CLINICAL PRACTICE GUIDELINES

Mac 2005

MOH/P/PAK/ (GU)

MANAGEMENT OF THE UNERUPTED AND IMPACTED THIRD MOLAR

MINISTRY OF HEALTH
Statement of Intent

This clinical practice guideline is meant to be a guide for clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not necessarily ensure the best outcome in every case. Every health care provider is responsible for the management of his/her unique patient based on the clinical picture presented by the patient and the management options available locally.

Review of the Guidelines

This guideline was issued in Mac 2005 and will be reviewed in Mac 2007 or sooner if new evidence becomes available.

CPG Secretariat
c/o Health Technology Assessment Unit
Medical Development Division
Ministry of Health Malaysia
Level 4, Block E1, Parcel E
Government Office Complex
62250 Putrajaya

Available on the following website: http://www.moh.gov.my
                                      :http://www.acadmed.org.my
GUIDELINE DEVELOPMENT AND OBJECTIVES

RATIONALE FOR GUIDELINE DEVELOPMENT
Removal of symptomatic third molars is generally accepted. However, many controversies surround prophylactic removal. This is because the surgical procedures for extraction of unerupted and impacted third molars are associated with significant morbidity while the benefits of such an operation on a pathology-free third molar have not been established. As a result, there is wide variation in the management of unerupted and impacted third molars among dental practitioners.

OBJECTIVES OF THE GUIDELINE
The objective of this guideline is to provide evidence-based recommendations for best practice in the management of unerupted and impacted third molars and to help achieve favourable outcomes as far as possible.

CLINICAL QUESTIONS
The clinical questions for these guidelines are:
• What are the diagnostic criteria of unerupted and impacted third molars?
• How is unerupted and impacted third molars managed?

TARGET POPULATION
These guidelines are to be applied to all patients presenting with unerupted and impacted third molars.

TARGET GROUP
These guidelines are developed for all oral health care professionals involved in the management of unerupted and impacted third molars.
MEMBERS OF THE PANEL

Dr Mohd Shah Abu Hassan ..................................................Chairperson
Senior Consultant Oral Surgeon & Head
Department of Oral Surgery
Ipoh Hospital

Committee Members (in alphabetical order)

Dr Maria Jerome Gere
Consultant Orthodontist
Cahaya Suria Dental Clinic
Kuala Lumpur

Dr Peace Indrani d/o Chelvanayagam
(Former) Consultant Oral Surgeon
Department of Oral Surgery
Tengku Ampuan Rahimah Hospital, Klang

Major Dr S Nagarajan
Paediatric Dental Specialist
Health Service Division
Military Armed Forces
Ministry of Defence

Dr Stephen Joseph Royan
Consultant Oral Surgeon
Department of Oral Surgery
Malacca Hospital

Datin Dr Nooral Zeila Junid
Principal Assistant Director
Oral Health Division
Ministry of Health Malaysia
Putrajaya

Dr Thomas Abraham
Consultant Oral Surgeon
Department of Oral Maxillo Facial
Tengku Ampuan Rahimah Hospital
Klang

Dr Kasmah Mohammad
Consultant Oral Surgeon
Department of Oral Maxillo Facial
Kualal Lumpur Hospital

Dr Yuen Kar Mun
Consultant Oral Surgeon
Department of Oral Surgery
Ipoh Hospital

Dr Kok Tuck Choon
Consultant Oral Surgeon
Department of Oral Surgery
Muar Hospital Johor

Dr S Sivalal
Deputy Director
Health Technology Assessment Unit
Medical Development Division
Ministry of Health Malaysia

Ms Jeya Devi Coomarasamy
Senior Nursing Officer
Health Technology Assessment Unit
Medical Development Division
Ministry of Health Malaysia

Coordinating and Editing By:
Dr Rusilawati Jaudin
Principal Assistant Director
Health Technology Assessment Unit
Medical Development Division
Ministry of Health Malaysia

Review and Final Editing By:
Dr S Sivalal
Deputy Director
Health Technology Assessment Unit
Medical Development Division
Ministry of Health Malaysia
METHODOLOGY

This guideline is formulated by adapting and updating the third molar document published by the Scottish Intercollegiate Guidelines Network in September 1999. In addition to the guideline, a systematic search was also carried out to look at evidence published after the year 1999 until 2005.

