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Good occlusal practice in children's dentistry

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The difference between paediatric dentistry and most other branches of dentistry is that in the child the occlusion is changing. Consequently 'Good Occlusal Practice' in children is a matter of making the right clinical decisions for the future occlusion. The clinician needs to be able to predict the influence that different treatment options will have on the occlusion when the child's development is complete.

In this part, we will discuss:

- Why occlusal considerations are different in children
- How the adult occlusion can be influenced by the treatment of common problems in the child's dentition

Many of the factors governing the developing occlusion have already been covered in the section on orthodontics, but there are specific instances in which the dentist in general practice will be faced with decisions which could have an influence on the occlusion of child patients. This section aims to present these situations and give guidelines, which will help the reader make the most appropriate treatment decision for their individual patients.

PROBLEMS AND CHOICES:

Premature loss of a tooth in the primary dentition:

If a primary tooth is lost prematurely, then consideration of an extra (balancing) extraction will be necessary.^{1,2} This will be with a view to preventing a shift of the midline or resultant disruption of the developing occlusion.

- If a *primary incisor* tooth is lost as a result of caries or trauma this does not usually have an effect on the developing occlusion. Space closure is not going to occur as primary incisor teeth usually become spaced prior to exfoliation.
- If a *primary canine* tooth needs to be extracted, then the contralateral primary canine should also be extracted, in many cases, to prevent an untoward midline shift. Only if the anterior dentition is spaced should unilateral loss be accepted.
- If a single *primary molar* tooth is unsavable and the other teeth have a good prognosis there is no need to extract other molar teeth.

If primary first and/or primary second molars *in three quadrants* have to be extracted

then the equilant molar in the fourth quadrant should be extracted in order to keep the development and drift symmetrical in each quadrant.

The 'submerging E'

The sight of a primary second molar that appears to be 'submerging' below the level of the occlusal plane of the adjacent teeth is not uncommon. Submergence is an inaccurate term as it is the adjacent teeth which are erupting normally, whilst the *ankylosed* primary molar is remaining static (Fig. 1).

The significance of the 'submerging E' lies not just with the loss of occlusal contact with the opposing teeth, but also the loss of contact, interdentally, with the adjacent teeth, especially distally with the first permanent molar.³ Figure 2 shows that the first permanent molar has tilted mesially, because of the loss of an effective stabilising contact with the second primary molar.

The issues, therefore, are:

Is there an effective contact with the opposing



Fig. 1 A case where the degree of submergence is minor; there is no tilting of the first permanent molar. This requires no treatment because the primary tooth is usually eventually shed, as long as the permanent successor is present

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Fig. 2 The submergence of the primary molar is more severe than that in Figure 1. As a consequence the primary second molar has lost contact against the adjacent first permanent molar, which has tilted mesially

teeth and has the first permanent molar started to tilt mesially?

If the 'submerging primary tooth is disrupting the occlusion and there is a permanent successor then the ankylosed primary molar must be extracted to facilitate the eruption of the permanent tooth. There is an argument that this tooth should be extracted even if there is no permanent successor, because the 'submerged E' is not adding to the occlusion and the tilting of the first permanent molar is still an unwanted side effect.

'Firm upper C'

The permanent canine is an essential tooth to consider in the developing occlusion. In an 'ideal' adult occlusion this tooth provides the anterior guidance during an excursive movement of the mandible.

At 9.5 years of age an assessment must be made for the position of the permanent canines.

This is initially done by palpating for the buccal canine bulge.⁴ When canines are not palpable the assessment must now include radiographs, for example parallax periapical views. If the canines are veering off from the normal path of eruption the primary canines should be extracted in order to encourage their permanent successors to erupt in the correct position. The eruption of the permanent canines should be reassessed radiographically after 6 months. If their position is not improving referral to a specialist orthodontist is advised.

At ages 9.5 to 10.5 continuing assessment must be made for the canine position. If one primary canine is mobile but the other is firm and the permanent canine is palpable under the mucosa the firm primary canine should be extracted to allow eruption of the successor.

