

## Complications in third molar removal: A retrospective study of 588 patients

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Contar CMM, Oliveira P, Kanegusuku K, Berticelli RS, Azevedo-Alanis LR, Machado MAN. Complications in third molar removal: A retrospective study of 588 patients. Med Oral Patol Oral Cir Bucal. 2010 Jan 1;15 (1):e74-8.

<http://www.medicinaoral.com/medoralfree01/v15i1/medoralv15i1p74.pdf>

Received: 01/03/2009  
Accepted: 02/08/2009

Article Number: 2726 <http://www.medicinaoral.com/>  
© Medicina Oral S. L. C.I.F. B 96689336 - pISSN 1698-4447 - eISSN: 1698-6946  
eMail: [medicina@medicinaoral.com](mailto:medicina@medicinaoral.com)

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### Abstract

**Objectives:** Surgical removal of third molars is a regular surgical procedure, which like all operations, may have complications. The purpose of the study was to analyze the incidence of complications and their relationship with the surgical difficulty in a group of 588 patients treated by the same oral and maxillofacial surgeon. **Study design:** This retrospective cohort study consisted of 1699 third molars (M3) removed between 2005 and 2008. The teeth were grouped into a 6-class scale of surgical difficulty rated according to the surgical procedure description in the patient's file: I: upper M3 requiring forceps only; II: upper M3 requiring osteotomy; III: upper M3 requiring osteotomy and tooth section; IV: lower M3 requiring forceps only; V: lower M3 requiring osteotomy; VI: lower M3 requiring osteotomy and tooth section. The complications were grouped into each surgical difficulty class and their incidence and management were also described. **Results:** 59 complications (3.47%), including pain, root tip fracture, paresthesia, alveolar osteitis, temporomandibular joint discomfort, and oroantral fistula were reported. Surgical difficulty class VI presented the higher incidence of complications (n=38). **Conclusions:** The risk of complications in third molar surgery will always exist and increases in proportion to the surgical difficulty. Mandibular M3 requiring osteotomy and tooth section have the highest risk of complications.

**Key words:** Third molar, complications, surgical procedures.

### Introduction

Removal of third molars is one of the most frequently carried out procedures in oral surgery (1,2). Most third molars surgeries are performed without intra- or post-operative difficulties, however sometimes this common procedure can result in several complications. The most common complications following third molar surgery include: sensory nerve damage, dry socket, infection,

hemorrhage and pain. Less common complications are: severe trismus, iatrogenic damage to the adjacent second molar and iatrogenic mandibular fracture (1,3).

In all surgical procedures, proper preoperative planning and the blending of surgical technique with surgical principles is of paramount importance for decreasing the incidence of complications (4). Complications related to third molar removal range from 4.6% to 30.9% and

may occur intraoperatively or develop in the postoperative period (4,5). The surgeon must inform the patient before surgery of the statistical likelihood of complications so that the patient can make an informed decision as to whether to undergo surgery (3). Any complication should be handled in a timely and corrective manner by the surgeon (4).

Factors reported to be associated with third molars complications include age, gender, medical history, oral contraceptives, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, relationship of third molar to the inferior alveolar nerve, surgical time and technique, surgeon experience, number of teeth extracted, use of perioperative antibiotics, use of topical antiseptics, use of intra-socket medications and anesthetic technique (4,5).

In this study we retrospectively investigated the incidence of complications after third molars surgery of 588 patients who had one or more third molar removed, in a total of 1699 teeth, between 2005 and 2008 by the same surgeon. We analyzed the type, frequency and the management of each complication.

### Materials and Methods

To address our research objectives, we designed a retrospective cohort study. The study sample was derived from the records of 588 patients treated by one surgeon (C.M.M.C) in private practice between July 2005 and July 2008. Of the 588 patients, 328 were women and 260 were men. Mean age was 26, 14 years, ranging from 14 to 54 years. To be included in the study sample, patients needed to have one or more maxillary or mandibullary third molars (M3) removed, present no medical conditions, have the surgical procedure description in his file and the evidence of post-operative follow-up to assess outcomes. Patients who did not filled these requirements were excluded from the sample. No patient had pericoronitis or severe periodontal disease at the time of surgery.

