

Current Concepts in the Surgical Management for Temporomandibular Joint Osteoarthritis

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Abstract

The aim of this paper was to give an overview of our experience about the treatment methods and results we have used in the TMJ osteoarthritis patients treatment. The stages of TMJ disorders are usually classified according to Wilkes [1]. Correct diagnosis is important for successful treatment and decision must be based on clinical symptoms and radiological findings, including the history and other diagnostic data as synovial fluid (SF) components, blood analysis *etc.* Usually SF aspirates are obtained during arthrocentesis or immediately before arthroscopy and used for determination the levels of intracellular inflammatory and pain mediators. In case of episodes of pain, opening reciprocal clicking, locking in the TMJ a conservative therapy with drugs, occlusal splints is indicated (Wilkes stages I-II). In stages III-V surgical procedures as arthrocentesis, arthroscopy or arthrotomy are indicated.

Keywords: *Temporomandibular Joint Osteoarthritis; Surgical Treatment*

Introduction

TMJ disorders are classified as follows [2]:

1. Inflammatory arthritis
 - a) Acute, chronic.
 - b) Infectious: Nonspecific, specific (gonococcal, syphilitic, tuberculous, Lyme disease associated arthritis).
2. Osteoarthritis/osteoarthrosis (most often disorder).
3. Injuries:
 - a) Luxation, concussion, fracture.
 - b) Microtrauma.
4. Ankylosis (fibrous, fibro-osseous, osseous).
5. Systemic conditions affecting the TMJ: rheumatoid arthritis, juvenile arthritis, psoriatic arthritis, gout, pseudogout, calcium pyrophosphate deposition disease (CPDD).
6. Tumours (benign and malignant).
7. Congenital disturbances: I and II branchial arch malformations, condylar hypo-, hyperplasia, idiopathic condylar resorption.

Osteoarthritis is one of the most common among the temporomandibular joint (TMJ) disorders. There are data that 38 - 50% of adults population have signs of TMJ [3,4]. Osteoarthritis affect the hard structures of the joint that results in destructive changes of bone and chondral tissues, Presence of adhesions, fibrillations, granulations, calcification granules etc. in the joint space are characteristic in case of osteoarthritis. In systemic diseases (psoriasis, rheumatoid arthritis etc.) involvement of TMJ occurs [5]. Knowledge about the pathogenesis of the TMJ osteoarthritis has been improved giving a possibility to achieve more efficient treatment results. Several cytokines and intracellular inflammatory mediators are identified in the synovial fluid as tumor necrosis factor (TNF α), interleukin-1 β (IL-1 β), prostaglandin E2 (PgE2), leukotriene B4 (LB4 and pain mediator serotonin 5-HT [6,7]. It is found that genetic factors can play a role in the aetiology of persistent pain condition in the TMJ. The associations between TMJ disorders and genes HTR2A and COMT have been reported [8,9]. AS early diagnosis is the key to successful treatment, the scores of subjective and clinical symptoms, and parameters as maximal interincisal opening (MIO), Visual Analogue scale (VAS), Activity of Daily Living (ADL) for pre- and posttreatment are to be compared. The associations between pain and bone characteristics on the ADL in osteoarthritis patients is found [4,6]. The following bone changes in case of osteoarthritis have been found by using OPTG, CT, MRI: erosions, subarticular sclerosis, condylar deformity, articular surface flattening, osteophytosis, intraarticular bodies, reduced space, ankylosis. MRI has diagnostic value to establish joint specific soft tissue changes and allows to analyse disc position [5,10].

Aim of the Study

The aim of this review paper is to give an overview of the treatment methods and results which we have used in the TMJ osteoarthritis patients treatment.

Treatment methods

In clinical practice the stages of internal derangements of the TMJ are usually classified according by Wilkes [1].

Treatment methods of osteoarthritis are as follows: conservative with drugs, arthrocentesis, arthroscopy, arthrotomy (open reduction), joint replacement, prosthetics (occlusal splints), physiotherapy, rehabilitation.

