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Characteristics of disease related to mesio-angular mandibular third molar teeth

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Abstract

The aim of this study was to identify the indications for the removal of mesio-angular mandibular third molars based on age and dental health as measured by the DMFT (decayed, missing, and filled teeth) score, and to find out if early intervention should be considered. We studied 319 patients who had 431 mesio-angular mandibular third molars removed. Variables recorded were age, primary indication for removal, and the DMFT score. Indications for removal included distal cervical caries (DCC) in the mandibular second molar (n = 180, 44%), pericoronitis (n = 131, 32%), and caries and related disease (n = 62, 15%). The frequency of distal cervical caries (DCC) in the mandibular second molar increased linearly as patients became older and was the most common reason why mesio-angular third molar teeth were removed. This suggests that patients should be advised of the consequences of retaining these types of third molars, and offered prophylactic removal of asymptomatic teeth.

Keywords: oral surgery; third molar; disease

Introduction

Mesio-angular impaction of mandibular third molars (maMd3M) is the most common type of impaction, and can contribute to a variety of common disorders such as pericoronitis, dental caries, and periodontal disease.[1–3] More importantly, mesio-angular mandibular third molars that are partially erupted can cause distal cervical caries (DCC) in the second molar, which can have serious consequences.[4–12] A recent study suggested that this accounts for the loss of up to 40% of second molars, with the remaining 60% requiring restoration.[1] Its incidence varies from 2% – 14% of patients who have third molars removed, but these figures relate to all categories of teeth rather than to specific types of impaction.[3,5,13–16]

If all, or a large proportion of, partially-erupted third molars lead to DCC in the adjacent tooth, then early intervention and prophylactic removal of the third molar should be considered because the risk of retention could outweigh the cost of early removal.[12] If this is the case, then the National Institute for Health and Care Excellence (NICE) guidance may be in conflict with the reality of retention (particularly of mesio-angular mandibular third molars) because of the risk they pose. However, as we cannot tell which patients will be affected, early intervention must still be questioned.

Our aim therefore was to study the characteristics of patients who had mesio-angular mandibular third molars removed, and to establish whether early intervention should be considered.

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Method

As part of a larger study, we collated and retrospectively assessed data on 1011 patients who had mandibular third molars removed over a two-year period (January 2013–January 2015).[3] The variables recorded were age, sex, angulation of the impacted tooth, primary indication for its removal, and the DMFT score as a basic measurement of dental health.The primary aim of the present study was to identify the indications for the removal of mesio-angular teeth in patients grouped according to age (five-year age groups), to find out if the disease varied, and to consider the diagnoses in relation to their dental health as measured by the DMFT score.

A total of 319 patients had mesio-angular teeth removed (mesial inclination related to the perpendicular of the occlusal plane). "Pericoronitis" referred to all variants of the condition, and "caries and related disease" to all teeth that were removed because of, or as a consequence of, dental caries.

Statistical analysis

The original sample size was calculated by a power calculator (Gpower 3.1.5, Universität Düsseldorf), which allowed for a CI of 95% with a 5% margin of error (standard power level of 80% and alpha level of p = 0.05). A sample size of 969 was calculated, but 1011 patients were ultimately assessed.

The sample and outcome characteristics were summarised using descriptive statistics. The mean age of the patients for different diseases and type of impaction were compared using one-way ANOVA. Significance was assumed at the 5% level, and analyses were done with the help of IBM SPSS Statistics for Windows, version 23.0 (IBM Corp).

Results

A total of 319 patients had 413 mesio-angular mandibular third molars removed (225 unilateral and 94 bilateral). The mean age of all the patients was 30.1 years (n = 319, SD:7.7 years, range 12-67 years).

Table 1 shows the indications for removal. DCC in the second molar, pericoronitis, caries and related disease, odontogenic cyst, and periodontal disease, were defined as the principal indicators because they were the most common and most important. These only were included in the descriptive analyses, as the incidence of the others, when spread across the age groups, was not significant.

