The Saudi Dental Journal 36 (2024) 761–764

Contents lists available at ScienceDirect

The Saudi Dental Journal

journal homepage: www.ksu.edu.sa
www.sciencedirect.com

Original Article

Close follow-up instead of antibiotic therapy after mandibular third molar surgery: A clinical trial

Mohammad Mehdizadeh [a], Alireza Sharifinejad [b,*], Shokoufeh Aghayari [a]

[a] Department of Oral and Maxillofacial Surgery, School of Dentistry, Qom University of Medical Sciences, Qom, Iran
[b] Department of Pediatric Dentistry, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran

ARTICLE INFO

Keywords:
Antibiotic
Mandibular third molar
Follow-up

ABSTRACT

Background: Prescribing antibiotics (AB) before or after third molar surgery is common among dentists and oral surgeons; however the effectiveness of AB therapy in reducing surgery complications is still contradictory.
Aim: The aim of this study is to evaluate the healing process after mandibular third molar surgery without AB therapy and to assess the role of close follow-ups on patient's perspective.
Methods: This study is a semi-empirical, prospective study conducted on 79 healthy patients. After surgical extraction of the impacted or semi-erupted mandibular third molar, assessment of pain, swelling (intergonial width), infection, and sub-periosteal abscess was done during the 1-month follow-ups of patients.
Results: The mean difficulty level of surgeries performed in this study was moderate. A significant relationship was found between the pain intensity and the psychological impact of follow-ups ($p < 0.05$). No fever or sign of infection were seen in any patient. The amount of swelling was significantly related to the difficulty level of surgery ($p = 0.001$); however, no significant correlation was found between the amount of pain and the level of difficulty.
Conclusion: Within the limitations of this study, it can be concluded that in order to reduce the hazards of AB therapy, close follow-up of patients after surgery can be advised.

1. Introduction

Removal of impacted or semi-erupted mandibular third molar is one of the most common procedures performed in oral surgery, which usually requires taking multiple medications (Sayed et al., 2019). Preventing inflammatory complications after surgical extraction including pain, swelling, and trismus is a major concern of oral surgeons and dentists (Moghaddamnia et al., 2013).

Overconsumption of medications following surgical extractions of impacted teeth including antibiotics (AB) and sedatives is a challenge that might lead to some complications involving the patient's general health (Brucoli et al., 2019). It has been reported that post-surgical prescription of celecoxib, ibuprofen, or other non-steroidal anti-inflammatory drugs (NSAIDs) could not alleviate signs of inflammation such as swelling and maximum mouth opening when compared to placebo (Isola et al., 2019). On the other hand, minimally invasive surgical techniques via employing dental loupes or microscopes can significantly reduce complications (Gupta et al., 2024); therefore using loupes was considered during this study.

Prescribing AB before or after third molar surgery is a widespread practice among dentists and oral surgeons (Choi et al., 2020). However there is an ongoing controversy over the usefulness of AB therapy in attenuating surgical complications (Prajapati et al., 2016; Rohit and Reddy, 2014). Although a number of recent studies have recommended the use of AB and regarded it as a surgical protocol, others have found no benefit for routine AB prescriptions (Milani et al., 2015; Xue et al., 2015; Braimah et al., 2017; Arteagoitia et al., 2016). On the other side, AB overuse can result in world-wide bacterial resistance as the world health organization (WHO) has warned (Loeffler and Boehmer, 2017).

Despite the aforementioned reports, AB prescription by dental practitioners is still prevalent for the matter of caution or patients satisfaction (Loeffler and Boehmer, 2017). According to many studies conducted in this issue, AB therapy might not be required to reduce surgical inflammation (Prajapati et al., 2016; Rohit et al., 2014; Cervino et al., 2019). Moreover, the psychological impact of patient monitoring after impacted tooth removal has not been studied yet. This research was conducted to witness the inflammatory reactions following mandibular third molar surgical extraction without using AB and to determine the

* Corresponding author.
E-mail address: a.sharifi137781@yahoo.com (A. Sharifinejad).

https://doi.org/10.1016/j.sdentj.2024.02.004
Received 24 October 2023; Received in revised form 27 January 2024; Accepted 13 February 2024
Available online 19 February 2024

role of close follow-ups on patient experience.

