

Extraction of Four Second Molars

Galen W. Quinn

A clinical review of second molar extraction cases treated over a period of more than 20 years, finding this to be an effective treatment modality in carefully selected cases when combined with adequate orthodontic supervision and therapy.

KEY WORDS: • EXTRACTION • MOLARS, SECOND • MOLARS, THIRD •

The objectives of orthodontic-orthopedic treatment should be to provide healthy and stable relationships in face and jaws, both vertically and horizontally. Operational objectives are to achieve treatment results with the least amount of physical and psychological trauma to the patient, in the shortest period of time, and with minimum expense.

A large part of the orthodontic problems in our Western civilization appear to involve crowding of teeth or deficiency of bone space for all of the teeth. Some of these problems may be due to the genetic mixing of dolichocephalic and brachycephalic patterns. Brachycephalic individuals have broad faces, and usually have broad, flat teeth. Dolichocephalic individuals have narrow faces and teeth, with more curvature on their labial and buccal surfaces. These genetic skeletal patterns may be further altered by environmental influences such as mouth breathing during growth and development.

Arch length deficiency has been a long-standing concern. ANGLE (1907) was a vigorous early proponent of non-extraction therapy. Two more recent prominent advocates of therapeutic extraction, CHARLES TWEED (1945) AND P. R. BEGG, (1965) both recommended removal of first bicuspid. Selecting the best course for the individual patient is still a major diagnostic challenge.

If third molars are present in bicuspid extraction cases, the eventual extraction of eight teeth is often necessary in those who still do not have enough space for the third molars to erupt into healthy, upright positions.

Routine prophylactic removal of third molars or any other teeth should be avoided while the deciduous and permanent dentitions are still developing. Removal of any tooth, deciduous or permanent, during these complex and critical

Author Address:

Dr. Galen W. Quinn
Division of Orthodontics
Duke University Medical
Center
Durham, NC 22710

Dr. Quinn is Chief and Professor, Division of Orthodontics, School of Medicine, Duke University Medical Center, Durham, North Carolina, where he is also in the private practice of orthodontics. He holds a D.D.S. degree from Creighton University, where he later served as Dean of the School of Dentistry, and an M.S. degree from the University of Tennessee. He is a Diplomate of the American Board of Orthodontics.

Extraction of Four Second Molars

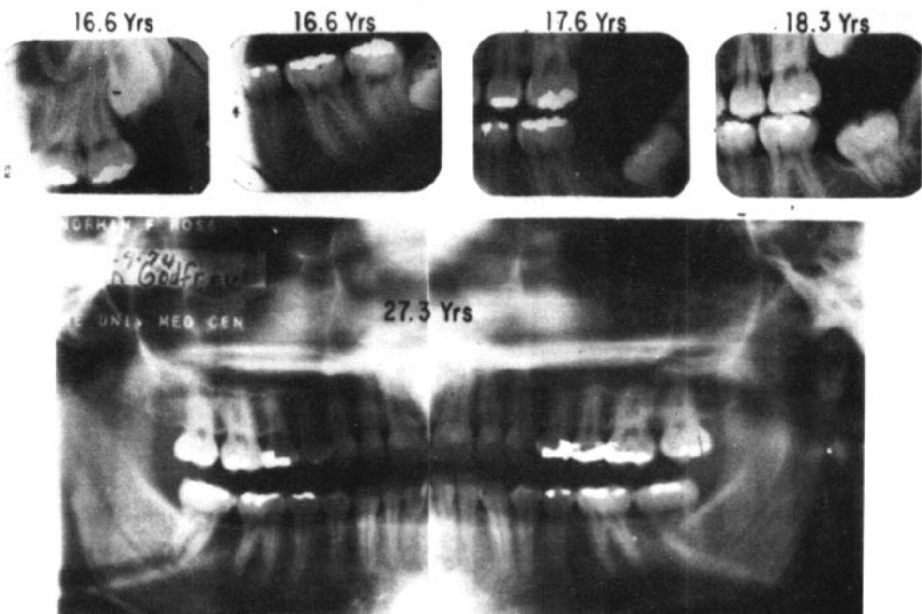


Fig. 1 Patient with a history of previous nonextraction orthodontic treatment and recurring crowding in the mandibular arch. Second molars were extracted at age 16.6 years. Tooth development was slow. The third molars erupted without assistance into good occlusion, with slight mesial root inclination.

stages should be based on a complete evaluation of the dentition and occlusion, *and* the skeletal structures in and related to the face. Present growth status and anticipated growth are essential components of such an evaluation.

