

# Should impacted third molars be removed? A review of the literature

WJ van der Linden, JF Lownie and PE Cleaton-Jones

Division of Maxillo-Facial and Oral Surgery, Department of Surgery, University of the Witwatersrand, Johannesburg and Dental Research Institute, Medical Research Council and the University of the Witwatersrand, Johannesburg

Mead (1954) defined an impacted tooth as one that is prevented from erupting into position because of malposition, lack of space, or other impediments.

The impacted third molar has been a point of discussion in the dental literature for many years - the debatable question is: "..... to extract or not to extract?" A great deal has been written by eminent clinicians for and against prophylactic extraction of impacted third molars (Laskin, 1969, 1971; Raley, Chapnick and Baker, 1977; Goodsell, 1977; Lyttle, 1979; Bishara and Andreasen, 1983). This often leads to confusion in the minds of the general practitioner who has doubts about referral or treatment of these patients and is not sure whether or not he should abide by the old adage "let sleeping dogs lie". There seems to be little doubt that the removal of symptomatic impacted third molars is indicated. Controversy arises however, regarding the prophylactic removal of asymptomatic teeth and the debate concerns the likelihood of problems developing in the future.

The prevalence of impacted teeth has been studied in various population groups. Most studies showed that the frequency of impaction varies between 17 and 22 per cent (Mead, 1930; Bjork, Jenson and Palling, 1956; Haralabakis, 1957; Dachi and Howell, 1961; Brown *et al.*, 1982). All of these studies have shown that impacted third molars are the most common form of tooth impaction. Some studies have suggested that impacted third molars are more common in females than in males (Hellman, 1938; Bjork, Jenson and Palling, 1956; Pindborg, 1970) and another study that whites have a significantly higher prevalence than blacks (Brown *et al.*, 1982).

## Indications for the removal of impacted or unerupted third molar teeth

There are a number of indications for surgical removal of these teeth.

### 1. Lack of space

For optimal dental health and function a full complement of teeth is required. They should be completely erupted and well aligned in their respective dental arches. Each tooth ought to be functional and surrounded by healthy, attached gingiva. Any tooth that has not been able to attain this ideal position is regarded as an impacted tooth.

Impacted teeth have a propensity for causing discomfort and causing pathologic lesions.

It is often advisable to remove offending third molars rather than to attempt courageous surgical and restorative procedures that have a poor prognosis and involve the patient in a great deal of expense and aggravation.

### 2. Pericoronitis

Pericoronitis has been described as an inflammation of the gingival tissues over the crown of a partially erupted molar (Laskin, 1969). For practical purposes pericoronitis can be divided into chronic, subacute and acute categories. In chronic pericoronitis the patient is largely unaware of a problem except for occasional discomfort and possibly a bad taste that exudes from under the gum flap from time to time. The clinical signs and symptoms of a subacute pericoronitis is far more specific, and a well localised, dull pain is present in the retromolar pad area. The gum is painful, red and swollen. Often indentations from the cusps of the upper third molars may be seen where they are pinching the pericoronal tissues and the adjacent buccal mucosa. A foetid oris is often present and pus can sometimes be expressed from underneath the gum flap. The submandibular lymph nodes may be palpable and tender and mild trismus and pain on swallowing may also be present. Patients suffering from acute pericoronitis are usually in severe discomfort, may be pyrexial and suffering from malaise and anorexia. The pain they suffer is severe

WJ van der Linden, BDS, MDent (Wits), FFD(SA) (MFOS)

JF Lownie, BDS, HDDent, MDent (Wits)

PE Cleaton-Jones, BDS, MB Bch, DA, PhD (Wits)

Article received: 28/6/1992

approved for publication: 30/9/1992

and throbbing, preventing them from performing their normal function, including sleep. Trismus may be marked and swallowing very painful. The affected side is often swollen with a tender submandibular lymphadenopathy. Intra- orally the gingiva overlying the retro-molar area is inflamed and swollen, as well as the adjacent buccal and pharyngeal tissues. The clinical features of the subacute variety are usually present in a more severe form. If untreated this infection is likely to spread into the adjacent tissue spaces, and if occurring bilaterally and not controlled with antibiotics at an early stage, can develop into life threatening submandibular, sublingual, submental and parapharyngeal space infection or Ludwig's Angina.