2. Materials and Methods

2.1. Patient selection

This research was a prospective, semi-empirical, non-controlled study conducted on 79 patients in 2020, Qom city, Iran. The empirical steps were taken once ethical approval was obtained from the research ethics committee (IR.MUQ.REC.1397.122) and informed consent was signed by all patients.

First, 79 patients were selected through accessible sampling within 2 months. After acquiring informed consent, their intergonial widths were recorded. Based on radiographic and clinical examination, the difficulty level of surgery was assigned according to Pell & Gregory and Winter's classification criteria [Table 1].

2.2. Inclusion and exclusion criteria

The inclusion criteria of this study were (1) healthy patients, (2) between 16 and 50 years of age, and (3) with at least one impacted or semi-erupted mandibular wisdom tooth. The exclusion criteria included (1) the presence of any systemic disease, (2) history of pericoronitis, (3) smoking, (4) lack of cooperation, (5) the presence of caries on third molar or adjacent tooth, and (6) history of AB consumption within 1 month before surgery.

2.3. Surgical phase

0.2 % chlorhexidine mouthwash (Multi-protection, Oral-B^{TM}, USA) was used before surgery. Local anesthesia was achieved using inferior alveolar nerve block and long buccal nerve block techniques. The surgical field was prepared according to the asepsis protocol. A mucoperiosteal flap was elevated from the mesial line angle of the first molar to the distal side of the third molar. Finally, the flap was sutured using a 3–0 silk suture (Supasil, Supa^{TM}, Iran). The duration of surgery and type of flap were recorded for each patient. Sutures were removed 7 days after surgery. Dental loupes (Orange Dental^{TM}, Germany) were employed during surgeries in this study for minimal invasive surgery at 3x and 4x magnification levels.

2.4. Follow-ups

In the follow-up sessions, the pain intensity was measured according to visual analogue scale (VAS). Clinical examination was also done in each session for evaluation the presence of swelling, infection, or fever.

Follow-ups were performed on the third and seventh days after surgery at the clinic by assessing the patient's intergonial width, pain intensity, and clinical examinations. Other follow-ups were carried out by phone calls within one month after surgery. Patients' perspectives on the psychological impact of close follow-ups were also recorded.

Table 1
Difficulty level of mandibular third molar surgery.

Third molar position	Scale*
Winter classification	
Mesioangular	1
Horizontal	2
Vertical	3
Distoangualr	4
Pell & Gregory classification (depth criteria)	
Class A	1
Class B	2
Class C	3
Pell & Gregory classification (ramus criteria)	
Class I	1
Class II	2
Class III	3

* The difficulty level is determined through the sum of these three classification scales. 3–4 indicates simple surgery, 5–7 indicates moderate surgery and 8–10 indicates hard level.

2.5. Statistical analysis

The final statistical analysis was done on 77 patients using SPSS Ver.16 software. Pearson's correlation exam, chi-square test, analysis of variance (ANOVA), and independent samples *t*-test were also used for evaluation the correlations between variables. It should be noted that two patients were excluded from the study 3 days post-surgery due to AB consumption.

3. Results

The statistical population consisted of 50 women (64.9 %) with a mean age of 25.92 years and 27 men (35.1 %) with a mean age of 25.48 years. The independent *t*-test illustrates that there is no significant correlation between gender and post-surgical level of pain, swelling, or infection rates. The minimum surgery duration was recorded as 2 min for a class I, mesioangular impacted third molar. The maximum duration, on the other hand, was 22 min for the extraction of a class II, distoangular tooth with 4 roots. The mean surgery time was 9.4 min. Table 2.

