

Temporomandibular disorders

Guidelines for surgical treatment

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These guidelines are written for ACC providers who are considering surgical treatment of temporomandibular disorders (TMD).

In New Zealand the surgical management of TMD is restricted to registered oral and maxillofacial surgeons.

The guidelines are not intended to replace the health practitioner's clinical judgment in each individual case.

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Temporomandibular disorders

Introduction

The vast majority of internal derangement and degenerative temporomandibular disorders (TMD) can be successfully managed by conservative therapies (1). When conservative management is not effective, surgical management has a small but defined role in the management of arthrogenous cases of TMD (2, 3).

Essentially the temporomandibular joint (TMJ) is a synovial joint and the full range of synovial pathology of the more extensively studied synovial joints, for example the knee and the hip, may occur in the TMJ. Therefore the principles of orthopaedic joint surgery need to be combined with the principles of oral and maxillofacial surgery in the surgical management of TMD.

There are particular issues relating to the TMJ which must be taken into account when TMJ surgery is being considered:

- The TMJ is the most active joint in the body, moving up to 2,000 times per 24 hours during talking, chewing, swallowing and snoring (4). While most contractions are very low intensity, high loads of 200-300 Newtons are placed on the jaw joint during mastication. This high load is over the very small articular joint surface area.
- The TMJ is in an anatomically complex area. The joint has complex concurrent rotational and translation movement and is connected by the mandible across the midline to the contralateral TMJ. Thus the effect of surgical procedures on one joint should be considered for the impact on the other joint.
- The onset of TMD is often at an early age so the patient may have over three to four decades of life remaining.

TMJ conditions which may mimic the presentation of TMD include inflammation, including post-traumatic, developmental conditions, and neoplastic pathology, which may also require surgery.

The nature of arthrogenous causes of TMD

1. Internal derangement

Internal derangement is where there is a mechanical interference with the smooth action of the TMJ.

Dental practitioners use several classifications related to internal derangements of the TMJ. The most popular classification is the Wilkes Stages (Table 1) (5). Several other classifications were proposed, including a new surgical classification for TMD proposed by Dimitroulis (6).

2. Degenerative joint disease (DJD)

Degenerative joint disease is a non-inflammatory degenerative disease which results in degenerative changes in the intra-articular surfaces. The changes seen on imaging are described as remodelling or osteoarthritis. When the joint becomes inflamed and painful it is termed osteoarthritis.

DJD can be classified into four stages (Table 2).

These degenerative changes are common in all synovial joints and increase with age. There are, however, important differences with TMJ osteoarthritis in that the joint progressively remodels with changes in the dentition as well as with age. This remodelling results in morphologic changes in the condylar head, including flattening, erosion and peripheral osteophytes. There is also an important difference from the major weight-bearing joints, for example the knees and the hips, in that TMJ osteoarthritis commonly resolves over time (up to five years). Thus a painful joint may spontaneously become painless over time and function normally. The radiographic appearance remains abnormal.

3. Other pathologies

There is a wide range of other pathologies which may occur in the TMJ. Essentially these can be grouped into the following:

a. arthritides

Inflammatory diseases of the synovial surface which may occur locally in the TMJ or be part of a polyarthralgic condition. Example: the rheumatoid arthritides.

b. other synovial pathology

Example: synovial chondromatosis.

c. post-trauma

Post-trauma changes may range from minor intra-articular adhesions through fractures, dislocations and ankylosis.

The presentation and behaviour of this wide range of uncommon conditions will not be discussed in detail in these guidelines.

Any ACC claims for these uncommon conditions would need to be fully documented.

Diagnosis

In the first instance the diagnosis must be fully and carefully evaluated in accordance with the best practice recommendations as per the TMD diagnostic criteria (7).

Detailed review of previous non-surgical treatment, and in particular why it failed, is required. This includes review of the type, quality and competence of the previous treatment.

Similarly detailed review must be made of any past surgical treatment.

There must be a thorough assessment of the patient's general musculoskeletal state including, but not confined to, consideration of the presence of fibromyalgia and similar states, rheumatoid type arthritides and the contribution of the neck problems to the TMD.

The patient's psychological state, including the presence of psychiatric disorders and stressful life events, needs to be evaluated. The patient's expectations of surgery also need to be assessed. Patients with chronic pain conditions generally respond poorly to surgery.

