

Clinical and surgical evaluation of the indication of postoperative antibiotic prescription in third molar surgery

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Objective. The aim of this study was to evaluate the need for antibiotic prescription in third molar surgery.

Study design. A double-blind randomized study was carried out with 71 patients from CODONT (Dentistry Center of the Police of São Paulo). Amoxicillin, clindamycin, or no medication was administered for 7 days immediately after surgery. The participants evaluated the presence of pain, edema, interincisal distance (ID), presence of infection, Pell and Gregory classification, rescue analgesia, osteotomy, and odontosection.

Results. There was no difference ($P < .05$) between antibiotics and control over the surgery duration, dose, visual analog scale (VAS), ID, and edema, yet significant differences were seen over time for VAS, edema, and ID.

Conclusions. Antibiotic prescription should not be indicated in all clinical conditions, yet it is necessary to correctly evaluate factors such as systemic condition of the patient, skill of the operator, and contamination of the surgical environment. (Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114(suppl 5):S26-S31)

Antibiotic prophylaxis in third molar surgery has long been a factor of controversy in dental clinical practice.^{1,2} The main issues are related to whether to prescribe pre- and postoperative antibiotics or not.

The greatest controversies concern the prescribing or nonprescribing of pre- and postoperative antibiotics, yet discussions are known regarding the definition of the term “antibiotic prophylaxis.” Considering that the term refers to the dose administered before or after surgery, this could extend to prophylaxis for bacterial endocarditis, installed infections, and at a distance. However, we found in indications in the literature of patients free of apparent infections, just as complications prevention of postoperative time.³

From the 1980s on clinical surveys were intensified to question the effectiveness of antibiotic prophylaxis in this surgical category.^{4,5} Besides the constant queries concerning the need for systemic prescribing in third molar surgery, major variations are confirmed in the literature regarding time, type of medication, administration routes, and duration of treatment.⁶

Whereas some authors categorically defend the effectiveness of antibiotic prophylaxis for third molars,^{7,8} several others emphasize opposition to this therapeutic option.^{9,10} Although discussions are mainly due to the questioning of effectiveness, allergic potential, risk of anaphylactic reaction, and induction of antibiotic resistance, it is known that clinicians do not abandon the practice of postsurgical prescribing, because it can prevent various postoperative complications.¹¹

Because oral surgery is performed in an environment potentially contaminated with a large quantity of bacteria, and the main postoperative complications are caused by these microorganisms, the prescribing of antibiotics is considered to be reasonable for the prevention and reduction of the frequency of postoperative complications. However, owing to the low incidence of these complications, no consensus is observed in the choice of administration of these antibiotics.¹²

These inquiries show that today, antibiotic prophylaxis is a choice of the surgeon and is supported mainly by the difficulty of clinical analysis and constant discrepancies regarding many variables, such as selection of cases, type of surgical procedure, experience of the operator, diagnostic criteria, and scientific rigor in the execution of the studies.¹³

STUDY DESIGN

The present randomized study was unicentric, prospective, and double-blinded for 3 groups. It was approved by the Committee of Ethics in Research of Clinical Medicine involving Human Beings of the Dentistry School of Universidade de São Paulo (no. 40/07), and each of the voluntary patients involved in the survey

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Received for publication Mar 27, 2011; returned for revision Jul 7, 2011; accepted for publication Aug 7, 2011.

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2212-4403/\$ - see front matter

doi:10.1016/j.tripleo.2011.08.018

received, read, and signed the free and clarified consent term.

Voluntary patients from the Dentistry Center of the Military Police of the State of São Paulo were included in the study, with the selection of 71 adults, aged between 18 and 45 years, of both sexes, 49 men and 22 women, classified in American Society of Anesthesiology group I, with indication of exodontia of impacted upper or lower third molars.

