Mandibular second molar impaction: a report of three cases of self-correction and a review of the literature

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ABSTRACT Permanent mandibular second molar impaction can lead to dental problems such as caries, periodontal disease, and root resorption of the adjacent first molars. Treatment of such cases can be complicated and often requires specialist care. It is important that general dentists identify potential impaction early, closely monitor the child’s dental development, and make appropriate referral when needed. This article reports the conservative management of three cases with apparently impacted permanent mandibular second molars. The impacted molars in these cases self-aligned after 12 to 24 months of observation.

Key words: Dental occlusion; Dentition, permanent; Mandible; Molar; Tooth, impacted

Introduction

Dental impaction is defined as cessation of the eruption of a tooth caused by a physical barrier in the eruption path 1. In a retrospective study, over 28% of Hong Kong adults had experienced dental impaction 2. Mandibular third molars were the most commonly affected, comprising over 80% of all impacted teeth 2. After third molars, maxillary canines were the most frequently impacted, followed by mandibular premolars 2.

Impaction of permanent second molars is relatively rare, with mandibular second molars more commonly affected than maxillary molars 1. The occurrence of permanent mandibular second molar impaction is often expressed as the percentage of all retained teeth in a group of patients. Shah et al. 3 studied the radiographs of 7886 Canadian patients and found 918 impacted teeth in the permanent dentition. Only three of these impactions were of permanent mandibular second molars. Noda et al. 4 studied the dental records of 700 Japanese patients with dental impactions, and only 3.2% of the 722 impacted teeth were permanent mandibular second molars. The prevalence of permanent mandibular second molar impaction in a population has been reported in few studies. It was found to be 0.06% in a radiographic study of 5000 American adults 5. Varpio and Wellfelt 6 found 88 cases of permanent mandibular second molar impaction in young people aged 10 to 19 years attending the Public Dental Service in Sweden between 1960 and 1974, and estimated the prevalence to be 0.15%. A higher prevalence of 1.4% was found in a recent study of Swedish children aged 10 to 16 years 7. A similar increase in prevalence has been noted in Hong Kong Chinese children. The prevalence of permanent mandibular second molar impaction in Hong Kong Chinese 12-year-olds was reported as 0.58% in 1988 8. Recently, the prevalence in Hong Kong Chinese children aged 11 to 14 years was estimated to be 1% 9.

The decreasing rate of permanent first molar extraction has been suggested as a probable reason for this relatively high rate. Studies have shown that unilateral impaction of a permanent mandibular second molar is more common than bilateral presentations, and that most of the impacted molars were mesially angulated 6,9.

Crowding has been quoted as the most common cause of permanent mandibular second molar impaction, and mandibular third molars are seldom missing in cases with mandibular second molar impaction 6,9,10. Previous space-regaining procedures, such as moving the permanent mandibular first molar posteriorly to gain or regain space,
may also result in impaction of the adjacent permanent second molar. Conversely, early loss of primary molars has not been shown to lead to a decrease in the rate of permanent second molar impaction. In fact, excess space in the molar region may possibly lead to permanent mandibular second molar impaction. Shapira et al. reported a case whose left second molar became impacted in the presence of excess space, whereas the contralateral second molar erupted upright in the absence of spacing. It has been suggested that close guidance from the distal root of the permanent mandibular first molar is needed for the adjacent second molar, a situation analogous to the eruption of the maxillary canines. Other possible causes for permanent mandibular second molar impaction include supernumerary teeth, odontomes, and odontogenic tumors.

Spontaneous self-correction has been reported in cases with impacted permanent mandibular second molars, as for other tooth types. However, the exact mechanisms leading to such self-alignment are obscure. The eruption of permanent molars differs from that of other permanent teeth in that they do not have preceding primary teeth. As a result of the growth of the jaw, the relative position of the first molar shifts anteriorly at the time of the development of the second molar. Initially, the occlusal surface of the mandibular second molar is mesially inclined and with growth of the jaw the crown gradually moves to an upright position. If the increase in arch length does not synchronize with the eruption of the second molar, an environment favoring impaction results. However, Tsai found that although most of the increase in arch length in the permanent mandibular second molar region occurred prior to its eruption, such jaw growth may continue after eruption has started. If the degree of impaction is mild and post-eruption jaw growth provides sufficient space, it may be possible for the second molar to free itself from entrapment and further eruption, a situation similar to those 'jump' cases of ectopically erupted permanent maxillary first molars. The role of occlusion and occlusal forces is not known, but it has been found that children with Class III molar relationships are more prone to have mandibular second molar impaction. It is thought that multiple factors may be involved but reliable indicators suggestive of future self-correction in these cases have not yet been identified. Further studies in this area are required.

Impaction of permanent molars can result in complications such as caries, periodontal disease, resorption of adjacent teeth, and malocclusion.

Management of impacted second molars can be complicated and often requires specialist care. It is important that general dentists are able to identify those cases early and arrange follow-up care. Although a minimal observation period of 6 to 12 months has been recommended by various authors, the incidence of self-correction of permanent mandibular second molar impaction has been estimated to be only 6%. Kavadia et al. reported the treatment results of 32 cases of permanent mandibular second molar impaction, and none of their cases showed spontaneous correction after 12 months of observation. These authors commented that self-correction of permanent mandibular second molar impaction was an exception rather than the norm. This article reports the conservative management of three cases of potential permanent mandibular second molar impaction. The impactions in these cases self-corrected after an observation period.