The nature of the diagnosis, by whom and when, is also important. If there is evidence or risk of malocclusion, the person who is or will be responsible for the treatment of that deformity should be consulted before any extraction. For the benefit of the patient, teamwork between the orthodontist and other dental professionals is especially important in these critical irreversible decisions.

The purpose of this discussion is to present indications, contraindications and treatment procedures involved in the extraction of four permanent molars.

Timing for such extraction should be judged by dental age, as evidenced by the development of dental components, rather than by chronological age (Fig. 1).

The third molars have an unfavorable reputation because when they are extracted in adulthood, the crowns are frequently malformed, and the roots gnarled or underdeveloped. This can be likened to a plant that has grown in a container that is too small; the roots cannot grow, making the plant unhealthy and incapable of proper growth. Third molars crowded into the ramus without adequate alveolar space can be malnourished while the crowns are developing, and later lack space for normal root growth.

Most third molars will develop healthy crowns and roots if space is available dur-

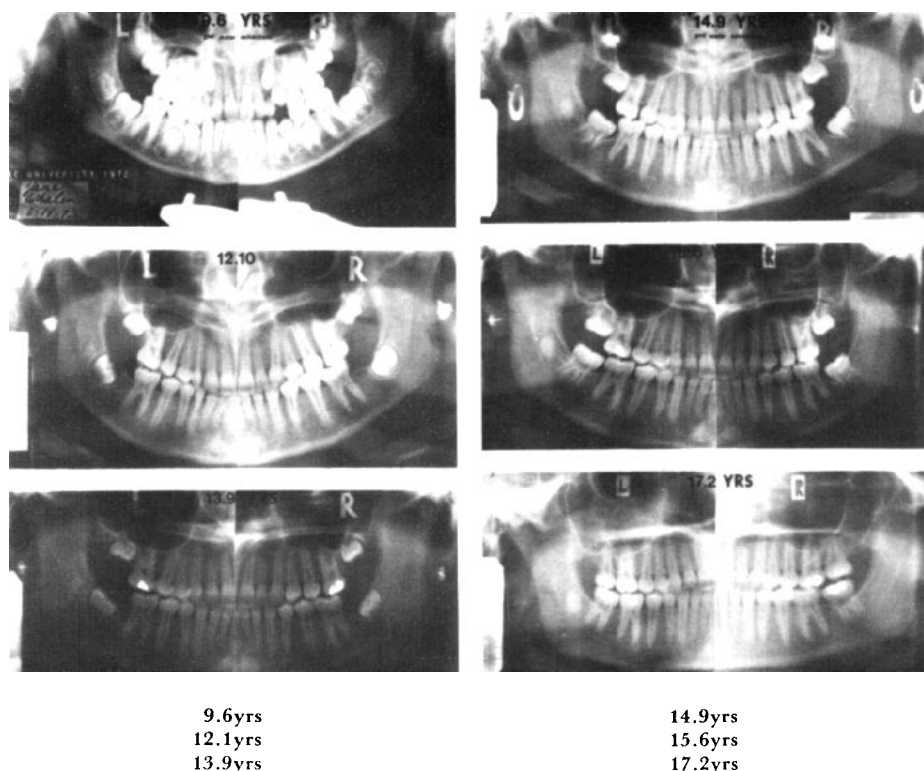


Fig. 2 This patient presented Class II cusp and jaw relationships, with an anterior open bite and a severe thumb-sucking habit. A thumb-sucking appliance was used for more than 4 years. The maxillary teeth were banded and headgear forces applied to the maxilla for 17 months. Second molars were removed at age 11. A maxillary retainer was then worn intermittently for 2 years.