EVALUATION OF GUIDELINES

This draft guideline was also posted on the Ministry of Health Malaysia and Academy of Medicine Malaysia websites for feedback, opinion and contributions towards the improvement of the guideline.
LEVELS OF EVIDENCE SCALE AND GRADES OF RECOMMENDATIONS

The definitions of the types of evidence and the grading of recommendations used in this guideline originate from the U.S./Canadian Preventive Services Task Force.

### LEVELS OF EVIDENCE

<table>
<thead>
<tr>
<th>Level</th>
<th>Strength of Evidence</th>
<th>Study Design</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>Meta-analysis of RCT, Systematic review</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Large sample RCT</td>
</tr>
<tr>
<td>3</td>
<td>Good to Fair</td>
<td>Small sample RCT</td>
</tr>
<tr>
<td>4</td>
<td>Good to Fair</td>
<td>Non-randomised controlled prospective trial</td>
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<tr>
<td>5</td>
<td>Fair</td>
<td>Non-randomised controlled prospective trial with historical control</td>
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<tr>
<td>6</td>
<td>Fair</td>
<td>Cohort studies</td>
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<tr>
<td>7</td>
<td>Fair</td>
<td>Case-control studies</td>
</tr>
<tr>
<td>8</td>
<td>Poor</td>
<td>Non-controlled clinical series, descriptive studies multi-centre</td>
</tr>
<tr>
<td>9</td>
<td>Poor</td>
<td>Expert committees, consensus, case reports anecdotes</td>
</tr>
</tbody>
</table>

### GRADES OF RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation Details</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Requires at least one randomized controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation. (Evidence levels Ia, Ib)</td>
</tr>
<tr>
<td>B</td>
<td>Requires the availability of well conducted clinical studies but no randomized clinical trial on the topic of recommendation. (Evidence levels IIa, IIb)</td>
</tr>
<tr>
<td>C</td>
<td>Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. (Evidence level IV)</td>
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SUMMARY OF RECOMMENDATIONS

1. Assessment of the unerupted and impacted third molar must involve history (including medical history) taking, clinical examination and radiological investigations.

2. Asymptomatic and pathology-free impacted third molars need not be removed.

3. Impacted third molars should not be removed to prevent late anterior crowding.

4. The main indications for removal of impacted third molars are dental caries and third molar associated infections.

5. Proper case assessment and careful surgical technique can prevent unwanted complications.

6. In third molar surgery, the buccal approach with minimal lingual soft tissue retraction minimizes the likelihood of lingual nerve injury.

7. Excessive bone removal is not recommended.

8. The routine use of antibiotics in third molar surgery is not recommended.
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1. **BACKGROUND**

Third molars or wisdom teeth generally erupt between the ages of 18 and 24 years. However, sometimes they fail to erupt because they are either absent or impacted (SIGN, 1999; Level 9). An impacted third molar tooth that fails to attain a functional position can cause infection, unrestorable caries, periodontal disease, cysts, or tumours (Health Technology Assessment, 2000, Level 1). The impacted third molar tooth can be managed conservatively, or alternatively, removed by surgical extraction, a common oral surgical procedure, which can be carried out by general dental practitioners or oral surgeons.

2. **DIAGNOSIS**

A detailed history must be taken, followed by clinical examination and radiological investigations.

2.1 Radiological investigations

2.1.1 Plain radiographs

A radiological evaluation provides information about the third molar and the surrounding structures. If there appears to be a relationship between the roots of the lower third molar and the inferior dental canal, a second radiograph using different projection geometry should be taken (SIGN, 1999 Level 9).

The following are the radiographs of choice:

- intra-oral periapical view
- orthopantogram
  - radiographic examination of choice when more than 1 of the third molar teeth requires to be assessed
- oblique lateral view of the mandible

2.1.2 Computed Tomography (CT) Scan

CT scan is indicated where there is a complex relationship between the third molar and the inferior dental canal. However, the benefits have to be weighed against the risks of high radiation exposure (Maegawa, 2003, Level 9).