All surgeries were performed in the same clinic with similar equipment and they were all carried out under local anesthesia or a combination of local anesthesia and nitrous oxide sedation. Cases where general anesthesia was used were excluded from the study. All patients received an antibiotic, amoxycillin, 1g every 12 hours for 5 days, starting with 2g 1 hour before surgery, an anti-inflammatory/analgesic, dexamethason 4mg every 8 hours for 2 days, starting with 8mg 30 minutes before surgery, and an antiseptic, chlorhexidine 0.12%, 2 mouth rinses per day for 15 days after the surgery (Periogard, Colgate-Palmolive Company, Brazil). Another analgesic was also prescribed to control the pain when necessary (paracetamol with codein 30mg every 6 hours in case of pain).

According to the surgical description found in the

patient's file, we made a 6-class scale for surgical difficulty (adapted from Lago-Méndez et al. (6):

- I, maxillary M3 requiring forceps only;
- II, maxillary M3 requiring osteotomy;
- III, maxillary M3 requiring osteotomy and tooth section;
- IV, mandibular M3 requiring forceps only;
- V, mandibular M3 requiring osteotomy;
- VI, mandibular M3 requiring osteotomy and tooth section.

The following itens were registered from each file: gender, age, number of third molars removed, surgical difficulty class of each tooth, associated complications and their management.

### Results

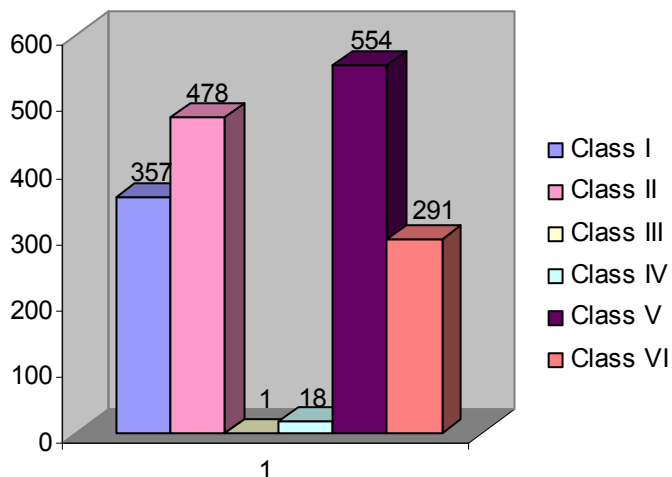
1699 teeth were removed from the 588 patients included in this study, being 836 maxillary (49.2%) and 863 mandibular (50.8%) M3. The most frequent surgical difficulty classes were type V (number of teeth (n)=554), II (n=478), I (n=358), VI (n=291), IV (n=18) and III (n=1) (Fig. 1).

A total of 59 (3.47%) complications, including pain (n=26), root tip fracture (n=21), paresthesia (n=7), alveolar osteitis (n=2), temporomandibular joint (TMJ) discomfort (n=2), and oroantral fistula (n=1) were reported (Fig. 2). Mandibular M3 presented an increased frequency of complications (n=53 / 3.11%) and most of them occurred in surgical difficulty class VI (n=31) (Table 1).

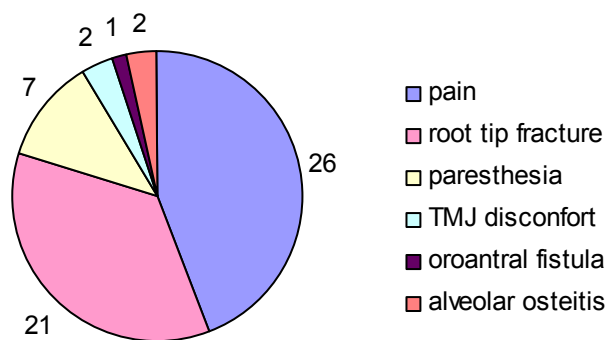
Pain was the most commom complication and it was associated to local food impaction due to poor oral hygiene (n=22), and presence of traumatic oral ulcers under the suture (n=4). Pain complaints occurred exclusively in surgical difficulty class V (n=14) and VI (n=12) and were highest among women (n=15). In the cases of local food impaction, local irrigation with saline solution and the instructions for better local hygiene were enough to solve the pain. The presence of traumatic oral ulcers under the suture occurred in both lower M3 of two patients and in these cases the suture, normally removed in the seventh postoperative day, was removed in the fifth postoperative day and low level intensity laser was applied over the lesions at this time and in the following day, in order to control the pain.

