Overview and Update on Treatment of Common Temporomandibular Joint Disorders

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This article has been selected by the Editorial Board of the Hong Kong Medical Diary for participants in the CME programme of the Medical Council of Hong Kong (MCHK) to complete the following self-assessment questions in order to be awarded one CME credit under the programme upon returning the completed answer sheet to the Federation Secretariat on or before 30 June 2009. One Credit will be awarded for the Dental Council of Hong Kong's CPD Program for Practising Dentists and one credit under the CDSHK CME Program (both subject to approval).

Introduction

Temporomandibular joint disorder (TMD) is one of the most common causes in patients presented with orofacial pain[1] (Jin et al 2004). In Hong Kong, 33% of the population reported to have jaw pain, and 5% of these patients actually had frequent pain with moderate to severe degree[2] (Pow et al 2001). These symptoms can be very debilitating which are not only affecting the patients physically but also psychologically. One study showed that 39.8% of TMD patients experienced moderate to severe depression, and psychosocial dysfunction was observed in 4.2% of the patients[3] (Yap et al 2003). The most common disease entities of TMD are 1) Myofascial pain, 2) Internal derangement and 3) Degenerative arthritis.

The muscles of mastication (temporalis, masseter, lateral and medial pterygoid) are responsible in myofascial pain. Micro- (e.g. bruxism) or macro-traumas (e.g. local trauma) to the muscles are thought to be the causes and resulted in painful myositis. Sometimes emotional stress and tension could cause and worsen the pain.

Internal derangement involved the actual joint apparatus. It usually presents with forward displacement of the articular cartilaginous disc overlying the condyle of the temporomandibular joint (TMJ). The two common clinical entities are 1) Disc displacement with reduction and 2) Disc displacement without reduction.

The study by Yap[3] has shown that muscle disorders (myofascial pain) were found in 31.4% of the TMD patients; disc displacement disorders (internal derangement) were found in 15% and arthritis were found in 13% of the patients.

Myofascial Pain

It is the most common type of TMD, which is predominant in females with a mean age around 33 years old. Masseter muscles are frequently involved and followed by the temporalis. Pain usually located on the cheek areas, and is elicited on eating, or during mouth opening. The muscles are tender when palpated, especially on the trigger point. Mouth opening could be normal or limited (due to muscle spasm). The pain also can radiate as headache, neck, shoulder and even back pain. These symptoms often improve without treatment in weeks to months. However, some individuals will experience an increase in symptom severity, and may develop long-term chronic jaw pain.

Classical Treatment for Myofascial Pain

- Educate the patient on muscle fatigue and spasm as the cause of pain and dysfunction.
- Emphasise on the avoidance of clenching and grinding.
- Institute soft diet; avoid hard food and chewing gum.
- Apply moist heat to increase the circulation around tense jaw muscles.
- Isometric jaw exercise.
- Use of oral appliance (splint), to prevent muscle overuse, especially for bruxers.
- Analgesics such as NSAID.
- Muscle relaxants (valium).
- Refer patient for psychological counselling to identify stresses.

New Treatment for Myofascial Pain - Botulinum Toxin-A (BTX-A) Injection

Most of the cases of myofascial pain can be managed by the atraumatic/conservative treatment mentioned above. However, there are still a small number of refractory cases with no improvement at all. These patients are very difficult to handle both physically and psychologically. Traditional muscle relaxants and NSAID therapy can have serious and unwanted side effects unacceptable to the patients. BTX-A injection offers an alternative for those who have failed in conservative treatment and has shown promising results in myofascial pain patients[4]. Its efficacy has also been studied, and reported that there was remarkable improvement observed in bruxers with myofascial pain[5] (Guarda-Nardini L 2008).

Kurtoglu and his colleagues[6] evaluated the effects of BTX-A injection in a group of non-bruxers with myofascial pain. Pain intensity and electromyography were measured. The results revealed a significant reduction in pain as well as improvement in patients'

psychological status. The only side effect was decrease in the action potential of the masseter muscles, which means the masticatory forces were reduced. However, this effect is usually temporary.

