

Postoperative Infection after Surgical Removal of Impacted Mandibular Third Molars: An Analysis of 110 Consecutive Procedures

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Key Words

Postoperative infection · Mandibular third molars, surgical removal

Abstract

Objective: The aim of this study was to evaluate the rate of postoperative infection and other complications after the surgical removal of impacted mandibular third molars. **Subjects and Materials:** Medical records of 110 consecutive patients with 130 consecutive surgical extractions of impacted lower third molar teeth performed under local anesthetic using strict aseptic techniques were reviewed and analyzed. No systemic antibiotics were administered or prescribed after the surgery. The rates of postoperative infection and other complications were evaluated clinically. **Results:** Of the 130 surgical removals, 110 in 90 patients met the inclusion criterion of nonuse of antibiotics. Fifty-nine were female and the remaining 31 were male. Average age was 25.2 years. Of the 110 surgeries, postoperative infection occurred in 6 (5.5%). Other complications were alveolar osteitis ($n = 9$, 8.2%), pain lasting more than 1 week ($n = 5$, 4.3%) and sensory dysfunction of the inferior alveolar nerve ($n = 2$, 0.8%). **Conclusion:** The low rates of postoperative infection and other complications observed in this study encouraged us to continue surgical removal of impacted mandibular third molars without routine prescription of antibiotics unless indicated for other medical reasons.

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Introduction

Surgical removal of impacted third molars is a common procedure performed by oral and maxillofacial surgeons worldwide. Infection after third molar surgery as a postoperative sequela has been reported to vary from 0.8 to 10.1% [1–8], and could develop in the early or late postoperative period [1, 3]. Surgical removal of bony impacted mandibular third molars carries a higher risk of postoperative infection than all other extractions combined [8], with most of those being minor infections.

Some oral and maxillofacial surgeons advocate the routine use of prophylactic systemic antibiotics to decrease the risk of postoperative infection and complications [9]. However, there are studies showing no difference in postoperative complications between patients who received postoperative antibiotics and patients who did not [10, 11]. MacGregor [12] and Sands et al. [13] in two separate studies concluded that it was inappropriate to recommend the routine use of antibiotics for third molar surgery, except for the most difficult cases.

The use of antibiotic therapy without appropriate indications can result in adverse outcomes. It is clear that there is a general trend to overprescribe antibiotics [14]. The potential risks of overprescribing antibiotics such as the development of hypersensitivity and allergic reactions, adverse side effects and the emergence of resistant microorganisms in the community might exceed the risk of infection. These potential risks and the cost of the

drugs must be considered against the low risk of infection following the surgical extraction of asymptomatic impacted lower third molar teeth, especially as such infections could be treated easily should they occur.

In a study of prescription habits in Kuwait, almost 90% of a group of dental practitioners indicated that they would use antibiotics for 7–10 days following a surgical extraction even if the tooth was not impacted [15]. Indeed, many respondents would consider antibiotic prescription for routine dental extraction, and for nonclinical reasons such as uncertainty of diagnosis, convenience, expectation of the patient and lack of time to treat the patient immediately. The recently established Oral and Maxillofacial Surgery (OMFS) outpatient clinic at the Dental Center, Kuwait University, decided not to use prophylactic postoperative antibiotics unless there are medical indications. Therefore, the aim of this study was to evaluate the frequency of postoperative infection following the surgical removal of asymptomatic impacted lower third molars.

Subjects and Methods

Medical records of 110 consecutive patients with 130 surgical extractions of impacted lower third molar teeth at OMFS, Kuwait University Dental Center, were reviewed and analyzed. One oral and maxillofacial surgeon performed all the extractions. All the extracted teeth were asymptomatic at the time of surgery and were fully or partially bone-impacted needing buccal bone removal and/or sectioning of the tooth. Based on radiographic evaluation, the angulations of the impacted teeth were classified according to Winter [16], while the depth of impaction was classified according to Pell and Gregory [17] (table 1).