At ages 10.5 onwards if a primary canine is still firm and the permanent canine is **not** palpable under the mucosa the appropriate treatment will depend upon the position of the unerupted canine. Specialist orthodontic opin-

ion should be sought so that an early decision can be taken as to whether:

- To encourage eruption of the permanent successor
- To leave the permanent canine unerupted
- To arrange surgical removal of the unerupted permanent canine

These are treatments that will, almost certainly, require specialist opinion and action; the important element is *timing* and it is only the patient's regular dentist who can ensure a timely referral is made by meticulous monitoring.

Premature loss of a first permanent molar

The literature is replete with data on how to, whether to, or whether not to restore carious first permanent molars, and the debate is still active. The authors consider that a clinician should think carefully before filling and especially before refilling a first permanent molar tooth in a child who is *less than 10 years of age*.⁵

'Restoration at all costs' may not always be the best option. Early extraction of first permanent molars with a poor long-term prognosis may be the best treatment option and must be considered at the outset. The essential question that general dental practitioners need to ask themselves at this time is whether the patient may require orthodontic treatment or will the affected tooth need a crown in the future? If either is likely, then consideration should be given to extraction of the decayed/hypoplastic tooth and also the other first permanent molars. With the welcome arrival of a more restorative treatment expectation in the minds of both the profession and general public, there is a real danger that some dentists may be tempted into restoring severely carious or hypoplastic first permanent molars in their young patients without considering how these teeth fit into the long-term treatment plan. Patients will almost certainly wish to avoid extraction, and whilst supporting this as a general principle, it may fall to the dentist to explain sensitively that this is an instance when extraction is preferable. To compound the problem, if there is a strong indication that if one or two first permanent molars need to be extracted, then extraction of the others must also be considered.

It is our aim to give some guidelines to the treatment planning of these cases. As always the treatment planning starts with an examination.

Examination procedures

Radiographic examination

- Extent of caries
 - Danger of pulpal involvement
 - Sign of caries on smooth surfaces
 - Likelihood of refilling or crown

Common Problems:

- **Premature loss of a primary tooth**
- **'Submerging E'**
- **'Firm upper C'**
- **Premature loss of first permanent molar**
- **Avulsed permanent tooth**
- **Fracture of permanent upper incisor**
- **Missing permanent teeth**

- Presence of all other unerupted permanent teeth, especially second premolars
- Development of the second permanent molars.

If an assessment reveals that spontaneous space closure is desirable, timing of extractions is crucial. When the bifurcation of the second molars is visible (just formed) on radiographs and the upper lateral incisor teeth have erupted, this is the best time to extract the first molars to ensure maximum spontaneous alignment. This is because if this stage of development has been reached the lower second molars will move bodily mesially during eruption rather than tilt mesially, which is what happens if extraction are left until later.⁶

- Hypoplasia of unerupted premolar teeth
If the premolar teeth are of poor quality and there is potential crowding then the balance swings towards conservation of the first permanent molars. The decision on which teeth to extract is delayed until the premolars can be assessed upon their eruption.
- Crowding in the premolar region
If the first molars are so carious or hypoplastic as to warrant extraction, then often the second primary molars may well have previously been extracted. This may have allowed the first molars to have drifted mesially resulting in a lack of space for the unerupted second premolar. In this situation, extraction of the permanent first molars is certainly indicated as it removes a tooth with a poor prognosis and also relieves premolar crowding (Fig. 3).

