

Management of Temporomandibular Joint Dislocation: Review of literature



Medical Science

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ABSTRACT

Dislocation of the temporomandibular joint (TMJ) is the dislodgement of the head of the condyle from its normal position in the glenoid fossa. Subsequently, the facial profile changes while the ligaments around the joint often stretch with intra-articular effusion, causing severe discomfort and difficulty with speech and mastication from muscle spasms and joint pain. Although manual reduction is the primary choice of treatment, patients presenting with recurrent or prolonged dislocations require conservative and/or surgical methods. Though there is a plethora of causes resulting in TMJ dislocation its management still remains an enigma. The aim of this review is to project a comprehensive understanding of the incidence, symptoms and management of all types of TMJ dislocations. This paper also intends to highlight the importance of diagnosis for successful management of these disorders in the light of literature review.

Introduction

The temporomandibular joint (TMJ) is the only movable joint of the massive cranio-facial structure, helps to unite the base of the skull to the mandible.¹ Dislocation of the TMJ occurs when one or both mandibular condyles are displaced in front of the articular eminence. It may be reducible when it returns spontaneously to the glenoid cavity (subluxation), or irreducible when one or two condyles remain dislocated (luxation). In this position, the mouth remains open due to the action of the elevator muscles with or without lateral deviation, depending on whether the dislocation is unilateral or bilateral.² It can also be acute, chronic protracted or chronic recurrent; anterior-medial, superior, medial, lateral or posterior dislocation.³

Etiopathogenesis

Dislocation of TMJ is generally of unknown origin, however it often occurs in context of yawning, and less frequently after a burst of laughing or relatively mild facial trauma (slap, punch on the chin).^{1,4} Cases of iatrogenic TMJ dislocation has also been mentioned earlier probably due to anesthesiologist's manipulation during surgical procedures or others like transesophageal echo probe placement, orotracheal intubation and laryngeal mask airway placement.^{5,6} Cases of spontaneous dislocation of the TMJ have been reported during sedation. TMJ dislocation in a lady during stressful labour is also reported.¹ Several theories have been put forward to explain the onset of TMJ dislocation. It is commonly associated with poor development of the articular fossa, laxity of the temporomandibular ligament or joint capsule, and excessive activity of the lateral pterygoid and infrayoid muscles due to drug use or disease. Additionally some disorders of collagen metabolism such as ligamentous hyperlaxity and Ehler-Danlos syndrome⁷ may also be related.²

Incidence

TMJ dislocation represents 3% of all dislocations throughout the body.⁵ Spontaneous anterior TMJ dislocation is not a common condition, with a reported annual incidence of 5.3 per 100 000 patients presenting to the emergency department.⁸ A female predominance is found in the literature, and would be linked,

according to some authors; due to hormonal imbalance.¹ The anterior subtype is most common.^{9,10} On the contrary, posterior, superior, or lateral dislocations of an intact condyle are very rare. The rarity of these dislocations can be attributed to the varying anatomy of the condyle, the direction of pull of muscles attached to the condyle and low incidence of skull base fractures from an indirect blow.⁹

Clinical presentation

Many patients function well with this condition for years and have no functional disorder as a result of the dislocation. Dentulous patients may complain of a malocclusion when it first occurs, but those without teeth may never do so.¹¹ TMJ dislocation may cause joint locking, and limited TMJ motion which limits the performance of daily activities, e.g., eating and speaking.¹² Other signs and symptoms include mandibular pain, an inability to occlude the teeth, pre-auricular depressions, and a prominent mandibular head anteriorly (anterior variant).¹⁰

