

Current Management of Temporomandibular Joint (TMJ) Disease

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Abstract

Temporomandibular joint (TMJ) disorder (TMD) is a collection of medical and dental conditions affecting the joint and muscles of mastication, as well as contiguous tissue components. This leads to pain and altered oral function and can lead to a poor quality of life. The majority of the population can be affected to some degree. Management of TMD is often simple in the first instance, but may involve complex decision making. This article summarizes the current investigative and treatment options available.

Magnetic Resonance Imaging is the recommended radiological investigation of choice for soft tissue assessment whilst TMJ arthroscopy supersedes most other invasive treatments available in relation management of symptoms and more accurate diagnosis. Should arthroscopy fail to achieve satisfactory resolution of symptoms a standardised treatment pathway based on arthroscopic findings involves appropriate assessment, possible open surgery or even TMJ replacement. This latter procedure is governed by NICE guidelines and delivers an excellent short and medium term outcome up to 20 years.

Keywords: Temporomandibular joint; Ginglymoid synovial joint; Replacement TMJ pain; Temporomandibular disorder; TMJ arthroscopy

Introduction

The temporomandibular joint (TMJ) is a load bearing modified bilateral, diarthrodial, ginglymoid synovial joint and permits movements in all three planes. Disruption to the anatomy of this joint from inflammatory changes and trauma could lead to a poor quality of life mainly through pain and functional deficit. TMJ disorder (TMD) is an umbrella term which encompasses pain and dysfunction of the muscles of mastication and TMJ. Over time these symptoms could translate into chronic conditions leading to intractable pain and limitations in jaw function. National Institutes of Health Technology Assessment Conference on Managing Temporomandibular Disorders defined TMJD as "a collection of medical and dental conditions affecting the joint and muscles of mastication, as well as contiguous tissue components" [1].

It is relatively common with a prevalence of 16-59% reporting symptoms and 33-86% exhibiting clinical signs. Twenty-five percent of these individuals will proceed to seek treatment [2]. Therefore it is not surprising that TMD is commonly encountered by both medical and dental professionals alike. Maxillofacial surgeons have the access to variety of investigative and treatment modalities but it is paramount to understand and be aware of the current practices of management of the TMJ and the degree of variability in the final outcomes. This article provides a brief overview of current practice and the developments within the management of TMJ disease.

Diagnostic Methods

Thorough clinical examination helps to localise and determine whether the origin of pain is primarily joint or muscle related. Tenderness over the masticatory muscles would indicate myofascial pain which can be diagnosed by the palpation of trigger points (tense tender bands of muscle). Studies have identified muscle palpation in the diagnosis of TMJD to be less reliable (kappa index 0.47) [3]. Joint pain could be triggered by the nerve endings in the capsular ligaments and retrodiscal tissues and could represent an underlying intra-articular pathology. Deviation of the opening path usually represents either problem with disc mobility, elongation of the coronoid process or ankylosis if lateral deviation is less than 8 mm [3]. The deviation tends to be towards the side of the pathology and is usually due to intra-articular problems.

Although panoramic radiography is commonly used as a screening tool in patients with TMD, doubts have been raised regarding the reliability in evaluating condylar morphology. Even though it may be suitable for assessing gross bony changes of the condyle; the head position can affect the images of the condyle and fossa significantly. This can lead to anterior condylar flattening, directing towards a misdiagnosis of osteoarthritis [4]. Lack of correlation between panoramic radiography and clinical findings makes this a weak radiological investigation in the management TMD [5]. It is however useful to exclude dental causes for pain and restricted mouth opening.

Cone Beam Computed Tomography (CBCT) is a suitable investigative tool to examine the TMJ without superimposition and distortion to determine the bone morphology, joint space and dynamic function. CBCT provides high-resolution multiplanar images and emits a significantly lower radiation dose compared with CT. CBCT machines are less bulky and available in the community,

whereas multiplanar CT is only available in a hospital environment. CT provides accurate hard tissue information but poor soft tissue visualisation [6].

