Australian Society of Orthodontists

University of Sydney

Third Molar Removal

Creating Brighter Futures

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Development and eruption of third molars

The development, eruption and morphology of third molars varies greatly. They have the highest incidence of agenesis with 9% to 20%[1,2,3] of people missing one or more . Third molars are also the most commonly impacted tooth with 29.9% of maxillary third molars and 17.5% of mandibular third molars impacted[4].

Although the average age for third molar eruption is 20 years, the timing of eruption shows considerable variation. The anatomic position of the third molars is not static over time and continues to change even in individuals over 25 years of age[5]. Third molars can eventually erupt and reach the occlusal plane in the third decade of life[6,7]. Importantly however this does not guarantee they remain symptom free or free of associated pathology. Shugars et al 2005 found 29% to 33% of patients over the age of 26 with asymptomatic impacted third molar teeth, of which one or more were at the level of the occlusal plane, had caries.

Management of Third Molars

The National Institute of Clinical Excellence (NICE)[8] in 2000, and the Scottish Intercollegiate Guidelines Network (SIGN)[9] in 1999, established well-defined criteria for extraction of third molars associated with pathologies and concluded that, given the risks involved, removal of asymptomatic third molars is not indicated. Similar conclusions were reached by a Cochrane systematic review[10], which reported that there is no evidence to support or refute the removal of asymptomatic third molars.

Tables 1 and 2 outline common indications for third molar removal and therefore orthodontists, dentists, surgeons and patients need to be aware of the possibility an asymptomatic tooth may have significant associated pathology that warrants removal.

Table 1: Guidelines for third molar extractions associated with pathology[14]

- Unrestorable caries (figure 1)
- Periodontal disease (figure 2)
- Non-treatable pulpal and/or periapical pathology
- Cellulitis, abscess and osteomyelitis
- Internal/external resorption of the tooth or adjacent teeth
- Fracture of tooth
- Disease of follicle including cyst/tumour (figure 3)
- Recurrent pericoronitis
- When involved in or within the field of tumour resection

Table 2: Other indications for removal[14]

- Prophylactic removal of a third molar which is likely to erupt in the presence of certain specific medical conditions, where the risks of retention outweigh the complications associated with removal
- When there is atypical pain from an unerupted third molar and a need to avoid any confusion with temporomandibular joint or muscle dysfunction
- When a partially erupted or unerupted third molar is close to the alveolar surface prior to denture construction or close to a planned implant
- In patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care
- Where a general anaesthesia is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal
- When the eruption of the second molar is obstructed by the third molar
- When the third molar is impeding surgery or reconstructive jaw surgery
- When the orthodontic treatment plan involves distalisation of first and second molars, which can result in the impaction of third molars.

*You may wish to share this issue of **Brighter Futures** with your hygienists and other staff members.*

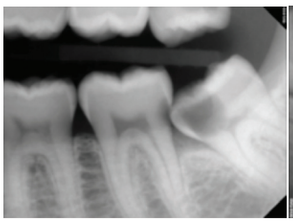

Figure 1: Extensive caries in impacted third molar indicating for extraction

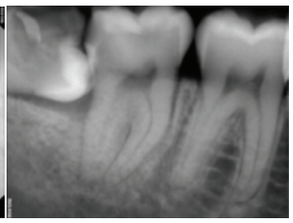

Figure 2: Mesio-angular mandibular third molar causing bone loss at the distal of the second molar.

Figure 3: Cyst associated with mandibular right third molar

Complications associated with third molar removal

Pain, swelling, and trismus following third molar removal are almost unavoidable.

Injury to the lingual and inferior alveolar nerve as a result of mandibular third molar removal is of concern to patients and surgeons alike. Some of the major risks of third molar removal are outlined in Table 3. Importantly, the incidence of Inferior Alveolar and/or Lingual nerve damage after this procedure is not significant and is rarely permanent[11,12].

