The Management of the Asymptomatic, Disease-Free Wisdom Tooth: Removal Versus Retention

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Introduction

The management of impacted third molars (M3s) or wisdom teeth is a decision encountered by oral and maxillofacial surgeons (OMSs) daily. The decision-making is usually very straightforward, owing to the presence of disease. A challenging management decision is how to manage the asymptomatic, disease-free wisdom tooth. For these types of M3s, the treatment is essentially a binary choice: (1) operative treatment (eg, extraction) or (2) retention.

Management (ie, extraction versus retention) of the asymptomatic, disease-free wisdom tooth is fiercely controversial, with avid proponents of each treatment option. Because of the risk of future disease, the American Association of Oral and Maxillofacial Surgeons historically advocated “... that wisdom teeth be removed by the time the patient is a young adult to prevent future problems and to ensure optimal healing.” The American Public Health Association (APHA) rejects this strategy. APHA “opposes prophylactic removal of third molars, which subjects individuals and society to unnecessary costs, avoidable morbidity, and the risks of permanent injury.” However, the management of most asymptomatic, disease-free wisdom teeth lies somewhere between these two polar views. The author recommends that wisdom teeth be evaluated by the time the patient is a young adult to ensure optimal, patient-oriented management.

The traditional evidence-based tool to address a clinical dilemma is the critical appraisal exercise (CAE). The CAE has 4 elements: (1) asking a relevant clinical question, (2) reviewing the literature, (3) assessing the validity of the best information available and answering the clinical question, and (4) applying the findings to enhance patient care. The relevant clinical question for this article is: Among patients with asymptomatic, disease-free M3s, do those patients who choose to retain their M3s, when compared with those who elect M3 removal, have “better” or “different” outcomes? “Better” outcomes primarily include avoiding the costs and risks of an operation. These outcomes, however, are short-term benefits. There are no guarantees that avoiding an operation today assures no operation in the future. As such, the short-term benefits of M3 retention are tempered by the tangible, but unknown, risk for M3 removal at some point in the patient’s lifetime with its associated costs and risks.

In executing the second and third steps of the CAE, namely, reviewing and assessing the literature, the author identified a Cochrane systematic review that addressed the clinical question. The reviewers concluded that “no evidence was found to support or refute routine prophylactic removal of asymptomatic impacted wisdom teeth in adults.” Well-meaning advocates of both management strategies have used this review to support their positions.

The final step of the CAE is to apply the findings to provide and enhance patient care. However, in the absence of good evidence to support either management position as the predominant strategy, what is the clinician (or policy maker or payor) to do? Evidence-based clinical decision-making is not using the best theoretical evidence to make decisions. For example, without one or more randomized clinical trials, Cochrane reviewers commonly conclude that no recommendation can be made owing...
to inadequate evidence, leaving the clinician at a loss. Evidence-based clinical decision making is characterized as providing care given the best evidence accepting fully that the decisions are being made in the face of relative ignorance. As such, management decisions must incorporate the clinician’s experience and expertise, and weigh heavily the patient’s wishes and desires regarding extraction versus retention after a careful, balanced review of the risks and benefits of both treatment options. The content of this article reflects largely the author’s personal decision-making process based on a careful literature review and clinical experience/expertise. The author admits freely and fully that the quality of the evidence used to support the management of asymptomatic, disease-free M3s is Level 5, namely, expert opinion.

The purpose of this article is to: (1) review the functional definition of impaction used herein, (2) outline a clinical classification system to categorize M3s based on patients’ report of symptoms and the presence of clinical or radiographic disease associated with the M3s, (3) introduce an algorithm for managing M3s, and (4) discuss in some detail the rationale for advocating treatment of asymptomatic, disease-free M3s either with extraction (or other appropriate operative interventions) or retention active surveillance.