Detailed imaging must be performed, including plain radiographs, CT and MRI as appropriate for the joint condition.

Imaging alone or heavy dependence on imaging for diagnosis can be misleading, for example:

- radiologic and CT imaging of asymptomatic joints will commonly show morphologic changes, particularly with increasing age
- there may be similar changes in both TMJs when the presentation is unilateral. Studies using plain radiology have shown that the pain-free side often has a greater extent of change than the painful side. This is advanced remodelling
- MRI studies have shown that disc displacement, disc dysfunction and abnormal morphology are common in the asymptomatic population (8). Again comparison needs to be made between the painful and the pain-free side.

Surgical options

As a general principle, the least invasive procedure appropriate to the condition should be chosen. Concurrent non-surgical treatment is commonly required.

1. Arthrocentesis

This is the least invasive procedure and is usually performed as a day stay LA and sedation procedure. General anaesthesia may be required for some patients, although this makes assessment of functional movements more difficult. Two needles are placed in the joint space for irrigation to remove painful substances within the synovial fluid, for pumping and manipulation for lysis of adhesions. On completion of the procedure, a steroid, or less commonly hyaluronic acid, is usually injected into the joint.

Indications for arthrocentesis are presented in Table 3.

2. Arthroscopy

Arthroscopy is also a day surgery procedure but is more commonly performed under general anaesthesia and with the introduction of a fine arthroscope to directly examine the articular surfaces.

A limited range of surgical procedures to smooth the articular surface and release adhesions can also be performed.

The indications for arthroscopy are similar to arthrocentesis (Table 3).

Both procedures show good short- to medium-term results. Sometimes incomplete resolution is obtained the first time so a second arthrocentesis/arthroscopy procedure can be performed at two to three months. Repeat procedures beyond that in the short term are not indicated.

If symptoms resolve but re-present some years later, the procedures can be repeated. One needs to check for altered life events and also that there is ongoing supportive non-surgical treatment.

3. Arthrotomy

This is where the TMJ is surgically opened under general anaesthesia. The patient is usually hospitalised for two to four days.

There are various techniques which may be applied to the intra-articular structures, depending on the clinical situation. The indications for arthrotomy are set out in Table 4.

The most common procedure is discectomy without replacement. Successful long-term results have been reported (9, 10).

Disc repositioning and replacement techniques are available, most with good short- to medium-term results but with progressive failure in a significant number of patients over time.

4. Temporomandibular joint reconstruction – autogenous

A wide variety of autologous tissue reconstruction techniques is available. Generally they have good long-term results, with a relatively low complication rate. The main ones are:

a. fat graft

This involves the placement of subcutaneous fat, with attached dermis, between the condylar head and the glenoid fossa. This acts as a cushion where there has been a moderate degree of articular disc destruction.

b. temporalis muscle graft

The posterior fibres of the temporalis muscle are transferred into the gap between the skull and the condylar stump.

This inter-positional graft is mainly used to prevent the recurrence of ankylosis and for gross destruction of joint morphology.

c. costochondral graft

The mandibular condyle is replaced by the costochondral junction, usually of the contra-lateral fifth rib.

The procedure is indicated where the condyle has been surgically removed or pathologically destroyed.

The indications for TMJ reconstruction – autologous are presented in Table 5.

5. Temporomandibular joint replacement – alloplastic

The replacement of knee and hip joints has a long history in orthopaedic surgery. There are clearly established techniques and requirements which produce good long-term results (Table 6).

TMJ alloplastic replacement has a much shorter history and it was marred by the disastrous results with the first major TM joint replacement which was widely used in the United States of America. This type of joint replacement was not used in Australia and New Zealand.

Following this experience, the FDA put much tighter controls in place in the USA. Three different types of alloplastic TMJ (11) have received FDA approval, but under fairly strict regulations.

The indications for alloplastic TMJ reconstruction are shown in Table 7.

The current status is that these devices have adequate short- and medium-term outcomes but the long-term results are not known. It is also evident that the results are operator sensitive; hence the results from one surgical and research centre do not necessarily apply when used by other individuals. Assessment of the outcome of surgery should be in accordance with the international criteria (Table 8).

The current situation in New Zealand is that a number of these devices have been placed, mainly in one regional center. The results of these New Zealand implantations have not been independently assessed.