3. **MANAGEMENT**

3.1 Conservative management

The removal of third molars is not indicated if they are asymptomatic and free of any pathology (Song et al, 1997, Level 1), as long as good oral hygiene is maintained (Sasano et al, 2003, Level 6). The possible outcomes of surgery may be worse than that of non-treatment (Armstrong, 1995, Level 8; Liedholm, 2000, Level 6), the risk of an impacted third molar developing pathology being small compared to the risks of surgical intervention (Hicks, 1999, Level 1). Conservative treatment has also been found to be more cost-effective (Edwards, 1999, Level 6). Late anterior crowding
related to impacted third molars cannot be accurately predicted (Hicks, 1999 Level 1; Song, 2000, Level 1) so that the removal of third molars to prevent crowding may be unjustified (Harradine, 1998, Level 3). Conservative treatment is also advised for medically compromised patients when the risk to the patient's overall health outweighs the benefits of surgery (SIGN, 1999, Level 9).

3.2 Surgical management

The surgical removal of impacted third molars is indicated in some situations. The decision to remove the impacted third molar must be made with due consideration to the patient’s overall health status and the potential risk of complications. Pre-operative assessment should be carried out and informed consent obtained prior to surgery.

3.2.1 Indications for removal

- **Infection** – removal of any symptomatic wisdom tooth should be considered, especially where there have been one or more episodes of infection such as pericoronitis, cellulitis, abscess formation; or untreatable pulpal/periapical pathology
- **Caries** – removal should be considered where there is caries in the third molar and the tooth is unlikely to be usefully restored, or when there is caries in the adjacent second molar tooth which cannot be satisfactorily treated without the removal of the third molar
- **Orthodontic consideration** – may be indicated prior to orthognathic surgery
- **Prosthetic consideration** – removal of partially erupted or unerupted third molar close to the alveolar surface should be considered prior to denture construction or implant placement
- **Other pathology** – third molars in relation to other pathology e.g. cysts, fractures, tumours may require removal. (SIGN 1999, Level 9).

3.2.2 Pre-operative assessment and management

Any associated infection should be treated with systemic antibiotics, chlorhexidine mouth rinses, local dressing and lavage prior to surgery (SIGN, 1999 Level 9).

The following radiographic signs have been associated with an increased risk of inferior dental nerve injury during third molar surgery:

- Diversion of the inferior dental canal
- Darkening of the root where crossed by the canal
- Interruption of the white lines of the canal (SIGN, 1999 Level 9; Blaeser, 2003 Level 7; Bell, 2004 Level 8).

The relationship or proximity of upper third molars to the maxillary antrum and the maxillary tuberosity should be assessed (SIGN, 1999 Level 9). The decision to treat surgically should be reviewed in the presence of any of the above signs.
Informed consent should be obtained prior to any third molar surgery (SIGN, 1999 Level 9).

3.2.3 Surgical procedure
The surgical procedure generally involves raising of soft tissue flaps for exposure, removal of bone using either chisel or bur with water-cooled irrigation, delivering the whole tooth with or without prior division, and wound toilet.

The surgical procedure to be carried out depends on the following:
- status of the tooth
- type of impaction
- surrounding structures e.g. relationship of the inferior dental and lingual nerves

While the raising of tissue flaps is always associated with post-operative pain and trismus (Garcia, 2001), a smaller incision with minimal reflection will result in less pain and swelling (Shevel, 2001 Level 3).

