

Third Molars : A Clinical Dilemma

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Third molars are the teeth which are most often missing, impacted and with altered morphology. At present human third molars often fail to develop, which indicate that these teeth may be on their way out. Although there are some who advice the early removal of the third molars, many strongly believe that the retention of asymptomatic third molars may be useful in later years as a substitute for badly decayed teeth or may even be useful as a transplant. This article reviews the clinical management of third molars with evidence based therapy.

Development & Eruption

There is great variation in the timing of development, calcification, and eruption of third molars. Development may begin as early as 5 years or as late as 16 years, with the peak formation period at 8 or 9 years. Hellman reported that the average age of eruption was 20.5 years. Early formation of third molars is generally regarded as predictive of early maturation but not always of early eruption.

Lower third molars normally have their occlusal surfaces tilted slightly forwards and lingually during early calcification. As the mandible increases in length, with bone resorption at the inner angulation between the body and the ascending ramus of the mandible, the third molars become more upright.

In contrast, upper third molars erupt downwards, backwards, and often outwards. There is, therefore, a possibility of crossbite, but tongue pressure on lower crowns and buccinator pressure on upper crowns will often correct this. If there is a lack of space, then normal eruptive paths cannot be followed, and crossbites can

result.

Assessment of Space for Third Molars

Shortage of space between the second molar and the ramus has long been identified as a major factor in the etiology of lower third molar impaction.

Ledyard, studying lateral jaw radiographs, found that less than a 2 mm increase in space between the lower second molar and the ramus could be expected after the age of 14 years and a negligible increase after 16 years.

Ricketts claimed that if 50% of the third molar crown lies ahead of the external oblique ridge at maturity, there is a 50% chance of eruption.

Impactions

Archer defined an impacted third molar as 'One which was completely or partly erupted and positioned against another tooth, bone or soft tissue, so that its further eruption was unlikely.'

Bjork and colleagues identified 3 skeletal factors that are separately influencing third molar impaction

1. Reduced mandibular length, measured as the distance from the chin point to the condylar head.
2. Vertical direction of condylar growth as indicated by the mandibular base angle.
3. Backward directed eruption of mandibular dentition determined by the degree of alveolar prognathism of lower jaw.

Mechanism For Eruption And Impaction

Differential root elongation might explain differences in eruptive behaviour among lower third molars. Richardson offered a theoretical explanation for favorable or unfavorable rotational movement.

Favorable change in angulation, to a

more upright position, seemed to occur in teeth where the mesial root developed ahead of the distal crown surface and root. The typical root configuration showed a mesial root which was curved in a distal direction and was slightly longer than the distal root.

Unfavorable mesial tipping, leading to horizontal impaction, seemed to occur when the distal root became the same length, and then longer than the mesial root. The distal root on such teeth was seen to appear to have a mesial curvature.

Factors Influencing Availability Of Space

Growth : Bjork et al measured the distance from the anterior border of the ramus to the second molar, and concluded that the bigger the space, the better the chance of eruption.

Bone Resorption : The increased space was obtained from both the mesial movement of the dentition and bone remodeling along the anterior border of the ramus. On average 2 mm of posterior space was created by bone remodeling.

Space Released By Attrition: In so-called primitive dentitions, where considerable attrition took place, the third molars erupt to take up the space released. Begg felt that lack of this attrition, due to highly refined diets, was a major cause of third molar impaction. Early and extensive interproximal caries could also reduce the size of erupted teeth, owing to disappearance of proximal contacts.

Uprighting Impacted Molars: In shallow mesio-angular impactions a second molar tube can normally be bonded onto the buccal aspect of a partly erupted lower third molar, if enough enamel is visible.

It is then possible to include the tooth in full treatment, if other teeth are already bonded and bracketed. If the case is not fully

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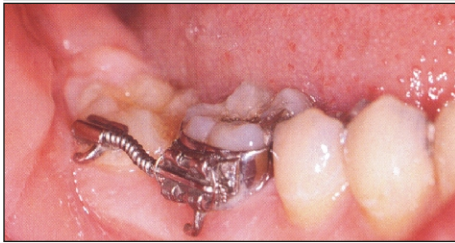
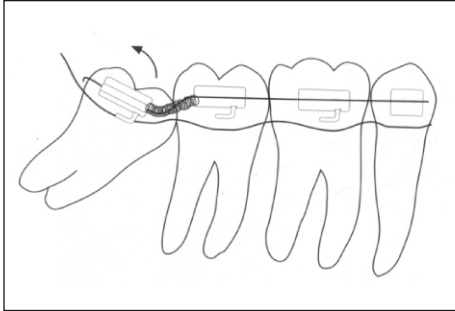
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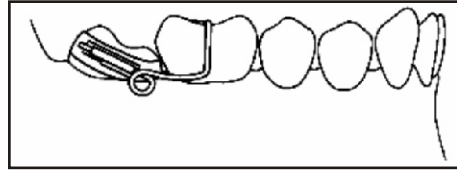
banded, then lower second or first molars alone can be used, with a lingual arch for support

In deep mesio-angular impactions, a two-stage method is used. The first stage involves bonding a second molar tube onto the occlusal surface of the lower third molar. The hook is removed from the tube, before bonding. Lower first or second molars are banded with a lingual arch, using first molar bands and brackets. A small sectional archwire, with a compressed coil spring, is used to provide a distalizing and uprighting force to the crown of the impacted molars. After some uprighting using this method, it is normally possible to bond a tube buccally for the second stage.