Currently there are no regulations concerning the placement of these devices in New Zealand. Commonly the American FDA requirements are followed.

Thus in New Zealand there are currently no guidelines on the type of device, the indications, or the skill and training of the surgeon in TMJ replacement.

Referenced tables

TABLE 1 WILKES STAGING OF INTERNAL DERANGEMENT OF THE TEMPOROMANDIBULAR JOINT

Stage	Features	Imaging
I Early	Painless clicking	Slight disc displacement
	Unrestricted movement	Normal bone contours
II Early/Intermediate	Occasional painful clicking	Slight disc displacement
	Intermittent locking	Mild disc deformity
	Headaches	Normal bone contours
III Intermediate	Frequent pain	Moderate disc displacement
	Joint tenderness	Moderate disc deformity
	Restricted movement	Normal bone contours
	Painful chewing	
IV Intermediate/Late	Chronic pain	Severe disc displacement
	Restricted movement	Severe disc deformity
	Headaches	Abnormal bone contours
V Late	Variable pain	Severe disc displacement
	Joint crepitus	Severe disc deformity
		Disc perforation
		Degenerative bone changes

Some studies suggest that painless clicking on its own is not predictive of the development of TMD (12).

TABLE 2 STAGES OF DEGENERATIVE JOINT DISEASE (DJD)

Stage	Features	Imaging
Stage I	Articular surface fibrillation	Crepitus
		No imaging change
Stage II	Articular surface thinning	Crepitus
	Deeper changes at the cartilage/bone interface	No radiologic change
Stage III	Articular surface collapse	Radiologic change
	Peripheral osteophytes	MRI change
	Marrow inflammation	Disc change
Stage IV	End stage	Radiologic change
	Subchondral cysts	MRI change

Note:

1. Any of these stages, particularly II and III, may be concurrently inflamed and osteoarthritic.
2. Stages III and IV may be associated with late stage internal derangement.

TABLE 3 CLINICAL INDICATIONS FOR ARTHROCENTESIS AND ARTHROSCOPIC EXAMINATION

Clinical signs and symptoms	Painful TM joint (well localised)
	Limited opening
Diagnosis	Internal derangement
	Osteoarthritis
	Other arthritides

TABLE 4 CLINICAL INDICATIONS FOR ARTHROTOMY

Clinical signs and symptoms	Painful TM joint (well localised)
	Limited opening
	Abnormal imaging signs
	Failed response to arthrocentesis
Diagnosis	Internal derangement
	Osteoarthritis
	Other arthritides

TABLE 5 TEMPOROMANDIBULAR JOINT RECONSTRUCTION – AUTOGENOUS

Clinical signs and symptoms	Painful TMJ
	Limited opening
	Abnormal imaging signs
	Evidence of gross destruction of joint anatomy
Indications	Failed previous surgery
	Gross destruction
	Ankylosis
	Resection

TABLE 6 IDEAL REQUIREMENTS FOR A SUCCESSFUL JOINT REPLACEMENT

Anatomically and physiologically reproduces the joint.
Capable of immediate loading and function.
Capable of withstanding normal function of the joint for the rest of the patient’s life.
Biologically compatible and not subject to wear.
Placed by skilled, trained and experienced surgical team.
Lifelong follow-up and specifically for major complications and implant replacement.

TABLE 7 INDICATIONS AND CONTRAINDICATIONS FOR TMJ REPLACEMENT

Indications	All previous treatment modalities have failed.
	Grossly mutilated joints secondary to advanced pathology or trauma and/or multiple failed surgical treatments.
	Posterior mandibular resection for neoplasia.
	Meets requirements for successful joint replacement (Table 6).
Contraindications	Infection or other active pathology at the site.
	Medical and psychological contraindications.
	Allergy to implant components.
	Excessive parafunctional habits.
	Skeletal immaturity.

TABLE 8 CRITERIA FOR SUCCESSFUL TMJ SURGERY

I	Mild intermittent pain of no concern to patient.
II	Range of motion greater than 35mm for vertical and 6mm for lateral and protrusive excursions**.
III	Ability for patient to enjoy regular diet, at worst avoiding tough, hard foods.
IV	Stabilisation of possible degenerative imaging changes.
V	Absence of significant complications (short, medium and long term).
VI	Regular long-term follow-up.

** Lateral and protrusive movements are usually limited following TMJ implant replacement surgery.

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