Chapter Nineteen

Management of temporomandibular and cervical components of headache

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Overlap between temporomandibular and cervical contributions to headache is common in many patients. In this chapter the authors, a musculoskeletal physiotherapist-anatomist and two dentists, address the identification and management of these components with emphasis on temporomandibular and dental aspects.

Severe acute and chronic headache can cause substantial physical, social and financial distress due to the intensity, frequency, and duration of pain (Jull et al 2004, Rasmussen 2001, Rasmussen et al 1991). Epidemiologists estimate that direct costs for migraine per annum in USA was over US$1 billion in the late 1990s, and the indirect costs due to absenteeism and reduced effectiveness at work was US$13 billion (Hu et al 1999). In an Australian study of 1717 patients it was reported that 47% sought help from medical practitioners, pharmacists, dentists, physiotherapists, chiropractors, ophthalmologists, optometrists or masseurs, and 99% took medication (Heywood et al 1998).

The International Headache Society (IHS) has classified headache as either primary or secondary (Olesen et al 2004). Primary headaches are not associated with or caused by other diseases. Migraine, tension headache and cluster headache are examples of primary headache. Secondary headaches are caused by a medical condition or a disease process that may be minor, serious or life threatening (Biondi 2001, Olesen et al 2004). Headache arising from cervical or temporomandibular disorders (TMD) are examples of secondary headache. A detailed discussion of primary and secondary causes of headaches can be found in Chapter 2.

The incidence of cervicogenic headache in the general population is estimated to be 16–18% (Greenbaum 2006, Jull et al 2004, Nilsson 1995, Pfaffenrath et al 1990, Zito et al 2006). In comparison it is estimated that 25–33% of those with TMD may have pain or headache (Dworkin et al 1990, Gremillion et al 2000). Structures in both regions can cause referred pain to the temporal region of the head. The mechanism of such referral is considered to be through functional overlap of cervical afferent nerves with the spinal tract of the trigeminal nerve (Bogduk 1985, Govind et al 2005, Lance et al 2004). The biomechanical relationship between the head and neck could also be a contributory factor in such headache referral (Kraus 2007, Rocabado et al 1991, Santander et al 2000, Watson et al 1993, Zito 2007). Clinicians therefore are faced with
the task of differentiating TMD from cervical disorders likely to cause headache (Zito 2007, Zito et al 2009).

This chapter discusses the clinical assessment, differential diagnosis, and management of patients whose headache may be associated with or triggered by TMD or cervical disorders.

TMD and headache

Temporomandibular disorders (TMD) is a collective term for different musculoskeletal conditions involving the temporomandibular joints (TMJs) and/or masticatory muscle disorders (Nitzan et al, 2008) and is described in Chapter 7. Some headache can be triggered by TMD due to TMJ or masticatory muscle involvement (Balasubramaniam et al 2008, Benoliel et al 2008a, Zito 2007) and this is referred to as ‘TMD-related headache.’ As well, headache can be associated with referred myofascial pain from the cervical region, tension type headache, migraine, fibromyalgia or bruxism and may refer pain to the TMJ and masticatory muscles resulting in ‘secondary TMD’ (Balasubramaniam et al 2008, Benoliel et al 2008a). Hence, TMD-related headache may need to be distinguished from other conditions that may contribute to TMD.

Bruxism

Bruxism may also play an important role in TMD and can occur while asleep or awake (Kato et al 2003). Sleep bruxism is defined as an oromotor movement disorder (Thorpy 2005) that can lead to tooth contact and result in activation of masticatory muscles (Lavigne 2005). However, it has been observed that rhythmic masticatory muscle activity can occur in the absence of tooth contact in 60% of normal controls and in those with rapid eye movement, sleep disorders and somnambulism (sleep walking) (Kato et al 2003, Lavigne, 2005). Awake bruxism can be associated with habitual tooth clenching (Kato et al 2003). Jaw bracing, nail biting and tongue thrusting are also considered associated signs of bruxism (Kato et al 2003, Okeson 2005).

Bruxism is estimated to occur in approximately 6–20% of the population (Glaros, 1981, Goulet et al 1993, 1995, Lavigne 2005) with 17–20% of all bruxers complaining of TMJ pain and disability (Goulet et al 1993, Piekartz von et al 2001, 2007). The prevalence of sleep bruxism in a Canadian study was estimated to be approximately 8% of the adult population (Lavigne, 2005). Sleep studies indicate that tooth grinding occurs in 80% of young adults during Stages 1 and 2 of sleep and in about 5–10% during rapid eye movement (REM) (Kato et al 2003; Lavigne 2005) Laboratory studies also demonstrate that a large number of sleep bruxism episodes occur in the supine position similar to obstructive sleep apnea (Lavigne 2005, Lavigne et al 2006).

Bruxism has been described as either primary (idiopathic) or secondary (iatrogenic) (Kato et al 2003). Primary bruxism may be induced by the central nervous system (CNS) in the absence of an underlying medical pathology resulting in day time tooth clenching or sleep bruxism. Triggers of primary bruxism could be acute or prolonged anxiety and periods of prolonged stress. Psychological or psychiatric conditions can also trigger primary bruxism. Secondary bruxism may occur due to neurological conditions, sleep dysfunction or medication (Kato et al, 2003) such as selective serotonin reuptake inhibitors, anti-psychotic drugs or due to drug withdrawal (Lavigne 2005, Winocur et al 2003).

Bruxism was initially considered due to gnashing and grinding of teeth provoked by psychological factors. However, the evidence from the literature does not support this
hypothesis (Kato et al 2003, Lavigne 2005, Raphael et al 2008). Laboratory studies demonstrate that cardiac autonomic activity and CNS mediated cortical function play an important role in initiating sleep micro-arousals during sleep bruxism (Kato et al 2001, 2003, Lavigne 2005, Lavigne et al 2006, Lobbezoo et al 2001, Macaluso et al 1998, Terzano et al 2002). These investigations show that there is an increase in autonomic cardiac activity 4 to 8 minutes prior to tooth grinding or phasic jaw muscle activity. Cortical activity then heightens followed by increased heart rate just prior to contraction of suprahyoid muscles. Following this, tooth contact occurs as the end result of a series of physiological episodes (Lavigne 2005, Lavigne et al 2006). Bruxism is therefore now considered to be mediated by cardiac autonomic and cortical activity.