Surgical Procedure

At least 4 days prior to surgery, the patients were given Corsodyl® mouthwash (chlorhexidine digluconate 0.2% w/v; Beecham Group plc, Middlesex, UK) to use twice daily. All the surgical extractions were carried out under local anesthesia with strict adherence to aseptic technique consistent with standard practice in the operating room. The surgeon used a standard protocol in all the patients. Local anesthesia, lidocaine 2% with adrenaline 1:200,000 (Xylocaine; AstraZeneca UK Limited, Luton, UK), was administered in doses ranging between 3.6 and 5.4 ml before surgery. A full-thickness mucoperiosteal envelope flap was reflected from the retromolar region distally to the lower first molar mesially. The cortical buccal bone was removed and the impacted mandibular third molar was sectioned, when necessary using a surgical drill under physiologic saline irrigation, and the tooth was removed. Curettage and removal of sharp bony edges were undertaken, and the base of flap and extraction socket were thoroughly irrigated with 30 ml of physiologic saline before the wound was closed with 3–0 sutures.

Table 1. Distribution of impacted lower third molar teeth according to Winter [16] and Pell and Gregory [17]

Classification type	Number of teeth
Winter [16] ¹	
Mesioangular	56
Vertical	33
Horizontal	13
Distoangular	8
Pell and Gregory [17] (1–3) ²	
Class 1	64
Class 2	42
Class 3	4
Pell and Gregory [17] (A–C) ³	
Class A	25
Class B	35
Class C	50

¹ The Winter [16] classification is based on the angulation of the long axis of the impacted tooth.

² The Pell and Gregory [17] classification (1–3) is based on the amount of impacted tooth covered with bone of the mandibular ramus.

³ The Pell and Gregory [17] classification (A–C) is based on the depth of the impacted tooth compared with the height of the second molar tooth.

The patients were then given postoperative instructions on how to care for the surgical wound and prescribed nonsteroidal anti-inflammatory analgesics, diclofenac potassium immediate release 50 mg (Cataflam®; Novartis Pharmaceuticals Corp., N.J., USA), every 6 h for pain control. No systemic antibiotics were prescribed before or after the operation. All patients were given a follow-up appointment 1 week after surgery for suture removal and examination for the presence of wound infection and other complications.

They were instructed to return sooner in case of any emergency, such as bleeding, severe pain not relieved by prescribed analgesics, or other complications. Wound infection was defined as the simultaneous presence of all of the following: pain at the extraction site, localized swelling and purulent discharge.

The patients were also asked if they, for any reason, had taken any antibiotics prescribed by someone else prior to the 1-week follow-up appointment. In addition all the patients in the study were interviewed by telephone to check for any late postoperative complications during the first 6-month period of surgery, and if there were any, how these complications had been managed. Patients requiring surgical removal of the other mandibular wisdom tooth were scheduled at least 2 months later and the same protocol and technique were followed.

Statistics

The Statistical Package for Social Sciences (SPSS, Chicago, Ill., USA, 2006), version 14, was used for processing the data; $p \leq 0.05$ was used as a cutoff level for statistical significance. The χ^2 test

Table 2. Characteristics of the 6 patients with postoperative infection

Pa-tient	Sex	Age years	Medical history	Impaction classification	
				Winter [16]	Pell and Gregory [17]
1	F	19	asthma	mesioangular	1C
2	F	23	asthma	mesioangular	1C
3	F	23	asthma, PCN allergy	mesioangular	2C
4	F	30	anemia, low BP	mesioangular	1B
5	F	41	asthma	vertical	1B
6	M	32	negative	horizontal	1A

PCN = Penicillin.

was used to assess the association between two qualitative variables, replaced by the Fisher's exact test in case of invalidity of χ^2 . The χ^2 for linear trend was used to ascertain the trend in case of ordinal variables.

The nonparametric Mann-Whitney U test was used to compare age in infected and noninfected groups since age frequency distribution was nonnormal positively skewed.

Results

Ninety patients with 110 extractions met the inclusion criterion of nonuse of antibiotics both before and after surgery. Four patients were not included in the study because their medical conditions necessitated the use of preoperative antibiotics. Ten patients had on their own initiative taken postoperative antibiotics and the remaining 6 patients were not available for follow-up.