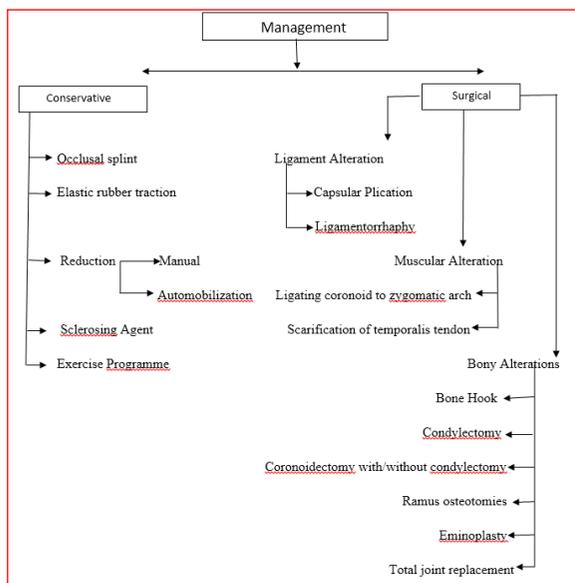
Acute dislocation of the TMJ is a condition where the condyle moves suddenly anterior to the articular eminence and gets locked. Chronic recurrent dislocation is characterized by a condyle that slides beyond the eminence and then returns to the fossa.¹³ Clinical presentation of anterior TMJ dislocation after anesthesia can vary significantly. In other cases, however, the presentation can be subacute, mouth opening less obvious and pain less impressive, so the diagnosis can be easily missed.⁵ Facial nerve damage might accompany lateral displacement of the intact ramus/condyle because the degree of displacement will usually result in traction on the facial nerve. This neuropraxia resolves within 6 to 9 months.⁹ Usually, whenever the signs, symptoms, and clinical course are atypical to a common mandibular fracture an unusual condyle dislocation should be considered. In such unusual cases it is always better to advise CT scans and in particular 3D CT.⁹

Diagnosis

The diagnosis of these dislocations is based on the clinical features. However confirmation can be achieved by radiological im-

aging such as orthopantomograph and 3D CT scan.

Management of TMJ dislocation:- It can be broadly categorized as below



Conservative approach

Occlusal splint/occlusal device/orthotics:- It can be made to cover the occlusal surfaces of maxillary or mandibular teeth and can be fabricated from many different materials, giving it a hard, soft, or intermediate feel. It is beneficial for masticatory muscle pain, TMJ pain, restricted jaw mobility, and TMJ dislocation.^{14,15}

Elastic rubber traction:- Elastic rubber traction with arch bars and ligature wires with elastic bands are useful to achieve reduction in chronic protracted dislocation. Prior to the use of elastic bands, acrylic blocks or impression compound spacer can be placed in between upper and lower teeth to depress the mandible and open up the bite posteriorly, this helps displace the condyle downwards, the elastic bands that are applied front backwards helps to push the mandible/condyle backwards into the fossa after removing the spacer in about 72 hrs to 1 week. Extrusion of the teeth has been reported and it is corrected with bite plane.³

Reduction:- This can be accomplished by 2 method

Manual reduction:- It can be accomplished by several methods

Nélaton maneuver:- operator places the pads of his thumbs on the molars of the patient with his fingers hooked around the mandibular angle. After obtaining a sufficient relaxation of the patient, the operator exerts a gentle and steady pressure directed downward and exaggerates mouth opening. It thus facilitates the maneuver by gently pushing the mandible backward to re-integrate the heads in the condylar glenoid.¹ This intraoral approach has disadvantages including potential bite wound for the practitioner, difficulty overcoming strong masticatory muscle contractions, and inability of the patient to tolerate the procedure due to pain without local or general anesthesia.¹²

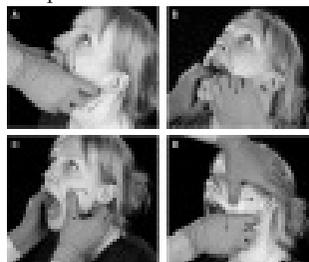
The Hippocratic method (fig 2A) is the most frequently described and involves the examiner standing in front of the patient and placing a gloved thumb on the posterior lower molars bilaterally with fingers wrapped laterally around the mandible. A constant inferior force is then applied and the mandible is eased back into the glenoid fossa posteriorly⁸

The wrist pivot method (fig 2B) involves the examiner in front

of the patient placing gloved thumbs at the apex of the mentum with fingers inside the mouth on the occlusive surface of the mandibular molars. A superior force is applied through the thumbs and inferior pressure with the fingers with a “pivoting” motion occurring at the wrists until the reduction is made.⁸

The extraoral method requires the examiner to apply a postero-inferior force to the coronoid process with the thumbs and has the advantage of reducing the risk of accidental human bite injury to the examiner (fig 2C).⁸

The combined ipsilateral staggered technique involves the reduction of each TMJ separately. The examiner uses one thumb intraorally to exert inferior pressure to the occlusive surface of the lower molars while simultaneously applying further postero-inferior pressure to the ipsilateral coronoid process extraorally (fig 2D). The maneuver is repeated on the contralateral side to complete the reduction.⁸