Researchers and clinicians debate whether bruxism can trigger TMD. However, the relationship is very complex and not clearly understood (Lobbezoo et al 1997, Manfredini et al 2003). Review of the literature by Lobbezoo et al (1997) observed that ‘a commonly held concept is that bruxism leads to signs and symptoms characteristic to one or more of the sub-diagnoses of TMD, while another hypothesis suggests that bruxism is a TMD itself and sometimes co-exists with other forms of TMD.’ Their review indicated that the causal relationship between bruxism and TMD was unclear. Subsequently a prospective study by Manfredini et al (2003) demonstrated that there was a significant association between bruxism and TMD. They examined 212 patients with different research diagnostic criteria for TMD-related diagnoses, and compared them with 77 sex- and age-matched asymptomatic subjects. The highest incidence of bruxism was found in those with myofascial pain and disc displacement (87.5%), followed by myofascial pain, disc displacement, and other joint conditions (73.3%), and then those with myofascial pain (68.9%). The investigators reported that there was a stronger association between bruxism and muscle disorders than with disc displacement and TMJ pathologies. Further studies need to be conducted in different populations to evaluate the relationship between bruxism and TMD.

Some clinicians claim that bruxism contributes to headache. Cross-sectional studies addressing the prevalence of headache in bruxers indicate that 66–87% experience headaches (Hamada et al 1982, Molina et al 1997). Yustin et al (1993) screened 353 patients of whom 86 were identified as bruxers. They found that 60% of bruxers develop headache and neck pain. However, there have been only a few large scale double-blind randomized clinical trials or cohort studies that have evaluated the contribution of bruxism to headache and the level of available evidence is low (Dao 1994, Jenum 2002, Kampe et al 1997, Lobbezoo et al 2008, Macfarlane et al 2001, Rugh & Harlan 1988). These authors infer that while bruxism may trigger headache it may not always be associated with TMD.

**Cervicogenic headache**

Researchers have demonstrated that cervical structures can trigger headache in the temporal, frontal and orbital regions (Bogduk 1985, 2001, Jull et al 1988, 2002, Sjaastad et al 1983, Zito 2007, Zito et al 2006). Provocative stimulation of the occipital condyles, C1 dorsal root, C3 dorsal ramus and upper cervical zygapophyseal joints has been shown to refer pain to the cranium (Bogduk 1985, 2001, Campbell & Parsons 1944, Jull et al 1988). Local anesthetic blocks to the C3 dorsal ramus or radio-frequency neuromyotomy have also been demonstrated to relieve headache (Bogduk 1985, Govind et al 2005).
Myofascial trigger points (MTPs) in the sternocleidomastoid (SCM), splenius capitis, trapezius (Simons et al 1999) and sub-occipital muscles (Fernandez et al 2006, 2008) have also been reported to refer pain to the head. Injecting these MTPs with local anesthetic (Okeson 2005, Simons et al 1999) or dry needling (Baldry 2005) have been described to relieve headache. The MTPs in the trapezius have also been described to evoke pain in the face, the temple, the angle of the mandible, retro-orbital region and behind the ear (Okeson 1996, Simons et al 1999, Travell 1960). The MTPs in the SCM have also been known to refer pain to the temporal region the anterior aspect of the face over the zygoma and masseters (Kellgren 1949, Simons et al 1999).

These investigations demonstrate that upper cervical disorders can refer pain to the head. The neuroanatomical connection between the upper cervical region and head and the possible mechanism of referred pain to the head is described in Chapter 9. The characteristics of cervicogenic headache are described in Chapter 8.

**Assessment**

A detailed clinical history is important in the process of differential diagnosis of headache since patients with similar headache presentation may have a different etiology. In order to differentiate primary from secondary headache it is important to establish the history of onset of the headache and related symptoms, intensity, frequency and duration of the headache, any change in headache pattern and development of any new headache. The process may also be assisted by asking questions about factors that trigger and ease the headache, the presence of headache while sleeping and on waking, general health, past history of headache, previous and current interventions including medication and their effectiveness. Psychosocial factors (Chs 21 and 22) and food sensitivities (Ch. 18) may co-exist with chronic headache. Validated psychometric measures such as the Beck Depression Inventory may assist in evaluating depression (Dworkin et al 2005).

It is important to establish whether the TMD-related headache is due to musculoskeletal factors or associated with other rare joint related conditions that may present as TMJ pain. Conditions such as ear disorder, dental conditions, neurovascular conditions such as hemicrania continua, cardiac conditions, autoimmune disorders, infections, and benign or malignant tumors can refer pain to the TMJ and need to be differentially diagnosed (Nitzan et al 2008).

Similarly it is necessary to establish whether the cervicogenic headache is due to musculoskeletal factors or other causes. In rare instances, a dissecting vertebral artery or internal carotid artery may contribute to headache (Jull et al 2004). The authors recall seeing two patients with unusual signs that might have suggested cervical headache, who were later found to have a pituitary tumor and an upper cervical meningioma respectively. While these cases are uncommon, it is important to be aware of sinister underlying pathology as a possible differential diagnosis particularly with unusual clinical presentations or when there is poor response to musculoskeletal interventions.

Hence red flags such as the ‘first or worst’ headache need to be considered (Ch. 2). In a retrospective study of 111 patients with headache presenting for neuroimaging, it was found that paralysis, reduced conscious levels, and papilledema were statistically significant red flag features in predicting abnormal neuroimaging (Sobri et al 2003). Other red flag features included onset of new or different headache, nausea or vomiting, worst headache ever experienced, progressive visual or neurological changes, weakness, ataxia, or loss of coordination, drowsiness, confusion, memory impairment, onset of
headache after age of 50 years, stiff neck, onset of headache with exertion, sexual activity or coughing, systemic illness, numbness, asymmetry of pupillary response, sensory loss and signs of meningeal irritation (Sobri et al 2003).

Some patients may have a combination of cervical disorders and TMD contributing to their headache. In these patients, the cervical region may need to be treated and signs and symptoms in both regions re-assessed to make a working diagnosis. If the condition is unaltered, the temporomandibular region needs to be treated and the signs and symptoms re-evaluated. Some patients may need both regions treated to evaluate the outcome. However, it is important to refer the patient to the medical practitioner for further investigation when a headache does not improve in the ‘prescribed time’ based on its severity, irritability and nature (Jull et al 2004, Niere & Selvaratnam 1995).