Factors influencing decision to extract

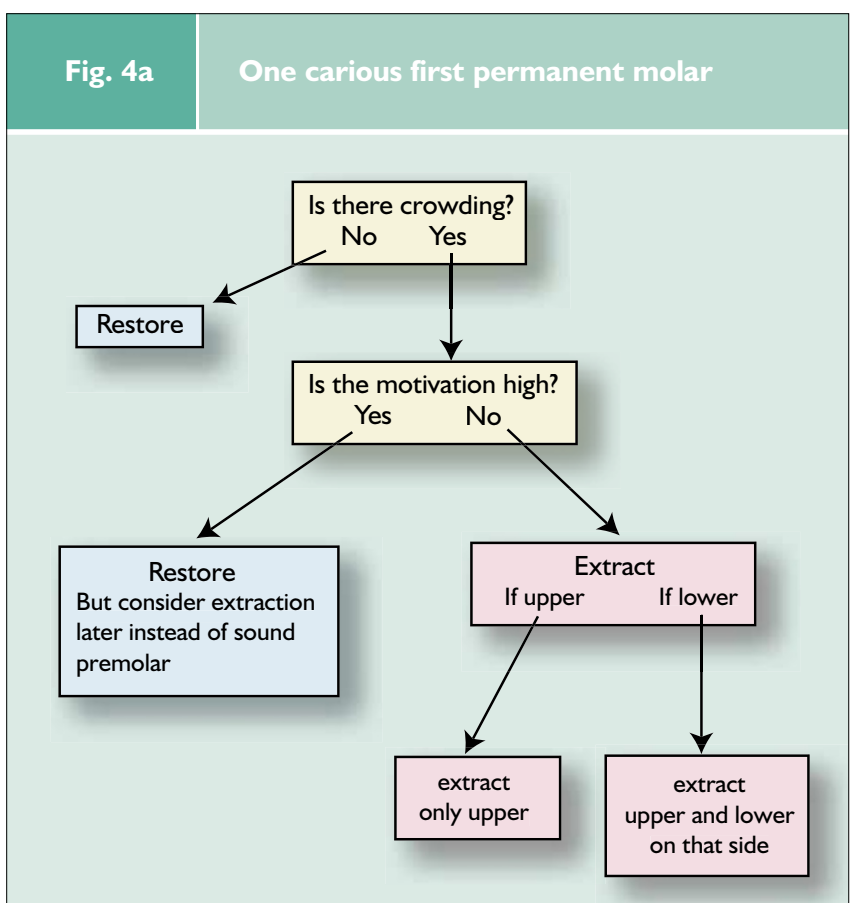
- Number of other carious teeth
- Extent of caries (extract if there is pulpal involvement)
- Oral health status
- Motivation towards dental health
- Presence of malocclusion
- Motivation towards orthodontic treatment