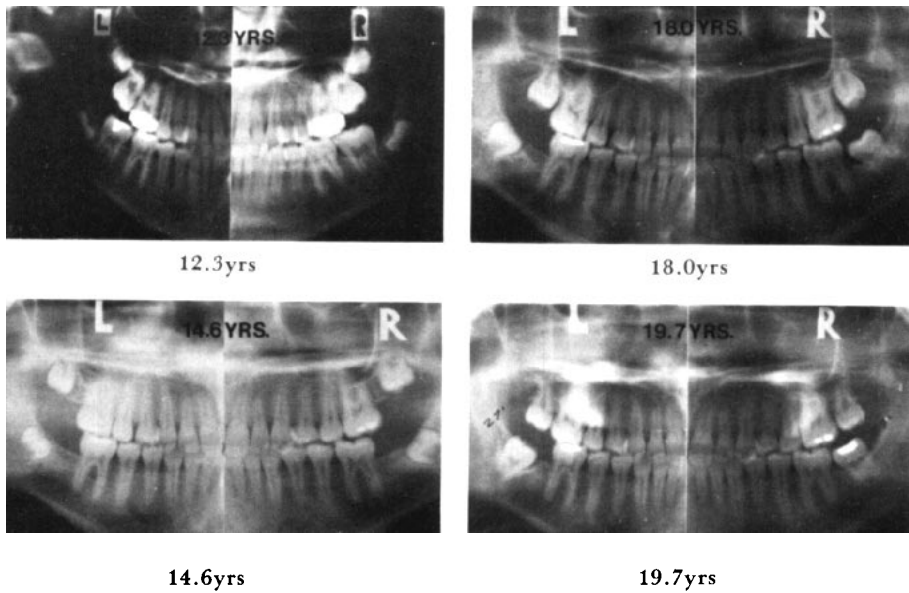
ing their developmental period, with a bony environment that provides good trabeculation and sufficient space for unimpeded growth.

If second molars are to be removed, it is recommended that they be removed as soon as an adequate diagnosis is reached, with enough of the cusps and morphology of the third molar crowns visible to assure a tooth of reasonable size (Figs. 2 and 3).

When the maxillary second permanent molars are removed, the third molars move into occlusion with rare exception.

Some may erupt with excessive mesial angulation, making it necessary to facilitate eruption and/or upright the tooth later.

One effective procedure for uprighting involves bonding or banding the third molar with a buccal tube, banding the first permanent molars and/or bicuspids, and fabricating a lingual arch. A rectangular wire with a long leg and helical loop between the first and third molars can then be used to upright the third molar. Figure 4 shows a combination of several possible mechanisms that can be used.

**Fig. 3**

There can be a discrepancy in rates of eruption. In this Class II malocclusion the second molars were removed at age 12.3.

The maxillary arch was banded, and a coil spring placed between the first bicusps and first permanent molars. Extraoral force was applied to the maxilla, retracting the first permanent molars. At age 14.6, it was apparent that the right mandibular third molar was erupting more rapidly than the left. At age 19.7 the right third molar had erupted into occlusion, while the left had not yet erupted through the soft tissue.

The only early difference that can be observed is that at age 14 the right molar is more distal, more advanced in eruption, and with greater mesial angulation.

The teeth on both sides eventually erupted, but the left molar required uprighting.

After the posterior tooth is uprighted, it is contoured and retained as necessary.

Should there be a discrepancy in the eruption rate of opposing third molars, it is necessary to retain the first tooth to appear at the level of the occlusal plane until the opposing molar has erupted into occlusal contact (Fig. 3).

Radiographs and Casts

Radiographs play an important role in orthodontic diagnosis, and they are especially important in evaluating second and

third molars. Axial orientation and relationships to the ramus and mandibular nerve are all important factors. The radiographic survey should preferably include a panoramic radiograph or angulated cephalometric views, supplemented by anterior films. The panoramic and cephalometric films provide an overall picture of the teeth and their relationships to each other, and to the inferior border of the mandible, the ramus, the mandibular canal, and the nasal cavities (Fig. 5).

Fig. 4

One combination of fixed/removable appliances with auxiliaries that can be used to upright third molars

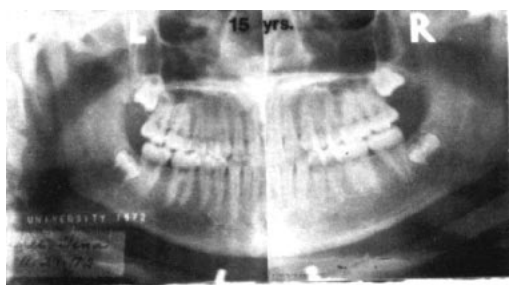
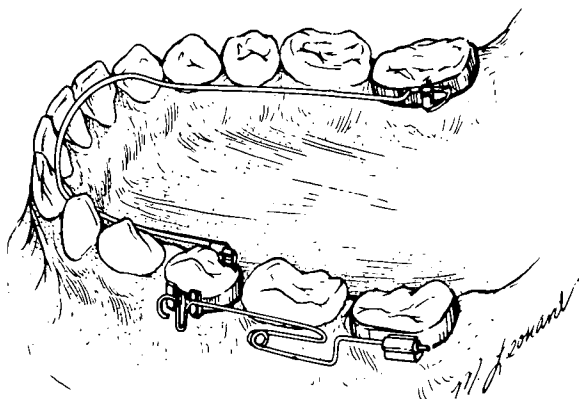
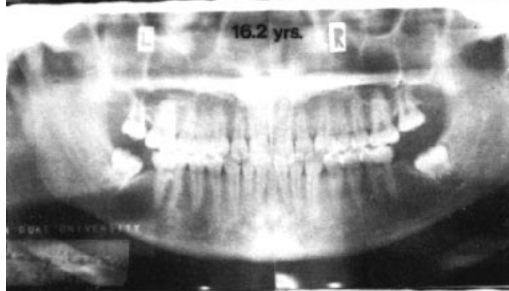