The visual analogue scale (VAS) can also be used to evaluate the intensity of headache on a ‘good day’ and a ‘bad day’ (where 0 is no pain, 1 mild pain, 5 moderate pain, and 10 the most severe imaginable pain). A pain diary can be used to assess the intensity, frequency and duration of the headache over a four week period to monitor the effects of treatment. Under experimental conditions females have been found to have a lower pain threshold during certain stages of their menstrual cycle (see Ch. 9). Lowered pain threshold was also observed in a study among women taking oral contraceptives (Fillingim et al 2000). Hence, it is important to consider these factors when assessing women with headache.

Guidelines for differential diagnosis

The following subjective and objective assessment provides further guidelines in differentiating a TMD-related headache from a cervicogenic headache. These guidelines are based on findings in the literature (Jull et al 2004, Lavigne 2005, Lavigne et al 2006, Okeson 2005, Zito et al 2006), clinical findings of expert physiotherapists and musculoskeletal physiotherapists (Zito 2007), and the authors’ clinical findings in patients with headache. Table 19.1 provides a summary of guidelines for differentiating patients with TMD-related headache from those with a cervicogenic headache.

Subjective assessment

Pain distribution

Pain caused by TMD-related headache can be unilateral or bilateral in the temporal and/or frontal regions (Lavigne et al 2006, Zito 2007). It is frequently associated with pain in the pre-auricular region, the muscles of mastication, in the distribution of the branches of the trigeminal nerve and as a feeling of fullness in the ear (Pettengill 1999, Zito 2007). Pain is rarely referred to the cervical region or trunk unless associated with fibromyalgia (Nitzan et al 2008).

Cervicogenic headache is usually referred from the upper cervical region to the frontotemporal and orbital regions in the distribution of the ophthalmic nerve (Sjaastad et al 1983, 1998, Zito 2007). The headache is often associated with pain in the sub-occipital region, occipital region, or lower cervical region (Zito 2007). Cervicogenic headache is most often unilateral but at times can be bilateral (Jull et al 2004, Sjaastad 1983, Zito 2007).

Aggravating factors

Patients with TMD usually have difficulty with jaw functions, such as biting or chewing on foods such as apples, carrots and bread rolls, which may provoke headache. Those with
Table 19.1 Guidelines for differentiation of patients with TMD-related and cervicogenic headache.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>TMD-related headache</th>
<th>Cervicogenic headache</th>
<th>Other causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjective assessment</strong></td>
<td></td>
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</tr>
<tr>
<td>Area of symptoms</td>
<td>Unilateral or bilateral temporal headache +/- TMJ and masticatory muscle pain. Pain may radiate anteriorly from the pre-auricular region or superiorly</td>
<td>Unilateral fronto-temporal, or orbital headache but can occur bilaterally. Pain may radiate superiorly from the cervical region to the cranium.</td>
<td>TMJ pain in rare instances may be associated with ear disorder, dental conditions, neurovascular conditions such as hemicrania continua, cardiac conditions, autoimmune disorders, infections and benign or malignant tumors.</td>
</tr>
<tr>
<td>Associated symptoms</td>
<td>Mandibular pain. Fullness in the ear. Sensitive teeth or periodontal structures.</td>
<td>Pain in the occipital or sub-occipital region or in the upper trapezius muscle.</td>
<td></td>
</tr>
<tr>
<td>Aggravating factors</td>
<td>Jaw function exacerbates TMD-related pain or headache.</td>
<td>Neck movements or sustained neck postures trigger headache.</td>
<td></td>
</tr>
<tr>
<td>Sleep pattern</td>
<td>Woken during sleep or on awakening with headache, mandibular, teeth or periodontal symptoms. Patient or partner complains of snoring.</td>
<td>Headache on waking associated with cervical pain or restriction. Not associated with snoring.</td>
<td>Waking in the early hours of morning could signify a red flag such as a brain tumor, or benign intracranial hypertension.</td>
</tr>
<tr>
<td>Awake signs and symptoms</td>
<td>Headache associated with masseter or temporalis muscle tightness. May be associated with a forward head posture while sitting.</td>
<td>Headache may be associated with a forward head posture or while sitting and working in a slumped posture with cervical flexion.</td>
<td></td>
</tr>
<tr>
<td><strong>Physical assessment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active movements</td>
<td>Active TMJ movements may be restricted and may reproduce headache. Accessory movements of TMJ may reproduce headache.</td>
<td>Active cervical movements may be restricted and reproduce or ease headache.</td>
<td></td>
</tr>
<tr>
<td>Spatula test</td>
<td>Placing spatula between premolars may reduce the patient’s constant headache or TMJ pain. Examining cervical movements (with the spatula between premolars) reduces or alleviates headache compared to examining without a spatula.</td>
<td>Headache is unaltered by placing spatula between premolars and on re-examining cervical movements.</td>
<td></td>
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</tbody>
</table>
cervicogenic headache may attribute their headache to cervical movements, prolonged cervical postures while performing manual work, or sitting with a forward head posture. The forward head posture could impact upper cervical structures and contribute to headache (McKenzie 1983). This posture may also predispose to tooth clenching and contribute to awake bruxism-related headache (Okeson 2005). The relationship between the forward head posture and headache needs to be identified in the physical assessment.

**Waking with headache.** Patients who experience sleep bruxism/TMD may wake with a headache during sleep or on awakening (Kato et al 2003). This phenomenon could be due to rhythmic masticatory muscle activity or tooth grinding/clenching during Stages 1 and 2 or the REM sleep cycle. In others insomnia can cause morning headache (Lavigne 2005, Lavigne et al 2006).

Researchers infer from sleep studies that the most predictive indicator of increased sleep bruxism is whether a patient snores (Lavigne 2005, Lavigne et al 2006). Information about snoring should be obtained during the patient interview. If there is uncertainty, then the partner or those sharing the same dwelling should be questioned about whether the patient snores or makes jaw sounds (Lavigne 2005).

