incidence of dry socket (alveolar osteitis), swelling, and the intensity of pain was recorded for all patients. The occurrence of dry socket was judged by both the signs and symptoms, and clinical examination. Dry socket was defined as absence of clot with necrotic remains present in the alveolus accompanied by severe persisting mandibular pain or increasing 48 h after surgery accompanied by intraoral inflammation and erythema.

Swelling was subjectively measured, as patients had just been asked if a significant swelling occurred or not and for how many days it lasted.

The assessment of the intensity of post operative pain was done by employing a 100 mm visual analogue scale, and then results were classified into three categories, i.e. mild, moderate and severe.

All patients were operated by the same surgeon (the main author) and the same surgical technique was employed in all cases, i.e. envelope mucopereosteail flap with minimal buccal bone removal if needed. All cases were done in the oral surgery outpatient clinics in our department at the Prince Ali Hospital in Karak (South of Jordan). All cases were performed under local anesthesia (zylocaine with adrenaline). The follow-up period was for two weeks, patients were reviewed on the second postoperative day, on day seven after the surgery and finally on day 14 postoperatively. Statistical analysis was performed by using 1-way analysis of variance, Student's *t* test, and chi-square test. A value of $P < 0.05$ was considered statistically significant.

Results

Among the 441 patients who entered the trial, 13 did not check in for the follow-up examination and complete data sets were obtained only from 428 patients, for whom statistical analysis was performed. The three main parameters i.e. pain, swelling and alveolar osteitis (dry socket) had been evaluated and analyzed independently in the three groups of patients (G1, G2, G3).

For the evaluation of post operative pain, see Table II that illustrates the numbers of patients who experienced mild, moderate or sever pain in the three groups of patients. The chi-squared test was employed to compare the results in the three treated groups, no statistically significant difference was found between the three groups *(P* > 0.05).

Regarding the postoperative reactionary swelling, the number of patients who experienced a significant swelling that was associated with limitation of mouth opening and lasted more than 48 hours was as follows: in Group one (43 patients 30%), in Group two (38 patients 27%) and in Group 3 (41 patients 28%), see Table III. Again no statistically significant difference was found between the data in the three tested groups (P > 0.05).

The incidence of alveolar osteitis (dry socket) in the three groups was as follows: in Group one (12 patients 8%), in Group two (14 patients 10%) and in Group 3 (13 patients 8.9%), see Table IV. Again no statistically significant difference was found between the three tested groups (P > 0.05).

Among the patients who experienced dry socket, 68% of the cases were males, and 32% were females. Another significant finding was that 85% of the patients who experienced dry socket were heavy smokers; they even smoked at the day of surgery.

Discussion

We conducted this study in view of the growing concerns about the over-prescription of antibiotics, considering the implications regarding adverse effects in individual patients and increasing antimicrobial resistance within the community, a very high price to pay, this becomes very true when patients get exposed to a life threatening infections and antibiotics fail to play their expected role, also a significant financial implications should be considered when considering the high price spent on unjustified prescription of antibiotics, and the need for more expensive antibiotics when serious infections happen.

Piecuch J *et al*, in their clinical trial to answer the question "should antibiotics be used for third molar surgery?" They found that the practice of oral surgeons of giving antibiotics to patients is usually led by one or more of the following reasons: 1) Presence of infection; 2) the patient is medically compromised and requires antibiotic prophylaxis against metastatic infection; 3) the patient or the patient's family demands antibiotics; 4) the standard of care in the oral surgery community is to use antibiotics, and hence not to use them violates this standard; and when 5) the risk of postoperative infection is high and, consequently, prophylaxis is needed. But in their analysis of these reasons and their results, they found that in case of erupted mandibular or partially erupted third molars antibiotics are not justified unless an active infection is present, or when prophylaxis is needed in certain cases of medical compromise, including cardiac and immunosuppressive disorders. Also they stated that antibiotics are not justified for wound prophylaxis for maxillary third molar extractions regardless of the level of impaction because the overall infection rate is so low (0.27%). So, they recommended complying with these standards regardless of the patient's desires, or even if it was the standard of care in the oral surgery community is to use antibiotics, as usually that standard implicates using antibiotics after surgery and that violates the basic principles of prophylaxis.[9] Also, many supportive opinions are in the literature recommending not to give antibiotics in third molar extraction as shown in the multi center study that involved patients with all four third molars below the occlusal plane, who were divided into two groups, the first group were given intravenous antibiotics just before third molar surgery, the second group (control group) did not receive intravenous antibiotics, and no statistically significant difference found between the two groups in term of the postoperative outcome.[10-13]

Also, we should not underestimate the value of some local measures like the application of 0.2% chlorhexidine gluconate mouth rinsing preoperatively for 30 seconds and postoperatively for seven days. It was found to improve the outcome of surgery in terms of patients' quality of life and postoperative complication.[14] Another valuable local measure after third molar surgery is local cold compression for 45 minutes postoperatively, as it causes vasoconstriction leading to reduced reactionary oedma and hence decreases the excitability of free nerve endings and peripheral nerve fibers, consequently increasing the pain threshold.[15] Also, the administration of IV corticosteroid with third molar surgery does have a positive impact in improving recovery after third molar surgery.[16]

Dentists for decades are used to prescribing antibiotics routinely after extraction. It is about time to reconsider this, and carry out a more thorough evaluation for the patients, especially those who are asymptomatic prior to extraction. Also, if antibiotics are to be given, they should be given preoperatively, as systemic antibiotic should be present in the tissues before the procedure is begun, and the use of antibiotics only after surgery has no benefit or justification.[17]

Patients following surgery usually will suffer pain, and what we really should care about is a very good regimen of analgesics, best started preoperatively, the best undoubtedly are the nonsteroidal anti-inflammatory drugs (NSAID), given on regular basis, and toped up by a more potent analgesics when needed, as basically what the patients go through following extraction is an inflammatory state that is best treated by an anti-inflammatory drugs and good analgesics rather than treating it with antibiotics.

Conclusion

The results of our study showed that specific postoperative oral prophylactic antibiotic treatment after the removal of partially erupted or soft tissue impacted lower third molars does not contribute to less pain, less swelling, or decreased incidence of dry socket. And therefore, it is not recommended for routine usage.

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