Fig. 5 A Class I molar cusp relationship with anterior crowding. Second molars were extracted at age 15, and maxillary molars retracted with a cervical headgear for 8 months. No retention was used.

15.0yrs



16.2yrs



20.4yrs

Size and shape of unerupted teeth are most accurately shown in periapical radiographs. An occlusal radiograph can show buccolingual positioning of unerupted teeth.

Since radiographs are two-dimensional, oriented study casts are also necessary to record and evaluate axial positioning of erupted teeth and the shape of the alveolar process.

Treatment Procedures

For over twenty years, the Author has elected to extract four second molars in preference to first or second bicuspid in selected cases, with very favorable results. SMITH (1958), TROTIER (1958), HALDERSON (1959), TULLEY (1959), RINDLER (1977), HUGGINS (1978), LAWLOR (1978), AND MARCEAU (1980) have also reported success in removing second molars with the objective of using third molars to replace them.

Extraction of four second molars may be applicable in the treatment of selected Angle Class I, II, or III malocclusions, anterior open bites, deep overbites, and even some prognathisms when extraction is necessary. Removal of second molars must be very selective in bimaxillary protrusion. As with any orthodontic treatment measure, molar extraction must be planned and executed as part of an overall plan that addresses the specific problems of the individual patient.

Following extraction of the second molars, all teeth may be banded or bonded. Where extraoral force or maxillary expansion are to be used, these are initiated early.

Where a headgear is used to retract the maxillary molars, coil springs may be placed between the lower bicuspid and first molars, and Class III elastic traction applied to the mandibular arch (Fig. 5). Upper bicuspid usually follow the first molars distally when a headgear is used. If they do not move, they can be moved

individually by coil springs or elastic force.

As soon as mandibular crowding has been eliminated in a Class I malocclusion, Class II forces can be applied to the maxillary arch to help correct malalignment of the maxillary teeth. The same procedure can be used in Class II (Fig. 6) or III malocclusions, with appropriate variations in intermaxillary traction.

Careful timing for extraction of second molars has reduced treatment time by as much as 50%, with stable results and integrity of the dental arches from the first molar forward.

It may also be necessary to contour the occlusal anatomy of some of these teeth in the final phases of treatment.

Advantages and Indications for the Extraction of Second Molars

The very limited literature on second molar extraction covers only Angle Class II, division I malocclusions, and with few exceptions is limited to the extraction of only maxillary second molars.

Second molar extraction typically causes less surgical trauma, and decreases the possibility of pericoronitis by allowing smaller third molars to erupt into the place of second molars that would be more likely to have distal opercula.

Extraction of four second permanent molars can be used to advantage where third molars are present, normal in size and shape, fairly upright, the crown partially or fully formed, and the cusps clearly identified.

Second molar extraction of itself is not a definitive treatment for orthodontic problems, although it may be useful in otherwise normal occlusions to eliminate the surgical procedures and complications involved in the removal of impacted third molars.