Hendrix and Tall (1971) claim that well over 75 percent of all young adults with partially erupted or impacted third molars develop pericoronitis. Kay (1970) and Rud (1970) believe that 10 per cent of third molars extracted are afflicted with pericoronitis. Radiologically, pericoronitis will only be observed if there has been osseous destruction distal to the second and also the third molars. This usually occurs following recurrent bouts of pericoronitis and can be seen as a radiolucent area either on the mesial or the distal aspects of the impacted or embedded third molar, that has no distinct cortical outline. On the distal aspect of the partially erupted third molar, a flame shape radiolucency is indicative of the presence of an osteitis, due to recurrent pericoronitis. (Langland, Langlais and Morris; 1982). These infections also tend to be more severe with each recurrence (Rud, 1970). Fitzgerald (1953) has described pericoronitis arising in an unerupted, apparently completely embedded third molar, and postulated that there might be a minute fistula connecting it to the oral cavity thereby permitting the ingress of oral microbes. This theory is supported by Baab, Morton and Page (1984) who reported a most unusual case of an unerupted, embedded third molar that presented for treatment because of pulpitis due to a large carious lesion in the crown of an embedded tooth, presumably due to the ingress of cariogenic bacteria through the fistula. The authors have noted similar paradoxical situations in their own experience.

### 3. Damage to adjacent teeth

Due to their position in the dental arch and relative inaccessibility for routine oral hygiene procedures, impacted partially erupted teeth allow a build-up of plaque

and possibly entrapment of food resulting in the development of caries as well as loss of periodontal support in the adjacent tooth. Goodsell (1977) claimed that more second molars are lost due to third molars being left in place than for any other reason. In addition, inaccessibility for restoration of second molars may influence the quality of restoration and so increase the potential for carious pulpal exposure and dental abscess formation, with all the ensuing possible complications.

The early removal of impacted third molars results in a better prognosis for the second molar because bony defects created by surgical removal of teeth in young adults fill rapidly and more completely than in older individuals (Marmary *et al.*, 1986).

Developing third molars have been implicated in causing root resorption of adjacent second molar teeth. Nitzan, Keren and Marmary, (1981) reported a prevalence of 7,5 percent, with a striking male predominance, in resorption of roots of second molars caused by pressure from adjacent mainly asymptomatic third molars. They postulated that, apart from pressure, there are other elements — probably systemic factors which play an active part in resorption. They also found that root resorption mainly occurred in patients under the age of 30 years, and so suggested that in attempting to prevent root resorption of an adjacent tooth, extraction of the impacted tooth after this age will have little bearing on the development of resorption of the adjacent second molar tooth root.

### 4. Caries and internal resorption of the impacted tooth

Dental caries as well as internal or external resorption of an impacted tooth is an indication for its removal (Lyttle 1979). Unless a minimally impacted tooth is serving a vital function such as an abutment for a partial denture or a sole remaining, functional molar tooth, these teeth ought to be extracted. Endodontic therapy of such teeth has a poor prognosis due to the inaccessibility of the canals, as well as the often complex nature of the root canal system.

### 5. Facilitation of orthodontic or periodontal treatment

The influence of third molars on the dental arch is still controversial (Hannah 1978). If posterior movement of first and/or second

molars is required, to facilitate retraction or to avoid impacting third molars, it may be deemed advisable to remove third molars before starting retraction procedures (Bishara and Andreasen 1983). The area of controversy involves the indication for advising removal of impacted third molars to prevent future crowding of lower anterior teeth, or to cause the forward relapse of the posterior movement of both first and second molars following orthodontic treatment. After an in depth study of these factors Bishara and Andreasen (1983) came to the conclusion that there was no scientific basis for this assumption.

Grondhal and Lekholm (1973) studied the periodontal condition around the distal aspect of the second molars behind which impacted third molars were present. They found that oral hygiene can be improved by extraction of impacted and semi-impacted third molars. Poor oral hygiene can lead to loss of osseous support and the periodontal condition worsens. Hannigan (1976) stated that periodontal pockets distal to second molars were difficult to treat surgically. This problem can be eliminated by early removal of impacted teeth.