**Definition of an impacted tooth**

For the purposes of this article, the working definition of an erupted tooth is one that is fully visible in the mouth, has reached the occlusal plane, all 5 surfaces are accessible for examination, and has attached gingiva around the tooth. An erupted tooth may be functional, malpositioned in the arch, or nonfunctional. An impacted tooth may or may not be visible. Its presence may only be detectable by periodontal probing or on radiographic images. If visible, it does not meet the definition of an erupted tooth. An impacted tooth is not disease. It is simply an anatomic description suggesting that there is inadequate space to accommodate the tooth in the dental arch. An erupting tooth is visible in the mouth and, based on physical and radiographic examinations, appears to have adequate hard and soft tissue space available to become an erupted tooth. An erupting tooth is a dynamic situation. Its status needs to be reevaluated periodically to determine if the tooth has erupted or has become impacted. In this article, there is no working definition for a partially erupted tooth. A tooth is either erupted, impacted, or erupting. These definitions (Table 1) apply to all teeth, not solely to M3s.

**Classifying M3s to facilitate clinical decision making**

M3s can be grouped into 4 clinical categories based on 2 axes, patients’ report of symptoms (present or absent), and clinical or radiographic evidence of disease (present or absent).

During the preoperative visit, clinicians should ask patients about symptoms or concerns that may be related to the M3s. Patients commonly report symptoms of pain, swelling, limitation of motion, bad taste, or smell. Patients also attribute signs of incisor crowding to their impactions. Most data, however, suggest that the crowding is due to insufficient space to accommodate all of the teeth because of a discrepancy between tooth and jaw size, not the result of impacted teeth trying to erupt and “squeeze” into the dental arch by crowding out other teeth.

The clinician then needs to determine if the symptoms are attributable to the M3s. Although usually not a major diagnostic challenge, some patients will mistake masseter muscle pain

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**Table 1**

<table>
<thead>
<tr>
<th>Symptoms Attributable to M3s</th>
<th>Clinical or radiographic evidence of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (D+)</td>
</tr>
<tr>
<td>Yes (S+)</td>
<td>A</td>
</tr>
<tr>
<td>No (S−)</td>
<td>C</td>
</tr>
</tbody>
</table>

A = Symptoms present (S+) and disease present (D+) or S+/D+.
B = Symptoms present (S+) and disease absent (D−) or S+/D−.
C = No symptoms present (S−) and disease present (D+) or S−/D+.
D = No symptoms present (S−) and disease absent (D−) or S−/D−.
(myalgia) for M3 pain. Other patients with erupting M3s will report pain symptoms that may be due to the inflammatory side effects of teething. In the setting of adequate space to accommodate the M3s, teething pain is a side effect of development, not an inflammatory disease. In the absence of adequate space to accommodate the M3s, teething pain may be sufficiently severe to warrant intervention.

Patients commonly report no symptoms attributable to the M3s and present for evaluation because “My dentist referred me.” After completing the history and physical and radiographic examinations, the clinician will need to decide that the patients’ symptoms are related to the M3s (symptomatic, abbreviated S+) or that patients have no symptoms or the symptoms are unrelated to the M3s (asymptomatic, abbreviated S−).

Because of the high percentage of asymptomatic disease present in M3s, careful physical and radiographic examinations are indicated. Obvious signs of inflammatory disease such as pericoronitis, caries, or periodontal disease are common. More subtle signs of disease, however, may be present. The following aspects of physical examination are important: (1) eruption status and, if erupted, the position in the arch; (2) functional status of the tooth; and (3) probing status. If the tooth is not visible, probing is important to determine whether the tooth communicates with the oral cavity. If the tooth can be detected on probing, this suggests the tooth is chronically contaminated with oral flora. Probing is also valuable to determine the periodontal health around the M3 and the adjacent second molar (M2). Probing depths (PDs) that are greater than 4 mm are associated with an increased risk of clinically significant (>2 mm) changes in PDs, suggesting a progression of periodontal disease. Specifically, when compared with subjects with PDs less than 4 mm at baseline, those with PDs greater than 4 mm have a nearly 40% increased risk for worsening periodontal health as evidenced by increased PDs after 2 years of follow-up.

