Journal section: Oral Surgery
Publication Types: Research

doi:10.4317/medoral.16.e376
http://dx.doi.org/doi:10.4317/medoral.16.e376

Factors associated with complications of removal of third molars: A transversal study

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Barbosa-Rebellato NL, Thomé AC, Costa-Maciel C, Oliveira J, Scariot R. Factors associated with complications of removal of third molars: A transversal study. Med Oral Patol Oral Cir Bucal. 2011 May 1;16 (3):e376-80.
http://www.medicinaoral.com/medoralfree01/v16i3/medoralv16i3p376.pdf

Received: 12/03/2010
Accepted: 26/08/2010

Article Number: 16973 http://www.medicinaoral.com/

eMail: medicina@medicinaoral.com
Indexed in:
Science Citation Index Expanded
Journal Citation Reports
Index Medicus, MEDLINE, PubMed
Scopus, Embase and Emcare
Indice Médico Español

Abstract

Objectives: The purpose of this study is to estimate the overall frequency of complications associated with third molars (M3) removal and to identify the risk factors associated with these complications. Study design: To the transversal analysis, a researcher confidentially reviewed the records of all M3 surgery patients. The predictor variables were demographic (i.e. age and gender), localization and position of third molar, bone removal and tooth sectioning. Results: 210 patients had one or more third molars teeth removed, a total of 605 teeth. The sample's mean age was 21,6 ±9,2 years, with 1,4 woman to 1 man. Postoperative complications were recorded in 54 extractions of third molars. The most common complications were infection (42,6%), followed by radicular fractures (11,1%) and gingival alterations (11,1%). Complications were significantly affected by 3 factors: age over 25 years old (p=0,002 – OR 2,21), location (p=0,006 – OR 2,36), bone removal (p=0,002 - OR 3,03) and tooth sectioning (p=0,00002 – OR 3,59). Conclusions: The results of these analyses suggest that age, location of the tooth, bone removal and tooth sectioning appear to be associated with a higher complication rate for M3 extractions.

Key words: *Third molar removal, oral surgery, complications, risk factor.*

Introduction

Extraction of third molars (M3) accounts for a large volume of cases in contemporary oral surgical practice and requires much planning and surgical skill, during both preoperative diagnoses and postoperative management(1). Postoperative complications after surgical removal of the M3 have been reported in different frequencies and extents, ranging from mild discomfort after operation to major complications that require further treatment, hospitalization, and may result in permanent damage(2). The most commonly described complications related are persistent bleeding, disturbed wound healing, dry socket, abscess information and dysesthesia(3).

The literature on complications associated with M3 removal is voluminous(4). Although extensive literature exists, there is a relative dearth of studies to assessing anatomic and operative factors associated with M3

complications(1). Besides, it is important that mathematical models would be used to identify and to relate risk factors with complications.

The purpose of this study is to estimate the overall frequency of complications associated to M3 removal and to identify risk factors associated with these complications.

Materials and Methods

Six hundred and five third molar teeth were removed between 1997 and 2008 at the Oral and Maxillofacial Surgery Center of Hospital de Fraturas XV, Curitiba-PR, Brazil. Thus, to proceed the transversal analysis, a researcher confidentially reviewed the records of all third molar surgery patients. The inclusion criteria consisted of charters with complete information. All surgeries were carried out with the same surgical team, equipment and technique.

The predictor variables for the study were sets of exposure considered plausibly related to complications rates. These variables were analyzed according to a strict protocol, including demographic variables, like age (under or over 25) and gender (male or female). Health status measurements included the American Society of Anesthesiologists (ASA) system from I to V. The chosen anatomic measure was the position of the third molar, defined according to the American Association of Oral and Maxillofacial Surgeons (AAOMS) parameters of care as absent, erupted, partially bony impacted or fully impacted. Bone removal and tooth sectioning were analyzed too.

The outcome variables were postoperative complications, with a complication defined as any event requiring additional patient management outside the planned treatment course. Overall complications included both intraoperative and postoperative complications. These included radicular fractures, osseous spicules, injury to adjacent tooth, gingival defect, infection, paresthesia, hemorrhage, oral-antral communication, sinusitis, suture dehiscence or any other complications.

Data were collected and revised and the information was entered and a database was created using Microsoft Excel (Microsoft, Inc, Redmond, WA). The database was transferred to Statistical Package for the Social Sciences (SPSS 15.0, Inc, Chicago, IL) for statistical analysis. Descriptive statistics were computed for all study variables. Bivariate statistics were computed to measure the association between the predictors and outcome variables, using the chi-square test. Differences of 5% level were accepted as significant. If the difference was present, there were calculated the odds ratio (ORs), to define the chance of risk factors.

Results

Between 1997 and 2008, 210 patients had one or more third molar teeth removed by a senior surgeon, a total of 605 teeth. The sample's mean age was 21,6 ±9,2 years, age range of 11 to 64, with 1,4 woman to 1 man ($p<0,0001$). The distribution of health status was as follows: ASA I (97,6%) and ASA II (2,4%). There were no patients included in ASA III, IV or V. From 605 teeth, the majority (69,4%) was fully impacted, 388 bone removal were made as well as 284 sectioning teeth. All data concerning to position of third molar are shown in table 1.

Postoperative complications (8,9%) were recorded in 54 extractions of third molars (Table 2). The most common complications were infection (42,6%), followed by radicular fractures(11,1%) and gingival alterations (11,1%).

