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# Do pathologies associated with impacted lower third molars justify prophylactic removal? A critical review of the literature

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Surgical removal of impacted lower third molars is widely carried out in general dental practice and in many institutional clinics. Despite the fact that there are well established indications for the removal of impacted lower third molars, prophylactic removal of these teeth is still being universally practiced. Some reports have estimated that the proportion of impacted third molars that are removed when no clinically sound justification for surgery is present is between 18% and 50.7%. Justifications for prophylactic surgery include the need to minimize the risk of disease (cysts and tumors) development, reduction of the risk of mandibular angle fracture, increased difficulty of surgery with age, and that third molars have no definite role in the mouth.

This article critically examines the literature regarding the relationship between impacted lower wisdom teeth, cysts and tumor development, and mandibular fractures. (*Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;102:448-52)

Removal of impacted (unerupted and partially erupted) third molars, the majority of which are found in the mandible, is the most common surgical procedure in dentistry. Impacted third molars are known to be associated with the risk of different disorders and complications. There are well-established indications for the removal of impacted wisdom teeth. However, prophylactic removal of impacted third molars free of any pathology is still a common practice and therefore remains controversial. During the pre-penicillin period, prophylactic removal of wisdom teeth used to be the order of the day, because of morbidity associated with pathologies related to these teeth.<sup>1</sup> In recent times, prophylactic surgery has been justified on the basis that third molars have no role in the mouth, the need to minimize the risk of disease (cysts and tumors) development,<sup>2-4</sup> reduction of the risk of mandibular angle fracture,<sup>5-10</sup> as well as increased difficulty of surgery with age.<sup>2,11</sup> Presently, anecdotal evidence and recent reports in the literature suggest that prophylactic removal of impacted third molars is still being universally practiced, especially in Europe and the United States.<sup>12</sup> In fact, the proportion of impacted third molars that are removed when no clinically sound justification for surgery is present is reported to be between 18% and 50.7%.<sup>13-15</sup> Lopes et al.<sup>13</sup> reported that over half of the patients who had their impacted third molars extracted at the Eastman Dental and University College Hospitals during a 12-month period did not have sound indications for surgery.

It is also an accepted practice to recommend that when 1 third molar has a defined indication for removal, all third molars should also be extracted with the same general anesthetic. The argument for this is the avoidance of the risk of increased morbidity that may accompany future anesthetics if retained teeth develop pathologic indications necessitating removal.<sup>16</sup>

This article critically examines the literature regarding the relationship between impacted lower wisdom teeth, cyst and tumor development, and mandibular fractures.

## RISKS OF CYST AND TUMOR DEVELOPMENT AROUND IMPACTED THIRD MOLARS

Although the proponents of prophylactic removal of impacted third molars have based their arguments on the likelihood of cyst and tumor development if these teeth are retained, a closer look at the literature shows that the incidence of cyst and tumor development from impacted third molars is apparently low.<sup>2-4,16-25</sup> Keith<sup>23</sup> reported an incidence of 1.6% of dentigerous cysts developing from impacted wisdom teeth, whereas Alattar et al.<sup>24</sup> and Mourshed<sup>25</sup> reported an incidence of 1% and 1.4%, respectively. Shear and Shigh<sup>17</sup> in an epidemiological study also reported an incidence of 0.001% and 0.0002% in a black and white South African population. Güven et al.<sup>4</sup> also reported an incidence of 2.31% of cyst formation associated with impacted third molars. Severe impaction of a mandibular third molar is reported to be a predisposing factor for cyst development.<sup>12</sup> In other studies, a correlation between the incidence of cystic changes in follicular tissues and age of the patients has been reported.<sup>2,18</sup> Most cystic changes were found in patients between 20 and 25 years, and the authors of the studies therefore concluded that age may be used as an indication for

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surgical removal of impacted lower third molars (ILTM), as the risk of surgical morbidity also increases with the increasing age. However, radiological surveys of the mouth and jaws have shown that about 1 in 5 people in their 30s have at least 1 unerupted third molar and that these can remain in situ throughout life without pathological changes.<sup>26</sup>