Internal Derangement

Internal derangement is characterised by a progressive anterior disc displacement. It is often associated with a capsulitis, making pain a common feature.

Pathogenesis

Nitzan et al.[7] proposed that there was a reversible restriction in gliding movements of the disc caused by its adherence to the fossa. Such adherence may arise from a number of possible causes such as fibrous adhesions, severe friction between damaged rough surfaces, stickiness that may be a direct result of an increase in synovial fluid viscosity, or a vacuum effect. A vacuum effect or alteration in synovial fluid consistency may create the environment for a suction effect of the disc to the fossa, restricting gliding movements and therefore resulting in displacement of the disc.

1) Disc Displacement with Reduction (DDWR)

DDWR derangement could be found with a clicking sound over the joint without associated pain. It is seen in over 50% of normal subjects. However, there is another type of DDWR derangement which has clicking of the joint associated with pain. The clicking is due to the noise the condyle makes as it moves under the anteriorly displaced disc. The pain is due to the stretching and subsequent inflammation of the retrodisc pad.

2) Disc Displacement without Reduction (DDWOR)

It is characterised with a persistent closed lock. The closed lock is due to the inability of the condyle to slide under the anteriorly displaced disc. Hence, there is usually no associated click or pop on physical exam and mouth opening is limited.

Classical Treatment for Internal Derangement

DDWR without pain often requires no intervention, and treatment for the painful type of DDWR and DDWOR is similar to those in myofascial pain. Instruction of a soft diet and jaw rest is given as is the prescription of NSAIDs and muscle relaxants (valium). Failure of these methods requires the addition of a splint to attempt to reposition the condyle. The purpose is to reposition the condyle into a more favourable position related to the disc. Clicking is usually not eliminated, but it may be reduced to a soft pop with reduced pain. If repositioning with a splint fails, arthroscopic or open surgical repair is recommended. The purpose of these procedures is to surgically remove adhesions and to reposition the disc into a favourable position.

New Treatment for Internal Derangement - Sodium Hyaluronic Acid Injection

Open joint surgery to reposition the displaced disc was always the choice in the past when conservative approaches failed. However, morbidity to the facial nerve and recurrence of the disc displacement were frequently observed. In addition, the focus was shifted from a disc displacement theory (Nitzan et al.) to more emphases on the biochemical causes. The inflammatory mediators such as cytokines, interleukin 6 were found responsible for the pain inside the joint[8,9]. The idea of using high molecular weight hyaluronic acid for intra-articular injection was borrowed from the orthopaedics, and which showed promising results in treating TMJ pain with no additional morbidity[10,11].

In a case series, 27 local Chinese patients with non-reduced disc displacement were treated with articular injection of sodium hyaluronate. The solution was mainly injected into the superior joint space (space between the articular disc and the glenoid fossa of the skull). There are a total of 34 injection sites in 27 patients. The age range was from 21 to 63 years, with a mean of 39.3 years. Two cycles of injections of high molecular weight sodium hyaluronate were performed in alternative weeks. Pain intensity was measured by the visual analog scale. Maximal mouth opening, clicking joint noise, and lateral movement were measured before and after injections for more than 6 months. The mean pain intensity decreased from 4.2 pre-operatively to 2.6 six months after the injections, and this change was statistically significant.

Besides reduction in pain, significant improvement in the maximum mouth opening was also observed. In conclusion, this intra-articular injection using high molecular weight sodium hyaluronate looks very positive for patients affected by non-reduced disc displacement and is encouraged to be used as a primary treatment to replace the open joint surgery[12].

Degenerative Arthritis

Degenerative arthritis can be either primary or secondary. Primary disease is seen in old people and is a disease of wear and tear. Patients are usually asymptomatic, and when symptomatic, the complaints are usually mild. Secondary degenerative arthritis occurs secondary to trauma or chronic bruxism. It occurs in younger people and the symptoms are much more severe. Radiographic findings consist of a primarily unilateral lipping of the joint with osteophyte formation or erosion and flattening of the articular surface of the condyle.

