

Temporomandibular joint dislocation

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ABSTRACT

Temporomandibular joint (TMJ) dislocation is an uncommon but debilitating condition of the facial skeleton. The condition may be acute or chronic. Acute TMJ dislocation is common in clinical practice and can be managed easily with manual reduction. Chronic recurrent TMJ dislocation is a challenging situation to manage. In this article, we discuss the comprehensive review of the different treatment modalities in managing TMJ dislocation.

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INTRODUCTION

The temporomandibular joint (TMJ) is a specialized joint between the mandible and the temporal bone of the skull. The condyle of the mandible articulates bilaterally in a concavity known as the glenoid fossa or the mandibular fossa. Biomechanics of the TMJ is under neuromuscular control, comprising the muscles of mastication, the ligaments associated with it, and neural transmission carried by the mandibular division of the trigeminal nerve. The pathophysiology of dislocation is the movement of the condylar process in front of the articular eminence and an inability to descend back to its normal position. It can be partial (subluxation) or complete (luxation), bilateral or unilateral, acute, and chronic protracted or chronic recurrent.^[1-3] The most common is anterior dislocation. The other types such as medial, lateral, superior into the middle cranial fossa, and posterior are rare and are mostly associated with trauma.^[4,5]

Alteration in the neuromuscular function occurs due to laxity of the articular disc and the capsular ligament, long-standing internal derangement, and spasm of the lateral pterygoid muscles. Structural deficit involves arthritic changes in the condyle, i.e., flattening or narrowing, decrease in the height of the articular eminence, morphological changes of the glenoid fossa, zygomatic arch, and squamotympanic fissure.^[6,7] Age and changes in the dentition also play definite role in dislocation.^[7,8] Other causes include over function, i.e., forceful wide opening of the mouth while yawning, laughing, vomiting, or seizures, dental treatments like third molar extractions or root canal treatments, or oendotracheal intubation, laryngoscopy, and trans oral fiber optic bronchoscopy.^[9-13] Certain antipsychotic medications may also lead to dislocation. Some syndromes are also associated with it such as the Ehlers-Danlos syndrome, orofacial dystonia, and the Marfan syndrome.^[8,14,15]

ETIOPATHOGENESIS

Dislocation of the TMJ is due to either imbalance in the neuromuscular function or structural deficit.

CLINICAL FEATURES

The most common clinical symptom is the inability to close the oral cavity, i.e., "open lock," difficulty in speech, drooling of saliva, and lip incompetency. In acute dislocation, pain in the preauricular region is present, but chronic recurrent dislocation is rarely associated with it. Usually bilateral and at times unilateral dislocation may lead to deviation of the chin to the contralateral side. Palpation over the preauricular region may suggest emptiness in the joint space. The patient may look anxious.^[16]

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DIAGNOSIS

Clinical history and examination are the most important tools in diagnosing TMJ dislocation. Other confirmatory diagnostic aids include plain and panoramic radiographies, showing the location of the condylar head anterior to the articular eminence. Three-dimensional computed tomography is the best in terms of its perfection to show this entity.

On the basis of the clinico-radiological evaluation, Akinbami^[17] classified TMJ dislocation into the following three types:

- Type I - the head of the condyle is directly below the tip of the eminence
- Type II - the head of the condyle is in front of the tip of the eminence
- Type III - the head of the condyle is high-up in front of the base of the eminence.

MANAGEMENT

Acute dislocation

It is a very painful clinical condition, but easy to manage. The conservative methods in its management include symptomatic pain relief with analgesics and manual reduction.