Lopes et al[13] noted that there is no difference in nerve damage between those who had asymptomatic third molars removed and those who had symptomatic third molars removed. Other rare complications such as oro-antral fistula, maxillary tuberosity fractures, and mandibular fractures were also reported[14]. Post-operative pain, swelling and trismus were reported to have a significant impact on quality of life during the post-surgical period for the relatively small proportion of patients affected. It should be noted in this study, of those patient adversely affected 63% had symptomatic third molars removed, 79% required bone removal and 87% were deemed difficult extractions by the surgeon involved. This group of patients, and these parameters were all significantly different to those patients not experiencing an adverse effect on QOL[15].

Table 3: Risks associated with third molar extractions [14]

- Temporary (0.4%-8.4%) and permanent (up to 1%) inferior alveolar nerve damage
- Temporary (0-5.3%) and permanent (up to 1%) lingual nerve damage
- Minor postoperative complications such as alveolar osteitis (0.3%-26%), infection (0.8-4.2%) and secondary haemorrhage (0.2%-5.8%)
- Postoperative complaints such as pain, trismus, swelling and generalized malaise occur in about 50% of patients within the first few days.
- Damage to the adjacent tooth and its periodontium or the development of a deep pocket distal to the second molar
- Rare complications include oro-antral fistula (0.008%-0.25%), maxillary tuberosity fractures (0.6%) and mandibular fractures (0.0049%)

Some evidence suggests that patients consider the disadvantages and complications of surgery as more undesirable than the consequences of non-intervention[16]. In addition, the outcomes of non-removal were preferable to outcomes of surgical intervention from patients' perspectives[17]. This suggests it is important to discuss with patients the rationale for removing asymptomatic third molars with pathology. Disease free, asymptomatic third molar teeth are probably best left undisturbed – but under regular review.

Cost and Benefit

Removal of pathology free third molars results in unnecessary expense, time off work and loss of income. In addition, patients need to be informed in advance of the possibility of reduced quality of life during the post-operative period, common to all surgical procedures. Quality of life after removal of third molars was reported to be reduced, particularly in the first 3 days of the post-operative period[18]. This was related to post-operative pain, trismus, and some moderate temporomandibular joint dysfunction.

Risk of pathological changes

Proponents for prophylactic removal of asymptomatic third molars believe that there is a risk of pathological change if these teeth are retained. However, studies have shown that there is no evidence of a significant increase in third molar pathology with age[19,20]. More recent studies suggest a consensus in the literature that postoperative risks associated with removal of third molar teeth increases with age. Incidence of dentigerous cysts developing around impacted third molars was reported to be 0.81% to 1.6%[19,21-23]. Reported incidence of tumours such as ameloblastoma associated with impacted third molars was as low as 0.14% to 2% [24-27]. Guven et al[24] examined 9994 impacted third molars and reported an incidence of 0.79% of odontogenic tumours in their study.

Stanley et al[19] examined 3,702 third molars impacted for an average of 27 years in 1,756 patients with an average age of 47 years. The incidence of pathologic changes noted in these study were: 0.81% developed dentigerous cysts, 0.43% had internal resorption, 4.48% showed periodontal ligament damage and bone loss distal to the second molar, and 3.05% developed pressure resorption on the second molar.

Thus, prophylactic removal of asymptomatic third molars to prevent future pathology may not be justified on a routine basis however, the dentist or orthodontist needs to ensure life-long follow-up (clinical and radiographic) of patients with impacted third molar teeth in order to ensure early detection and timely management of pathologic change.

Development of periodontal pathology

The American Association of Oral and Maxillofacial Surgeons' (AAOMS) research and the AAOMS Third Molar Multidisciplinary Conference report elevated levels of complex microorganisms, gingival crevicular fluid, interleukin 1-ß (IL1-ß) and prostaglandin E2 (PGE2) in individuals with periodontitis and those with >5mm pockets in the third molar area[28,29]. Sixty-six per cent of individuals with asymptomatic erupted third molars have at least one pocket depth ≥4mm in the third molar region[30]. Patients with ≥4mm pocket depth at a third molar region are more likely to develop deteriorating periodontal condition at the area, and to develop pocketing of ≥4mm at a non-third molar region, as well as other third molar regions[31-33].

Chronic periodontal disease has been associated with systemic diseases such as renal vascular disease, coronary artery disease, stroke, diabetes, as well as preterm birth[28]. The findings of studies indicate that the periodontal status of erupted third molars with a pocket depth of ≥4mm has a greater risk of getting worse over time than those without periodontal pockets. Therefore, extraction is indicated, particularly if periodontal maintenance is not feasible or if a patient's oral hygiene is poor. If extraction is to be delayed, close monitoring of erupted third molars with periodontal pathology is recommended.