Of the 110 surgeries, postsurgical infection occurred in 6 (5.5%) with pain, fluctuant swelling and purulent discharge. Four were apparent at the time of registration (1 week after surgery) while 2 occurred later: one occurred 1 month and the other 3 months after surgery. There was a trend towards increased infection in patients aged over 30 years. Five of the 6 cases with infection were female. The medical history was positive in all the 5 female patients (4 had asthma, and 1 anemia and low blood pressure). However, there was no significant difference between infected patients with positive and negative medical history ($p = 0.423$).

Five of the 6 infections developed where there had been full bony impaction requiring surgical bone removal and tooth/root sectioning. Four cases of the 6 were with mesioangular impaction, 1 with vertical impaction,

and 1 with horizontal impaction. As per Pell and Gregory [17] classification infection developed in 3 class C, 2 class B and 1 class A. There was no significant difference in infection with regards to the degree of impaction according to Winter [16] ($p = 0.934$), or the degree of impaction based on ramus coverage according to Pell and Gregory [17] (1–3; $p = 0.591$) or the degree of impaction based on the position of the occlusal surface [17] ($p = 0.848$).

Other postoperative complications included alveolar osteitis ($n = 9$, 8.2%), pain lasting more than 1 week ($n = 5$, 4.5%), and paresthesia ($n = 2$, 0.8%). Alveolar osteitis and postoperative pain both resolved within 2 weeks, and the 2 cases with paresthesia resolved completely 4 weeks after surgery.

Discussion

The results of the present study showed that impacted mandibular third molar surgery can be carried out without the use of prophylactic postoperative antibiotics without a high risk of postoperative infection. The 5.5% incidence of postoperative infection of this study was similar to previous reports [1–8]. Clinical observation was used to assess the postoperative infection although a measurable assessment technique such as acute-phase protein levels [18] had been reported. Observational assessment had been used in previous studies [1–8] and it was, therefore, deemed fit to use it in the present study.

Of the 20 patients excluded in the analysis of this study, 10 admitted taking antibiotics on their own initiative without having any clinical manifestations of postoperative infection. They either had the antibiotics at home or had access to a physician who could prescribe the antibiotics for them because they complained of pain and swelling. It is a common practice here to prescribe a course of antibiotics after oral surgical procedures because the patient complains of pain and swelling [19]. However, pain, swelling, and trismus (in the absence of infection) are considered to be normal inflammatory sequelae to surgical trauma and patients should be instructed of the outcome [19]. Therefore it was not possible to know whether or not these patients would have developed an infection if antibiotics had not been prescribed for them. The infections that occurred were treated simply without any complication by local drainage and irrigation.

The results of this study confirmed that it is possible to minimize the indiscriminate use of antibiotics and the consequences of potential hypersensitive reactions,

untoward side effects and the most dreaded effect of emergence of resistant and more complex oral microflora to commonly used antibiotics in dentistry [20]. The danger of the emergence of resistant microorganisms in a society has been aptly reported previously [21, 22]. An incidental advantage of this study was financial savings that accrued from not buying antibiotics.

A limitation of this study was the small number of patients. The nonsignificance of the various findings among the 6 patients with postoperative infection (age, gender, positive medical history, and type of impaction; table 2) could be attributed to the small number of patients particularly since other studies [2, 23] have shown that age and positive medical history were risk factors for increased potential for postoperative complications. Most recently, Chuang et al. [23] in 2007 suggested that patients over the age of 25 years were more likely to have complications associated with third molar surgery even after controlling for other potential confounding factors such as a preexisting periodontal condition, or more difficult third molar anatomy.

Other complications such as alveolar osteitis and sensory dysfunction were not observed to occur with high incidence and this finding was similar to other studies [24, 25] that had shown that these could be treated successfully or resolved spontaneously.

It is important to point out that the present study should, therefore, be regarded as a quality control of sur-

gical routines and not as a comparative study between using and not using antibiotics. In the future it will be of interest to have an equivalent study carried out where the administration of prophylactic antibiotics is used as a routine for surgical removal of impacted lower third molars.

Conclusion

Given the use of strict aseptic techniques, it is concluded that postoperative infection after mandibular third molar surgery is low even when antibiotics are not used. For this reason it has been decided to continue not prescribing antibiotics routinely for dentoalveolar surgery except in medically compromised patients or when major surgical procedures are carried out.

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