In the authors’ experience most patients are either unaware of or deny snoring. Thus, if the patient or their partner is unable to shed further light then the diagnosis of sleep bruxism based on snoring is very limited. Symptoms associated with bruxism such as jaw muscle

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**Table 19.1  Guidelines for differentiation of patients with TMD-related and cervicogenic headache.—Cont’d**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>TMD-related headache</th>
<th>Cervicogenic headache</th>
<th>Other causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscles</td>
<td>Hypertrophied masseters</td>
<td>Hypertrophy of masseters is not associated with cervical disorder</td>
<td>Fibromyalgia, orofacial tumors, and blockages of the parotid duct need to be considered when masseters are hypertrophied</td>
</tr>
<tr>
<td>Palpatory examination</td>
<td>Palpation of the TMJ reproduces symptoms Presence of MTPs in masticatory muscles may reproduce headache or orofacial pain Some patients may have MTPs in cervical muscles which may trigger orofacial pain</td>
<td>Palpation of upper cervical motion segments reproduces headache Sustained pressure of the cervical motion segments for 30 to 60 sec may reproduce the headache or alleviate it Palpation of cervical MTPs reproduces or eases headaches</td>
<td>Red flags: dissecting vertebral artery or internal carotid artery</td>
</tr>
<tr>
<td>Slump test</td>
<td>Slump test negative</td>
<td>Slump test may reproduce headaches</td>
<td></td>
</tr>
<tr>
<td>Odontogenic factors</td>
<td>Wear facets of the dentition Cracked tooth syndrome Tongue crenations and linea alba</td>
<td>Dental signs are not associated with cervicogenic headache</td>
<td></td>
</tr>
</tbody>
</table>

TMJ = temporomandibular joint. MTPs = myofascial trigger points.
tightness, fatigue and pain and other odontogenic factors described in this chapter needs to be considered. Assessment for sleep apnea may be conducted at a sleep disorder clinic.

The patient’s cervical region could also contribute to headache while sleeping and on waking (Jull et al 2004). The cervical sleep posture in different functional positions needs to be assessed to identify the contribution of the cervical region to headache. Changing the cervical posture or the number of pillows may assist in identifying whether it is a causative factor. In some patients wearing a cervical collar while sleeping may assist in identifying the cervical contribution to headaches. The collar may provide support to and relieve strain on cervical structures thereby easing headache.

Raised intracranial pressure can also cause individuals to awake with headache (Lance et al 2004). Those with a suspected raised intracranial pressure should be referred immediately to an emergency department for further evaluation (see Ch. 2).

Sensitive teeth or gums. Patients with TMD due to sleep bruxism may complain of a recent episode of sensitive teeth and/or gums on waking or during functional activities while awake (Okeson 2005). Tooth sensitivity could be due to stimulation of nociceptive afferents of the maxillary and mandibular branches of the trigeminal nerve. Sensitivity of teeth to cold liquids may also be reported. The dentist may find that there is no odontogenic cause to their pain and bruxism may be suspected. Persistent pain may lead to hypertonicity of masticatory muscles and contribute to TMD-related headache (Okeson 2005).

Intermittent tooth pain. Patients who brux may complain of intermittent tooth pain lasting for two to three days on waking or at the end of a busy day (Okeson 2005). In contrast, the pain for patients with dental conditions may be variable (i.e., improving or worsening) or constant pain.

Clinical studies have also demonstrated that pain can be referred to the teeth from the temporalis and masseter muscles (Simons et al 1999), the SCM and trapezius muscles (Okeson 2005). Thus, in the absence of odontogenic causes, pain referral from the cervical and masticatory muscles should be considered (Okeson 2005).

Abscess. Clinicians need to be aware that dental abscess may also cause masticatory muscle co-contraction and TMD-related headache. Patients with a dental abscess may be incorrectly diagnosed with TMD. The pain in the affected tooth can be intense or throbbing and can occur quite suddenly and gradually worsen over a few hours or days. Red flags such as constant unremitting tooth pain associated with pain spreading to the ear, jaw and neck on the same side as the affected tooth should guide clinicians to promptly refer the patient to a dentist for further evaluation. Other symptoms of a dental abscess could include tenderness of the tooth and surrounding area to touch and pressure from biting, unpleasant taste in the mouth, sensitivity to food and drink that is very cold or hot, fever, a general feeling of being unwell, difficulty swallowing or opening the mouth and disturbed sleep (Benoliel et al 2008b, Doss et al 1999, Sharav et al 2008).

Physical assessment

The physical assessment needs to include the patient’s posture, examination of the cervical and temporomandibular regions. The headache intensity during active and passive movement examination can be assessed with the verbal pain rating scale (which is an analogue to the VAS) where 0 is no pain, 1 is mild pain, 5 moderate pain and 10 is severe pain (Selvaratnam et al 1994). Dental pathology, secondary occlusal dysfunction such as missing teeth and open bites needs to be assessed by a dentist (Nitzan et al 2008).
Postural considerations

The patient’s cervical posture (Braun et al 1989, McKenzie 1983, Mayoux-Benhamou et al 1994, Rocabado et al 1991, Watson et al 1993) as well as thoracic, lumbar and pelvic postures need to be assessed (Ch. 17) in the standing and sitting positions as part of the comprehensive headache examination (Gibbons et al 2006). Previous clinical studies did not support the effect of the forward head posture on the stomatognathic system (Braun et al 1991) in contributing to headache (Haughie et al 1995, Refshauge 1995, Treleaven et al 1994) or TMD (Olivo et al 2006, Sonnesen et al 2001). However, the clinical investigation by Fernandez et al (2006) observed a relationship between forward head posture and unilateral migraine sufferers. They compared 20 unilateral migraneurs without side-shift and 20 matched controls. The craniovertebral angle was measured with side-view photographs in the sitting and standing positions. Neck mobility was measured with a goniometer. Migraine sufferers demonstrated a smaller cranio-cervical angle than controls ($p < 0.001$), and thereby presenting with a greater forward head posture in both positions. There was also a positive correlation between the craniovertebral angle and reduced cervical extension in migraineurs. This preliminary study lends support to the hypothesis that the forward head posture can be associated with headache sufferers.

A subsequent blinded pilot study also evaluated the effect of forward head posture in 15 episodic tension tension-type headache patients and 15 matched asymptomatic controls. (Fernandez et al 2007) The study evaluated the differences in each group for the presence of forward head posture, active and latent MTPs in upper trapezius, sternocleidomastoid, temporalis, and neck mobility. Side-view photographs were taken in the sitting and standing positions to assess the craniovertebral angle. A goniometer was used to measure neck mobility. The investigation identified that the patient group demonstrated a greater forward head posture than controls in both positions ($p < 0.05$). The patients with active MTPs in the analyzed muscles demonstrated a greater forward head posture than those with latent MTPs. They also demonstrated reduced neck mobility than the asymptomatic patients. This study further demonstrates the importance of assessing the contribution of forward head posture in headache sufferers.