The possibility of tumors such as ameloblastoma, epidermoid carcinoma, and odontogenic carcinoma arising from impacted wisdom teeth have been stressed as another indication for prophylactic removal of impacted third molars.<sup>18-20</sup> The incidence of ameloblastoma associated with impacted third molars is reported to range from 0.14% to 2%.<sup>4,17,18,22</sup> Güven et al.<sup>4</sup> reported an incidence of 0.79% (benign, 0.77%; malignant 0.02%) of odontogenic tumors among 9994 impacted third molars in their study, a majority (92%) of which were found in the mandible. Other isolated case reports of odontogenic tumors associated with impacted lower third molars are found in medical literature.

Reports and data from the literature indicate that cysts and tumors do develop in a relatively small minority of patients with impacted wisdom teeth. Therefore, the relatively small percentages of cysts and tumors associated with the retention of these teeth do not justify their prophylactic removal.

### RISKS OF MANDIBULAR FRACTURES IN THE PRESENCE OF IMPACTED LOWER THIRD MOLARS

Proneness of the mandibular angle to fracture in the presence of ILTMs has long been a strong point for prophylactic removal of lower wisdom teeth, especially in adolescents and young adults who frequently play contact sports. The mandible constitutes the bony structure of the lower third of the face, and it is the most frequently fractured facial bone.<sup>27-29</sup> The mandible has a few mechanically weak portions, including the angle, condylar process, and both sides of the mentum.<sup>29,30</sup> Several factors have been proposed that influence the location of mandible fractures including the site, direction, and severity of the force and impact, as well as the bone's intrinsic attributes.<sup>31,32</sup> Bone fractures occur when the local stresses exceed the ultimate strength of the bone in that region.<sup>33</sup> Generally, the lower part of the condylar process is likely to be fractured by a horizontal external force applied to the mentum. The lateral and median portions of the mentum and the lower part of the condylar process are easily fractured by a vertical force.<sup>31,34,35</sup> Halazonetis<sup>36</sup> also concluded that the "weakest" region of the mandible to fracture is the angle, because of its natural weakness and the presence of unerupted third molars.

There is incontrovertible evidence in the literature regarding the proneness of the mandibular angle to being fractured in the presence of ILTMs.<sup>5-10</sup> One mechanism by which third molars have been hypothesized to increase the risk of angle fractures is by occupying osseous space and, thereby, weakening the angle region by decreasing the cross-sectional area of bone.<sup>5</sup> By using dry isolated vervet monkey mandible, Reitzik et al.<sup>31</sup> showed that mandibles with unerupted third molars required 40% less force to be fractured than the mandibles with fully erupted third molars. Based on this evidence, some investigators have advocated removing unerupted mandibular third molars to prevent angle fractures, especially in those in contact sports.<sup>5,9</sup> Meisami et al.,<sup>37</sup> however, opined that removing ILTMs may or may not increase the strength of the mandibular angle region in the long term, and mandibular angle may fracture under a greater force or simply fracture at a different anatomical location.

In 2004, Iida and his colleagues<sup>6</sup> in a retrospective study reported another dimension to mandibular fractures and the presence of impacted lower third molars. They found that the frequency of occurrence of the mandibular angle fracture was higher in the group with incompletely erupted mandibular third molars ( $P < .001$ ), and that of the condylar fracture was higher in the group without it ( $P < .001$ ). Their result showed that the presence of incompletely erupted mandibular third molars diminished the incidence of condyle fractures with a statistical significance in both results of the patients ( $P < .001$ ) and the side of the mandibles ( $P < .001$ ). They therefore concluded that the presence of ILTMs helps to prevent the condylar fracture.