Removal of the impacted teeth through the buccal approach without lingual tissue retraction minimizes the risk of lingual nerve damage (Hagler & Reich, 2002 Level 9). When the surgery is performed with lingual split technique together with lingual flap retraction, the incidence of lingual nerve injury appears to be even greater (Pichler & Beirne, 2001 Level 1; Hagler & Reich, 2002 Level 9). The placement of a periosteal elevator or lingual nerve retractor to protect the lingual tissue during surgical removal of impacted wisdom teeth appears to increase the incidence of lingual nerve damage (Robinson & Smith, 1996 Level 2; Robinson et al, 1999 Level 5; Valmaseda-Castellon et al, 2000 Level 5; Gargallo-Albiol et al, 2000 Level 4; Pichler & Beirne, 2001 Level 1; Hagler & Reich, 2002 Level 9). However, lingual nerve injury associated with lingual flap retraction is found to be temporary (NHS Centre for Reviews and Dissemination, 2004). There is conflicting evidence as to the most appropriate form of protection for the lingual nerve (SIGN, 1999 Level 9). Generally, minimal interference to the lingual soft tissue is associated with a low incidence of lingual nerve injury (Malden & Maidment, 2002 Level 8). Retention of the lingual plate gives optimum protection to the lingual nerve during removal of impacted third molar teeth (Appiah-Anane & Appiah-Anane, 1997 Level 5).

Exposure or intra-operative opening the mandibular canal during surgery greatly increases the incidence of inferior alveolar nerve paresthesia (Gulicher & Gerlach, 2000 Level 5; Gulicher & Gerlach, 2001 Level 4; Tay & Go, 2004 Level 4).

Excessive removal of bone and vertical sectioning of the impacted teeth may lead to inferior alveolar nerve injury (Miura et al, 1998, Level 5).
Any suspicious pathological material should be sent for histopathology examination. Occasionally, a small fragment of the apical root of a vital tooth may be left behind if its removal carries a greater risk of complications than retention. In these situations, the patient should be informed and recorded in the case notes (SIGN, 1999 Level 9).

Other procedures include **operculectomy**, which can be considered in carefully selected cases with the proviso that subsequent removal of the tooth may be required. Surgical exposure or surgical **reimplantation/transplantation** may be appropriate treatment in selected cases (SIGN, 1999, Level 9; Sobhi, 2003 Level 8; Mejare, 2004 Level 8).

### 3.2.4 Peri-operative drug therapy

**Antibiotics**
Antibiotics prescription may be considered in the following situations:
- presence of acute infection at the time of operation
- significant bone removal
- prolonged operation time
- patient is at increased risk of infection
(SIGN, 1999 Level 9; Delilbasi, 2002 Level 3).

However, the routine use of antibiotics in third molar removal is not recommended (SIGN, 1999 Level 9; Bulut, 2001 Level 5; Sekhar, 2001 Level 2; Poeschl, 2004 Level 2).

**Analgesics**
Oral analgesics such as paracetamol or ibuprofen are commonly prescribed for outpatients. The new COX-2 selective inhibitors such as rofecoxib have superior analgesic effects without the common gastrointestinal side-effects of other NSAIDs (Pajarola, 2003 Level 3). NSAIDs or opiates are commonly prescribed for inpatients. NSAIDs may also be helpful in reducing post-operative swelling (Bjornsson, 2003 Level 3).

**Steroids**
Where there is a risk of significant post-operative swelling, pre- or peri-operative administration of dexamethasone or methyl prednisolone has been shown to reduce swelling and discomfort (SIGN, 1999 Level 9).

### 3.2.5 Complications associated with surgery
The complication rate of third molar surgery ranges from 9.1% to 12.6% (Muhonen et al, 1997 Level 6; Schoen et al, 1998 Level 6; Christiaens & Reychler, 2002 Level 6). The most common complications are as follows:
- Dry Socket /Alveolar Osteitis (0.3% - 35%)
- Wound infection /post operative infection (1% - 16%)
- Post-operative bleeding (1.5%)
- Lingual and inferior alveolar nerve injuries
  - transient disturbances of the inferior alveolar nerve (0.4-0.6%)
  - transient disturbances of the lingual nerve (0.06-11.5%)
  - permanent nerve disturbances (0.2-1%)
(Strietzel & Reichart, 2002 Level 1; Muhonen et al, 1997 Level 6).
When only nerve injuries are considered, the incidence of inferior alveolar injury is between 0.6-20.3% (Black, 1997 Level 4; Miura et al, 1998 Level 5; Gulicher & Gerlach KL, 2000 Level 5; Gulicher & Gerlach KL, 2001 Level 4; Rehman et al, 2002 Level 5; Tay & Go, 2004 Level 4), and lingual nerve injury 0.05-6.9% (Robinson & Smith, 1996 Level 2; Chiapasco et al, 1996 Level 6; Robinson et al, 1999 Level 5; Gargallo-Albiol et al, 2000 Level 4; Gulicher & Gerlach, 2000 Level 5, Gulicher & Gerlach, 2001 Level 4; Rehman et al, 2002 Level 5). Most of these nerve injuries are transient in nature.