#### 6. Impacted teeth related to odontogenic cysts and neoplasms

The formation of a cystic lesion or neoplasm in relationship to an impacted third molar is probably the most serious complication associated with these teeth. The first clinical sign of development of such a lesion will either be expansion of the mandible or maxilla causing swelling of the face, or pain due to secondary infection of the pathological condition. Fortuitous discovery of the lesion during routine dental radiography will greatly improve the prognosis for the patient following treatment. Fortunately this is not a very common occurrence and when present occurs more often in the mandible than the maxilla (Brown *et al.*, (1982).

Whether an ameloblastoma can arise in the wall of a dentigerous cyst is controversial. Shafer, Hine and Levy, (1983) reported a study by Stanley and Diehl (1965) in which they found that approximately 17 per cent of their sample of 641 cases of ameloblastoma were definitely associated with an impacted tooth and/or a dentigerous cyst.

Other odontogenic cysts that may involve third molars are the odontogenic keratocyst, lateral periodontal, paradental

and radicular cysts. The odontogenic keratocyst and lateral periodontal cysts are developmental in origin and the impacted status of the wisdom tooth has little bearing on the pathogenesis of these cysts.

Ackerman, Cohen and Altini, (1987) reviewed the development of the paradental cyst, and linked it specifically to the partially erupted third molar that had undergone several episodes of pericoronitis. They believe that this cyst is quite common, but it's reported prevalence is not that high due to the fact that many surgeons do not routinely send specimens of this nature for histological examination. The presence of the cyst is confirmed either radiologically or at time of surgery.

A continuous radio-opaque line forming the boundary of a radiolucent space surrounding the tooth crown is defined as a normal follicular border. Absence of part (or all) of this line indicates resorption of the follicle. Whenever the radiolucent space diameter exceeds 3mm and root formation is complete, as indicated by the closure of the apices of the tooth, then the eruptive potential of the tooth is greatly diminished and cystic transformation of the tooth can be said to have occurred. (Langland, Langlais and Morris, 1982.) Classically, the paradental cyst presents as a radiolucent space on the distal aspect of a partially erupted third molar, which often extends into the inter-radicular area.

When the impacted tooth has been removed a smooth concavity will be present in the ascending ramus of the mandible just distal to where the impacted tooth was present. The cyst lining is usually attached to the neck of the tooth and is often fused with the surrounding oral mucosa, thus making it difficult to remove intact. This is probably the main reason why specimens are not routinely sent off for histology.

A radicular cyst can also develop in a grossly carious impacted wisdom tooth due to pulpal degeneration.

Recently, Shiratsuchi and Kurihara (1987) reported the development of an haemorrhagic cyst of the mandible associated with a retained root apex of a lower third molar.

The problems that cystic lesions cause are weakening of the angle region of the mandible increasing the possibility of fracture, possible malocclusion due to the

movement of adjacent teeth, expansion of the cortices of the mandible limiting the normal range of motion, and secondary infection causing pain (Goodsell, 1977).

Other odontogenic tumours - ameloblastoma and its varieties, odontomas, (Morning, 1980) as well as odontogenic myxoma may involve impacted third molars.

#### **7. Pain of unknown aetiology**

Removal of an impacted third molar has reported to have relieved pain in the temporomandibular joint, the ear, the neck, opposing dental arch on the same side as well as headaches (Lyttle, 1979). However, Lyttle (1979) guarded against the assumption that these teeth actually caused the pain, because of the multiplicity of factors which result in pain in the oro-facial regions.

Raley, Chapnick and Baker (1977) cited pressure of the third molar on the neurovascular bundle of the mandible causing a neuritis or diffuse neuralgia as possible mechanisms for the pain referred to the ear, due to linking of neural pathways causing referred pain. Our belief is that removal of these impacted teeth allows the mandible an opportunity to rest during the post-operative healing phase due to protective muscle splinting causing a reduction in movement. This will allow an inflamed temporomandibular joint, (TMJ pain and earache) and painful muscle spasm (muscular headache) the necessary rest to allow for relief of symptoms. Removal of infected impacted teeth can relieve earache (referred pain due to infection) as well as neck pain due to subsiding of a tender lymphadenopathy due to the removal of the cause.