Treatment for Degenerative Arthritis

Treatment of degenerative arthritis is similar to that of myofascial disorders and early internal derangements. NSAIDs and muscle relaxants with a soft diet are the primary treatment. Bite appliances are added as necessary. When conservative medical management fails to improve symptoms after a 3-6 month trial, surgery is considered. Surgical intervention includes removal of any surgical capsular abnormality, including osteophytes, until the joint space is smooth. A condylar shave is a procedure, which means removing the entire cortical plate, this is not routinely performed as resorption of condyle is a known complication.

Image-guided Hyaluronate Injection in TMJ Inferior Joint for Degenerative Arthritis

Case Report

A 18-year-old lady with history of chronic right TMJ pain and limited mouth opening, was prescribed with conservative treatment by her dentist for at least 9 months. However, no improvement of symptoms was seen. She was subsequently referred to our centre for further management. Clinical examination revealed pain on the right pre-auricular region in maximal mouth opening; there was no clicking on both joints. Maximal mouth opening was 22mm. No muscle tenderness was noted and thus myofascial pain was excluded. Magnetic resonance imaging (MRI) was performed to confirm the diagnosis of the degenerative arthritis in the right TMJ. The MRI image showed flattening of the condylar head of the right TMJ with no disc displacement (Fig.1). After confirming the diagnosis, treatment options were discussed with the patient. However, there were not many alternatives in this case as she had gone through a long period of conservative treatment including the use of oral appliance. The only choice was open joint surgery, but the patient was very reluctant to this option. Finally, intra-articular injection using hyaluronate was proposed and the patient agreed.

Figure 1. MRI image showing flattening of the right condylar head

Figure 2. The Stryker eNlite Navigation System

In our previous experience, we have injected hyaluronate into the superior joint space to treat the non-reduced disc displacement, which was relatively easier to access as the superior joint space is bigger in volume. However, in this case the disease involved the condylar head, which was the inferior joint space. The accessibility of the inferior joint space was much more difficult. Thus we decided to use the image-guided technique to assist the injection. The navigation machine we used was the eNlite Navigation System from Stryker (Fig 2). MRI data were then imported into the navigation system and a 3-dimensional image of the patient was reconstructed (Fig 3). Preoperative planning of the entry point of the needle, needle pathway and target point could be achieved on the 3D image using the designated software.

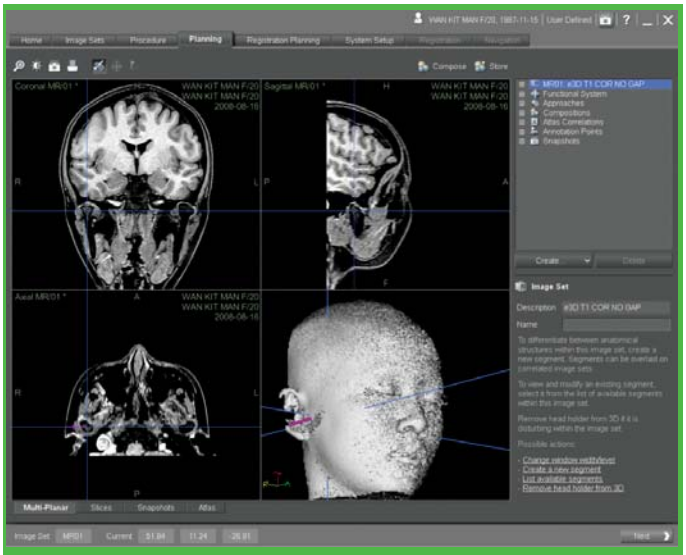

Figure 3. Reconstructed 3D image for MRI Data

Intra-operatively, the patient was prepared by placing the sensors on her head for calibration of the position of the needle (Fig 4). The solution we used was hyalgan (sodium hyaluronate, Fig 5). The injection was carried out under intravenous sedation to prevent unnecessary movement of the patient. After calibration of the needle, the injection began with inserting the needle in the pre-determined entry point and the monitor on the computer showed the real-time position of the needle until the target point is reached (Fig 6 &7). The hyaluronate solution was injected into the joint until a resistance and rebound of the needle was seen. A total of 1.5ml solution was injected.