Extraction of four second molars can be useful in treating some anterior open bites

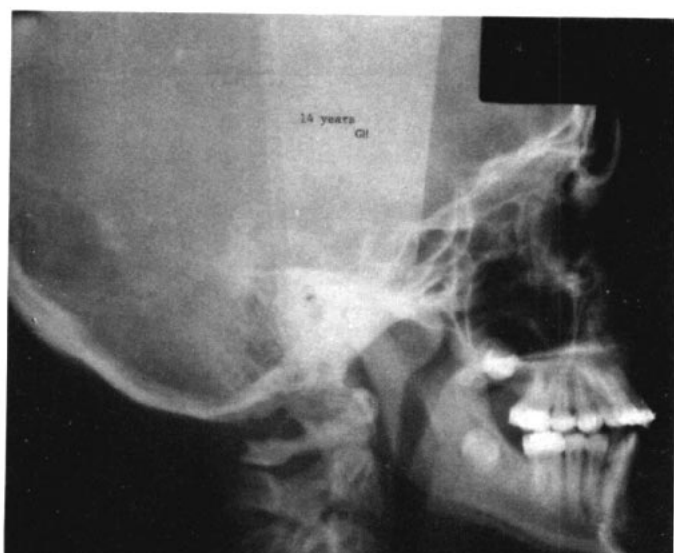
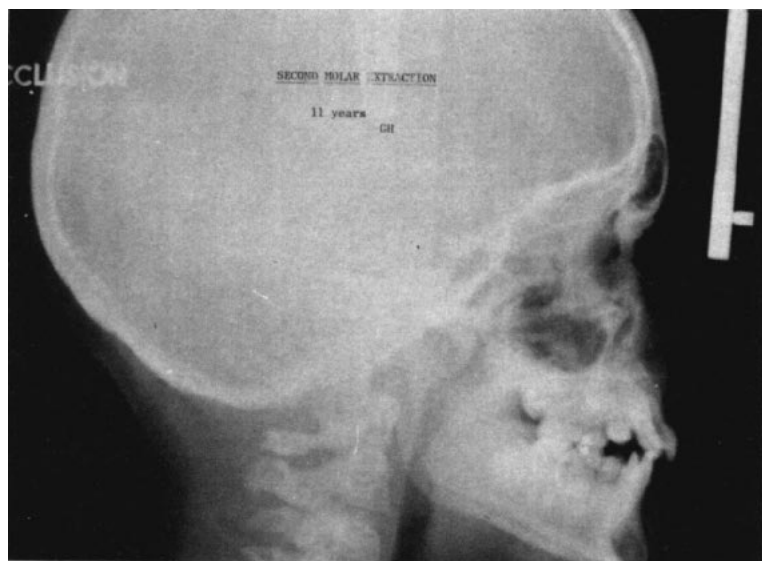
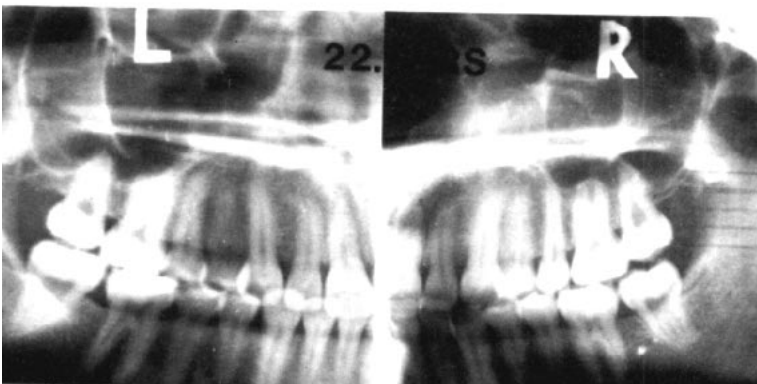
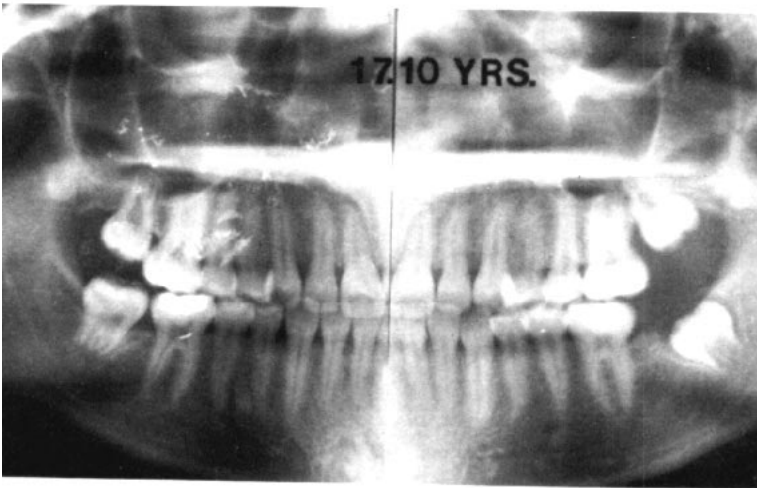
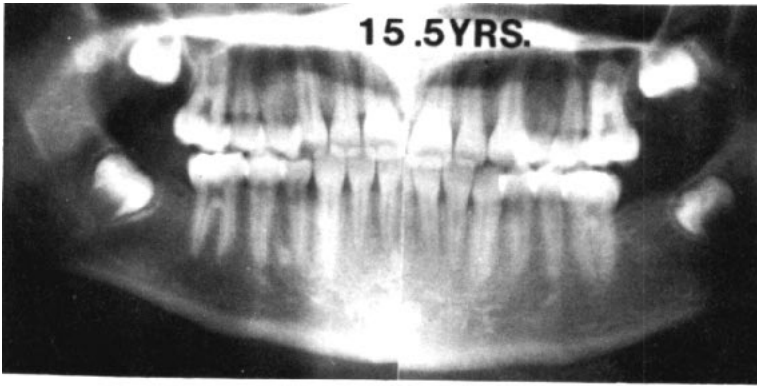