#### **8. Pre-irradiation removals**

In order to prevent the disaster of osteoradionecrosis it is advisable to remove all potentially troublesome teeth in the radiation field prior to commencement of such radiation therapy. This is especially pertinent to partially erupted and impacted teeth (Lyttle, 1979).

#### **9. Prophylactic removals**

Carl and Schaff (1972) highlighted the problem of an impacted tooth in an edentulous area causing weakening of the mandible following the resorption of the alveolar process. Schwimmer, Stern, and Kritchman (1983) recommended the prophylactic removal of impacted third

molars in athletes who engaged in sport with a high prevalence of facial trauma, and who, therefore, are at greater risk for fractured mandibles should they have impacted third molars.

#### **Contra-indications for the removal of impacted teeth**

There are also very sound reasons for advising against the prophylactic removal of impacted wisdom teeth.

##### **1. Possible damage to adjacent structures**

An asymptomatic impacted tooth, the position of which in the mandible or maxilla is such that its removal will adversely influence any adjacent structures should be left in place. Such structures includes the maxillary antrum, infra-temporal fossa, the lingual nerve and inferior dental neurovascular bundle.

The potential complications affecting these structures are;

- a. oro-antral communication;
- b. displacement of the tooth into the infra-temporal fossa and possible damage to structures such as the pterygoid venous plexus, maxillary artery and pterygoid muscles;
- c. damage to roots, crowns or periodontium of adjacent teeth;
- d. lingual or labial dysaesthesia with a varying length of time for recovery.

##### **2. Compromised health status and the age of the patient**

These factors either singly or in combination may be a contra-indication to the removal of asymptomatic impacted or unerupted teeth of long standing. The pros and cons of undertaking the procedure in such patients should be carefully evaluated (Goodsell, 1977). A good principle to follow is that the cure should not be worse than the disease in this type of patient (Lyttle, 1979).

##### **3. Abutment teeth and adequate space for third molars**

Unerupted teeth could be used for possible bridge abutments once erupted. This is especially true where there has been loss of a first or second molar tooth. In addition if a person does have enough space in the dental arch for full eruption of the wisdom teeth and the patient has the ability to clean this area, the unerupted or partially erupted teeth could be left in place. If, however, oral hygiene is going to be a problem, the long term well being of the second molar could be affected in which

case the third molar should be removed (Goodsell, 1977).

#### 4. Orthodontics

Where no specific indication for the removal of third molars exists, there are some orthodontic contra-indications for extraction of third molars.

For example, when orthodontic treatment planning calls for extraction of first or second permanent molars or when first or second permanent molars have been extracted due to extensive caries and/or periapical involvement the fate of the third molar should be carefully evaluated (Bishara and Andreasen, 1983).

#### 5. Transplantation of impacted teeth

Third molars have been successfully transplanted into extraction socket sites of both first and second molars (Cook, 1972; Brown, 1973). Goodsell (1977) reported a 75 percent success rate in properly selected cases where the wisdom tooth had been transplanted into the first molar site.

#### 6. Patient is unwilling to have the tooth removed

A patient with an asymptomatic impacted tooth, who is unwilling to have the tooth removed should have his wishes respected.

### DISCUSSION

Third molars, as determined by clinical and/or radiological considerations should be removed to improve the patient's oral status as well as his general medical condition. Chronic infection present for a long period of time is known to adversely affect the body's immune system, and therefore elimination of a septic focus is a very important principle. Dental problems such as periodontal disease, recurrent pericoronitis, caries, paradental cyst formation and the possibility of root resorption occurring in males under the age of thirty years are very real problems. In older individuals the completely unerupted, embedded impacted wisdom tooth could well be left in situ and reassessed at regular intervals to make sure that no pathological process is taking place (Lyttle, 1979).

Goodsell (1977) believed that where patients are aware of the benefits of preventive medicine and dentistry, it is wise to advise the removal of all four wisdom teeth if they serve no useful function. He believed too that benefits from performing this surgery at a younger age are that patients tolerate surgery better and recover more quickly, and suggested the

middle to late teens to be the ideal time. Raley, Chapnick and Baker, (1977) expanded on this and proposed that in these patients third molars be removed for the following reasons:

- a. osseous tissue is less sclerotic than in older individuals
- b. there is usually much better osseous regeneration of bone distal to second molars
- c. the follicular space facilitates dislodgement of the tooth in younger individuals, whereas this space is often missing in older persons with ankylosis being a great possibility
- d. post-operative alveolitis is more common in older individuals
- e. ideal removal time is when two-thirds of the root development has occurred, before any tortuous curvature of the apical portion of the root has taken place. Therefore, the best age group to consider removal is 18-25 years.