The manual reduction method is performed by first pressing the mandible downward, then backward, and finally upward as described by Hippocrates. In 1981, Lewis modified it in his way by stating that the patient should be made to sit down and the clinician should stand in front of him/her or at 11 o' clock position. Then, the thumb should be pressed down on the occlusal surface of the lower molar teeth. At the same time, the chin should be elevated with the fingers and the entire mandible should be pushed posteriorly.^[18] Few authors have further modified the technique by changing the position of the thumb from the occlusal surface of the teeth to the anterior border of the ramus.^[19] Sometimes, the manual reduction is complicated by the secondary reflex spasm of the lateral pterygoid muscle, followed by painful stimuli from the joint capsule. As the condition is very painful, it is always better to perform manual reduction under local anesthesia by giving auriculotemporal nerve block or local infiltration in the joint space. Role of the muscle relaxants in controlling the reflex muscle spasm is still debatable.

In 1987, Awang^[20] described another simple, safe, and rapid method in managing acute dislocation. According to him, induction of the gag reflex by probing the soft palate creates a reflex neuromuscular action that resulted in the reduction.^[3]

Chronic dislocation

If this condition is long-standing or recurrent, it poses a challenge to the treating clinician. The management is divided into two stages, the conservative methods are opted; if the results are not satisfactory, then we go for the surgical methods.

Chronic recurrent dislocation (Subluxation)

The conservative method includes the use of various sclerosing agents like alcohol, sodium tetradecyl sulfate, sodium psylliate, morrhuate sodium, and platelet-rich plasma that has been injected into the joint space.^[2,21] In case of chronic protracted dislocation, elastic rubber traction with arch bars and ligature wires/intermaxillary fixation (IMF) with elastic bands are useful to achieve the reduction.^[2]

The use of autologous blood in recurrent dislocation was reported by Brachmann in 1964 and is very popular nowadays. It is based on the principle to restrict mandibular movements by inducing fibrosis in the upper joint space, the pericapsular tissues, or both.^[22] In an animal study, Gulses *et al.*, demonstrated that there are significant fibrotic changes histologically evident in both retrodiscal and pericapsular tissues.^[23] The volume of blood to be used ranges 2-4 mL in the upper joint space and 1-1.5 mL in the pericapsular structures, repeated twice a week for 3 weeks. To further enhance the fibrosis, restriction of the mandibular movement with a head bandage is required for the period of 3-4 weeks.^[24-26] However, some authors have reported chances of degeneration in the articular cartilage and permanent joint destruction.^[27,28] But after inducing hemiarthrosis in the TMJ of rats, Alons *et al.*, reported that there is no noticeable damage to the cartilage and the interposing disc on histopathological examination.^[29] The only reported disadvantage of this technique is severe restriction in the mandibular range of motion.^[30] Machon *et al.* advocated that the patient should start jaw rehabilitation by a gradual and controlled range of motion exercises after 2 weeks of the autologous blood injection therapy.^[26]

Another newer conservative method is the application of botulinum toxin A (BTX-A) in recurrent TMJ dislocation. Previously, BTX-A was used in the management of facial wrinkles, masseteric and temporalis muscle hypertrophies, strabismus, hyperhidrosis, hemifacial spasm, sialorrhea, and masticatory myalgia.^[31,32] There have been several anecdotal reports of the use of BTX-A as a treatment for TMJ dislocation, but a controlled clinical trial is needed to prove the evidence of its efficacy.^[33-35] It involves injecting the drug in the lateral pterygoid muscle, to prevent temporarily recurrent dislocation.^[36] It acts by causing temporary weakening of the skeletal muscle by blocking the Ca²⁺-mediated

release of acetylcholine from the nerve endings of the neuromuscular junction.^[37] Because the effect is temporary, repeated administration is required after 2 weeks for better results. BTX injection therapy is also an option in those patients who suffer from recurrent dislocation of the TMJ as a result of impaired muscle coordination, secondary to oromandibular dystonia, neuroleptically-induced early and late dyskinesias, epilepsy, and brainstem stroke syndromes.^[31,34] The adverse effect involves diffusion into the adjacent tissues, transient dysphagia, nasal speech, nasal regurgitation, painful chewing, and dysarthria. It is contraindicated in a few conditions like hypersensitivity to BTX and myasthenia gravis in pregnant and lactating women.^[31,32]

Chronic long standing dislocation

The surgical methods are indicated in those cases where the patients have not responded well to the conservative methods.