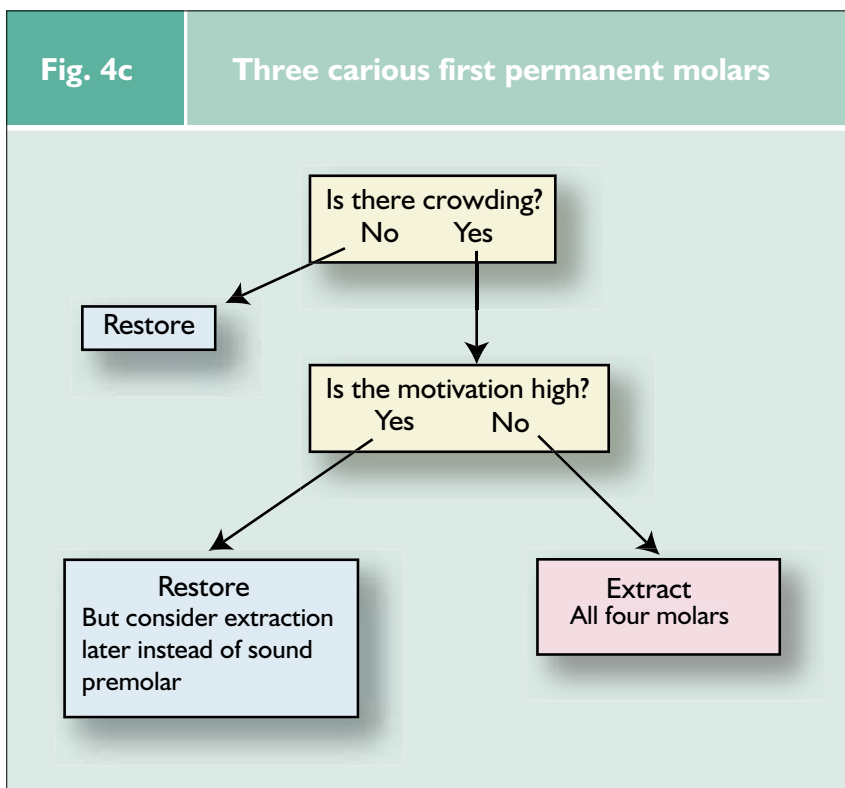
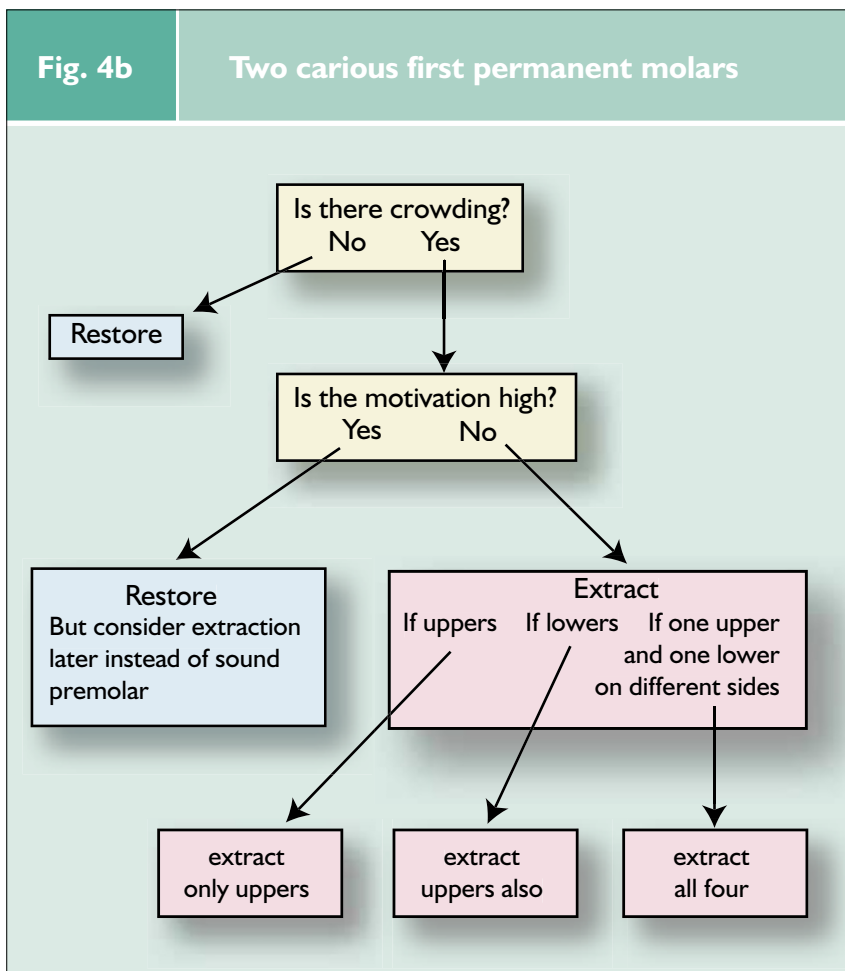
‘Restoration at all costs’ may not always be the best option



Fig. 3 Panoramic radiograph: the lower first permanent molars are carious and there is premolar crowding

Fig. 4a–c Extraction of first permanent molars. After carrying out the examination, the difficult decision of whether to advise extraction of one or more of the first permanent molars must be taken. The flowcharts in Figures 4 a, b, and c are offered as guidelines, when considering extraction of first permanent molars in patients in the age range of 8 to 10 years.





Trauma in the permanent dentition

The general dental practitioner frequently encounters a patient presenting with a fractured or avulsed upper incisor tooth. The management of the clinical condition of the fractured, or avulsed, tooth is the subject of many publications and the practical and definitive treatment plan can be sought elsewhere. What we aim to address in this section is the *effect of the treatment plan upon the occlusion*.