The mean intergonial width was calculated at 24.5 cm (SD: 1.98) before surgery, 25.51 cm (SD: 2.02) on the third day after surgery, and 24.64 cm (SD: 3.43) 7 days post-surgery. No fever was seen in any patient. Pearson's correlation test shows a significant relation between coefficient of swelling on the third day and difficulty level of surgery (p-value: 0.001). Also a significant relation was found between swelling and duration of surgery (p-value: 0.001).

Mean post-surgical pain was 7.27 (SD: 2.38) on the first day, followed by 3.28 (SD: 2.28) and 1.9 (SD: 2.14) on the third and seventh days respectively. There was no association between pain at first and third days and variables like age, gender, difficulty and duration of surgery. However a significant correlation between pain and psychological impact of close follow-ups was illustrated ($p = 0.044$).

The surgical difficulty was classified into three level: easy for 8 teeth (10.4 %), moderate for 61 teeth (79.2 %), and hard in 8 of them (10.4 %). This, the mean difficulty level was moderate. Pocket flaps were used

Table 2
descriptive information of subjects and teeth.

	N	Minimum	Maximum	Mean	SD (standard deviation)
Age (year)	77	17.00	48.00	25.7662	6.00854
Surgery difficulty score	77	4.00	8.00	5.8701	1.18489
Intergonial width before surgery (centimeter)	77	21.00	30.00	24.4987	1.98365
Intergonial width 3 days after surgery (centimeter)	77	21.90	31.10	25.5091	2.02109
Intergonial width 7 days after surgery (centimeter)	77	21.50	30.50	24.6390	3.42334
Duration of surgery (minutes)	77	2.00	22.00	9.4156	4.08898
VAS*.pain.1st day after surgery	77	0.00	10.00	7.2727	2.38767
VAS.pain.3 days after surgery	77	0.00	10.00	3.2857	2.28183
VAS.pain.7 days after surgery	77	0.00	8.00	1.8961	2.14344
Psychological effect of follow-ups	77	7.00	10.00	8.8571	0.99623

* Visual Analogue Scale.

in 76 surgeries, whilst triangular flap was employed in only one tooth. Among all patients during one-month follow-up, only 3 teeth (3.9 %) showed sub-periosteal abscess.

4. Discussion

This prospective, non-controlled study was conducted on 79 patients to witness the incidence of inflammation symptoms after mandibular third molar surgical extraction without AB prescription but with the help of close follow-up till 30 days after surgery. No sign of infection was seen in the follow-ups, except for sub-periosteal abscess in 3 patients which recorded 30 days after surgery. Results of the current study emphasizes at close monitoring of patients which showed to have a great psychological importance.

In the study of Monaco et al. (2009), healthy patients were divided into two groups with and without AB after third molar surgery. While no significant difference was found in swelling and fever rates between two groups, the pain and infection rates were lower in the AB group. History of pericoronitis, smoking or caries was not in their exclusion criteria. Besides, mean duration of surgery was significantly higher in their research (32.5 min).

Luaces-Rey et al. (2010) found no difference in AB prescription between case and control groups. In the study of Bezerra et al. (2011), rates of inflammation and infection were similar between the AB and placebo groups. The aforementioned results are inconsistent with the Morrow et al. (2018) study, which considered post-surgical AB effective in reduction the rate of infection and inflammation. Lower infection and dry socket was reported in the AB group. However, no sign of infection or dry socket was observed in our study. Also, the mean duration of surgery was higher in their research. The inconsistency between studies can be attributed in part to the surgery duration, as we found that swelling and pain have a significant correlation with the duration of surgery.

Lower infection and dry-socket were reported in the AB group, in the study conducted by Lang et al. (2016), which may be due to the fact that their exclusion criteria did not include patients with a history of smoking and pericoronitis.

Isiordia-Espinoza et al. (2015) did not recommend AB prescription after the third molar surgery in healthy patients which is consistent with our study. In Adde et al. (2012) study, patients were divided into three groups: Amoxicillin, Clindamycin, and placebo. They reported no significant difference between these groups.