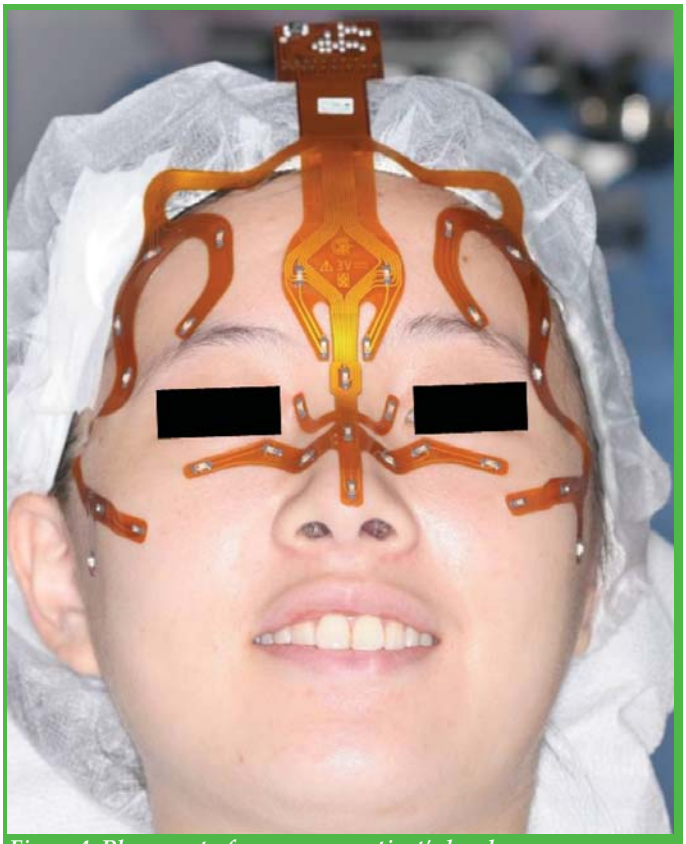

Figure 4. Placement of sensors on patient's head

Figure 5. Sodium hyaluronate (Hyalgan)

Figure 6 Injection of sodium hyaluronate

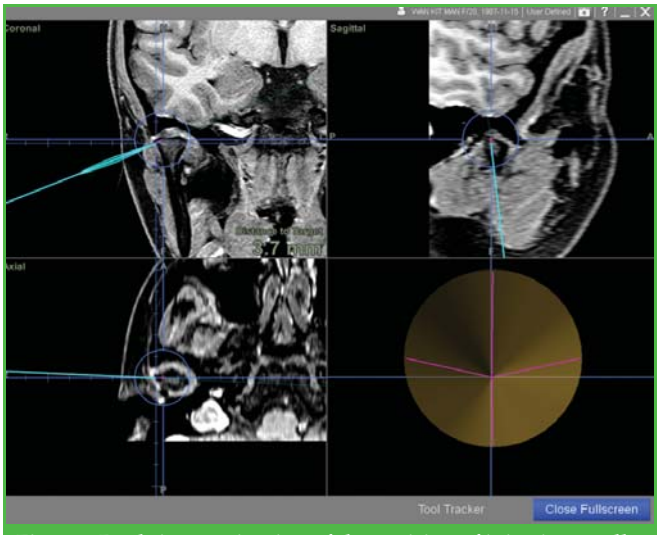

Figure 7 Real time navigation of the position of injection needle

Post-operative 1 week review showed minimal swelling and pain on the injection wound, and no abnormal feeling at the joint by the patient. At 6 month post-op, the pain intensity (VAS) decreased from 7 to 4 according to the patient, and maximal mouth opening increased from 22mm to 34mm.She was able to eat with lesser pain than previously. In conclusion, injection into the inferior joint space is feasible with the assistance of image-guided technique, and the hyaluronic acid seems effective in treating pain elicited by arthritis. However, further studies should be carried out, so that the effect can be evaluated thoroughly.

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