After completing the physical examination, the clinician can initially classify the M3 as disease free (abbreviated D−) or disease present (abbreviated D+). A D− M3 can be fully erupted and well positioned in the arch and have PDs of less than 4 mm around the M3, and may be functional. At the other extreme, a D− M3 is not visible in the mouth, cannot be probed, and has PDs of less than 4 mm around the distal aspect of the adjacent M2, and its presence is only confirmed by radiographic imaging.

A radiographic examination is required to confirm the disease status of the M3. Without clinical evidence of M3s, the radiograph will confirm the presence (or absence) of M3. Imaging is also valuable to assess the anatomy of the M3 and its relationship to other local anatomic structures such as the mandibular nerve or adjacent second molar (M2). Although a numerically rare complication of retained M3s, in a tertiary referral practice it is not uncommon to see community patient referrals who are asymptomatic by history and have an unremarkable clinical examination, only to discover on radiographic examination jaw lesions that are several centimeters in diameter (Fig. 1). More commonly, disease radiographically associated with asymptomatic M3s includes inflammatory radiolucent lesions, internal resorption or caries, or caries/resorption of the adjacent M2.

After reviewing the history and physical and radiographic examinations, the clinician can group the clinical status of the M3 into 1 of 4 categories (Table 1) that inform clinical decision making:

- **Group A**: symptomatic and disease present (S+/D+)
- **Group B**: symptomatic and disease absent (S+/D−)
- **Group C**: asymptomatic and disease present (S−/D+)
- **Group D**: asymptomatic and disease absent (S−/D−)

![Fig. 1](image-url)
Identifying patients with Group A M3s is not difficult. The patient has specific localized pain complaints, and the disease is readily evident on physical or radiographic examination.

Identifying patients with Group B M3s, however, can be a more subtle challenge. Patients in this category have vague complaints of pain with no evidence of disease associated with the M3s. With a redirected history and physical examination, commonly these patients have myalgia involving the masseter muscle or atypical facial pain. Alternatively, patients in this category have pain associated with the erupting tooth (teething pain), but in the setting of adequate space to accommodate the tooth, this is a side effect of normal tooth eruption, not disease. As already noted, an erupting tooth is a dynamic process needing periodic reevaluation to determine if the tooth has erupted into a useful, functional position or has become impacted and needs to be reclassified into Group A, C, or D.

Patients with Group C M3s are common and prove the maxim that the absence of symptoms does not equal the absence of disease. These patients report no symptoms, but clinical or radiographic evidence of disease is readily apparent. Some of the more common clinical findings include a visible tooth that is nonfunctional and nonhygienic, with evidence of gingival inflammation as evidenced by erythema or bleeding on probing, or PDs greater than 4 mm. Sometimes the tooth is not visible but can be readily probed, or PDs along the distal of the M2 are greater than 4 mm. The tooth may be erupted, but malposed in the arch, or there are caries or PDs greater than 4 mm present. Common radiographic findings suggestive of disease include a radiolucency associated with the M3, internal resorption, caries, or resorption on the adjacent M2.

Patients with Group D M3s (Box 1) report no symptoms, and there are no clinical or radiographic findings suggesting disease. On examination the M3 may be completely erupted, well oriented in the arch, and functional, with PDs less than 4 mm. Alternatively the M3 may be impacted, not visible, cannot be probed, and PDs are less than 4 mm. There is no radiographic evidence of disease associated with a Group D M3.

Kinard and Dodson reported their experience with this clinical classification system for M3s. Using a retrospective cohort study design, the investigators enrolled a sample of 249 subjects who presented to a tertiary care referral center for M3 evaluation and management. The study sample’s 855 M3s were classified as follows:

- Group A, symptomatic and disease present (S+/D+) = 11.0%
- Group B, symptomatic and disease absent (S+/D−) = 0.6%
- Group C, asymptomatic and disease present (S−/D+) = 51.1%
- Group D, asymptomatic and disease absent (S−/D−) = 37.3%

In 11.6% of the subjects, all M3s present were Group D (S−/D−). Conversely, 88.4% of the subjects presenting for evaluation had at least 1 diseased M3 requiring treatment. Of note, among patients with Group D M3s, when offered the choice between retention with active surveillance or extraction, after reviewing the risks and benefits of the 2 treatment alternatives, patients elected extraction 60% of the time.