Age and disease

Fig. 1 shows the mean age of patients who required the removal of teeth by principal diagnoses. For the most common diseases, the mean age varied with the type of disease. Patients who had pericoronitis were significantly younger than those with caries or those with DCC in the second molar (p < 0001).

Table 1
Disease/principal indications for removal of 413 mesio-angular mandibular third molars (MAMd3M) (225 unilateral and 94 bilateral) in 319 patients.

	Diagnosis for removal of MAMd3M	No. (%) removed
1	Distal caries in the mandibular second molar (Md2M DCC)	180 (44)
2	Pericoronitis	131 (32)
3	Caries & related disease (C&RD)	62 (15)
4	Periodontal disease	13 (3)
5	Prevention of distal cervical caries in the second molar	14 (3)
6	Odontogenic cyst	5 (1)
7	Preorthodontic/orthognathic treatment	5 (1)
8	External resorption of second molar	2 (<1)
9	Prophylactic secondary to GA	1(<1)
	Total number removed	413

DMFT

To allow comparison with the 2009 Adult Dental Health Survey (ADHS), the mean DMFT score was calculated for 10-year age ranges of patients who had mesio-angular mandibular third molars removed because of pericoronitis, DCC in the second molar, and caries and related disease (Fig. 2).[17] The mean score based on these most common diseases was comparable with each disease but roughly 50% lower than the ADHS for each of the 10-year age ranges. The only exception to this was patients aged between 45 and 54 years who had caries and related disease. In this group it was comparable to that in the ADHS 2009. The mean DMFT scores of patients from the main database of 1011 patients also showed a DMFT that was 50% lower than the ADHS for each of the 10-year age ranges.[3]

Disease distribution

Fig. 3 shows the most common indications for the removal of mesio-angular mandibular third molars by age group. Other indications constituted a small proportion of patients and offered no descriptive analyses. The age range of all the patients was 12-67 years, and that of those with the principal diseases was 17-67 years (a 67-year-old patient had one tooth removed but this is not shown on the graph).

In the younger age groups, pericoronitis was the most common reason for removal, and accounted for 78% of all the teeth removed in those aged 15-19 years (n = 18/23 teeth); 55% in those aged 20-24 (n = 39/71 teeth); 41% in those aged 25-29 (n = 55/134), and 14% in those aged 30-34 (n = 13/93).