Osborn *et al.*, (1985) did a prospective study of complications related to mandibular third molar surgery and concluded that increased numbers of complications occur after the removal of third molars of older patients. On this basis they advocated the early, judicious removal of third molars, when indicated, to decrease the prevalence of post-operative morbidity.

### CONCLUSION

The arguments both for and against the prophylactic removal of impacted third molar teeth are all valid. In order to make a decision that is going to benefit the patient the authors believe that each case should be assessed on its merits. The decision whether or not to remove the third molars should take the overall benefit to the patient's oral status and general health into account. However, the benefits of practising preventive medicine and dentistry are endorsed.

### ACKNOWLEDGEMENTS

The authors are indebted to the Librarians of the University of the Witwatersrand, Dental School Library for their assistance during the information retrieval and to Ms Anne-Marie Muller and Miss Juanita Gomes for typing the script.

### REFERENCES

- Ackerman, G, Cohen, MA & Altini, M (1987) The paradental cyst: A Clinicopathological study of 50 cases. *Oral Surgery Oral Medicine and Oral Pathology* **64**, 308-312.
- Baob, DA, Mortan, TH & Page, RC (1984) Caries and periodontitis associated with an unerupted third molar. *Oral Surgery Medicine and Oral Pathology*. **58**, 428-430.