Conservative treatment with drugs

In conservative treatment of arthritis or osteoarthritis non-steroidal anti-inflammatory drugs (NSAIDs) mainly diclofenac-Na, ibuprofen, naproxen, tolfenamic acid, etoricoxib, aceclofenac etc. are used [11,12]. These drugs inhibit the synthesis of intracellular inflammatory mediator PGE2. It is shown that PGE2 stimulates resorption of bone tissue [13,14] and in case of TMJ arthritis the level of PGE2 in synovial fluid aspirate was higher than normal, thus indicating a pathological condition of an inflammatory nature [7]. A comparison of therapeutic efficacy and tolerability of NSAIDs is also performed. It was found that tolfenamic acid was statistically superior to diclofenac-Na., etoricoxib has been superior to diclofenac-Na for the treatment of osteoarthritis of joints [12,15].

Arthrocentesis

Arthrocentesis is considered as a treatment method between nonsurgical treatment and arthroscopy or arthrotomy. Indications for arthrocentesis are radiological bone changes in TMJ characteristic to osteoarthritis and non effectiveness of conservative treatment with NSAIDs. The aim of arthrocentesis is to aspirate synovial fluid for diagnosis, to analyse the levels of mediators and cytokines in the aspirate, perform lavage of the joint space and insert medicaments in the joint space if indicated. Arthrocentesis is widely used in the treatment of TMJ disorders as well as diagnostic purposes [16,17]. Methods of arthrocentesis are as follows: direct method, pumping, single irrigation, irrigation under pressure, "push and pull technique" [18-21]. Good results have been achieved by intramuscular botulinum toxin injection additional to arthrocentesis in the management of TMJ disorders [22]. Arthrocentesis is performed under local anaesthesia usually with 2 mL 2% Lidocain solution by blocking the auriculotemporal nerve. Mainly the saline solution (NaCl 9 mg/mL) is used for irrigation (Figure 1).



Figure 1: The needle is inserted into posterior part of the upper joint compartment and connected with the three-way stopcock for arthrocentesis in the open mouth position.

Arthrocentesis can release intracapsular adhesions, especially these are released by irrigation under pressure in order to achieve resolution of symptoms. Filling upper compartment under pressure gives a possibility to lubricate the joint space, brake down adhesions, allowing remove degenerative products in the synovial fluid (calcificates, chondromatosis granules). On the bases of our results [21-23] arthrocentesis with the push and pull technique offer good results with regard to reducing pain, increasing MIO and improving function. Stable access to the upper space of the TM joint and limited trauma are the advantages of arthrocentesis. Arthrocentesis is indicated. for Wilkes`stages II-III.

Arthroscopy

Arthroscopy is performed under visual control of internal TM joint structures. Indications for arthroscopy are patients with osteoarthritis who had undergone and failed to respond to the treatment with NSAIDs and other drugs or arthrocentesis, mainly the patients with Wilkes`stages III, IV, V. Figure 2 shows arthroscopy (arthroscope KARL STORZ GmbH&Co, KG) under nasotracheal general anaesthesia.



Figure 2: Forward - oblique telescope 30° (HOPKINS®) fiber optic light transmission incorporated and outflow cannula are inserted into the right upper TMJ space.

Beforehand a marking lines and puncture points were made on the skin surface. For distension of the superior compartement 1% lidocain solution 2 mL was injected Through a small skin incision from the tragus 1,0 cm a puncture with a trocar with a blunt obturator was inserted into posterior recess of the TMJ upper space. Another skin incision was made ca 0,75 cm from the first skin incision for an outflow cannula. In case of osteoarthritis several pathological changes are found as adhesions, fibrillations, irregularities of the articular surfaces, destruction of bone structures, calcifications etc. In some cases eburneation and chondromatosis granules are found (Figure 3A and 3B).