Patients' pre-operative dental anxiety levels are associated with the amount of pain and swelling they experience (Starch-Jensen et al., 2023). In the study of Pippi et al. (2018) telephone follow-ups were considered effective in evaluating the healing process after surgery. In the current study, a significant relationship was found between the pain intensity and psychological effect of follow-ups.

Sub-periosteal abscess usually occurs 3–4 weeks after surgery (Wei and Mahdey, 2019). One month follow-up in our study found 3 patients with sub-periosteal abscess who then underwent adequate treatment. None of the aforementioned studies consisted of a one month follow-up for surveillance of sub-periosteal abscess.

5. Conclusion

Based on the findings of this study, close follow-ups are effective in reducing patient's anxiety about not prescribing antibiotics. To avoid AB overuse, authors recommend close-follow-ups instead of AB prescriptions after mandibular third molar surgery.

CRediT authorship contribution statement

Mohammad Mehdizadeh: Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Investigation, Validation, Methodology, Supervision, Project administration. **Alireza Sharifinejad:** Data curation, Writing – original draft, Writing – review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology. **Shokoufeh Aghayari:** Data curation, Writing – original draft, Writing – review & editing, Visualization, Validation, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Adde, C.A., Soares, M.S., Romano, M.M., Carnaval, T.G., Sampaio, R.M., Aldarvis, F.P., 2012. Clinical and surgical evaluation of the indication of postoperative antibiotic prescription in third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol 114, S26–S31.

Arteagoitia, M.I., Ramos, E., Santamaría, G., Alvarez, J., Barbier, L., Santamaría, J., 2016. Survey of Spanish dentists on the prescription of antibiotics and antiseptics in surgery for impacted lower third molars. Med Oral Patol Oral Cir Bucal. 21 (1), e82.

Bezerra, T.P., Studart-Soares, E.C., Scaparo, H.C., Pita-Neto, I.C., Batista, S.H.B., Fonteles, C.S.R., 2011. Prophylaxis versus placebo treatment for infective and inflammatory complications of surgical third molar removal: a split-mouth, double-blind, controlled, clinical trial with amoxicillin (500 mg). J. Oral Maxillofac. Surg. 69 (11), e333–e339.

Braimah, R., Ndukwe, K., Owotade, J., Aregbesola, S., 2017. Impact of oral antibiotics on health–related quality of life after mandibular third molar surgery: An observational study. Niger. J. Clin. Pract. 20 (9), 1189–1194.

Brucoli, M., De Andreis, M., Bonaso, M., Boffano, P., Benech, A., 2019. Comparative assessment of dexamethasone administration routes for the management of postoperative symptoms following third molar surgery. Journal of Stomatology, Oral and Maxillofacial Surgery. 120 (6), 529–533.

Cervino, G., Cicciù, M., Biondi, A., Bocchieri, S., Herford, A.S., Laino, L., 2019. Antibiotic prophylaxis on third molar extraction: Systematic review of recent data. Antibiotics 8 (2), 53.

Choi, Y.Y., 2020. Prescription of antibiotics after tooth extraction in adults: a nationwide study in Korea. J. Korean Assoc. Oral Maxillofac. Surg. 46 (1), 49–57.

Gupta, A., Nagpal, T., Bhatt, V., 2024. The Use of Endoscopic Assistance in Minor Oral Surgery to Enhance Outcomes. Int. J. Oral Maxillofac. Surg. 52 (2), 4.

Isiordia-Espinoza, M.A., Aragon-Martinez, O.H., Martínez-Morales, J., Zapata-Morales, J., 2015. Risk of wound infection and safety profile of amoxicillin in healthy patients which required third molar surgery: a systematic review and meta-analysis. Br. J. Oral Maxillofac. Surg. 53 (9), 796–804.

Isola, G., Matarese, M., Ramaglia, L., Cicciù, M., Matarese, G., 2019. Evaluation of the efficacy of celecoxib and ibuprofen on postoperative pain, swelling, and mouth opening after surgical removal of impacted third molars: A randomized, controlled clinical trial. Int. J. Oral Maxillofac. Surg. 48 (10), 1348–1354.