Fig. 6 *Above and right*

A Class II molar relationship with deep overbite. Four second molars were removed at age 14. Note the uneven rate of eruption. At 22 years of age all molars were erupted in good position.

Extraction of Four Second Molars



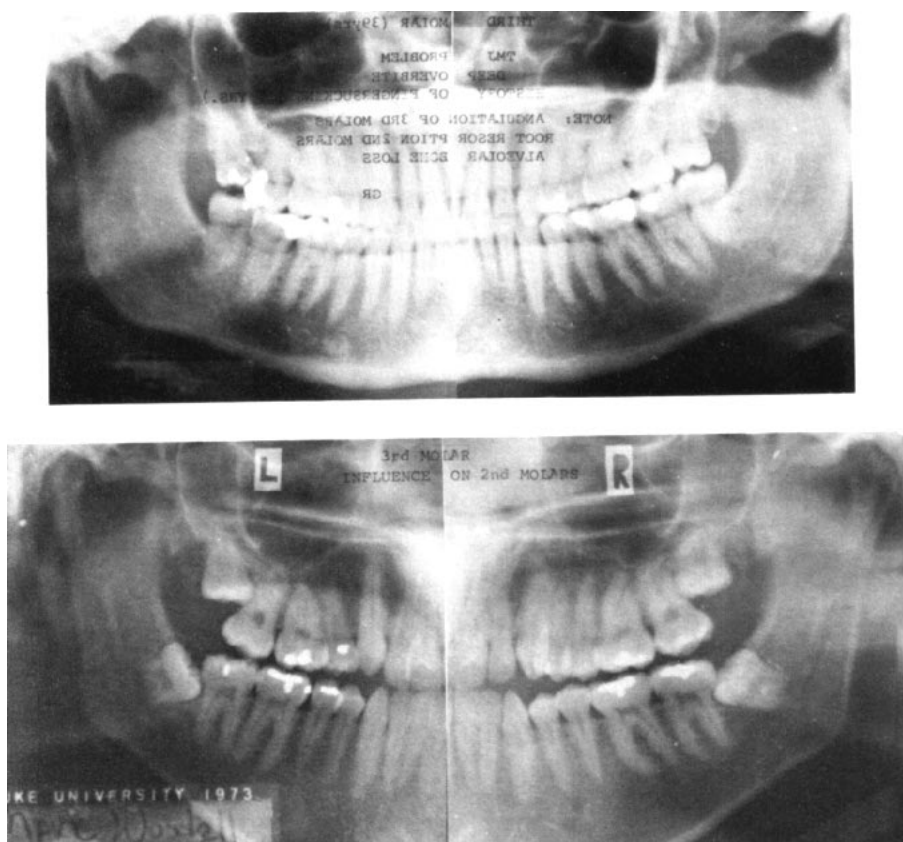


Fig. 7 Two cases in which impacted third molars have disrupted second molar eruption and caused caries, root resorption and bone loss. This may have been prevented by earlier second molar extractions.

by temporarily reducing the functioning molar area, moving the mandibular “fulcrum” one molar width forward. This also temporarily increases space for the tongue.

Overbite problems can be more easily controlled when treated with extraction of second molars instead of first bicusps.

In Class III problems where Class III retraction has aggravated lower molar crowding, second molars can be removed near the end of active treatment to allow the third molars to erupt. This is espe-

cially useful in pseudo prognathisms in cleft lip/palate patients.

There is no problem of extraction spaces and diastemas in the anterior region with four second molar extraction.