Correcting the forward head posture from upper cervical extension (Fig. 19.1a) to upper cervical flexion (Fig. 19.1b) in the sitting/standing positions and sustaining this position for 30 seconds may assist in evaluating the cervical component to headache. This sustained movement may need to be repeated 3 to 5 times due to long term adaptation of soft tissues. If the headache is unchanged, the patient is requested to place the tongue on the floor of the mouth to reduce masticatory muscle activity and jaw clenching (Carlson et al 1997). Any change in headache intensity may indicate a TMD-awake bruxism component. The effect of the tongue position may also be evaluated in different cervical positions. While these postural changes may infer a cervical/TMD component, the diagnosis can only be made following a comprehensive cervical and temporomandibular assessment.

Some patients may experience headache while seated in a slumped position with the cervical and thoracic spine in flexion. The slump test may assist in identifying the potential postural or spinal dural components of headache (Butler 2000). Anecdotal evidence suggests that changing a patient’s sitting posture from a slumped position to a more erect sitting posture may reduce headache intensity and assist in diagnosing the spinal postural component to headache. Applying postural taping from the C7 to the T9 level (Fig. 19.2) to correct posture and improve postural awareness...
may also assist in evaluating the postural component to headache.

It is also the authors’ experience that attending to postural variations in some patients with a protracted scapula, a lumbosacral tilt, or an apparent leg length discrepancy has reduced their headache intensity or TMD-related pain due to biomechanical or neural effects. Thus, each patient’s presenting condition and their postural variations need to be addressed carefully to evaluate whether postural changes alter the intensity or nature of the headache both within the session and over the long term. Patient-specific functional scales (Cleland et al 2006, Sterling 2007) would assist in evaluating the efficacy of postural changes.

Despite the paucity of large scale randomized clinical studies to support this empirical evidence, the benefit of postural correction and awareness in headache patients has support from the physiotherapy and dental professions.
Proponents of evidence informed medicine recommend that the patient’s report on treatment outcomes and physician’s experience must be considered in addition to systematic research findings (Sackett et al 1997). However, further clinical research is required to test these theories.

## Cervical examination

Cervical diagnostic blocks are considered the gold standard in diagnosing cervicogenic headaches (Bogduk 2001, Govind et al 2005). These diagnostic blocks are not office procedures and cannot realistically be offered to each patient. However, diagnostic blocks assist in the diagnosis and indicate potential treatment options for patients with refractory cervicogenic headache and are described in Chapter 5. In most cases the diagnosis of cervicogenic headache can be made after a careful interview and physical examination of the cervical region (Jull et al, 2004, Zito et al 2006).

Active movements of the cervical spine of flexion, extension, rotation, lateral flexion, and upper cervical flexion and extension (Niere & Selvaratnam 1995) may reproduce or ease a patient’s headache (Jull et al 2002). Repeated movement of upper cervical flexion in the standing, sitting or supine positions (10 repetitions) may assist in evaluating changes in the intensity, quality, and directional preference (such as centralizing or peripheralizing) of the headache (Kent et al 2009, Long et al 2004, McKenzie 1983). Repeated movements can also be performed with other cervical movements to evaluate the behavior of the headache.

In addition, careful palpation of the cervical muscles, and passive physiological and accessory movements of the cervical motion segments will further assist in evaluating the cervical component (Brontfort et al 2004, Gibbons et al 2006, Jull et al 2002, Niere & Selvaratnam 1995). Reproducing or easing the patient’s headache by manual cervical distraction (Fig. 19.3) or posteranterior palpation of the cervical region may assist in identifying the cervical contribution.

If the headache is not reproduced, sustained palpation of the cervical region for 30 to 60 seconds may assist in reproducing or easing their headache. Treatment of the cervical region with passive physiological or accessory movements (Niere & Selvaratnam 1995), and re-examining active neck movements, functional activity and patient specific functional scales (Cleland et al 2006) will further assist in evaluating the cervical component.

## Temporomandibular evaluation

Active opening and closure of the mouth, protrusion, retraction, and lateral movement of the TMJ in the sitting or supine positions will assist in assessing TMD and/or related headache (Trott 1985, Zito 2007). The TMJ can be palpated laterally over the pre-auricular region or posteriorly via the external auditory meatus. The presence of TMJ clicking and/or crepitus during opening and closing may be assessed digitally over the lateral and posterior aspect of the TMJ. A stethoscope over the TMJs would assist in evaluating joint sounds since they can be present continuously or at a particular point of joint motion (Nitzan et al 2008).
The click usually occurs for a brief moment during opening and closing of the mouth. When it occurs during both directions it is referred to as reciprocal click. In contrast, crepitus may occur throughout the joint motion (Nitzan et al 2008).

The normal range of inter-incisor opening in women is 35–45 mm and in men 45–54 mm; it can be assessed with a millimetre ruler or a measuring tape. The inter-incisor opening needs to be observed carefully to evaluate deviation or deflection of the mandible (Fig. 19.4) and whether correction to the deviation occurs. Persistent deviation to the side of the TMD is considered to be due to ipsilateral joint dysfunction or disc derangement without reduction. Deviation on opening which corrects itself is considered due to ipsilateral disc displacement with reduction (Nitzan et al 2008). However, deviation away from the TMD can also be due to muscle imbalance of the contralateral medial or lateral pterygoid and/or the unilateral temporalis (Okeson 2005). Headache in the presence of abnormal or restricted TMJ movement may suggest the possibility of TMD (Zito 2007) but needs to be taken in context with the total assessment of the patient.

Hypertrophied masseters may be observed in patients who brux or have TMD. However, fibromyalgia, orofacial tumors, and blockages of the parotid duct are diagnoses that should also be considered (Lavigne 2005). Palpation of the masseter, temporalis, medial pterygoid, SCM, trapezius, sub-occipital muscles and splenius capitis for the presence of MTPs will further assist in evaluating their contribution to headache related to TMD or cervical disorders (Simons et al 1999). The MTP examination of these muscles is described in Chapter 23.

Accessory movements of the TMJ such as postero-anterior gliding lateral movement and longitudinal gliding may also assist in the diagnosis of TMD (Trott 1985, Zito 2007) though their reliability has yet to be assessed. **Dental wear facets.** Clinicians need to assess for dental wear facets as part of the examination. Prolonged teeth grinding may result in excessive dental wear facets (Fig. 19.5) that in some instances may appear as a diamond shaped
facet. However, the presence of dental wear does not provide an indication as to when it may have occurred. Dental wear may have occurred over many years and may not be an indication of bruxism that is ongoing. Attrition of dental facets could also be compounded by an acidic diet and therefore may not be the cause of a patient’s recent episode of tooth pain or TMD-related bruxism/headache.