Mandibular incisor crowding

The role of impacted third molars in crowding of lower incisors remains controversial. Bergstrom and Jensen[34] examined dental students with unilateral 3rd molar agenesis and reported greater degree of crowding in the quadrant with the third molar present. Vego[35] compared 2 groups, one with 3rd molar agenesis and the other with

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3rd molars present. He claimed that slipped contacts in those with 3rd molars was significant enough to show a possible correlation of 3rd molars with incisor crowding. Lindquist and Thilander[36] concluded that the space change on the third molar extraction side was improved in 70% of cases and recommended extraction in severe crowding. Richardson[37] found 1mm more crowding in subjects with 3rd molar impaction compared to those without 3rd molars.

However, Kaplan[38] examined post-retention relapse in 3 groups of patients - fully erupted, bilaterally impacted and bilateral agenesis of 3rd molars. He concluded that there was no difference in any of the parameters tested among the 3 groups. In addition, Southard et al[39] studied the interproximal contact force level between teeth with or without 3rd molars present and concluded that the 3rd molars exerted negligible force on the tooth mesial to it.

In summary, presence of mandibular third molars does not significantly influence incisor crowding and the cause of mandibular incisor crowding is most likely multifactorial. Hence, the recommendation for mandibular third molar extraction with the objective of either alleviating or preventing mandibular incisor crowding is not justified.

Relationship between wisdom teeth and orthodontic treatment

When premolars are extracted in conjunction with orthodontic treatment, there can be mesial movement of molars[40-42] resulting in an increase in retromolar space[40-42] and improvement in the angulation of third molars[43]. However, studies[42, 44-46] have also shown that extraction of premolars does not always prevent the need for third molar extraction and it is often difficult to predict how third molars will respond to different treatment modalities. Some studies found that non-extraction treatment significantly increases the rate of third molar impaction[47-49], while others have found no significant difference in third molar impaction between extraction and non-extraction treatment[41-50].

Faubion[46] compared the rate of mandibular third molar impaction in patients who had extraction of four premolars to those who did not have extraction. It was noted that 55% of the extraction group retained the mandibular third molars in good position compared to 15% in the non-extraction group. He concluded that the space for eruption of mandibular third molars was increased after the extraction of premolars. Richardson[42], who also examined the effect of premolar extraction on eruption of mandibular third molars, reported that there was an increase in available third molar space in the extraction group. However, Richardson[42] indicated that factors other than change in third molar space influenced the eruption of third molars. Saysel et al[43] reported that extraction of premolars improved angulation of the third molars. However, third molars with improved angulation may not necessarily erupt into a favourable position and eruption of third molars is influenced by factors other than just their angulation.

Others have looked into the effects of second molar extraction on eruption of third molars[51-52]. Findings from these studies showed that extraction of second molars significantly reduces the number of unerupted and impacted third molars compared to premolar extraction. However, extraction of second molars does not guarantee eruption of third molars into a favourable position[51-52]. Therefore, it is important to inform patients that orthodontic treatment with extractions does not necessarily prevent the need for third molar extractions. For most orthognathic surgery cases, third molars are removed as they usually lie in the location of the planned osteotomy.

Conclusion

While the presence of pathology is usually a clear indicator for extraction of third molars, monitoring is, in many cases, all that it is required for asymptomatic third molars. The decision of whether to extract an asymptomatic third molar should be based on risks and benefits of its removal as well as the consequences of retaining it. In addition, patients' perspectives, values and attitudes should play a prominent role during the decision-making process.

When orthodontic treatment is indicated, the decision regarding third molar extraction should be delayed, in the absence of pathology, until orthodontic treatment is finalised. Extraction of premolars or permanent molars for orthodontic purposes may improve the chances of third molar eruption. However, orthodontic treatment with premolar or permanent molar extractions does not routinely eliminate the need for third molar removal. Furthermore, removal of third molars does not significantly change the likelihood of ongoing incisor crowding.

References available upon request