Extraction of a second molar eliminates the impaction of third molars, at least temporarily, and reduces the likelihood of uneven marginal ridge levels in the molar area (Fig. 7).

Extraction of four second molars can reduce the amount and duration of appliance therapy, lessen the problem of

“dished in” faces, and lessen the likelihood of some types of relapse.

Second molars presenting actual or potential pathology may be extracted and replaced by healthier third molars. Buccal eruption, anomalous crowns or roots, ankylosis (Fig. 8), severe caries, defective enamel, and large restorations are examples.

Following extraction of second molars, narrower teeth are moved posteriorly into the wider alveolar process previously occupied by the molars. Movement of wider molar teeth into narrower bicuspid areas is sometimes not possible or advisable, especially in adults, sometimes resulting in recession of bone and gingivae.

Some of the benefits that can be accomplished through careful selection of second molar extraction in orthodontic treatment outlined by TROTIER (1958) complement the Author's findings.

- Increases stability and retention following orthodontic therapy by the occlusal interlocking of all eight bicuspid
- Improving or maintaining good facial esthetics
- Providing only the amount of space needed for orthodontic correction
- No problem with closure as seen in the so-called borderline cases
- Chances are decreased for increasing an excessive overbite
- Complications of surgical removal of third molar impactions and some pericoronitis are eliminated
- Facilitates the early eruption of the third molars
- Allows the orthodontist to replace a carious, malformed, malpositioned, or a badly restored second molar with a sound third molar
- May lessen the length of active orthodontic treatment and retention period.
- Eliminates the third molar as a possible cause of relapse.

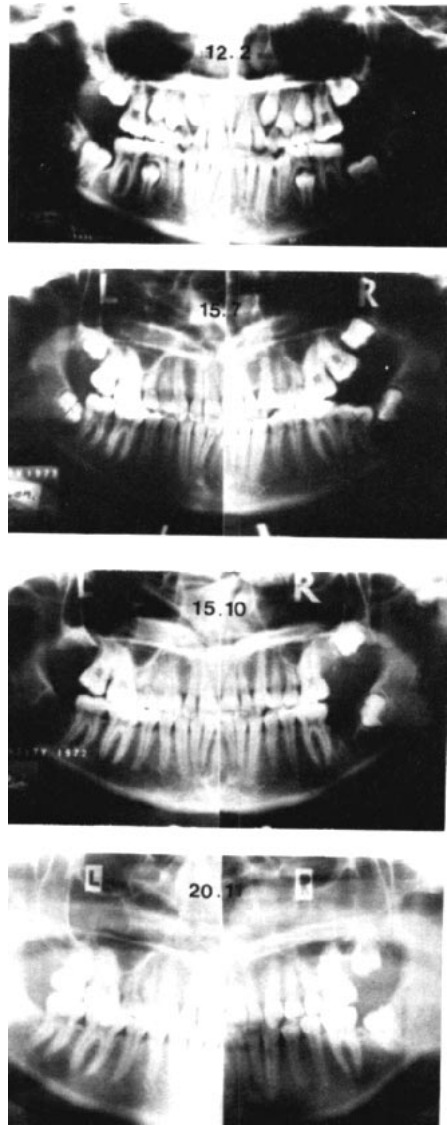


Fig. 8

The mandibular right second molar was ankylosed. Anterior teeth in both arches were crowded. Left third molars and right second molars were extracted. Although the third molars were not completely erupted in the last radiograph, they did erupt into good positions later.



Fig. 9 An enlarged mandibular third molar and deformed maxillary third molars in close proximity to the sinus contraindicate second molar extraction in this case.

Disadvantages and Contraindications for the Extraction of Second Molars

Second molar extraction is not a panacea. It is an option that must be evaluated in the light of a detailed diagnosis. Some negative considerations are:

- Small or poorly formed third molars
- Oversized third molars (Fig. 9)
- The possibility of third molars involving the sinus area
- Horizontal third molar
- Missing third molar
- Congenitally missing bicuspid or incisors
- Severe bimaxillary protrusion
- Severe space deficiency
- Need for extended orthodontic supervision through third molar eruption
- Possible need for third molar uprighting
- Possible failure of third molar eruption

— Summary and Conclusions —

The cases presented here clearly demonstrate that the removal of second permanent molars can be effective in many cases where removal of first or second bicuspid would otherwise be recommended.

Third molars can be useful components of the dentition. The Author has found that when the proper diagnosis is made and the extraction of second molars is recommended, third molars will assume their position in juxtaposition to the first permanent molar in over 75% of the cases.