Case reports

Case 1

Case 1 was aged 11 years when first seen. Her medical and dental histories were unremarkable. She presented with permanent dentition with Class I molar relationships and a 4-mm incisal overjet. Mild mandibular crowding was seen in the right canine area. Both her permanent mandibular second molars were partially erupted and mesially impacted with the adjacent first molars (Figure 1a). Root formation of the mandibular second molars was almost complete. All third molars were seen developing in the radiograph. The patient and her parents were informed of the dental condition and the occlusion was reviewed biannually. Both mandibular second molars self- aligned within 12 months (Figure 1b). The patient and her parents were satisfied with the occlusion despite the increased overjet. Regular check-ups with preventive care were recommended.

Case 2

Case 2 presented when aged 13 years. Both his medical and dental histories were unremarkable. He presented with permanent dentition with Class I molar and incisor relationships. His left permanent mandibular second molar was partially erupted and mesially impacted with the adjacent first molar (Figure 2a). Only very mild crowding was seen in the mandibular premolar regions. The left maxillary third molar and both mandibular third molars were seen developing in the radiograph. Root
formation of the impacted second molar was almost complete. The patient was reviewed biannually and the impacted second molar self-aligned during the review period (Figure 2b).

Case 3

Case 3 was aged 11 years when first seen. Both medical and dental histories were unremarkable. He presented with late mixed dentition with Class I molar and incisor relationships. His right permanent mandibular lateral incisor was clinically missing and an orthopantomogram confirmed its absence. The developing permanent mandibular second molars appeared to be mesially impacted in the radiograph (Figure 3a). The patient was reviewed biannually and both mandibular second molars self-aligned during the course of eruption (Figure 3b).

Discussion

Management of permanent mandibular second molar impaction can be complicated. Dentists must consider each individual’s medical and dental conditions, dental age, oral hygiene, motivation, expectation, and occlusal relationship. Close observation of the impacted molars is needed. As the chance of self-correction with deep horizontal impaction is deemed minimal, dentists should consider prompt referral for these cases (Figure 4). Treatment options for permanent mandibular second molar impaction may include:

1. Placement of separators: this option is simple but is limited to very mild impaction;
2. Orthodontic uprighting: this gives excellent treatment results, but involves a long treatment period and may be contra-indicated in molars with gross displacement or widely diverging roots;
3. Surgical repositioning: this option provides quick treatment results, but there is a risk of pulp necrosis, root resorption, as well as ankylosis;
4. Extraction of the impacted second molar to allow the third molar to drift mesially; success depends on the eruption path of the third molar which can be unpredictable; and
5. Extraction of the impacted second molar and transplantation of the third molar into the extraction site: this is technically demanding and also carries the risk of pulp necrosis and root resorption.
It has been reported that late treatment of impacted molars may lead to decreased success rates. It is therefore important that general dentists diagnose cases early and make appropriate referral as indicated. The chronological age at which permanent second molars erupt shows great individual variation, ranging from 8 years 11 months to 14 years 4 months. Therefore, monitoring of the eruption pattern is important. In general, the buccal bulges of permanent maxillary canines should be palpable at dental age 10 years. At dental age 12 years, the permanent premolars and maxillary canines erupt, and this is followed by the permanent second molars in a further few months. Tang and Sayaniwatas suggest that delayed eruption of a pair of teeth by 2 years, or delayed eruption of a unilateral tooth by 1 year compared with its contralateral counterpart may indicate possible impaction. This should lead to further radiographic investigation. As seen in Case 3 in this report, permanent mandibular second molars are often mesially inclined during early development and may appear to be ‘impacted’ on radiographs. These teeth often self-align during the course of eruption and the importance of correct diagnosis in these cases cannot be over-emphasized. On the other hand, the chance of self-correction is low if root development of the impacted permanent mandibular second molar has reached an advanced stage. Although the impacted molars observed in Cases 1 and 2 in this report self-aligned without treatment, dentists should be aware that this is rather uncommon and patients and their parents should be informed of the prognosis when such impaction is detected.

Dentists should also be able to differentiate an impacted molar from one which is secondarily retained (Figure 5). Secondary retention is a type of eruption failure characterized by the cessation of eruption after emergence. Clinically the affected tooth appears as ‘submerged’ or ‘infra-occluded’. There is an absence of any physical barrier in the eruption path, which distinguishes retention from dental impaction. Local areas of ankylosis are the most common cause and local trauma, infection, disturbed local metabolism and genetic factors have been
suggested as possible etiological factors. Orthodontic treatment of such teeth is almost impossible and surgical intervention is often needed.

In this report, self-correction of impacted mandibular second molars was seen despite the presence of third molars, as well as mild crowding in the mandibular arches. Nonetheless, dentists should remember that self-correction of permanent mandibular second molar impaction is a rather uncommon finding and the importance of close observation and the need for specialist care should not be overlooked.

Conclusion

Dentists must perform a thorough assessment of the patient's condition in order to make a diagnosis of dental impaction. When impaction or potential impaction is seen, the dentist should discuss the prognosis and possible treatment options with the patient and their parents. Timely referral to specialist care is mandatory.

References