**Cracked tooth syndrome.** Chronic bruxism could result in teeth cracking or overtly fracturing. Occlusal trauma or mastication of hard food can lead to a similar outcome. Dental wear facets and fractures may lead to an altered bite (Okeson 2005, Sharav et al. 2008). An acute bite change may result in development of MTPs in masticatory muscles (Rocabado et al. 1991, Simons et al. 1999). Clinicians therefore need to be aware that while a cracked tooth could contribute to TMD-related headache it may not always be associated with a recent episode of headache.

**Tongue indentation.** The presence of indentations in the lateral aspects of the tongue (crenations) (Fig. 19.6) and cheek (linea alba) should be assessed as it could occur with bruxism or a tongue thrusting and/or chewing habit (Piquero et al. 1999).

**Spatula test**

The spatula test is performed to identify if a cervical disorders or TMD are contributing to the symptoms (Piekartz von et al. 2001). Currently there is limited evidence on the discriminative validity and reliability of the spatula test despite its clinical utility. The spatula is placed between the points of most contact (for example, the pre-molars) in the sitting position (Piekartz von et al. 2001, Piekartz von 2007) (Fig. 19.7a). The spatula reduces tooth contact between the upper and lower molars and is considered to lower peripheral neural receptor activity between the molars, and thereby reduce CNS input and/or activation of masticatory muscles (Piekartz von 2007).

Though clenching of the teeth is not the only means of determining TMD, a reduction of symptoms with application of the spatula at rest or in combination with cervical movements may indicate that it may be due to TMD or central sensitization. For example, when a patient presents with unilateral right temporal headache, active cervical movements are initially examined in the sitting position to determine whether they reproduce the patient’s headache. If the patient’s headache is reproduced at 60° of right cervical rotation, the neck is returned to the neutral position. A spatula is then placed between the points of most contact. Right cervical rotation is then re-assessed (Fig 19.7b). If the headache is eased, this change may be inferred due to TMD or central sensitization (Piekartz von et al 2001). If the headache is unaltered it is possibly due to cervical involvement. The cervical component can be further assessed by palpating the upper cervical zygapophyseal joints or cervical muscles with the cervical spine rotated. Reproduction of the headache further confirms the

**Figure 19.6** - Indentations in the lateral aspect of the tongue (crenations).
cervical contribution. Other cervical movements such as upper cervical flexion or cervical flexion could be examined with the spatula, particularly when forward head posture or cervical flexion causes headaches.

The spatula test may give rise to false-positives and false-negatives. However, it provides clinicians with an assessment tool to evaluate the contribution of cervical or TMD to headache in the absence of expensive laboratory tests to examine sleep apnea or injection studies to the cervical region.

**Investigations**

Appropriate investigations and imaging need to be conducted when suspecting catastrophic or sinister headaches (Ch. 2). Blood tests or lumbar puncture may be indicated. A CT scan or MRI of the brain will be required to rule out some sinister or catastrophic causes of headache. Cervical X-rays or MRI may be required for cervical disorders. Panoramic radiographs of the TMJ are usually taken for routine assessment (Nitzan et al 2008). Cone bean CT scans have replaced panoramic radiographs and other plain films as a routine examination for the TMJ and other bone pathology (Moron et al 2007). MRI would be useful for more detail investigation of the articular disc and soft tissues (Nitzan et al, 2008).

**Clinical decision making and management**

Effective management of headache will depend on the practitioner’s clinical decision making and diagnosis. To this end it can be useful to sub-group patients on the basis of subjective and physical assessment findings rather than ‘clumping’ them and treating them in a prescriptive
manner (Kent et al 2004). This approach seems to be supported by the results of a survey of 650 participants in two Australian low back pain meetings, where it was found that physiotherapists, medical practitioners, specialist physicians, musculoskeletal physicians, chiropractors, and osteopaths are more likely to sub-group patients according to their physical impairments (signs and symptoms) rather than the pathoanatomy (Kent et al 2009).

Sub-grouping patients by physical impairments may assist in identifying those headache patients who require immediate medical attention (Ch. 2), referral for management of anxiety/depression (Chs 21 and 22), food sensitivity (Ch. 18), or hormonal dysfunction (Ch. 9). Sub-grouping may also assist in identifying patients with other medical conditions than can cause TMJ pain (Table 19.2) or who have a musculoskeletal headache due to TMD or cervical disorders.

Musculoskeletal headache may be further classified as acute or chronic. As well it is useful to evaluate irritability, which is the degree to which the headache is provoked by functional movements (Niere & Selvaratnam 1995). Aggravating factors are likely to implicate specific cervical or mandibular functional movements/postures that could contribute to headache and may suggest possible management strategies which will vary in each patient.

The TMD may be sub-grouped according to TMJ or masticatory muscle involvement (Table 19.3). The TMJ component may be further subdivided into joint locking, hypermobility, internal disc derangement with or without reduction and deviations of the mandible. Treatment selection will depend on the condition being managed. Likewise, masticatory muscle involvement may be sub-grouped according to the muscles that cause the disorder, their action, particularly when these muscles contribute to mandibular deviation.

<table>
<thead>
<tr>
<th>Table 19.2</th>
<th>Sub-grouping of patients for diagnosis and management.</th>
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<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td><strong>Management</strong></td>
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<tr>
<td>Catastrophic or sinister headache (Ch. 2)</td>
<td>Referral to Emergency Department/medical practitioner/ neurologist</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>Cognitive strategies/ referral to psychiatrist/ psychologist/psychoanalyst (Chs 21 and 22)</td>
</tr>
<tr>
<td>Food sensitivity</td>
<td>Referral to integrative medical practitioner (Ch. 18)</td>
</tr>
<tr>
<td>Hormonal headache (Ch. 9)</td>
<td>Referral to medical practitioner/endocrinologist/ integrative medical practitioner</td>
</tr>
<tr>
<td>Temporomandibular disorders(TMD)</td>
<td>See Table 19.3</td>
</tr>
<tr>
<td>A. TMD-related headache</td>
<td>Referral to medical/dental practitioner</td>
</tr>
<tr>
<td>B. Entities that may in rare occasions be associated with TMJ pain; e.g. ear (Ch. 10), dental, neurovascular conditions such as hemicrania continua, cardiac, auto-immune and malignant condition</td>
<td></td>
</tr>
<tr>
<td>Cervicogenic headache</td>
<td>Referral to medical practitioner</td>
</tr>
<tr>
<td>A. Non-musculoskeletal; e.g., vertebral artery/internal carotid artery dissection, cervical meningioma, pituitary tumor mimicking as cervicogenic headache</td>
<td>See Table 19.4</td>
</tr>
<tr>
<td>B. Musculoskeletal</td>
<td></td>
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CHAPTER 19