Although we used several methods of measuring developing mandibular third molars, we were unable to predict accurately and consistently which teeth would erupt in the proper upright position (Fig. 10). With rare exception, maxillary third molars will erupt uneventfully, but in the mandibular arch there is a much greater possibility that it may be necessary to upright or reposition the third molars.

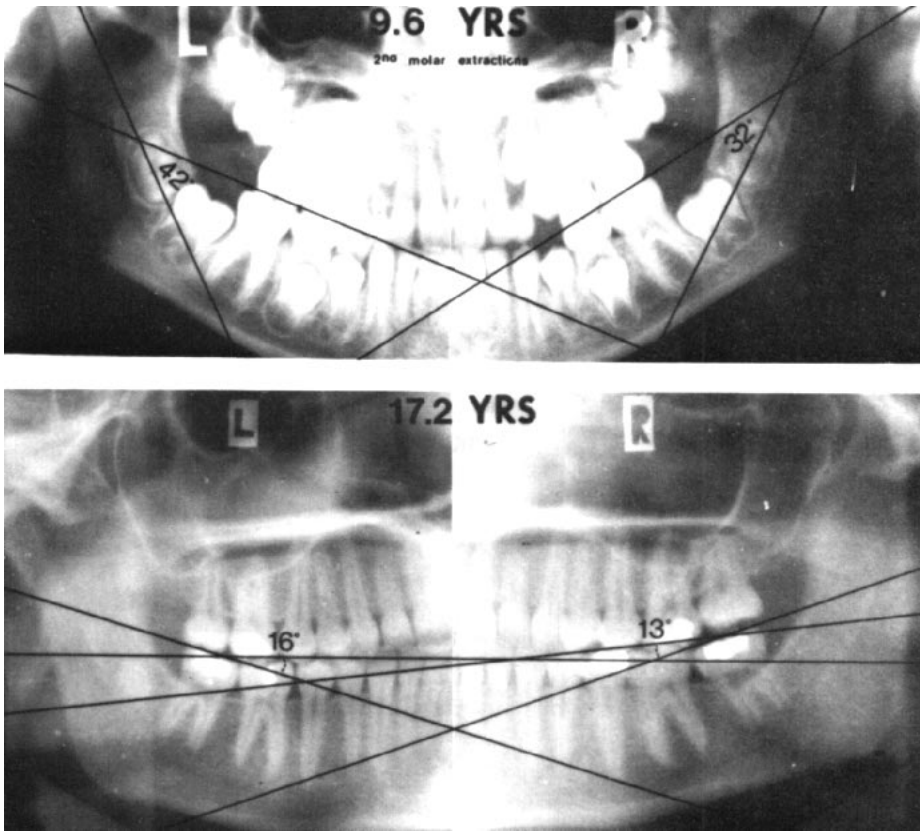


Fig. 10 Measurements have proven unreliable for predicting third molar eruption.

REFERENCES

- Angle, E. H. 1907. *Malocclusion of the Teeth* Philadelphia, S. S. White.
- Begg, P. R. 1965. *Begg Orthodontic theory and technique* Philadelphia, London, W. B. Saunders.
- Halderson, Holly 1959. Early second permanent molar extraction in Orthodontics, *Journal of Canadian Dental Association* 25:549-560
- Huggins, D. G., McBride, L. J. 1978. The eruption of lower third molars following the loss of lower second molars: A longitudinal Cephalometric study, *British J. Orthod.* 5:13
- Lawlor, John 1978. The effects on the lower third molar of the extraction of the lower second molar, *British J. Orthod.* 5:99-103
- Marceau, J. Edward 1980. Personal communication from D. Marceau regarding second molars. 91 No. Winooski Ave., Burlington, Vt.
- Rindler, Arne, L.D.S. 1977. Effects on lower third molars after extraction of second molars. *Angle Orthod.* 47:55-58
- Smith, E. I. 1958. The eruption of third molars following extraction of second molars, *The Dental Practitioner* 8:292-294
- Trottier, Benoit P., 1958. *The influence of second molar extractions in orthodontic treatment.* Preceptorship thesis. Burlington, VT.
- Tulley, W. J. 1959. The role of extractions in orthodontic treatment, *British Dental Journal* 107:199-209
- Tweed, C. H. 1945. A philosophy of Orthodontic treatment, *Am. J. Orthod.* 31:74-103.