- Bishara, SA & Andreasen, G (1983) Third Molars: A review. *American Journal of Orthodontics*, **83**, 131-137.
- Bjork, A, Jensen, E & Palling, M (1956) Mandibular growth and third molar impaction. *Acta Odontologica Scandinavica*, **14**, 231-272.
- Brown, LH, Berkman, S, Cohen, D, Kaplan, AL & Rosenberg, M (1982) A radiological study of the frequency and distribution of impacted teeth. *Journal of the Dental Association of South Africa*, **37**, 627-630.
- Carl, W & Schaff, NG (1972) Impacted teeth in denture - bearing areas: A potential source of problems. *Journal of Oral Surgery*, **33**, 331-334.
- Dachi, SF & Howell, FV (1961) A survey of 3874 routine full mouth radiographs II. A study of impacted teeth. *Oral Surgery Oral Medicine Oral Pathology*, **14**, 1165-1169.
- Fitzgerald, LM (1953) The impacted mandibular third molar. *Oregon Dental Journal*, **22**, 27-31.
- Goodsell, JF (1977) An overview of the third molar problem. *Quintessence International*, **10**, 11-18.
- Grondhal, H & Lekholm, U (1973) Influence of mandibular third molars on related supporting tissues. *International Journal of Oral Surgery*, **2**, 137-142.
- Hannah, DR (1978) Unerupted third molars (letter). *Australian Dental Journal*, **23**, 366.
- Hannigan, EJ (1976) The impacted third molar: to extract or not to extract? *Oral Health*, **66**:40.
- Haralabakis, H (1957) Observations on the time of eruption, congenital absence and impaction of third molar teeth. *Trans European Orthodontic Society*, **33**, 308-309.
- Hellman, M (1938) Some aspects of wisdom teeth and their impactions. *Archives of Clinical Oral Pathology*, **2**, 125-132.
- Hendrix, W & Tall, J (1971) Reasons for removing third molars. Los Angeles County USC Medical Center. Presented Southern Californian Dental Association May 1971. [Quoted in Goodsell, JF. (1977)]
- Hutton, MB, Timcke, PH, Tindall, RJ & Wilson, RMH (1974) A comparative study of radicular, dentigerous and primordial cysts. *Journal of the Dental Association of South Africa*, **29**, 21-23.
- Kay, LW (1966) Investigations into the nature of pericoronitis. *British Journal of Oral Surgery*, **3**, 188-205.
- Langland, OE, Langlais, RP & Morris, CR (1982) *Principles and Practice of Panoramic Radiography* Ch. 7-10, pp 194-273. Philadelphia: W.B Saunders Co.
- Laskin, DM (1969) Indications and contra-indications for removal of impacted third molars. *Dental Clinics of North America*, **13**, 919-928.
- Laskin, DM (1971) Evaluation of the third molar problem. *Journal of the American Dental Association*, **82**, 824-828.
- Lyttle, JJ (1979) Indications and contra-indications for removal of the impacted tooth. *Dental Clinics of North America*, **23**, 333-346.
- MacGregor, AJ (1985) *The impacted lower wisdom tooth*. Ch. 1, pp. 16. Oxford: Oxford University Press.
- Marmary, Y, Brayer, L, Tzukert, A & Feller, L (1986) Alveolar bone repair following extraction of impacted mandibular third molars. *Oral Surgery Oral Medicine Oral Pathology*, **61**, 324-326.
- Mead, SV (1930) Incidence of impacted teeth. *International Journal of Orthodontics*, **16**, 885-890.
- Mead, SV (1954) *Oral Surgery* 4th Ed., pp. 507-510. St. Louis: CV Mosby Co.
- Morning, P (1980) Impacted teeth in relation to odontomas. *International Journal of Oral Surgery*, **9**, 81-91.
- Nitzan, D, Keren, T & Marmary, Y (1981) Does an impacted tooth cause root resorption of the adjacent one? *Oral Surgery Oral Medicine Oral Pathology*, **51**, 221-224.
- Osborn, TP, Frederickson, G, Small, IA & Torgerson, TS (1985) A prospective study of complications related to mandibular third molar surgery. *Journal of Oral Maxillo-Facial Surgery*, **43**, 767-769.
- Pindborg, J (1970) *Pathology of the dental hard tissues*. pp 242. Toronto: WB Saunders Co.
- Raley, L, Chapnick, P & Baker, G (1977) The impacted third molar. *Journal of the Canadian Dental Association*, **8**, 364-366.
- Rud, J (1970) Removal of impacted lower third molars with acute pericoronitis and necrotising gingivitis. *British Journal of Oral Surgery*, **7**, 153-160.
- Schwimmer, A, Stern, R & Kritchman, D (1983) Impacted third molars: A contributing factor in mandibular fractures in contact sports. *American Journal of Sports Medicine*, **11**, 262-266.
- Shafer, WG, Hine, MK & Levy, BM (1983) *A textbook of Oral Pathology*. 4th Ed., Ch.4, pp 258-317. Philadelphia: W.B. Saunders Co.
- Shah, RM, Boyd, MA & Vakil, TF (1978) Studies of permanent tooth anomalies in 7886 Canadian individuals. 1: Impacted teeth. *Journal of the Canadian Dental Association*, **44**, 262-264.
- Sharma, JN (1983) Haemorrhagic cyst of the mandible in relation to horizontally impacted third molars. *Oral Surgery Oral Medicine Oral Pathology*, **55**, 17-18.
- Shiratsuchi, Y, Tashiro, HM & Kurihara, K (1987) Haemorrhagic cyst of the mandible associated with a retained root apex of the lower third molar. *Oral Surgery Oral Medicine Oral Pathology*, **63**, 661-663.
- Stanley, HR & Diehl, DL (1965) Ameloblastoma potential of follicular cysts. *Journal of Oral Surgery*, **20**, 260-268.

## Applications for the 1992 FLOYD MEMORIAL AWARD

are invited to reach the  
Executive Director

Private Bag 1, Houghton, 2041  
**before 30 June 1993**

The award is in the form of a Bronze Medal and a cash prize of R1 500 funded by the Research, Education and Development Fund.

The award is made to persons under the age of 35 (thirty-five) for the best scientific paper published in the *Journal of the Dental Association of South Africa*.

## Conditions of the Award

1. Articles may be written by not more than three (3) authors, the first-named of whom shall be under the age limit of 35 (thirty-five) years at the time of submission of the article.
2. In the event of multiple authorship, each author will be awarded a Bronze Medal and the cash prize of R1 500 will be equally divided between the authors.
3. Papers by eligible authors will be considered annually.
4. Papers will be judged by two persons appointed by the Editorial Panel of the *JOURNAL* of the DASA and their recommendation will be made to the Awards Committee for final approval.