CT as a diagnostic imaging tool for TMD has a reported sensitivity of 75% and a specificity of 100% for detecting bony changes [7]. Although the radiation dose involved in the imaging process is a concern, wide accessibility and better tolerance among patients makes it a diagnostic tool which should not be dismissed. In patients where Magnetic Resonance Imaging (MRI) is contraindicated, Multidetector CT (MDCT) remains the next suitable investigation of choice. MDCT have been successfully used to investigate and identify internal disc derangement, arthritis and other miscellaneous other conditions of the TMJ [8].

MRI remains the gold standard investigation to elicit TMJ abnormalities. Internal derangement related to disc displacement is a common MRI finding in patients with TMJ disorder and is present in 80% of patients consecutively referred for TMJ imaging. Disc displacement, joint effusion, mandibular condyle and marrow abnormalities can be better assessed using MRI [9]. MRI morphological manifestations of TMJ are shown to correlate well with symptoms and confirms the value of MRI in the diagnosis of TMD [10]. However, studies have shown that the diagnostic accuracy of MRI in relation to disc tear is only around 50% compared with surgical findings at arthroscopy or open surgery [11].

Conservative Management

Management of TMD involves a conservative and a surgical arm. Rest, occlusal support, non-steroidal anti-inflammatory drugs (NSAID) in combination can be used to treat majority of patients. Occlusal splints of all types have shown to reduce TMJ pain but the results are not significant [12,13]. These should cover the whole of the dental arch as localised devices can cause orthodontic tooth movements. Cochrane assessment shows no evidence for the use of occlusal modification in TMD [14,15]. Use of medications to combat symptoms of pain does not manage the underlying disorder [16]. Therapeutic exercises as a non-harmful adjunctive treatment is considered effective in the management of purely myofascial pain. The evidence for this is based on clinical experience rather than clinical trials [17]. It is important in all management techniques to “First do no harm” so irreversible changes which are not supported by adequate literature such as orthodontics, occlusal management, extractions etc. should be avoided.

Pain over the TMJ indicates joint involvement and can be confirmed by injecting local anaesthetic into the joint which should relieve the pain. Arthrocentesis involves the lavage of upper joint space and is minimally invasive. The TMJ is flushed under pressure to reduce inflammatory mediators, release any adhesions and improve joint mobility and pain. Studies have confirmed significant reduction in pain and mouth opening at 1-year follow-up after TMJ arthrocentesis thus concluding it to be a simple, minimally invasive procedure with a relatively low risk of complications and significant clinical benefits [18].

Currently there is no strong evidence to support the benefits of injecting corticosteroids to manage TMD [19,20]; but recent studies have shown some promise with Hyaluronic acid [21,22], although this is by no means conclusive. Myofascial pain may be managed by the injection of botulinum toxin into areas of muscle spasm [23]. Amitriptyline and gabapentin have also been shown to improve pain

in patients with myofascial pain but should be used in conjunction with a multidisciplinary pain team [24].

Proliferation treatment also known prolotherapy is regenerative injection therapy practiced since 1937. Non-pharmacological solutions such as dextrose, psyllium seed oil, phenol and glycerin is injected into the TMJ region. In theory prolotherapy initiates a non-inflammatory or inflammatory process which leads to deposition of additional fibres that will strengthen ligaments and possibly promote the release of local growth factors [25,26]. Studies have confirmed improvement in symptoms of pain and dislocation following prolotherapy, especially in patients who have had conservative treatment with intraoral appliances and physical therapy [27]. This is weak evidence and UK trials are currently under way.

Surgical Management

Arthroscopy

TMJ arthroscopy is widely used in the diagnostic and treatment of joint related TMD. This is a low risk procedure with significant benefits which also provides diagnostic support if required for ongoing management. It may be performed either under local or general anaesthesia and usually requires a short post-operative stay. Availability of small, 1.2 mm arthroscopes has shown maintained outcomes and diagnostic ability compared with larger scopes which potentially cause more morbidity [28]. Restricted view of the lower joint space and operator dependant results can be a drawback of this procedure. Since the majority of cases with restricted mouth opening is due to involvement of the upper joint space, TMJ arthroscopy is invaluable in visualising this space prior to any further management. Arthroscopy and arthrocentesis have shown therapeutic success in reducing pain whilst improving the functional outcome in up to 90% of cases but no significant therapeutic difference was noted between these two modalities of treatment [29,30]. Cochrane review of arthroscopy for TMJ disorders identifies a reduction in pain after 6 months but in comparison to open surgery it was more effective after 12 months. No difference was noted in mandibular function [31].