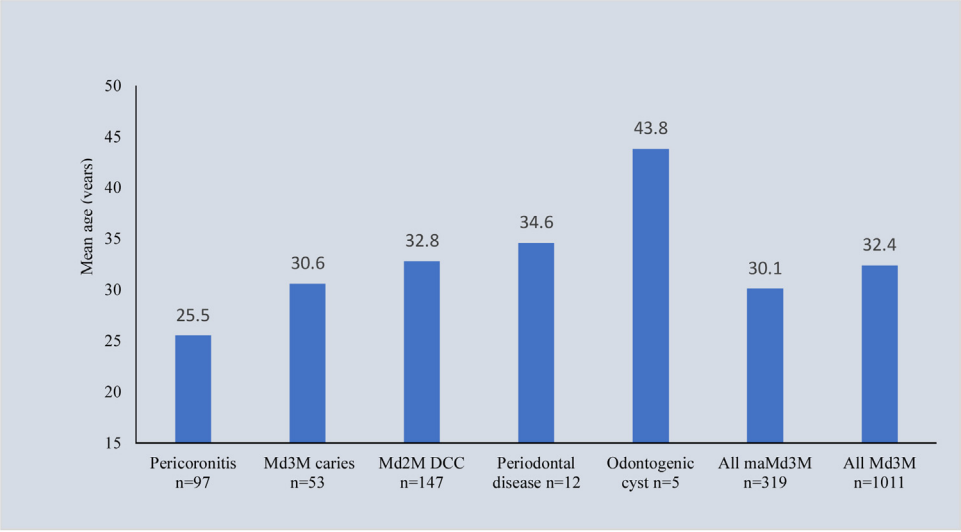

Fig. 1. Mean age (years) of patients requiring removal of mesio-angular mandibular third molars (MAMd3M) based on principal diagnoses. The graph shows that for the most common diseases, the mean age of patients who had MAMd3M removed varied with the type of disease. Patients who had pericoronitis were significantly younger than patients with Md3M caries ($p < 0.001$; df 149, $F = 21.8$) or those with distal cervical caries in the second mandibular molar (Md2M DCC) ($p < 0001$; df 243, $F = 74.5$).

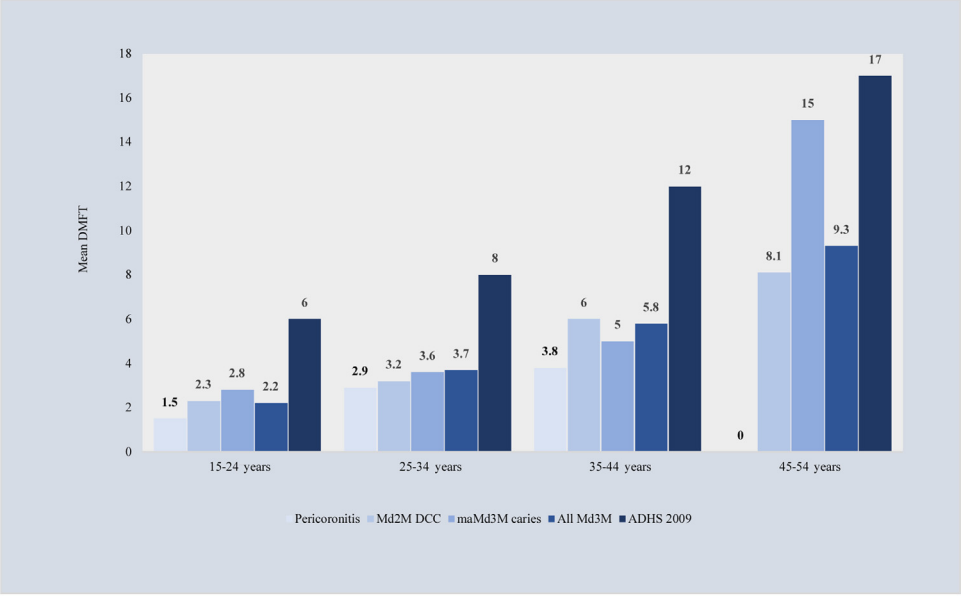

Fig. 2. Mean decayed, missing, filled teeth (DMFT) scores for patients who had mesio-angular mandibular third molars (MAMd3M) removed, based on principal diagnoses, and compared with all third molars (Md3M) removed and the results of the Adult Dental Health Survey (ADHS) 2009[3,17] (Md2M DCC = distal cervical caries in the mandibular second molar). For the most common diseases, the mean DMF of patients who had MAMd3M removed was comparable with all patients requiring removal of Md3M, though approximately 50% lower than the AHDS 2009 for comparable age groups.

The incidence of caries and related disease ranged from 10% - 20% in all age groups. No patients under the age of 20 had DCC in the second molar, but it was the primary indication for the removal of mesio-angular mandibular third molars in 21% of those aged 20-24 (n = 15/71 teeth), 35% of those aged 25-29 (n = 47/134 teeth), and 68% of those aged 30-34 (n = 63/93 teeth). In each of the older age groups the proportion removed was generally over 60%, but the total number of patients in each of these groups decreased with age, as fewer third molars are retained into older age.