Reduction methods. (A) Hippocratic (B) wrist pivot (C) extraoral (D) combined

TMJ automobilization:- It involves approximately 3-second-long incisal bite on an improvised compressible wedge(3cm thick created by rolled washcloth) placed between patients incisors. The wedge is compressed to approximately 5–10 mm in thickness, causing the patient’s mouth to be near occlusion. Repeat the procedure with a 6 cm thick wedge; compressing it to approximately 1–2 cm.¹²

Manual manipulation can also be done under local anesthesia, sedation, or general anesthesia with the use of muscle relaxants.¹⁶ Masseteric nerve block, deep temporal nerve block, and lateral joint infiltration are used to reduce pain and spasms during manual reduction of a luxated mandible. This technique is quick, safe, and easy to implement.¹⁷ The post-reduction care typically involves dietary control, use of anti-inflammatory medications, immobilisation of the mandible for a short period and mouth-opening training.¹⁰

Exercise Program :- “Rocabado’s ‘666 exercise protocol” is designed to restore neuromuscular control, improve TMJ mobility, and improve cervical spine and upper back postural impairments thought to increase TMJ stress. It includes 6 exercises that are to be performed 6 times each at a frequency of 6 sessions per day for 6 weeks(Table 1).¹²

Table 1 Rocabado¹² 6 x 6 exercise protocol. Exercises performed 6 times each, 6 sessions per day

Exercise name	Exercise description
Rest position of the tongue	Tip of tongue on anterior palate, just posterior to upper front teeth (rest position), perform ‘clucking’ sound, practice diaphragmatic breathing through the nose during exercise (avoid use of accessory respiratory muscles).
Control TMJ rotation	Controlled opening of mouth in a ‘hinge’ fashion. Tongue in rest position, open mouth maintaining tongue on anterior palate to avoid lateral deviation of the jaw, resist jaw opening and closing (resistance at chin with index fingers).
Rhythmic stabilization	Tongue in rest position, resist right and left lateral deviation of the jaw, resist jaw opening and closing (resistance at chin with index fingers).
Cervical joint liberation	Upright posture, faced hands behind cervical spine for stabilization of C2-C7, perform head nodding motion (cranio-cervical flexion).
Axial cervical extension	Upright posture, perform cervical retraction exercise moving the head back while maintaining ears and eyes level (upper cervical flexion and lower cervical extension).
Shoulder girdle retraction	Upright posture, retract and depress shoulder girdles while maintaining proper cervical spine posture.

Note: TMJ=temporomandibular joint; C2=2nd cervical vertebra; C7=7th cervical vertebra.

Sclerosing Agent :- The various sclerosing agent, like alcohol, rivanol (aethacridine), 5% sodium psylliate (synsalol), sodium morrhuate, 3% sodium tetradecyl sulfate have been injected

in to the joint cavity.¹⁸ This procedure is used in chronic recurrent; is easy to perform and it causes no foreign body reaction. The advantages are no requirement of dissection, few or no post operative complications such as facial nerve injury, loss of sensation, swelling, infection and pain, no necessity to stay in hospital.²

Autologous Blood Injection(ABI)- ABI in the treatment of chronic recurrent TMJ dislocation had advantages such as no requirement of dissection, few or no post operative complications such as facial nerve injury, loss of sensation, swelling, infection and pain, no necessity to stay in hospital, and easiness of administration under local anesthesia.²

Botulinum A Toxin :- It produces dose-related weakness of skeletal muscle by impairing the release of acetylcholine at the neuromuscular junction. In a study of 5 recurrent TMJ dislocation patients, injections of BTX-A 25-50 units/muscle at two sites were given after reduction of the dislocation by manual repositioning of the condyle. In these cases one injection in lateral pterygoid was found to be enough.¹⁹

Surgical Interventions

The suboptimal efficacy of these relatively conservative approaches led to the concept of surgical interventions for alteration of TMJ ligaments, musculature and bony components.