In another recent report,<sup>38</sup> the absence of unerupted mandibular third molars was significantly associated with higher incidence of condylar fractures ( $P < .001$ ). The authors also found that there were significantly more symphysis and condyle combination fractures in the unerupted third molar absent group than in the third molar present group ( $P < .001$ ). In 9 patients who had symphysis and bilateral condyle combination fractures, all of them had no unerupted third molars. These 2 findings suggest that when the mandible is traumatically injured in the absence of ILTMs, more force is transmitted to the condylar region; hence, the increased incidence of associated condylar fractures. Iida et al.<sup>6</sup> and Zhu et al.<sup>38</sup> have provided us with solid evidence that the presence of ILTMs help to prevent condylar fractures.

What are the implications of the recent findings regarding the proneness of mandibular condyles to being fractured in the absence of ILTMs to us as surgeons and health care providers? In terms of patient care, mandibular angle fractures are easily accessible, and excellent reduction and stable fixation are easily performed

with minimal postoperative complications. On the other hand, most surgeons would agree that condylar fracture is one of the most difficult to treat in the maxillofacial region, and may be associated with malocclusion and facial nerve injury. Condylar fractures are usually more severe, are more difficult to treat, and have greater risk of long-lasting complications than angle fractures.<sup>39,40</sup> Is it appropriate to strengthen the mandibular angle region and to make the mandible more vulnerable to condylar fractures by means of removing an asymptomatic ILTM? Therefore, prophylactic removal of asymptomatic ILTMs may not be beneficial as a means for reducing the chances of angle fracture in those patients at risk of maxillofacial trauma.

### COMPLICATIONS ASSOCIATED WITH LOWER THIRD MOLAR SURGERY

The complications associated with the removal of impacted third molars should not be underestimated. The surgery entails incision, stripping of periosteum, bone and tooth removal, and suturing. Pain, swelling, and trismus are almost universal after this procedure, and the incidence of both inferior and lingual nerve damage is high and may be permanent.<sup>8,12</sup> Nerve damage with temporary or permanent labial or lingual paresthesia or anesthesia are significant risks of surgery.<sup>12</sup> In a recent survey among oral and maxillofacial surgeons (OMS) in California,<sup>41</sup> nearly 80% of OMS are aware of patients who have permanent injury to the inferior alveolar nerve, and almost a half are aware of patients with permanent injury to the lingual nerve following impacted lower third molar removal. The total incidence of 13.4% for nerve injury was reported by Lopes et al.,<sup>13</sup> and they also found that patients who do not have clinically sound indications for surgery have a similar incidence of sensory deficit and morbidity when compared to those with accepted symptoms.

A significant adverse impact on oral health—related quality of life in the immediate postoperative period following lower third molar surgery has also been reported to increase for patients who had experienced pain/swelling/trismus.<sup>42,43</sup> Delayed clinical healing after third molar surgery is not uncommon, and Ruvo et al.<sup>42</sup> in a recent report showed that this significantly increased the prevalence of delayed recovery for lifestyle, oral function, late symptoms, and pain.

Intraoperative, immediate, and late postoperative mandibular fractures following ILTM surgical extractions are also well reported.<sup>12,44-46</sup> In addition, Shepherd<sup>47</sup> claimed that recent evidence suggests that the patients generally consider the disadvantages and complications of surgery as more serious than those of non-intervention. Liedholm et al.<sup>48</sup> also reported that

outcomes of nonremoval were preferable to outcomes of surgical intervention from patients' perspectives. In another report,<sup>13</sup> 4.8% of patients thought that the surgical removal of their teeth did not relieve their original problems. Hu et al.<sup>49</sup> reported a 16.7% incidence of adverse outcome among patients treated by administration of anesthesia in an office-based setting; 62% of these patients had their impacted third molar removed. The risks of increased surgical morbidity in older patients who require impacted third molar surgery have also been advocated to justify prophylactic removal. Unless the validity of the need for surgery has been established, the fact of lesser morbidity in the younger patient should not of itself be used as an indication for preventive surgery.<sup>16</sup>

In ethical terms, carrying out a procedure that has a significant risk of morbidity and associated risks of general anesthesia without good reason is presently unacceptable.