Discussion

The diseases that contribute to the removal of third molars are generally reported independent of the type of

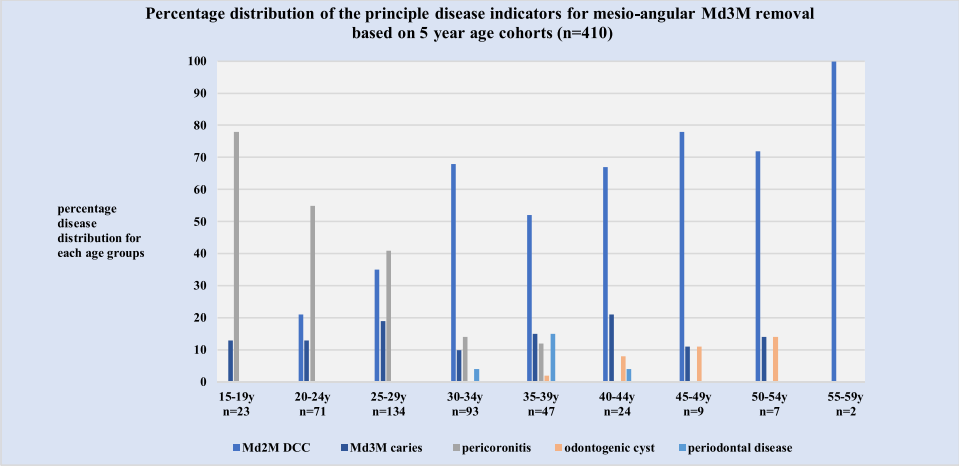

Fig. 3. Percentage distribution of principal disease indicators for removal of mesio-angular mandibular third molars (MAMd3M) based on five-year age groups. A total of 413 teeth were removed from 319 patients. Other indicators constituted a small number of patients and offered no descriptive analysis and are not shown on the graph. Overall, ages ranged from 12 to 67 years, and for those with principal disease indicators from 17 to 67 years one patient under 15 years had 2 MAMd3M removed for orthodontic reasons and a 67-year-old patient had one MAMd3M removed but these are not included on the graph) (Md2M DCC = distal cervical caries in the mandibular second molar; Md3M C&RD = caries and related disease in the mandibular third molar).

impaction,[1,15,18–20] which gives a comprehensive illustration of the disease, but does not show the effect of variables such as age and type of impaction. Our study solely evaluated disease in patients with mesio-angular mandibular third molar teeth.

Pericoronitis is commonly reported to be the main indication for the removal of mandibular third molars and those that are mesio-angular,[1,3,15,20] but in our study, most were removed because of DCC in the second molar (44%). A previous study reported that as the mean age of the third-molar patients increased, caries and its variants (C&RD) become the most common primary reason for removal.[21] The large incidence of DCC in this group also reflects the fact that those having third molars removed are now older than previously reported, and present with a different spectrum of disease.

The mean age of patients with pericoronitis (25.5 years compared with 30.6 years for caries and related disease: $p < 0.0001$; df 149; $F = 21.8$, and 32.8 years for DCC in the second molar: $p < 0.0001$; df 243; $F = 74.5$) confirms that it is a disease of younger patients (Fig. 1). From the data, 55% of all mesio-angular third molars were removed before the age of 30 years, and pericoronitis was the most common reason (49%). In comparison, DCC in the adjacent second molar tooth accounted for 27% of the teeth removed in patients under 30, and for 65% of those removed in older patients. Pericoronitis accounted for only 10% of all the teeth removed in those over 30, with most of these being in the 30-34 age range (Fig. 1). Caries and related disease accounted for roughly 15% of all the teeth removed, and the incidence remained relatively uniform across the age groups (range 10% - 20%). The increasing frequency of DCC in the mandibular second molar as patients become older has previously been suggested,[6,16] but these studies did not reflect or compare their results with other clinical indications, or did not have comparable age groups. It is noteworthy that in this study the frequency of caries and related disease remained relatively constant in each of the age groups, but the frequency of DCC in the adjacent tooth increased, even though both diagnoses are caries.