Management of temporomandibular and cervical components of headache
<table>
<thead>
<tr>
<th>Table 19.3 Sub-grouping of TMD-related headache for diagnosis and management.</th>
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<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
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<tr>
<td>Muscles</td>
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<tr>
<td>Asses function of masticatory and cervical agonist and antagonist.</td>
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<tr>
<td>Assess MTPs in the cervical and temporomandibular regions (Ch. 23)</td>
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<tr>
<td>Joint</td>
</tr>
<tr>
<td>Locking, hypermobile, clicking, crepitation, internal disc derangement with or without reduction</td>
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<tr>
<td>Posture</td>
</tr>
<tr>
<td>Evaluation of postural biomechanics</td>
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<tr>
<td>Bruxism</td>
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<tr>
<td>Sleep/awake bruxism</td>
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<td></td>
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<tr>
<td>Neural</td>
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<tr>
<td>Pain referral in the trigeminal nerve distribution</td>
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<td></td>
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<td>Referred from cervical region</td>
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<tr>
<td>TMD-related headache associated with temporals muscle, myofascial pain, migraine and tension headache</td>
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CCFP = Craniocervical flexor program. MTP = Myofascial trigger point.
Similarly cervical disorders may be subgrouped according to structures involved – the zygapophyseal joint, muscular or neural structures and the cervical segment contributing to the disorder (Table 19.4). Investigators have assessed patients with neurocompressive and non-specific low back pain. They report that exercise prescription by manual therapists based on centralization/peripheralization was strongly predictive of the specific exercise that would assist patients (Kent et al 2009, Long et al 2004). Based on these findings, repeated cervical movements, for example, upper cervical flexion may further identify which movement eases the headache and exercises prescribed accordingly (McKenzie 1983).

Preliminary studies indicate that lumbar mobilization/manipulation and stabilization exercises can be used successfully in patients with physical impairments due to non-specific low back pain (Childs et al 2004, Flynn, 2002, Hicks et al 2005). From these findings, it is hypothesized that physical impairments may indicate whether manual cervical distraction, passive accessory cervical zygapophyseal joint or TMJ mobilization, cervical, or masticatory muscle interventions is the best approach for the patient. Impairments may indicate the need for zygapophyseal joint blocks, radiofrequency neurotomy, MTP injections, or dry needling. Similarly, impairments may suggest that a patient requires stabilization exercises for the cervical region (Ch. 15) and temporomandibular region compared to range of movement exercises or referral to a dentist for a stabilizing occlusal splint. Sub-grouping may also identify patients likely to benefit from postural re-training, postural taping intervention, or an ergonomic assessment at work or home.

As a group, headache patients can be complex. However, sub-grouping will assist informed decision making regarding physical management and identifying those patients who may benefit from a multi-disciplinary approach.

It is imperative that the management includes an explanation of the clinical findings so that the patient understands the nature of the condition and proposed plan of management. The explanation will assist patients to comply with

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**Table 19.4 Sub-grouping of cervicogenic headache for diagnosis and appropriate management.**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Postural</strong></td>
<td>* Ergonomic recommendations for work and home environment</td>
</tr>
<tr>
<td></td>
<td>* Evaluate the effect of changing forward head posture or the slumped posture</td>
</tr>
<tr>
<td></td>
<td>* Postural taping program</td>
</tr>
<tr>
<td><strong>Muscles</strong></td>
<td>* Exercise programs</td>
</tr>
<tr>
<td><strong>Muscle function</strong></td>
<td>* CCFP (Ch. 15)</td>
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<tr>
<td>(e.g. altered</td>
<td>* Perform CCFP and evaluate if craniocervical flexor endurance improves and/or</td>
</tr>
<tr>
<td>endurance of</td>
<td>MTP is deactivated</td>
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<tr>
<td>cervical stabilizers</td>
<td>* Isometric cervical extensor program</td>
</tr>
<tr>
<td></td>
<td>* Upper cervical flexion in sitting</td>
</tr>
<tr>
<td></td>
<td>* Lumbar core stability programs</td>
</tr>
<tr>
<td></td>
<td>* MTP therapy (Ch. 23)</td>
</tr>
<tr>
<td></td>
<td>* Dry needling (Ch. 24)</td>
</tr>
<tr>
<td></td>
<td>* Pain management</td>
</tr>
<tr>
<td></td>
<td>a. Cognitive therapy (Chs 21 and 22)</td>
</tr>
<tr>
<td></td>
<td>b. Progressive muscle relaxation</td>
</tr>
<tr>
<td></td>
<td>c. Breathing relaxation</td>
</tr>
<tr>
<td></td>
<td>d. Feldenkrais therapy (Ch. 25)</td>
</tr>
<tr>
<td></td>
<td>e. Medication</td>
</tr>
<tr>
<td><strong>Zygapophyseal</strong></td>
<td>* Passive mobilization (Chs 15, 16 and 17)</td>
</tr>
<tr>
<td>joint</td>
<td>* Cervical stabilization with CCFP</td>
</tr>
<tr>
<td></td>
<td>* Zygapophyseal joint block (Ch. 5)</td>
</tr>
<tr>
<td><strong>Nerve</strong></td>
<td>* Neural mobilization (e.g. manual cervical distraction, slump test, upper</td>
</tr>
<tr>
<td></td>
<td>limb tension test)</td>
</tr>
<tr>
<td></td>
<td>* Radiofrequency neurotomy (Ch. 5)</td>
</tr>
</tbody>
</table>

CCFP-Craniocervical flexor program. MTP-myofascial trigger point.
the management plan. In this way, the patient is more likely to play an active role in management. In contrast, a hasty explanation may lead to confusion, reduce compliance, and compromise the outcome of intervention.

The following management strategies are a guide to clinicians and are neither prescriptive nor exhaustive. There is published evidence supporting some of these management strategies while other interventions are based on evidence-informed medicine (Sackett et al. 1997) and have consensus within the medical, physiotherapy, and dental professions based on anatomical, biological, and biomechanical concepts. The outcome measures described in Chapter 13, the mandibular function impairment questionnaire (Stegenga et al. 1993), and patient specific functional scales (Cleland et al. 2006, Sterling 2007) may assist clinicians to plan and evaluate interventions. Some of these management strategies are described in the following section.