Patients excluded from the study were those that consumed analgesics or antiinflammatory medications within up to 12 hours before surgery; with conditions of hypersensitivity to the drugs; past records of gastrointestinal bleeding, peptic ulcer, severe hepatic, and/or renal problems; uncontrolled cardiovascular disorders; diabetes mellitus, pregnancy, and lactation; and clinical profiles of pericoronitis or periodontal abscess in the third molars.

Regarding randomization, the patients were divided randomly by computerized draw, and the surgeon received a standardized brown envelope with the medication and identification number of their patient directly. The patients from group A received 500 mg amoxicillin every 8 hours for 7 days, group B 300 mg clindamycin every 6 hours for 7 days, and group C no antibiotic.

As a routine of the service, the patients were all medicated with a postoperative antiinflammatory drug (50 mg diclofenac sodium every 8 hours for 3 days), following the classic postoperative indication where the expectation of inflammatory response is of lesser intensity and targeting the prevention of excessive edema. They were also instructed, through a specific and standardized prescription, on the occurrence of intense or severe postoperative pain to use pain relief medication, 750 mg paracetamol, ≥ 1 hour after the start of surgery, every 6 hours and as often as necessary to relieve the pain, with the compulsory annotation by the patient of the quantity and timing of ingestion of the analgesic.

For the diagnosis of postoperative infection, the participants used the analysis of a single operator calibrated and informed about criteria accepted by the literature, including body temperature $>37.8^{\circ}\text{C}$ without other discernible causes, intraoral abscess with drainage floating point, alveolitis, persistent severe pain or pain intensified 48 hours after surgery and accompanied by inflammation and/or erythema, and severe pain after the seventh day accompanied by inflammation.

The inflammation, erythema, edema, and pain were measured qualitatively (presence or absence), with pain measured through the 10-cm visual analog scale (VAS) and edema by the visual scale of edema (VSE) adapted by the Department of Integrated Clinical Medicine of the Dentistry School of Universidade de São Paulo.

Other variables were also analyzed, including trismus, presence of infection, duration of surgery, Pell and Gregory classification, doses of rescue analgesics, osteotomy, and odontosection.

All of the surgeries were performed with standard aseptic procedures using a 0.2% chlorhexidine gluconate solution (extraoral) and 0.12% solution for 1 minute (intraoral), conventional anesthetic technique (2% lidocaine chlorhydrate with epinephrine 1:100,000) with standardized 2 cartridges for upper teeth and 3 cartridges for the lower teeth, and surgical technique standardized and carried out by a single operator specialized in buccomaxillofacial surgery, with the assistance of a dental office assistant.

When necessary, odontosection or osteotomy were considered to be absent or present variables and performed with a normal sterile Kavo high-rotation motor.

After the surgery, all of the patients received an envelope containing the exact quantity referring to their group of medications or, when belonging to group C, just the antiinflammatory drug and analgesics in case of pain. Neither the patient nor the surgeon had identification of the medications used; for this purpose they exhibited the same color, texture, shape, and type.

All of the patients were assessed in the immediate postoperative period, where they received guidance, training and standardized information for completion of the patient chart. Moreover, the patients were also observed on the seventh postoperative day, at the time of suture removal.

If signs of infection were observed, the patient was advised to contact the dental surgeon by phone or the dental team on duty at the Dentistry Center of the Military Police. The dentists from the teams on duty were trained to act in a standardized manner, with alveolar reopening, irrigation with saline, and intraalveolar medication with zinc oxide–eugenol.

The patients that did not fulfill the postoperative recommendations of the operator and completion of the patient chart were automatically eliminated from the study. Their instructions for completion of the postoperative form followed the VAS of pain and the VSE (Figure 1).

The statistical analysis was conducted considering sex and age of the patient, visual scale of pain, need for rescue medication, visual scale of edema, quantity of anesthetic cartridges, Pell and Gregory classification, osteotomy and odontosection, duration of surgery, and interincisal distance (ID).