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**Box 1. Characteristics of asymptomatic, disease-free (S−/D−) M3s**

**Patient history:**
No symptoms or vague, nonspecific complaints

**Clinical examination:**
1. Impacted M3 cannot be seen, cannot be probed, and PDs are less than 4 mm
2. Erupting M3 with adequate space to accommodate a functional tooth
3. Erupted M3 has reached the occlusal plane, is functional, hygienic, with PDs less than 4 mm, with no caries, restorable caries, or restored caries; all 5 surfaces can be examined clinically, as well as attached tissue along the distal surface of the tooth

**Radiographic examination:**
No evidence of radiographic disease is present
M3 management recommendations

After completing the history and physical and radiographic examinations, the clinician needs to categorize each M3 as Group A, B, C, or D, and suggest a management option (Fig. 2). The clinical decision making for patients with Groups A and C M3s (symptoms present or absent, but disease present) is straightforward: treat the disease as indicated. Treatment depends on the diagnosis and can range from the full scope of restorative and hygiene care, to periodontal therapy, to coronectomy, to extraction. Treatment choice depends on factors such as hygiene, eruption status, functionality, anatomic location, risk to local anatomic structures, and patient preference. Although it is beyond the scope of this article to detail the treatment options, it is well within the range of dental services to render the indicated treatments.

Patients with Group B M3s, that is, symptoms thought to be attributable to M3s but without clinical or radiographic evidence of disease, are more challenging to manage. It takes additional time and further diagnostic effort to establish the cause of the symptoms. In the author’s experience, Group B patients commonly have myalgia. Other diagnostic considerations include temporomandibular disorders, atypical facial pain, odontalgia, and carious or infected second molar teeth, among others. The treatment rendered should be appropriate for the diagnosis.

A small number of patients with Group B M3s report pain associated with an erupting M3 and have pericoronal soft-tissue inflammation present on clinical examination, while radiographically there appears to be adequate room for the M3s to erupt into a useful functional position. These inflammatory signs and symptoms are not disease, but a side effect of the normal developmental process of teething pain associated with tooth eruption. In general these patients are managed with analgesics, antibacterials, and observation. The clinical judgment that the patient has adequate room for M3s to erupt into a useful, functional position is imperfect. Both clinician and patient need to be prepared to revise the management if the clinical impression is wrong and the tooth becomes impacted.

The management of patients with Group D M3s (asymptomatic and disease-free M3s) is controversial. Given the lack of evidence to support routinely retaining or removing M3s, the clinician needs to review in detail the risks and benefits of both treatment options and weigh these against the patient’s preferences, wishes, desires, and perceived risks and benefits.

The risks and costs of M3 removal have been well documented and are not detailed herein. In brief, problems associated with M3 removal include inflammatory complications such as surgical-site infection or osteitis, hemorrhage, injury to local anatomic structures (teeth or nerves), periodontal defects, fractures of the maxillary tuberosity or mandible, persistent oroantral communication, retained roots, and the need for additional treatment to manage the complication. Another consideration, in addition to the direct cost of care, is the indirect cost associated with loss of productivity at work or school.

The risks and implications of M3 retention are less well detailed. Recent studies involving patients who elected to retain teeth demonstrate that retained M3s frequently and unpredictably change position, eruption status, and periodontal status. Depending on the duration of follow-up, 5% (one year followup) to 60% (18 years of followup) of retained M3s are extracted at some future time.

For patients who elect to retain their M3s, the management decisions revolve around the need for and frequency of follow-up visits and who should do the follow-up. There is no good evidence as to the need for or frequency of follow-up visits or who should do the follow-up examinations. As such, the following set of management recommendations is for patients with Group D M3s, based on Level V evidence (expert opinion).

Some patients with Group D M3s are instructed to follow-up when they have symptoms. This is poor advice. As noted earlier, the absence of symptoms does not equal the absence of disease. Many, if not most, diseases, for example, hypertension, cancer, and diseased M3s, are asymptomatic for months to years before symptoms or signs of disease manifest. Because of the documented risk for future disease and the unpredictable behavior of M3s, for those patients electing to retain their asymptomatic, disease-free M3s, active surveillance is recommended.