Fracture of root tips, the second most commom complication, occurred in classes I (n=5), V (n=7) and VI (n=9) and were highest among men (n=14) with mean age of 30.71-year-old (22-47). In all cases the tips were left in place and radiological follow-up is being done annually.

One 34-year-old male patient with a class II M3 presented a small oroantral fistula. In this case the oroantral communication was observed during surgery and amoxicillin was extended to 10 days and nasal descon-



**Fig. 1:** Incidence of surgical difficulty classes in the removal of 1699 third molars (M3). Class I: maxillary M3 requiring forceps only; Class II: maxillary M3 requiring osteotomy; Class III: maxillary M3 requiring osteotomy and tooth section; Class IV: mandibular M3 requiring forceps only; Class V: mandibular M3 requiring osteotomy; Class VI: mandibular M3 requiring osteotomy and tooth section.



**Fig. 2:** Complications and their incidence (n=59 / 3.47%) in the removal of 1699 third molars.

**Table 1.** Number of third molars removed and their percentage of complications in each surgical difficulty class following surgery.

Class	N	Total complications	Pain	Root Tip Fracture	Oroantral Fistula	TMJ discomfort	Paresthesia	Alveolar osteitis
I	357	5	*	1.40%	*	*	*	*
II	478	1	*	*	0.20%	*	*	*
III	1	*	*	*	*	*	*	*
IV	18	*	*	*	*	*	*	*
V	554	22	2.52%	1.26%	*	0.18%	*	*
VI	291	31	4.12%	3.09%	*	0.34%	2.40%	0.68%

N= number of third molars removed (1699); Total complications = 59; \* = 0%.

gestant was administered. At the time of sutural removal an oroantral fistula was observed due to wound dehiscence; the communication that was smaller than 2 mm closed spontaneously without any treatment.

TMJ discomfort was reported by two young women (16 and 18 year-old) who presented surgical difficulty class V and VI M3, respectively. Both were treated with a soft diet for 10 days and anti-inflammatory medication for 5 days with good results.

Inferior alveolar nerve (IAN) paresthesia occurred in class VI M3 of three women (one of them presented paresthesia in her both molars) and two men with mean age 25.6-year-old (18-33 years). All except one IAN paresthesia resolved within one month. In one case the resolution occurred within four months. Lingual nerve paresthesia occurred in one class VI M3 in a 19-year-old man; this case resolved within fifteen days.

Alveolar osteitis (AO) occurred in two class VI M3 of one 28 and one 29-year-old women. Both cases were treated with a combination of antibacterial dressings (Alvogyl®) and systemic analgesics (paracetamol with codein 30mg). In one patient the dressing had to be changed for three times to complete eliminate the symptoms; for the other one no change was necessary.

## Discussion

The troubling consequences of third molar retention such as periodontal destruction, root caries, acute and chronic infection, and morbidity of late extraction in older patients are seen in daily practice of oral and maxillofacial surgeons (7), once the removal of third molars is the most common procedure performed by them (1).

Consistent with other studies, our results indicated that mandibular M3s were associated with an increased frequency of complications relative to maxillary M3s. The four most common postoperative complications of M3 removal reported in the literature are localized alveolar osteitis, infection, bleeding and paresthesia (3,4). Among the 1699 teeth removed in the present study there was any case of infection and bleeding. Major complications, already reported in the literature, having the greatest impact on patient, patient's family and surgeon including morbidity requiring hospitalization (8,9), some form of untoward outcome rendering the patient disabled such as fractured jaw (1,9) or permanent nerve injury (10) also didn't occur in any case.