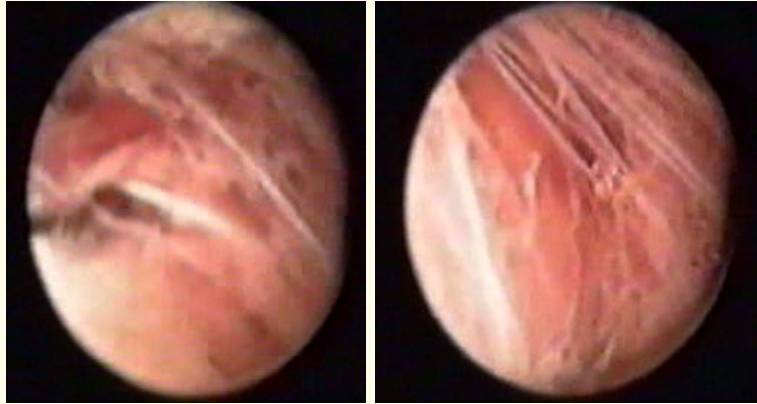


Figure 3: A. Superior compartment of the left TMJ. Adhesions and fibrillations with “crab meat” appearance, mild granulations, irregularities of condylar surface. Hyperaemia of the capsular wall.
B. Superior compartment of the right TMJ, chondromatosis granules in the center, pronounced fibrous adhesions, fibrillations and fibres are seen. Synovial inflammation is localizing in the posterior part of the disc.

It is accepted that arthroscopy is a safe, minimally invasive means of treating TMJ osteoarthritis [24,25]. Pre- and postoperative MRI revealed that disc position remained anteriorly without reduction after arthroscopic surgery, disk mobility increased and deformity of the disks progressed [26]. It has been an effective method of TMJ disorders refractory to non-surgical treatments. Improvement in MIO and VAS data is also observed over the 5-10 years period of time [24,27]. Application of TMJ arthroscopy in case of osteoarthritis have led to the acceptance this minimally invasive means in treating of intra-articular and degenerative TMJ problems.

Arthrotomy

Although some TMJ osteoarthritis patients are successfully treated by arthrocentesis or arthroscopic surgery [3,22,28] there are still patients for whom an open reduction is necessary with disc surgery. Erosions, large osteophytes on the condyle which are very difficult to shave arthroscopically need arthrotomy. Surgical interventions for arthrotomy are as follows:

- a) Discoplasty, discectomy, discopexia
- b) Eminectomy
- c) High condylar osteotomy.

Central cartilaginous perforations need an arthrotomy and possibly discectomy. Arthrotomy and disc surgery are necessary e.g. in case of painful clicking in osteoarthritis patients with limited mouth opening with anteriorly displaced, non-reducing disc, or it is perforated or

rigid, misshaped. Healing of the disk perforations is also described [3]. Disc repositioning using bioresorbable screws for the disc fixation to the condyle is reported [29]. Synovial chondromatosis is observed in the patients due to TMJ osteoarthritis where open reduction is indicated in order to remove nodules [30] (Figure 4).

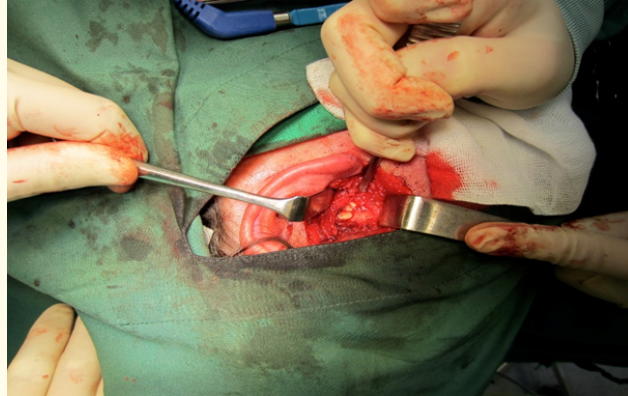


Figure 4: Arthroscopy of the right TMJ. Capsule is incised and upper compartment is exposed. Numerous opalescent nodules are visible.

Open joint procedures are developed for reposition the displaced disc or to perform discoplasty. Ipsilateral myofascial temporal pedicle flap is used for the interpositional arthroplasty in disc formation [31].

The results of arthroscopic surgery and arthrotomy in two centers, using the Jaw Pain and Function Questionnaire were compared and it was concluded that these treatment results with arthroscopic surgery were comparable with open reduction treatment [32]. The advantages of arthroscopy compared with arthrotomy are that arthroscopic surgery is less invasive and associated with lower morbidity.

Conclusion

In case of TMJ osteoarthritis it is important:

- a) To estimate the extent of osteoarthritis pathology and on the bases of received data to choose the least morbidity procedure.
- b) For the patients with episodic signs and symptoms a conservative treatment mainly with drugs (Wilkes' stages I-II) are indicated.
- c) For Wilkes' stages III-V arthrocentesis, arthroscopy or arthrotomy is indicated.

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