Active surveillance is a prescribed treatment of monitoring the patient on a scheduled basis, including a review of the patient’s history and a complete and careful physical and radiographic examination. Patients who elect active surveillance as their preferred treatment may be committed to a lifetime of monitoring with its associated costs, and no assurance that extraction will be avoided later in life with its associated costs and risks.
M3 Symptom Status

Symptomatic (S+)
- Disease Present (D+)
  - Group A – S+/D+
    - Group A
  - Group B - S+/D-
    - Group B
  Treat as Indicated

Asymptomatic (S-)
- Disease Absent (D-)
  - Group D – S-/D-
    - Group D
  Retain M3 and monitor with active surveillance
  Remove M3

Disease Present (D+)
- Group C - S-/D+
  - Group C
  Treat as Indicated

Disease Absent (D-)
- Group B - S+/D-
  - Group B
  Treat as Indicated

Fig. 2. Protocol for M3 management.
For patients electing M3 retention with active surveillance as their preferred treatment, the appropriate duration between follow-up visits is unknown and depends on the patient’s age and history. The author recommends that new patients be seen every 2 years, sooner if they develop symptoms. Biannual visits are chosen for 2 reasons: (1) there can be clinically significant evidence of progression of periodontal disease in 2 years, and (2) the morbidity of extraction, as evidenced by the duration of postoperative recovery, increases as patients age. Reasonable arguments can easily be made for different follow-up intervals.

Is the primary care dentist or the OMS the best person to provide follow-up care? Again, there is no good evidence supporting one type of clinician over another. The author recommends that the follow-up assessments be executed by clinicians competent in the assessment and management of M3s. Others may argue that if specialists do the follow-up there will be an increased bias toward extraction over continued surveillance, and that it is more expensive than seeing the primary care dentist. There are no available data to dispute these assertions (and those supporting these assertions have no data either). Balancing these arguments is the risk that there may be a delay in seeking treatment owing to a lack of skill or experience in detecting and diagnosing subtle or occult disease.

A major unknown in the management of S/D/C/D M3s is the cost difference between removal and retention. Cross-sectional and short-term assessments suggest that retention is the lower-cost option. These studies, however, fail to account for the lifetime risks associated with M3 retention, and an economic rationale is weak evidence to support M3 retention as the preferred strategy. For extraction the costs are based on the expenses of: (1) removing the tooth, plus (2) missing work, school, regular activities on a planned scheduled basis, plus (3) treating complications. Those who elect retention need to consider both the current and future costs of active surveillance (scheduled follow-up visits with clinicians with appropriate training regarding the assessment of M3s and indicated imaging) and the risk of incurring the costs associated with treating the retained M3, which can range from the full scope of restorative options to extraction on either a planned or unplanned basis, resulting from urgent clinical situations such as symptomatic infection.

**Summary**

Although M3 management is usually straightforward, the evidence supporting extraction versus retention for asymptomatic, disease-free M3s is lacking. Extreme positions aggressively advocating either treatment option cannot be rationally supported. Initially polite debate on the topic usually degenerates into inane comments, accusations, and sound bites citing rare outcomes as evidence to support a position. Until such time that randomized trials provide the necessary data to guide management decisions, the evidence-based clinician should offer patients both treatment options, including a detailed comparison of the risks and benefits of operative and nonoperative treatments, and lean heavily on patient preference regarding the management choices.

**Further readings**

**A. Organizational positions on M3 management**


**B. Principles of evidence-based clinical decision-making and applications to M3 management**


Kinard BE, Dodson TB. Most patients with asymptomatic, disease-free third molar elect extraction over retention as their preferred treatment. J Oral Maxillofac Surg 2010;68:2935–42.

C. Disease associated with retained M3s


D. Predicting available space for M3 eruption


E. Risk of future M3 extraction among retained M3s


F. Decision analyses supporting M3 retention