These include:-

Ligament Alterations:-

Capsular plication:- wedge of the capsule is excised and the tissue repaired with the goal of restituting and reinforcing the lax capsule, in situations where the eminence is low, it can be augmented or reconstructed with screws, plates or implants to improve the height.³

Ligamentorrhaphy:- involves surgical fixation of the lateral ligament of the capsule to the periosteum of the overlying zygomatic arch, followed by Maxillo-mandibular fixation for 1 week.⁸

Muscular Alterations:-

Ligating coronoid to zygomatic arch:- ligation is done by either wire or animal tendon of slow absorbability. A variation involves drilling small holes into the extracapsular portion of the condylar neck and through the zygomatic arch just anterior to articular tubercle.⁸ Limitation of forward movement can be done by tying a length of fascia lata or Mersilene (Dacron) to zygomatic arch and around Condylar neck.¹⁸

Scarification of temporalis tendon/temporalis myotomy:- Majority of tendinous fibers are stripped from the ramus and sutured to the reflected periosteum and oral mucosa in a fashion that creates tissue disorientation and subsequent scar formation which will lead to horizontal scar; may tighten the tendon and limit the range of motion.⁸

Bony Alterations:-

Bone Hook:- It is used to apply traction via the sigmoid notch, Traction with wires is also possible through holes drilled in the angle of the mandible.³

Condylectomy:- Delay in reduction induces fibrosis of the glenoid fossa, resulting in imperfect or unsuccessful reduction. Unsuccessful or imperfect reduction induces fibro-osseous ankylosis of the TMJ; such conditions necessitate condylectomy with or without arthroplasty. However, the resulting pseudoarthrosis may limit the range of mandibular movement.⁸

Ramus Osteotomies:- An oblique or vertical ramus osteotomy is used to reposition the mandible thereby restoring vertical ramal height, reestablishing normal occlusion & correction of open

bite.¹⁶ However it may cause impingement of the coronoid on the condylar processes unlike the inverted L-shaped osteotomy where such encroachment is avoided due to retention of the relative positions of condylar and coronoid processes.^{20,16}

Eminoplasty:- It can be done either by reducing eminence or by increasing the eminence. Eminectomy/ arthroscopic eminoplasty:- They involve removing a portion of the eminence to allow the condyle to move freely. One of the most frequent complications after eminectomy is TMJ noise.²¹

Total joint replacement:- It should be considered when all treatments fail in chronic protracted cases especially those with associated degenerative diseases.³

Discussion

Dislocation of TMJ is an infrequent disease but still almost spectacular.¹ The goal of treatment of any dislocation is the return of the condyle to its original physiologic position. It is extremely important that exact etiology which caused the dislocation be analysed. It is also equally important that the signs and symptoms be correctly diagnosed so that the treatment can be carried out as quickly as possible without further delay. After dislocation occurs, spasms of the masseter and pterygoid muscles may worsen over time, causing the mandible to contract into the dislocated position, therefore making the reduction procedure more difficult. If left untreated for longer than 14 days, fibrosis and even fractures become increasingly apparent.⁵

Certain interesting associations have been noted in literature which makes this seemingly easy diagnosis a diagnostic dilemma. In one case, the first manifestation of the metastasis of a primary lung cancer was a non-reducible dislocation of the mandible.²² TMJ dislocation due to dystonia following a single dose of aripiprazole²³ & two cases of acute pure PPL toxicity associated with bilateral TMJ dislocation as a complication has also been reported.²⁴ A Correlation between fracture/fracture-dislocation of the condyle and onset of Frey's syndrome (due to the intimate anatomical relationship between the auriculotemporal nerve and TMJ) has been suggested. With this in mind, such dislocations need to be addressed with extreme caution (i.e., the condyle should not be allowed to snap back into the glenoid fossa, but rather should be "guided" into the fossa—in a direction opposite to that of muscle pull) to avoid possible ATN injury.²⁵ With the types of dislocation we face the proper management should be opted considering the risk and benefits. Postoperative long-term followup is, however, germane in the routine management of these cases, since TMJ problems reappear, irrespective of type.⁹

Conclusion:-

TMJ dislocation can considerably affect the psychological level of the patient, as there is always a fear of dislocation in recurrent cases while jaw movement. The more complex and invasive method of treatment may not necessarily offer the best option and outcome of treatment, therefore conservative approaches should be exhausted and utilized appropriately before adopting the more invasive surgical techniques which should be done after thorough assessment and treatment planning. In the scientific community dislocation with astonishing etiologies are being reported with time. Lack of proper treatment protocol of TMJ dislocation is a dilemma, which needs to be worked out in the future.

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