**Pain management**

Relaxation skills, behavior modification, time management, work-life balance, adequate sleep, and managing psychosocial stressors are all important in the management of people with headache. While clinicians are aware of stress management skills, some patients may require referral to a psychologist/psychiatrist to deal with specific mental health factors or stressors that may contribute to headache. Chapters 21 and 22 address psychological issues and management strategies. Pharmacotherapy for different conditions is discussed in Chapters 2, 3, 10, and 22.

Addressing lifestyle stressors is important since headache and orofacial patients may suffer from anxiety, depression, and distress (Nitzan et al. 2008). Some patients may benefit from progressive muscle relaxation (Jacobsen 1929, Lance et al. 2004), breathing techniques, visual imagery (Ricks 1994) and prayer (Benson 1996) in managing their headache/TMD. Evidence-based outcome studies indicate that cognitive behavioral therapy benefits patients with tension-type headache, migraine, and TMD (Raphael & Ciccone 2008). A review of the literature disputes a psychogenic explanation to orofacial pain, though there is evidence that psychological factors can perpetuate ongoing pain and dysfunction (Raphael & Ciccone 2008). Thus behavioral therapy programs need to be prescribed judiciously and take into account the patient’s condition and personality in order to provide the best management strategy.

**Ergonomics and postural awareness**

Postural considerations in relation to sleep position (described previously), work and home ergonomics are imperative in the individual’s management. Applying taping to the cervico-thoracic region to improve postural awareness (Fig. 19.8) will limit slumping while seated and reduce forward head posture. The tape can be worn for 2 days and then be removed for a day. If the patient is able to function without experiencing skin irritation, the tape can be trialed over one to three weeks. Patients need to be advised about potential skin irritation and also to remove the tape gently. The effect of posture and taping on the outcome of headache can be evaluated with a VAS scale or a pain diary. Taking pause breaks and changing one’s work posture every 20 minutes, prioritizing work, and conflict resolution are also important tools to manage headache.

**Spinal mobilization and exercise**

Spinal mobilization (Gibbons et al. 2006, Jull et al. 2002, Niere & Selvaratnam 1995) and low load exercises focusing on the craniocervical flexor muscles have been shown to benefit those
with cervicogenic headache (Jull et al 2002). In a randomized clinical study in 200 patients with chronic unilateral cervicogenic headache, spinal manipulative therapy (SMT) performed by physiotherapists, and combining SMT with a low load craniocervical flexor program significantly reduced the frequency and intensity of headache in a large majority of patients compared to controls on medication (Jull et al 2002). The investigation demonstrated that SMT or exercise with SMT is effective in the management of those with chronic cervicogenic headache and the effects maintained over a 12 month period. However, it is important while performing SMT or exercise therapy that the muscle and joint changes correlate with changes in headache pattern. If the headache is alleviated for only a few hours, despite improved upper cervical joint and muscle signs, it is wise to refer them to an appropriate specialist (Jull et al 2004). More details on the cervical rehabilitation program can be found in Chapter 15.

Patients with TMD may also benefit from a rehabilitative exercise programs to the temporomandibular region. Randomized clinical trials have been conducted in patients with TMD (de Wijer 2005, Michelotti et al 2004, van der Glas 2000). Exercise therapy was compared with occlusal splint therapy in 71 patients with ‘myogenous temporomandibular dysfunction’ (de Wijer 2005, van der Glas 2000). The findings of the study indicated that exercise therapy prescribed by physiotherapists to the temporomandibular region might be preferred to occlusal splint therapy due to lower costs, similar efficacy, and shorter treatment duration. In another study of 70 ‘myogenous TMD’ patients, education about their condition was compared with a combination of education and a home exercise program (Michelotti et al 2004). The exercise involved gently opening the mouth to the point of pain onset and maintaining the stretch for one minute. This exercise was performed a total of six times. Co-ordination exercises were also performed by opening and closing the mouth 20 times. The home program included diaphragmatic breathing and self mobilization of the masseters and temporalis. After 3 months the success rate in the education only group was 57% and 77% in the combination therapy group. These findings support education and exercises in patients with TMD.

Clinicians need to take care when prescribing mandibular exercises. There is a risk of over-stretching the TMJ, accentuating mandibular protrusion while performing mandibular exercises, and aggravating the condition. Hence, when prescribing these exercises, specific
instructions must be provided to move within pain free limits. From clinical experience and based on the biomechanical relationship of the cervical and temporomandibular regions, it is recommended that patients commence cervical exercises prior to commencing an exercise program directed at the temporomandibular region. For example they can perform upper cervical flexion in the sitting position (see Fig. 19.1b), or craniocervical flexion in the supine position (see Fig. 15.1).

Masticatory muscle relaxation can be achieved by placing the tongue on the floor of the mouth (Carlson et al 1997) and quietly breathing in and out for 5 sec. This exercise can then be repeated 5 times. Orofacial exercises can also be performed by placing the tip of the tongue on the upper gums and moving the tongue over the upper gums and then over the lower gums. The tip of the tongue can then be placed on the cheek pouch and slow circular movements performed in the clockwise and counter clock-wise direction without causing excessive stretching of the TMJ. The exercise program described in Chapters 20 and 25 can also be performed within pain free limits.

**Conclusion**

Temporomandibular and cervical disorders can refer pain to the temporal regions of the head. Diagnosis can be a complex challenge requiring a comprehensive history and clinical examination to differentiate TMD-related from cervicogenic headache, and to assess the possible contribution of bruxism. Sub-grouping can be useful in differential diagnosis and management, and in identify the need for referral to other health professionals. High quality research into chronic cervicogenic headache supports the use of spinal mobilization therapy and craniocervical exercise to produce long term positive outcomes in the management of this patient group. Similarly, research supports education in conjunction with exercise programs conducted by physiotherapists for those with TMD. The evidence also supports the view that relaxation therapy and stress management skills can produce positive outcomes. However, other treatment approaches which have sound anatomical, biological, and biomechanical paradigms are based on convention, and need to be monitored with appropriate outcome measures to justify ongoing use in clinical practice.

**References**


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Childs JD, Fritz JM, Flynn W et al 2004 A clinical prediction rule to identify patients with low back pain most likely to benefit from spinal manipulation: a validation study. Annals Internal Medicine 141: 920-928.


Hicks G E, Fritz J M, Delitto A et al 2005 Preliminary development of a clinical prediction rule for determining which patients with low back pain will respond to a stabilization program. Archives Physical Medicine Rehab 86 (9): 1753-1762.


Approaches


Sharav Y, Benoliel R 2008 Acute orofacial pain in... Elsevier, Edinburgh, p 75-90.
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