Most mesio-angular mandibular third molars are removed before the age of 30 years whilst the number of older people retaining them decreases. It is this group that may have problems with DCC in the adjacent second molar. As patients become older, the frequency of pericoronitis as the main reason for removal declines, but conversely DCC increases (Fig. 2). Most patients with a mesio-angular mandibular third molar will have it removed due to pericoronitis when younger, before the potential for DCC in the second molar can be realised. Those patients who retain their mesio-angular mandibular third molars into later life are at significant risk of developing DCC in the adjacent second molar. The reason why we do not always find it is because a large proportion of mesio-angular teeth are removed before it can occur.

It has been reported that the mean DMFT scores of patients with DCC in the second molar were roughly 50% lower than those of comparable age groups in the ADHS 2009.[4,5] This suggested that patients with low scores may be more likely to have DCC, as low scores suggest better oral hygiene, a reduced likelihood of pericoronitis, and consequent retention of the mesio-angular mandibular molar into later life. In our study the mean DMFT scores for patients with DCC were also 50% lower than those in the 2009 ADHS, as were the mean DMFT scores for patients with the other main types of disease associated with mesio-angular mandibular third molars (Fig. 1). In addition, the mean DMFT scores for all patients having mandibular third molars removed was also roughly 50% less than the comparable age ranges from the ADHS 2009.[4] Good dental health, as measured by the DMFT score cannot therefore be used as a predictor of any specific disease in people with mesio-angular mandibular third

molars. It suggests instead that all patients with partially-erupted mandibular third molars are at risk of disease, and not that patients with better dental health are more or less prone. Low scores cannot, therefore, be used to refute the possibility of future problems with impacted third molar teeth.

The relative incidence of DCC in patients who require removal of a third molar has been reported to be between 4% and 14%.[3,5,13–16] These figures, however, include all types of impaction and disguise the fact that DCC primarily affects patients with mesio-angular mandibular third molars. Horizontal mandibular third molars are also associated, but the incidence is only 9%.[3] The inclusion of patients with other types of impactions that do not contribute to DCC of the second molar dilutes the clinical significance, and it would be inappropriate to base the widespread prophylactic removal of all third molars on such a small proportion of patients. However, as 44% of all mesio-angular third molars, and 65% of those in patients over 30 years of age, are removed because of DCC, then prophylactic intervention may be helpful in patients with partially erupted mesio-angular mandibular third molar teeth.

In most cases, third molar disease will principally affect the third molar tooth alone. In such cases, leaving it until disease occurs may be appropriate, but the prevention of DCC must be considered for those patients with mesio-angular mandibular third molars. Watchful waiting and radiographic observation are pointless, as once the disease has occurred, it is too late.[12,22] If the potential for DCC to develop is significant, then it reopens the debate about early intervention and prophylactic removal of third molars, specifically those that are mesio-angularly impacted.

The results of this study suggest that it is becoming easier to qualify and quantify the relative risks of mandibular second molar DCC. NICE relies on the outcomes of randomised controlled trials to determine healthcare policy and guidance,[23] but this level of evidence to support or refute prophylactic removal does not exist, and clinical trials to measure the results of retention would be unethical. Case series such as these are often discarded because of potential bias, but they are the best that are available.

The NICE guidance advises against the removal of disease-free impacted third molars, stating that there is no reliable evidence to support any benefit to health.[24] However, retention of mesio-angular mandibular third molars risks the formation of DCC in the second molar and its development can result in the loss of 40% of second molars.[12] Early intervention should be considered in the management of these patients and will involve removal of the third molar, or coronectomy, where there is a high risk of injury to the inferior dental nerve.

Conclusion

We recommended that all patients with asymptomatic, partially-erupted mesio-angular mandibular third molar teeth are informed of the relative risks of long-term retention and the development of DCC in the adjacent second molar, and that consideration is given to the early, prophylactic removal of mesio-angular mandibular third molars when appropriate.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Ethics advice was sought and deemed not to be required. Patients' permission not required.

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