

Extraction of First Permanent Molar with Developmental Anomalies : A Dilemma!

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Introduction

Permanent first molars are very important teeth in the dentition and extraction is only considered if their long-term prognosis is poor. Unfortunately, many first molars become carious soon after eruption; a national survey in the UK showed that, by the age of 10 years, only 38% of children had not experienced decay in these teeth¹. The relative timing of coronal development associated with first permanent molars makes them susceptible to chronological enamel defects leading to hypo-mineralisation and/or hypoplasia²; whilst their eruption at around six years of age makes them vulnerable to the development of dental caries³. In addition, combined first permanent molar-incisor hypomineralisation (MIH) is a recognized condition of unknown etiology with a prevalence of around fifteen per cent in Caucasians⁴. Currently, the majority of first permanent molars are extracted because of dental caries⁵.

If permanent first molars must be extracted, the undesirable effects on the occlusion may be minimised by balancing and compensating extractions and if possible, by extracting the teeth at the most appropriate time in dental development, which is usually between the ages of 8½ and 10 years; the developing second molars then have the best chance of erupting into the first molar spaces and a satisfactory occlusion may be established without appliance therapy.

Assessment of Long-term Prognosis

It is an important responsibility of a dentist to assess the long-term prognosis of permanent first molars in child patients by the age of 8 or 9 years, so that a decision can be made on whether to conserve or extract the teeth⁶. Signs that indicate a poor prognosis include the following:

1. Large amalgam restorations already present.

2. Recurrent caries in teeth already restored.
3. Lingual demineralisation or caries in mandibular molars, and buccal demineralisation or caries maxillary molars, especially around existing restorations.
4. Abnormal enamel structure (e.g. hypoplasia).
5. Unfavourable attitudes of the child and parent regarding dental care.
6. Poor oral hygiene.
7. Poor patient cooperation.

Treatment Planning

When the permanent first molars are assessed to have a poor prognosis, the following factors must be considered before a decision is made to extract them.

1. Congenital Absence of Teeth

Clearly, plans to extract first molars become complicated if other teeth are found to be congenitally absent. However, the absence of third molars has only a marginal effect on the decision. Indeed the germs of the third molars may not have begun to calcify at the age of 8½ - 10 years; therefore the decision to extract first molars must often be made without knowledge of the development of third molars.

2. Hypoplasia of Premolars

One or more unerupted permanent teeth may be hypoplastic due to infection of the primary-predecessor to trauma during extraction of the primary tooth; second premolars are most commonly affected. It may be possible to detect severe hypoplasia on a radiograph and to decide that the prognosis of the hypoplastic tooth is worse than that of the first molar.

3. Occlusal Relationship and Degree of Crowding

In general, the most favourable conditions for extraction of first molars are a Class 1 occlusal relationship and mild buccal segment crowding (i.e. insufficiency of space

for eruption of canines and premolars). The desired mesial movement of mandibular second molars is encouraged if the developing dentition is crowded; maxillary molars move mesially even in the absence of crowding.

4. Stage of Dental Development

Extractions must be timed to maximize bodily mesial movement of the developing second molars, and to minimize mesial tilting.

Ideal Conditions for Extraction

Having considered the factors outlined above, the ideal conditions for extracting first molars that have a poor long-term prognosis are:

1. Unerupted canines, premolars and second molars are visible on a radiograph and show no evidence of abnormality.
2. The occlusal relationship is Class I.
3. There is mild buccal segment crowding, i.e. there is insufficient space in the arch for the eruption of canines and premolars.
4. The patient is between 8½ and 10 years of age.

If, however, all the conditions outlined above are not satisfied, it would be prudent to consult an orthodontist before proceeding with treatment. For example, if the patient has severe incisor crowding or a Class II malocclusion with increased overjet, it may be preferable to delay (if possible) the extraction of maxillary first molars until the maxillary second molars erupt, and then to fit an appliance to hold the second molars in position after the first molars are extracted, thus preserving space for retraction of premolars and correction of incisor crowding overjet.² However, some orthodontists argue against this approach, on the grounds that the patient may be more than 13 years of age before the second molars are erupted sufficiently to be clasped (an age when orthodontic treatment is not always well

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tolerated) and that retraction of premolars followed by correction of incisor crowding or overjet is lengthy treatment complicated by anchorage problems; they suggest that maxillary first molars should be extracted with the mandibular molars at about 8½-10 years and accept that a premolar unit may have to be extracted later to complete treatment⁷. This approach ensures that treatment is carried out for a relatively young child and is completed quickly, but the possible loss of premolars in addition to first molars may be considered unacceptable.

Ideal timing of First Permanent Molar Extraction

In the upper arch, the developmental position of an unerupted second permanent molar generally ensures that this tooth will achieve a good occlusal position following extraction of the first permanent molar.

In the lower arch, achieving a good occlusion is more dependent upon the timing of the first permanent molar extraction.

- Generally, whenever practical the lower first molar should be extracted when there is radiographic evidence of early dentine calcification within the second molar root bifurcation. This usually occurs within a chronological age range of 8 to 10 years^{8,9}. If the first molar is extracted before the age of eight years, there is often no radiographic evidence of third molar development. In addition, in the lower arch:
 - The second premolar can drift distally into the extraction space, tip and rotate.¹⁰
 - The labial segments can retrocline with an accompanying increase in the overbite¹⁰⁻¹². If the first molar is extracted during the later stages of second molar eruption:
 - The second molar may tip mesially and rotate mesio-lingually, producing spacing and poor occlusal contacts⁸.
 - The erupted second premolar can migrate distally.

Extraction of a first permanent molar is rarely the extraction of choice. However, favourable spontaneous development of the dentition and space closure can be expected in the majority of cases. It is also possible to achieve good results following the removal of

these teeth using fixed appliances, although treatment times tend to be increased.^{13,14} It is not advisable to extract a healthy premolar for orthodontic purposes if the first permanent molar in the same quadrant is heavily restored.¹⁵

Balancing and Compensating Extractions

When only one or two of the four permanent first molars need to be extracted or are assessed as having poor long-term prognosis, it is necessary to consider the need to balance or compensate the extraction(s) (i.e. to extract the contralateral or opposing tooth/teeth, respectively).

- Balancing extraction - removal of first molar from contralateral side of the same arch.
- Compensating extraction - removal of first molar from ipsilateral side of opposing arch.

In addition to the general factors outlined above, two main factors must be considered:

1. The occlusal relationship of the teeth
2. The adequacy of space in the dental arches for eruption in good alignment of premolars and permanent canines.

Conclusion

Under ideal norms of age, radiograph and jaw relationships, extraction of the four first molars is fully justified, and often results in a satisfactory occlusion with acceptable contacts between second premolars and second molars; sometimes, final adjustments with an orthodontic appliance may be required later. This outcome is preferable to that resulting from extraction of first molars several years later, following repeated repair and extension of restorations.

As a general rule, compensating extraction of an upper first molar is often recommended when extraction of the lower is required. This is to prevent over-eruption of an unopposed upper first molar and prevention of mesial movement of the lower second molar. There is, however, little definitive data with regard to these effects in the literature¹⁶. Balancing the extraction of healthy first molars is not generally recommended in either arch and there is little evidence that unilateral extraction will adversely affect the dental centreline.¹⁷

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