Open Joint Surgery

Similar results have been reported following open and arthroscopic joint surgery for internal derangement of the TMJ and hence initial arthroscopy which is minimally invasive should be the preferred choice [32]. Despite this open joint surgery is still advocated for certain TMJ conditions. Eminectomy has been used for the treatment of recurrent dislocations and disc displacement with associated joint pain with favourable results but lacks evidence to support positive outcomes for management of TMJ pain [33]. Other forms of open joint surgery (disc plication, discectomy and condylar shave) have their exponents, all suggesting 80% benefit following surgery, however recent reports suggest that outcomes are not as good in patients where prior arthroscopy has failed suggesting that some of the good results from open surgery relate to those cases where arthroscopy alone would have been beneficial [34]. Condylar shave is a suitable option to treat condylar hyperplasia and remodelling of joint surface for degenerative progress in internal derangement but there are no long term outcome studies [14].

Discectomy is indicated for the grossly damaged discs which are not salvageable. This is a good choice of treatment for patients with reciprocal clicking or chronic closed lock due to disc disease [35], but

has poorer outcomes when prior arthroscopy has failed [36]. Although several interpositional materials have been tried, an ideal replacement following TMJ discectomy has not been determined [36]. Whether the disc should be replaced at all is debatable. If these treatment options fail to deliver a good quality of life for the patients and further surgery is indicated there is little to offer other than total joint replacement.

Despite the concept of total joint replacement originating in the 19th century it has only been during the last three decades that TMJ replacement has been given serious consideration due to the long term success of Christensen prosthesis. Currently there are three prostheses available in United Kingdom (UK) which includes TMJ Medical (formerly Christensen), TMJ Concepts (formerly Techmedica) and Biomet (formerly Lorenz) prostheses. The TMJ Medical (Christensen) prosthesis is metal-on-metal cobalt-chrome alloy with around 10% exhibiting a foreign body reaction [37]. The long term follow up with this type of replacement was based on the old acrylic on metal model but showed good outcome up to 10 years with failure due to wear of the acrylic component. The TMJ Concepts prosthesis is custom made and has a good success rate reported at 14 years [38,39], but longer in case presentations and company data. This and the Biomet prosthesis are both high molecular weight polyethylene fossa with a cobalt chrome condylar component similar to total knee replacement. Biomet (Lorenz) have a stock and custom prosthesis dependent on whether the stock prosthesis can be made to fit the patient. Patients who undergo TMJ replacement often have had previous surgical interventions thus making them more susceptible for significant post-operative morbidity usually involving the facial nerve. Despite this at one year and beyond function improves by 90% and pain reduces by 90%, with associated improvements in mouth opening [40].

In UK the National Institute for Health and Clinical Excellence (NICE) has issued guidance on total prosthetic TMJ replacement [41]. These guidelines are comprehensive and much more stringent when compared to guidelines available for other joint replacements. Currently 16 surgeons are involved in TMJ replacement in UK and collectively they have established a TMJ replacement database with the support of BAOMS (The British Association of Oral and Maxillofacial Surgeons). Between 1994 and 2012; 402 patients had 577 joints inserted [42]. Despite the cost and morbidity; studies have provided good evidence that total TMJ replacement has good outcomes in relation to function and pain with few complications of note [40].

Summary

TMD is a heterogeneous term which encompasses a variety of signs and symptoms. History, clinical examination and appropriate conservative management should precede further investigations as indicated by an appropriate treatment plan to achieve a good overall outcome. Other TMJ pathology should be considered in the differential diagnosis. MRI remains the investigation of choice whilst TMJ arthroscopy should precede more invasive treatment modalities. Open surgery and joint replacement should be reserved for those who have failed less aggressive treatments. Joint replacement is strictly governed by NICE guidelines and should only be carried out by an appropriately trained surgeon in the UK. Overall outcome following TMJ replacement remains good.

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