The following clinical or subjective variables were recorded by the actual patient on a form developed for data gathering in the specified postoperative periods of 1, 2, 3, 4, and 48 hours and 7 days for the VAS and the 1st, 6th, 12th, and 24th hours after surgery for the VSE.

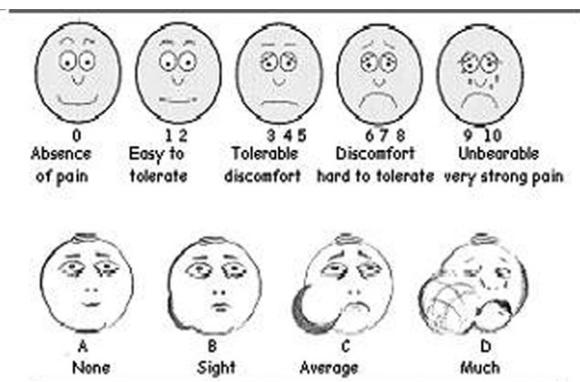


Figure 1. Visual analog pain scale and visual scale of edema.

A ruler marked in millimeters was used to gauge ID, and the investigator took 3 measurements: preoperative, immediate postoperative, and on the 7th day, recording results in the data-gathering form. The variables of local presence of infection, duration of surgery, need for and quantity of rescue analgesic used, Pell and Gregory classification, and need for osteotomy and odontosection were also appropriately recorded by the surgeon.

To evaluate the existence or nonexistence of association between classification, odontosection, and osteotomy among the groups, we applied the Pearson χ^2 test.¹⁴ The other variables were quantitative, and their comparisons among the groups were carried out by the Kruskal-Wallis nonparametric test.¹⁵

A model of nonparametric variance analysis for ordinal data with repeated measures was applied to the VAS pain scale, interincisal distance, and edema for us to evaluate the effects of time, group, and interaction between group and time, because the normal distribution in these cases was rejected.

RESULTS

The sample group was formed by 71 patients between 18 and 45 years of age (mean age 27.1), with 33.8% (24) from group A, 32.4% (23) from group B, and 33.8% (24) from group C. The following variables were evaluated in relation to the 3 groups: classification of dental position according to Pell and Gregory, duration of surgery, odontosection, osteotomy, VAS, ID, and edema.

The statistical analysis did not show any evidence of significant differences ($P > .05$) among the groups for duration of surgery, VAS, ID, and Edema, and no evidence of significant association between classification, odontosection and osteotomy was observed among the groups.

According to Table I, the general behavior of the VAS was marked by an increase from the start with

maximum values reached between 3 and 6 hours and subsequent decline in 48 hours, returning to values close to the initial ones on the 7th day, with mean VAS of 0.1845 but still different from 0. Among most of the postoperative times observed, the difference of VAS, on average, was statistically significant ($P < .001$), except between the times of 48 hours and 1 hour and between 6 hours and 3 hours.

Significant differences ($P < .001$) were found for ID over time. Through the measurements of effects and contrasts, it is concluded that the ID values at the end of surgery were lower than they were initially. Although the values had increased on day 7, they were still lower than the values at the beginning (Table II).

Edema analysis did not show significant differences over time ($P > .05$). Through the contrasts and measurements of effects, it was verified that at all times the values of edema were higher than they were initially, presenting the highest values in 48 hours. The values of edema at 24 hours were lower than at 48 hours and higher than on the 7th day (Table III). Both on the 3rd and on the 7th day, the values were similar to those at 48 hours, and on the 7th day the values were lower than at 3 days but still higher than the initial values (Table III).

In the presence of odontosection, osteotomy, and duration of surgery, edema continued to exhibit significant changes over time. The groups showed no evidence of differences among one another, and therefore comparisons between times can be observed in general, considering a single group. The effect of the duration of surgery was also significant and positive: An increase of 10 minutes in the duration of surgery increased edema on average by 0.07.