Complications were significantly affected by 3 factors: location ($p=0,006$), bone removal ($p=,002$) and tooth sectioning ($p=0,00002$). Other factors, like gender, age, position of 3M weren't significantly affected. In this model, the OR of the position was 2,36 (1,21 – 4,66) suggesting that for each superior third molar complication, 2,36 inferior third molar complication occurred; in other words, a major chance (2,36X) of complication in the removal of the mandibular third molar was found when compared with the superior third molar. Patients who had their third molars surgically removed associated with bone removal showed an OR 3,03 (1,39 – 6,80) when compared to the same patients who had their third molars removed without bone removal. When we compared the patients who had their third molars removed associated with tooth sectioning the odds ratio increased to 3,59 (1,84 – 7,11). Table 3 summarizes the association between the predictor variables and the outcome variable.

Table 1. Anatomic measure – position of third molar.

Position of third molar	(n = 605)	%
• Erupted	87	14,4
• Fully impacted	420	69,4
• Partial impacted	98	16,2

Table 2. Postoperative complications associated to extractions of third molars.

Complication	Number (n = 54)	Percentage (%)
• Gingival defect	6	11,1
• Oral-antral communication	5	9,3
• Suture Dehiscence	1	1,8
• Osseous Spicules	3	5,6
• Radicular fractures	6	11,1
• Hemorrhage	3	5,6
• Infection	23	42,6
• Injury to adjacent tooth	1	1,8
• Paresthesia	5	9,3
• Sinusitis	1	1,8

Table 3. Association between the predictor variables and the outcome variable.

Predictor Variable		**Complications (outcome variable)**	
		*P**	Odds ratio
Gender		0,007	*
Age	Under the age 25	0,544	*
	Over the age 25	**0,02**	**2,21 (1,04 – 4,70)**
Localization		**0,006**	**2,36 (1,21 - 4,66)**
Position		0,08	*
Bone removal		**0,002**	**3,03 (1,39 – 6,8)**
Tooth sectioning		**0,00002**	**3,59 (1.84 – 7,11)**

Note: Bold text indicates values that are statistically significant.
* P Value of x2 test.

Discussion

To understand factors that influence complications of M3 extractions may be valuable for both planning and scheduling procedures, and also for students and residents training(1). This study purpose was to identify and quantify the risk factors associated with problematical M3 extractions. We hypothesized that the bone removal and the tooth sectioning could be determined as a sign of M3 complications.

Results brought an overall complication rate of 8,9%. In other studies, this rate is variant, like 4,6%(4) and 18,9%(5). Therefore, it is almost identical to the findings of other authors, but it is important to observe that studies devoted to complications have garnered significant attention, due to the fact that a large volume of cases results in significant numbers of complications, even though the overall incidence remains relatively low(5). Besides, some studies published their complications results based on subjects and other based on teeth.

It has previously been suggested that a significant difference in postoperative complication rates between male and female exist. However, even having a different number of men and women, this study showed no significant difference between gender and complications.

Several risk factors were associated with complications. Studies have enabled us to better identify those risks of complications. Among other things, we have noticed that a positive correlation between age(6), medical history and tooth position is linked to the incidence of complications. It allowed us to tailor our advice and therapy of the patients(7). The predictors associated with an increased risk for overall complications in the present study were the age over 25, localization of third molar, bone removal and tooth sectioning during the surgical procedure.

Some studies related postoperative complications to older age(5-8) A recent study(5), related to the American Association of Oral and Maxillofacial Surgeons'Age-Related Third Molar Study(9) showed that patients over the age of 25 were 46% more likely to develop complications than those under that age. In a specific study(10), the older group (over 30 years old) presented higher levels of swelling when compared to a younger group (under 30 years old). Our results brought statistical difference in groups (over the age 25). In group over 25 (p,02), we found OR 2,21. This increase of complication may be associated with alteration in bone properties including bone density(11).

In relation to the localization of the tooth, our results confirm the common clinical observation that mandibular M3 are more difficult to extract than their maxillary counterparts. This effect probably occurs due to the greater cortical bone density in the mandibular arch and the additional caution required avoiding inferior alveolar nerve injury(1).

In addition, some authors(11) showed position of third molar as a risk factor to complication. We could not find statistically difference in our results. A study found that the degree of impaction was correlated with the operation length and related to surgical difficulties for extraction. Other authors(1) while developing a predictive model for M3 extraction included maxillary and mandibular position as a variable that would increase the operating time (i.e. numbers that varied from +0,8 minutes for eruption to +3,2 minutes for full bony impacted). However, these variables were not taken into account in this study.

Bone removal and tooth sectioning were considered as risk factors of complications of the removal of the third molars, as our results showed. As bony impactions require lengthier procedures involving bone removal and a wider flap reflection, there was a greater chance for damaging adjacent structures(12). In a study(8) to determine the risk factors of alveolar osteitis and pain, removal bone was statistically significant for both variables. Our results found that the risk to have a complication when bone is removed in a extraction of 3M is 3 times greater (OR 3,03) if compared to a procedure without bone removal .

The results of this study suggested that the age over 25, the tooth localization, the bone removal and/or the tooth sectioning were associated with an increased risk of complications. This information should be reflected in both evaluation of the indications of removal of third molars and in the informed consent process. Future work in this field relating specific forms of complications and risk factors should clarify these topics.

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