### COST IMPLICATION AND RISK-BENEFIT ANALYSIS OF THIRD MOLAR SURGERY

The lack of scientific data, the morbidity, and the increasingly significant cost of treatment have led some clinicians to query the scientific validity of prophylactic removal of asymptomatic or nonpathologically involved third molar.<sup>13,16</sup> Operating on a patient without good reason involves unnecessary expenditure to purchasing authorities, cost to the patient in both time off work and postoperative complications, and, further, may result in potentially avoidable legal problems for practitioners.<sup>13</sup> Venta et al.<sup>50</sup> reported that between 1987 and 1993 in Finland there were 139 claims for permanent sensory or motor disturbances related to removal of lower third molars. The lingual nerve was injured in 54% and the inferior alveolar nerve in 41% of the claims. Health insurance companies may even query the veracity of treatment claims.<sup>51</sup> In the United States, the largest expenditure for any surgical procedure by the Blue Shield in the state of Pennsylvania was for third molar surgery, and this represented 50% of the cost of all oral surgery.<sup>51</sup> A similar high expenditure was also reported from England.<sup>52</sup> A study of sick leave after third molar surgery in one study<sup>13</sup> showed that 81% of patients took time off work. The modal number of days off work was 3, with a range of 0 to 10 days. In another study,<sup>49</sup> the mean number of work days missed after third molar surgery was 1.26 (SD = 1.49), and the average number of days that the patient was unable to perform his or her daily activities was 1.23 (SD = 2.98). Therefore, from a cost implication point of view it is acceptable only to remove teeth with appropriate well-defined indications.

## ESTABLISHED INDICATIONS FOR LOWER THIRD MOLAR REMOVAL

The indications for removal of impacted lower wisdom teeth are clearly established. These include recurrent pericoronitis, cellulitis, abscess, osteomyelitis, disease of follicles including cysts and tumors, unrestorable caries or periodontal breakdown, prophylactic removal in the presence of medical or surgical conditions, among others.<sup>53-55</sup> The first attempt to create simple but effective guidelines to aid decision making regarding removal of third molars was made at a National Institutes of Health Conference in the United States in 1979.<sup>53</sup> In 1997, the Faculty of Dental Surgery of the Royal College of Surgeons of England published guidelines for the management of patients with impacted wisdom teeth.<sup>55</sup> The endorsement of these guidelines by the National Institute for Clinical Excellence (NICE) of England in March 2000,<sup>56</sup> with the added comment that a first episode of pericoronitis, unless otherwise severe, should not be considered an indication for removal, made prophylactic removal in the absence of specific medical and surgical conditions unjustifiable. Although recurrent pericoronitis is generally accepted as a defined indication for ILTM extraction, there are some cases where simple excisional surgery to expose the clinical crown may be indicated.<sup>16</sup>

## CONCLUSIONS

There are well-established indications for removal of impacted lower third molars. Although ILTMs may sometimes be associated with pathologies, this occurs in a relatively small proportion of patients according to reports in the literature. Patients with ILTMs are more likely to have an angle fracture than those patients without impacted mandibular third molars, but emerging evidence, however, shows that the presence of ILTMs helps to prevent condylar fractures, which are more severe, are more difficult to treat, and have greater risk of long-lasting complications than angle fractures. Is continuation of prophylactic ILTM extraction an evidence-based practice in light of the above facts? Evidence-based practice involves tracking down the available evidence, assessing its validity, and then, using the best evidence, to inform decisions regarding care.<sup>57</sup> In fact, the principles and methods of evidence-based dentistry give dentists the opportunity to apply research findings to the care of their patients.<sup>57</sup> Prophylactic extraction of impacted lower third molars in the absence of specific medical and surgical conditions should be discontinued. The decision to extract or not to extract impacted third molars should be individualized, rather than generalized. All patients with impacted third molars should be evaluated and treatment planned based on their individual presentation, and should not be

subjected to a “standardized generic treatment protocol.” Extraction of impacted third molars should be limited to those teeth with well-defined medical, surgical, or pathologic indications.

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