DISCUSSION

The aim of this study was to demonstrate the need of postoperative prescribing of antibiotics in third molar surgery, based on a comparison of the use of amoxicillin and clindamycin, 2 antibiotics of efficacy proven in literature, whose administration is the most widely disseminated worldwide for prophylaxis in third molar surgery.

The study demonstrated that in postoperative prophylaxis there is no difference regarding the indication of extended-spectrum antibiotic (amoxicillin), broad-spectrum antibiotic (clindamycin), or no antibiotic for prevention of pain, edema, trismus, and postoperative complications in impacted or retained third molar surgery.

The procedures with indications for antibiotic prophylaxis in dental surgery were recently published in a consensus statement in Spain. These include periapical surgeries, bone surgeries, surgeries for dental implants, bone grafts, excision of benign tumors, and exodontia

Table I. Relative effects and contrasts in visual analog scale of pain

	Start	1 h	2 h	3 h	6 h	48 h	3 d	7 d
Relative effects								
A	0.285	0.53	0.645	0.709	0.611	0.494	0.414	0.326
B	0.285	0.542	0.613	0.692	0.752	0.564	0.445	0.317
C	0.285	0.515	0.539	0.66	0.601	0.461	0.394	0.328
Contrasts								
Start		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0161
1 h			.0033	<.0001	.0033	.553	.0022	<.0001
2 h				.0001	.0955	.0061	<.0001	<.0001
3 h					.2532	<.0001	<.0001	<.0001
6 h						<.0001	<.0001	<.0001
48 h							<.0001	<.0001
3 d								<.0001

Table II. Relative effects and contrasts in interincisal distance

	Start	End	7 d
Relative effects			
A	0.285	0.448	0.567
B	0.285	0.428	0.598
C	0.285	0.411	0.602
Contrasts			
Start		<.0001	.0003
End			<.0001

Table III. Relative effects and contrasts in visual scale of edema

	Start	24 h	48 h	3 d	7 d
Relative effects					
A	0.297	0.604	0.698	0.604	0.336
B	0.297	0.606	0.635	0.577	0.338
C	0.297	0.615	0.641	0.596	0.355
Contrasts					
Start		<.0001	<.0001	<.0001	.0063
24 h			.0317	.6016	<.0001
48 h				.0027	<.0001
3 d					<.0001

of impacted teeth.¹⁶ Therefore, our interest and concern in reviewing the literature and the current tendency of global surgical techniques is justified.

The use and benefits of antibiotic prophylaxis in third molar surgery are controversial, and there are no defined recommendations concerning this prophylactic category. There are discussions on the use of antibiotics regarding the removal of soft tissue, total or partial removal of bone, ideal time of use, dose, duration, and route of administration.¹⁷

Even though, paradoxically, most British surgeons and >50% of American surgeons prescribe systemic antibiotics for third molar surgery,¹⁸⁻²⁰ this global tendency should be investigated, queried, and proved for adequate clinical practice.

In the present study, we used scales of pain and edema, because the VAS has been established for some

time as a valuable tool for pain evaluation.²¹⁻²³ For edema evaluation, we decided on the use of a cartoonized visual scale developed by the Dental School of Universidade de São Paulo, because analyses of the pilot work revealed easy adaptation to and intimacy of the patients with the visualization nature of the 4 images (no, slight, average, and much swelling).

As with Monaco et al.,²⁴ no statistically significant differences were found regarding pain between the groups that used antibiotics (amoxicillin or clindamycin) and the group that received no antibiotic. Moreover, the peak of pain was concentrated between 3 and 6 hours after surgery (Figure 2).

On the other hand, we found a statistically significant difference ($P < .05$) throughout the postoperative times, where at all the times the VAS values were higher than the initial values, reaching the highest values between 3 and 6 hours after surgery, which coincides with the peak of the inflammatory process described in the literature. The significant reduction of edema started after 48 hours.

Regarding edema, no statistically significant differences ($P > .05$) were found among groups A, B, and C, and slight and average edema predominated.