Avulsed tooth

- If the avulsed upper tooth is successfully replanted

There is likely to be no lasting effect upon the developing occlusion, except that effects of the orthodontic treatment on this tooth are likely to be unpredictable, in respect of root resorption.

- If the avulsed upper incisor tooth is not replanted

A space maintainer should be fitted. The design of this is important from an occlusal point of view. A simple tissue borne spoon denture is not sufficient, because if the prosthetic tooth fractures off from this type of denture then immediately the teeth on either side will start to drift into the space. A more desirable approach is to fit what is in effect an orthodontic appliance with a tooth attached. This design should include clasps on the posterior teeth and stops on



Fig. 5 Anterior view of space maintainer showing mesial and distal stops



Fig. 6 Mirror view of space maintainer

the teeth either side of the gap, at the level of the gingival papillae. If the tooth fractures off this appliance, then the stops will maintain the space until the appliance can be repaired (Fig. 5, 6).

Fracture of permanent upper incisor

- The most common fracture involves the mesial or distal aspects of the crown. These teeth can be relatively easily and quickly restored by acid etch composite tips so preserving the contact point with the adjacent tooth. The restoration of the contact with the adjacent tooth is very important. In the case illustrated (Fig. 7 a,b) the failure to do so has resulted not only in a mesial and labial tilting of the unrestored tooth, but also in a loss of palatal width. As a consequence of this inaction the restoration of this young patient's dentition represents a major orthodontic and restorative challenge.
- Fortunately a horizontal fracture of the crown of a tooth is less common. It is important that the crown of a tooth so fractured is restored to its original size and shape to prevent occlusal problems developing. The results of this type of injury to the tooth remaining unrestored are over-eruption of the opposing tooth, and less obviously the damaged tooth may tilt buccally because there is reduced lip control.

Missing permanent teeth

In the case of the congenital absence of permanent teeth, the general practitioner's responsibility is early detection. The responsibility, now, for treatment planning lies with the paediatric dentist and specialist orthodontist because with timely referral many of the potential problems of hypodontia can be avoided.



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Fig. 7a Despite the poor aesthetics and marginal adaptation, the fracture of URI (I1) has been restored. The lack of restoration of ULI (21) has allowed mesial and labial tilting

Fig. 7b The tilting of ULI (21) has resulted in narrowing of the space for the crown of the tooth

Guidelines of good occlusal practice

- 1 The examination of the patient involves the teeth, periodontal tissues and articulatory system.
- 2 There is no such thing as an intrinsically bad occlusal contact, only an intolerable number of times to parafunction on it.
- 3 The patient's occlusion should be recorded, before any treatment is started.
- 4 Compare the patient's occlusion against the benchmark of ideal occlusion.
- 5 A simple, two dimensional means of recording the patient's occlusion before, during and after treatment is an aid to good occlusal practice.
- 6 The conformative approach is the safest way of ensuring that the occlusion of a restoration does not have potentially harmful consequences.
- 7 Ensuring that the occlusion conforms (to the patient's pre-treatment state) is a product of examination, design, execution and checking (EDEC)
- 8 The 'reorganised approach' involves firstly the establishment of a 'more ideal' occlusion in the patient's pretreatment teeth or provisional restorations; and then adhering to that design using the techniques of the 'conformative approach'
9. An 'ideal occlusion' in removable prosthodontics is one which reduced de-stabilising forces
10. The occlusal objective of orthodontic treatment is not clear, but a large discrepancy between centric occlusion and centric relation should not be an outcome of treatment
11. An 'orthodontic' examination of the occlusion should include: the dynamic occlusion; and the jaw relationship in which the patient has centric occlusion
12. The occlusion of periodontally compromised teeth should be designed to reduce the forces to be within the adaptive capabilities of the damaged periodontia
13. **Good occlusal practice in children is determined by the needs of the developing occlusion, consequentially 'restoration at all costs' may not be the best policy.**