In 1968, Rowe and Killey used a bone hook that was passed over the sigmoid notch through a small incision below the angle of the mandible and downward traction was applied on the condyle. Traction with wires was done by applying the wires through the holes drilled in the angle of the mandible.^[2] In 1981, Lewis used a technique in which the Bristow's elevator was passed through the temporal fascia as in the Gillies technique of elevation of the depressed zygomatic bone. The tip of the elevator was used and strong force was applied in the downward and posterior directions. This method also facilitates open reduction by extending the incision as used for the preauricular approach to the joint.^[18]

Various other methods like condylotomy, modified condylotomy, and myotomy had been tried. Condylotomy was used as a blind approach using a modified Kostecka approach and a Gigli saw. It is an open approach, usually using the preauricular route.^[38,39] Myotomy with resection of the insertion of the external pterygoid muscle had been described by Bowman in 1949. It limits the mandibular translation and allows only rotational movement of the condyle.^[40] In 1973, Laskin proposed an intraoral surgical approach to the muscle via a coronoid incision to perform a temporalis myotomy.^[41]

In 1976, Adekeya *et al.* described a technique in which the occlusion was restored by means of the inverted L-shaped osteotomy of the ramus.^[42] Other authors have also recommended the use of vertical or oblique ramus osteotomy and bilateral sagittal split osteotomy for correction of the occlusion. But it did not get popularized due to many disadvantages like the risk of damage to the inferior alveolar bundle, less bone contact, and impingement/impaction of the coronoid process on the condyle.^[43,44]

Few authors have suggested surgical procedures that either remove the mechanical obstacle in the condylar path or create a mechanical obstacle by augmenting the articular eminence. In 1951, Myrhaug first reported total eminectomy as a treatment for dislocation. The removal of the eminence will facilitate the return of the condyle without any interference into the glenoid fossa.^[45] Augmentation of the articular eminence can be done by autogenous bone grafts like the iliac crest or the calvarial bone.^[8] Various other materials have also been used like L-shaped pins, vitallium mesh implants, and mini implants to enhance the eminence.^[46,47] Silicone wedge blocks and coralline hydroxyapatite blocks have also been used by few authors.^[48] Looseness, displacement, and immune reactions are some of the adverse effects, especially for silicones.

Initially in 1933, Mayer described that downward displacement of the zygomatic arch acts by obstructing the path of the condylar translation. Later, Dautrey modified the technique in which the greenstick fracture was performed at the zygomaticotemporal suture and displaced the anterior segment downward and inward to serve as a stop to the forward and the upward movements of the condyle head. It cannot be performed in elderly people due to the brittleness of the bone; so, it is restricted to younger individuals.^[16,49]

Fascia lata, MERSILENE tapes (Dacron, Ethicon, Johnson and Johnson Ltd, Baddi, Himanchal Pradesh, India) anchored around the zygomatic arch and passed around the condyle have also been used to restrict its movement. Fascia lata can be readily harvested and the treatment is cheaper but accompanied with postoperative pain, swelling, minor gait disturbance, and movement of the lower limb.^[16] Surgical capsulorrhaphy also helps by reinforcing the lax capsule. Meniscopeplasties and meniscectomies are relevant procedures done when the altered disc morphology and the position cause dislocation or prevent self-reduction. Total joint replacements should be considered when all the appropriate treatments fail in chronic protracted and chronic recurrent dislocations, especially those with associated degenerative joint diseases.^[3]

CONCLUSION

The management of TMJ dislocation is customized as per the underlying cause. Hypermobility or subluxation can be managed by the use of autologous blood, sclerosing agents, and capsulorrhaphy. Manual reduction is sufficient in case of acute dislocation. Chronic protracted and chronic recurrent dislocations are among the most difficult to manage. Surgical intervention is required to treat these properly.

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