The results show that there were no significant statistical differences ($P > .05$) among the 3 groups for the analysis of ID, with a decrease of the ID measurement in the 3 groups at the end of surgery.

Regarding complications and infections, no infections were verified in the analysis of the 7th postoperative day, and none of the patients needed to use the channel of communication with the operator or investigator to notify of any kind of complication.

The frequency of the use of medications should be considered, because many authors do not agree with the indiscriminate use of antibiotics prophylactically, the incidence of postoperative infections being too low to justify this approach.^{25,26} The estimated rate of infection after third molar exodontia is <1%, which justifies this query.^{27,28} This fact is reaffirmed by the data ob-

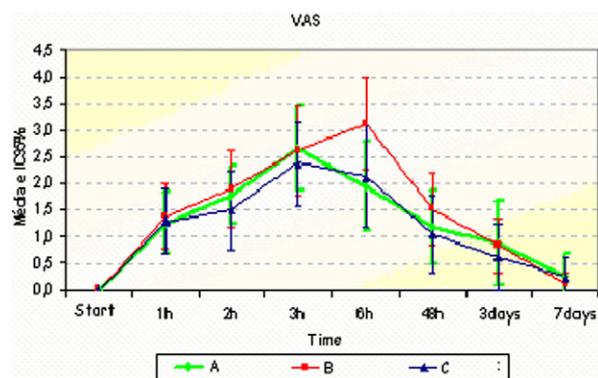


Figure 2. Description of the visual analog scale (VAS) pain values in the groups. Image is available in colour at www.ooooe.net.

tained by the present study, because, regardless of the group in question, not a single case of postoperative infection was found, not even with the patients from the group not taking antibiotics.

Regarding the existence of adverse reactions to medications, it is estimated that 6%-7% of the patients that receive antibiotics have some kind of reaction.¹⁰ In our sample, no cases of reported or confirmed reaction were verified.

The mean duration of surgery was statistically similar among groups A (17.17 min), B (17.74 min), and C (13.0 min), which is in line with descriptions reported in the literature for exodontia of a single third molar (15-25 min). On the other hand, owing to the existence of different degrees of surgical difficulty in our sample, besides surgeries that required durations above the average times described, we consider that the surgeon's experience overlaps the analysis of time or surgical difficulty.

According to the comparative analysis, no significant difference ($P > .05$) occurred between the presence of lower or upper molars among the groups.

The comparison of the frequency of odontosection among groups A, B, and C demonstrated a balance among them and a nonsignificant difference ($P > .05$), which does not compromise the postoperative analysis. In osteotomy, we also found a nonsignificant difference among the groups ($P > .05$). The predominance of the execution of this surgical maneuver was established in the 3 groups. Verification through the comparative analysis for the 3 groups showed that group A presented a higher percentage, where 83.30% of the surgeries were performed with the need for osteotomy. However, the comparison among groups did not present any significant statistical difference ($P > .05$).

Regardless of the radiographic or clinical verification of surgical difficulty, all of the patients received anti-

inflammatory medication for 3 days, besides the indication of rescue analgesic.

Regarding the use of paracetamol (750 mg) in our sample, we found low average ingestion of the emergency analgesic: 3.21 doses (group A), 3.57 doses (group B), and 2.92 doses (group C).

Both the nonparametric model (nonparametric analysis of variance) and the model adjusted to odontosection, osteotomy, teeth, and duration of surgery (generalized estimating equation) suggest that the measurements of VAS, ID, and edema presented differences over time, but differences among groups were not evident. The generalized model identified a significant effect of the duration of surgery on edema, where an increase in the duration of surgery increased edema.

Accordingly, this study demonstrated that antibiotic prophylaxis should not be indicated in all cases of third molar surgery. The evaluation of factors, such as systemic conditions of the patient, skill of the operator, and contamination of the surgical environment should be conducted correctly.

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