Lang, M., Morrow, A., Gonzalez, M., Dodson, T., 2016. Do Postoperative Antibiotics Decrease the Frequency of Inflammatory Complications Following Third Molar Removal? J. Oral Maxillofac. Surg. 74 (9), e33–e34.

Loeffler, C., Boehmer, F., 2017. The effect of interventions aiming to optimise the prescription of antibiotics in dental care-A systematic review. PLoS One. 12, 11.

Luaces-Rey, R., Arenaz-Búa, J., López-Cedrún-Cembranos, J.L., Martínez-Roca, C., Pértega-Díaz, S., Sironvalle-Soliva, S., 2010. Efficacy and safety comparison of two amoxicillin administration schedules after third molar removal. A randomized, double-blind and controlled clinical trial. Med Oral Patol Oral Cir Bucal. 15, 4, e633–e638.

Milani, B.A., Bauer, H.C., Sampaio-Filho, H., Horliana, A.C.R.T., Perez, F.E.G., Tortamano, I.P., 2015. Antibiotic therapy in fully impacted lower third molar surgery: randomized three-arm, double-blind, controlled trial. J. Oral Maxillofac. Surg. 19 (4), 341–346.

Moghaddamnia, A.A., Nosrati, K., Mehdizadeh, M., Milani, S., Aghvami, M., 2013. A comparative study of the effect of prednisolone and celecoxib on MMO (maximum mouth opening) and pain following removal of impacted mandibular third molars. J. Oral Maxillofac. Surg. 12, 184–187.

Monaco, G., Tavernese, L., Agostini, R., Marchetti, C., 2009. Evaluation of antibiotic prophylaxis in reducing postoperative infection after mandibular third molar extraction in young patients. J. Oral Maxillofac. Surg. 67 (7), 1467–1472.

Morrow, A.J., Dodson, T.B., Gonzalez, M.L., Chuang, S.K., Lang, M.S., 2018. Do postoperative antibiotics decrease the frequency of inflammatory complications following third molar removal? J. Oral Maxillofac. Surg. 76 (4), 700–708.

Pippi, R., Pietrantoni, A., Patini, R., Santoro, M., 2018. Is telephone follow-up really effective in early diagnosis of inflammatory complications after tooth extraction? Med Oral Patol Oral Cir Bucal. 23 (6), e707.

Prajapati, A., Prajapati, A., Sathaye, S., 2016. Benefits of Not Prescribing Prophylactic Antibiotics after Third Molar Surgery. 2, 217–220.

Rohit, S., Reddy, P., 2014. Efficacy of postoperative prophylactic antibiotic therapy in third molar surgery. J. Clin. Diagn. Res. 8, 5, ZC14.

Sayed, N., Bakathir, A., Pasha, M., Al-Sudairy, S., 2019. Complications of Third Molar Extraction: A retrospective study from a tertiary healthcare centre in Oman. Sultan Qaboos University Medical Journal. 19 (3), e230.

Starch-Jensen, T., Gacic, B., Konstantinovic, V.S., Ontañón, A.V., Sapundzhiev, A., Pavlov, N., Pechalova, P., Szalma, J., Mottl, R., Tamme, T., Tiigimäe-Saar, J., 2023. Patient's perception of recovery following surgical removal of mandibular third molars. A prospective European multi-center study. Journal of Cranio-Maxillofacial Surgery. 51, 10, 635–643.

Wei, M., Mahdey, H.M., 2019. Dissecting Subperiosteal Abscess After Surgical Removal of Mandibular Third Molar. Online Journal of Dentistry & Oral Health. 1, 4.

Xue, P., Wang, J., Wu, B., Ma, Y., Wu, F., Hou, R., 2015. Efficacy of antibiotic prophylaxis on postoperative inflammatory complications in Chinese patients having impacted mandibular third molars removed: a split-mouth, double-blind, self-controlled, clinical trial. Br. J. Oral Maxillofac. Surg. 53 (5), 416–420.