Oro-antral communication and fracture of maxillary tuberosity are possible complications associated with upper third molar removal (SIGN 1999, Level 9).

Pain, swelling and trismus are common post-operative features of third molar surgery, with maximum pain about 6 hours after surgery (Penarrocha et al, 2001, Level 4). These complications can cause significant deterioration in quality of life of the patient for the first 4-5 post-surgical days (McGrath et al, 2003 Level 6; Schoen et al, 1998 Level 6).

Another less common complication is periodontal pocketing, which occurs distal to the second mandibular molar, especially when there is an existing periodontal pocket prior to surgery, or when there is poor post-surgical local plaque control. The impacted tooth is mesioangularly placed, with pre-surgical crestal radiolucency seen in radiographs (Kan et al, 2002 Level 6).

Fracture of mandible is a rare complication with an incidence of 0.0049% (Libersa et al, 2002 Level 6). The fracture usually occurs within the first week after surgery.

Other severe, rare and unexpected complications can also occur following third molar surgery due to poor clinical case assessment or due to careless and unorthodox clinical practices.

### 3.2.6 Risk Factors

The following risk factors have been shown to influence the occurrence of post-operative complications following third molar surgery:

- **Age**

  Older patients tend to report more intense post-operative pain (Olmedo-Gaya, 2002, Level 4) and are at higher risk of extended operation time (Benediktsdottir, 2004, Level 6).

- **Gender**
  Female patients appear to be more prone to post-operative complications such as pain and dry socket (Phillips et al, 2003, Level 6; Benediktsdottir

- **Pre-existing pathology**
  There is a significant increase in post-operative complications if there are signs of pericoronal inflammation or infection of the impacted teeth prior to surgery (de Boer et al, 1995, Level 6; Phillips et al 2003, Level 6).

- **Depth of impaction and position**
  Deeply embedded teeth that require removal of bone show higher incidence of post-operative complications (Muhonen et al, 1997 Level 6; Christiaens & Reychler, 2002, Level 6; Strietzel & Reichart, 2002 Level 1). The position of the impacted teeth relative to the inferior dental nerve has a significant influence on the post-surgical nerve dysesthesia or paresthesia (Gulicher & Gerlach, 2000 Level 5; Gulicher & Gerlach, 2001 Level 4; Bui et al, 2003 Level 6), lingual nerve dysesthesia being greater when the impacted teeth are lingually angulated (Valmaseda-Castellon et al, 2000 Level 5).

- **Oral hygiene**
  Patients with poor oral hygiene pre-operatively have higher pain level post-operatively (Penarrhoca et al, 2001 Level 6).

- **Choice of Anaesthesia**
  Local anaesthesia carries less risk (SIGN, 1999, Level 9) and is associated with less patient stress (Hill, 2001 Level 5). Post-operative complication rate following third molar surgery ranges from 8.2% (general anaesthesia) to 12.6% (local anaesthesia) (Christiaens & Reychler, 2002 Level 6). While removal of third molar under general anaesthesia shows greater incidence of nerve injury (Hill et al, 2001 Level 5; Brann et al, 1999 Level 4), no link has been established between the choice of anaesthesia and nerve damage during lower third molar removal (Hill, 2001 Level 5; Rehman, 2002 Level 5). The incidence of lingual dysesthesia is greater when the surgery is performed under general anaesthesia (Gulicher & Gerlach, 2000 Level 5; Gulicher & Gerlach, 2001 Level 4).

- **Experience of the operator**
  Experienced surgeons are able to predict the difficulty of surgery and the factors that could delay post-operative recovery (Phillips et al, 2003 Level 6).
4. REFERENCES