AO is a clinical diagnosis characterized by the development of severe, throbbing pain several days after the removal of a tooth and is often accompanied by halitosis (4). In the present study AO represented just 0.11% of the total complications, a lower frequency than the reported in the literature that ranges from 0.3 % to 26% (3-5,11). Sisk et al. (3) previously mentioned that the reported incidence of AO tend to be lower in single-surgeon and private practice studies than in multiple-

surgeon and institutional studies what would explain the lower frequency of AO in this study. AO has an increased incidence with mandibular M3 extraction sockets and in more difficult and traumatic surgeries (5,11). Both cases of AO in the present study occurred in surgical difficulty class VI teeth where a longer trans-operative time, extensive osteotomies, and tooth section were necessary. In the management of AO a combination of antibacterial dressings, obtundant dressings, and topical anesthetic agents is used to alleviate severe pain. Patients should be seen regularly after placement of the dressing, which may need to be changed several times to eliminate the symptoms (4).

Neurological damage of the lingual nerve or of the inferior alveolar nerve (IAN) is certainly one of the least desired side effects of M3 removal (2) once it can be devastating for patients because of its effect on speech, mastication, swallowing, and social interactions (12). The incidence of IAN and lingual nerve injuries reported ranges from 0.4% to 22% and, fortunately, most of these injuries undergo spontaneous recovery (12). The surgical complexity associated with full bony impactions may account for the higher frequency of this kind of injury, as compared with soft tissue impactions and erupted teeth (11); this was particularly true for the cases with reported paresthesias in this study once all of them occurred in surgical difficulty type VI M3. Risk factors as regards damage to the lower alveolar nerve are the depth of impaction and dental roots proximity to the alveolar canal (12,13), and to the lingual nerve is the detachment of the prepared flap for the M3 removal also from the lingual side (14).

Root tips fractures are relatively common during M3s removal due to the severe roots curvature and, sometimes accessory root, these teeth frequently present. Most of the time the tips are removed requiring just a little longer time to finish the surgical procedure. However, in cases where preoperative imaging indicates an intimate relationship between the root of the tooth and the inferior alveolar nerve, deliberate retention of the apical portion of the roots might be appropriate in order to prevent IAN damage (15). This deliberate retention is also our choice in cases of upper M3s in intimate association with maxillary sinus in order to prevent displacement of the tips into the sinus. Root tips of maxillary or mandibullary M3s that are mobile should not be retained because they can act as a mobile foreign body and become a nidus for infection or migration. Radiological follow-up in our series showed bone formation over the retained root fragments for all patients.

A casual relationship between M3 removal and TMJ injury currently has little support in the literature (4). However, some authors suggest that mouth opening for extensive period of time and the exertion of a variable force on the mandible that occurs in some surgeries can

overload or injure one or both TMJ (16). Care should be taken in judicious application of force and a biteblock should be used to stabilize the mandible upon surgical mobilization of the lower M3s (4). Both patients who presented TMJ pain in our study were young female (16 and 18-year-old) and they both reported nocturnal bruxism and a high stress period of their lives in the preoperative evaluation. After the remission of the symptoms they were both directioned to orthodontic and psychological evaluation. A preoperative examination of the temporomandibular region, including an evaluation of joint sounds, opening and excursive movements, and temporal/masseter/pterygoid muscle tenderness is very important in all M3 extraction patients and should be performed by all oral and maxillofacial surgeons (4).

As surgical removal of M3 is often associated with postoperative pain, swelling and trismus, some authors do not consider them complications as they are expected and transient. However pain can have a significant impact on the patient's postoperative quality of life. Pain sensation depends on each individual's subjective pain threshold, which may be influenced by diverse factors including age, gender, anxiety and surgical difficulty (17). Longer interventions are typically associated with more pain and it increases with increasing difficulty of surgery (6). Poor oral hygiene is another contributing factor for postoperative pain due to local food impaction and this was a common condition among the patients with pain complaints in this study. Good oral hygiene instructions and a prescription of chlorhexidine 0.12% mouthwash after the surgery are of great importance to prevent this kind of problem. However, when the patient doesn't follow the instructions, local irrigation with saline solution usually is enough to clean the area and solve the pain. Although uncommon, traumatic oral ulcers under the suture can be another pain causing factor. In these cases we suggest early removal of the suture and the application of low-level laser therapy over the lesions to control pain.

## Conclusion

Although M3 surgery is a secure and low morbidity procedure, the risk of complications will always exist and it increases with increased surgical difficulty. Mandibular M3 requiring osteotomy and tooth section have the higher risk of complications. Adequate preoperative evaluation of the patient and meticulous surgical technique are of paramount importance to diminish the incidence of such complications.

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