'Modified Sling shot' appliance

After surgical exposure a cleat is bonded in center of mesial marginal ridge..The mesial hook is placed 3 mm distal to the distal portion of the third molar. Appliance is cemented in place and is activated with elastic modules



Whip Spring

Whip Spring that is unobtrusive and fairly fast acting with a treatment time of 4 to 12 months u, can be used for disimpacting , mild to severe mesially impacted lower terminal molars (LTM)

Replacement of Third Molars for Second Molars: The third molars can be substituted for the second molars in certain situations .The indications for eliminating maxillary second molar and replacing it with third molars are:

1. Maxillary third molars of fair size and shape with the possibility of good root development
2. Small, restricted maxillary tuberosities and the possibility of interference with distal movement in maxillary posterior region.
3. Second molars erupted buccally.
4. Second molars decayed ,badly decalcified or having large restorations.
5. Maxillary third molars in favourable position and angulation relative to second molars and maxillary tuberosity.
6. Maxillary third molars in favourable relation to mandibular second molars.
7. Desirability of relieving the anchorage units of an overload.

The replacement of maxillary second molar will be considered in both Class I and Class II malocclusions

The contraindications for substitutions are:

1. Maxillary third molars too high in the tuberosity.
2. Maxillary third molars too low in relation to the second molars
3. Poor angulation in relation to second molar and the tuberosity.
4. The possibility of third molars involving maxillary sinus.
5. Small, odd shaped third molars or an indication of the formation of small roots.

Auto-transplantation of Third Molars:

Auto-transplantation of teeth has become an accepted and reliable treatment modality in patients with early loss of teeth or aplasia.

Their root development which continues into the late teens and twenties makes these teeth suitable for use into adulthood. It is essential that the root not be damaged in any way during its relocation

The prognosis for successful transplantation is diminished as the root apex nears closure. Revascularisation must take place. While post operative resorption is rarely reported, the effective reduction in root length is minimized by allowing adequate development prior to transplantation.

Third Molars & Crowding: The current studies indicate that incidence of mandibular incisor crowding may not be related to third molars and their extraction may not be justified.

Extraction of Third Molars: The third molars need to be considered as part of overall treatment planning, and this may include a recommendation for extraction. The timing of extractions requires an understanding of the various techniques available.

Extraction Before Treatment: It is not common practice for third molar teeth to be enucleated before orthodontic treatment of adolescents. Orthodontists are normally reluctant to make surgical extractions a prerequisite of providing treatment. They



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may feel that ramus growth and lower third molar eruptive pattern cannot be predicted, and take the view that the third molars may erupt eventually.

Those in favour of enucleation believe that many young adults between the age of 18 and 22 years experience problems with their third molars and that at later ages, pathologic changes often occur.

Enucleation is not, however, a generally accepted procedure. Later caries experience, space conditioned, and the effect of orthodontic treatment are unknown at this early age.

Lateral Trepanation: At about age 12 years, the need for third molar extraction may be more obvious. Conventional surgical removal of the calcified crowns, at this age is difficult. The tooth rolls in its crypt with considerable trauma to the adjacent tissues. There is also a risk of gingival damage, with a pocket formation to the distal of the lower second molars due to the U shaped incision involved.

A deep lateral approach, called 'Lateral trepanation' can be used for third molars in an early stage of partial development.

Extraction During Treatment: If orthodontic treatment includes orthognathic surgery to one or both jaws, and third molars also require extractions, surgeons prefer to do it at the same operation. However, some prefer to remove lower third molars 6 months before orthognathic surgery, so that bone healing can occur in the surgical site.

Extraction after Orthodontic Treatment: Late lower arch crowding is caused by pressure from the back of the arch. Whether this pressure results from a developing third molar, physiologic mesial drift or the anterior component of force derived from the forces of occlusion on mesially inclined teeth is not clear. There is a school of thought holding the view that in the absence of third molar, the dentition has

room to settle distally under anterior pressures caused by late growth or soft tissue changes. Thus the third molar plays, at the very least, a passive role in the development of late lower arch crowding.

From the current data it can be concluded that third molars do not play a significant, quantifiable role in mandibular anterior crowding.

Two consensus conferences were dedicated to the management of third molars, one sponsored by the National institute of Dental Research in 1979 and the other by the American Association of Oral and Maxillofacial Surgery in 1993. Points of the consensus which were important to Orthodontics were:

1. Crowding of the lower incisors is a multifactorial phenomenon that involves a decrease in arch length, tooth size, shape and relationship, narrowing of the intercanine dimension, retrusion of the incisors, and growth changes occurring in adolescence. Therefore, there is little rationale for the extraction of third molars solely to minimize present or future crowding of the lower anterior teeth.
2. Orthodontic therapy, in both maxillary and mandibular arches, may require posterior movement of both first and second molars by either tipping or translation, which can result in the impaction of third molars. To avoid impacting third molars and to facilitate retraction, it may be deemed advisable in some cases to remove third molars before starting retraction procedures.
3. There is no evidence to suggest that a third molar is needed for the development of the basal skeletal components of the maxilla and mandible.
4. There was agreement that postoperative pain, swelling, infection, and other possible consequences of surgery are

minimized when surgery is performed in patients who are dentally young, as judged by the third molar roots being about two thirds developed.

5. Although there are orthodontic reasons for the early removal of third molars, the consensus was that enucleation of third molar buds based on measurements obtained at age 7 to 9 years is not acceptable.
6. Patients should be informed of potential surgical risks including any permanent condition that has an incidence greater than 0.5% or any transitory condition that occurs with an incidence of 5% or more. On this basis, patients should be informed about hemorrhage, pain, swelling, alveolar osteitis, trismus, and nerve injury.

Thus the case for 'wait and see' with third molars is stronger than it was, and the case for extractions has become weaker.

Conclusion

Management of third molars have always been a dilemma for the dentists. As scientific opinion about management of third molars is changing rapidly with the new scientific evidence, it is imperative for the Dentists to keep abreast with these changes, to provide the patient with the best dental health care possible.

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