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ORIGINAL ARTICLE

Chronic Long-Standing Temporomandibular Joint Dislocation: Report of Three Cases and Review of Literature

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Abstract
Purpose To present three cases of chronic long-standing TMJ dislocation and discuss our treatment protocol with other options in the literature.
Patients and methods Three cases of chronic TMJ dislocation (more than 4 months) that has never been reduced previously were treated by open reduction, meniscectomy or meniscoplasty and lateral pterygoid muscle myotomy. After a short period of MMF, TMJ physiotherapy was performed.
Results During 3 years of follow-up, the condition had not recurred at all and all patients were functional and symptom free.
Conclusion Based on other therapeutic options in the literature, our treatment protocol seems to be an effectual operation with fewer complications.

Keywords TMJ · Dislocation · Chronic · Long standing

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Introduction

True TMJ dislocation is a condition in which condylar processes are displaced from glenoid fossa anterior to the articular eminence [1–3]. It is an uncommon condition which occurs for a variety of reasons including extreme mouth opening during yawning (46%), trauma to the mandible, dental treatments, anti-emetic medications, systemic diseases such as Ehlers–Danlos and Marfan syndromes, tracheal intubation, and some psychogenic/neurologic disorders [4, 5]. TMJ dislocations can be subdivided into acute, chronic or recurrent type [1]. In acute situations, it requires manipulation by another individual to reduce to its normal position. If the reduction of acute dislocation is delayed, the chronic condition will be encountered that manual reduction usually is insufficient and maybe requires surgical reduction [5]. The recurrent dislocation is a condition that repeated episodes of dislocation happen, and it may be self-reducing or needs manual reduction [2, 3]. Contrary to acute dislocation, a variety of treatment options has been reported in the literature for managing chronic conditions [6–9]. The purpose of this study is to describe three cases of chronic long-standing TMJ dislocation that have never been reduced previously and present our treatment protocol. Informed consent was obtained from all individual participants included in the study.

Case 1

A 50-years-old otherwise healthy female was referred to the authors' clinic with the chief complaint of inability to close her mouth for four months. She stated that she was unable to close her mouth after a yawning. The patient was

completely edentulous and had no prior history of TMJ dislocation. On examination, an anterior open bite of 20 mm, a notable preauricular depression and a restricted range of mandibular motion were observed. Panoramic radiograph revealed a bilateral TMJ dislocation (Fig. 1).

The patient was admitted to the hospital, and under general anesthesia any attempt for close reduction was unsuccessful. The right and left TMJs were then exposed using preauricular approach. It was observed that the mandibular condyle had developed a pseudoarticulation anterior to the articular eminence, and the glenoid fossa was occupied completely by a dense fibrous connective tissue which seemed to be the overstretched and hypertrophic retrodiscal tissues and malformed meniscus. The fibrous tissue intervened with reducing condylar head into the glenoid fossa as a physical barrier. So we excised all the fibrous tissues except a serviceable meniscus. Then, the pseudoarticulation was disengaged using a Joseph periosteal elevator. After that, the condyle was pushed back to its normal position by applying downward and backward forces through the sigmoid notch using a strong bone hook and simultaneously downward force to the condylar head by an Obwegeser periosteal elevator.

Due to severely altered disk morphology, meniscectomy was performed and temporoparietal fascia flap was used for the replacement of the TMJ disk. In order to prevent recurrent dislocation, lateral pterygoid muscle myotomy was also performed. Finally, maxillomandibular fixation (MMF) in proper occlusion was applied using patient's denture for 7–10 days. After opening the MMF, ten sessions of TMJ physiotherapy were started using transcutaneous electrical nerve stimulation (TENS) and ultrasound to achieve normal jaw function. After three-year follow-up examination, the condition had not recurred.

Case 2

A 70-year-old woman who had bilateral TMJ dislocation after yawning since eight months ago was unable to close her mouth. She had undergone an unsuccessful attempt to reduce her dislocation under general anesthesia. Her past medical history was unremarkable. On clinical examination, an anterior open bite of 12 mm, a restricted range of mandibular motion and a notable preauricular depression were observed (Fig. 2).

Under general anesthesia with deep muscle relaxation, further attempts for close reduction were done without any success. After that, the same surgical procedure as in the case number one was performed to open reduction of both dislocated condyles. The only difference in the surgical plan of this case was that abnormally stretched meniscus was preserved and tightened by taking a wedge of tissue out behind the disk and suturing the edges together. After three-year follow-up examination, the patient was symptom-free.

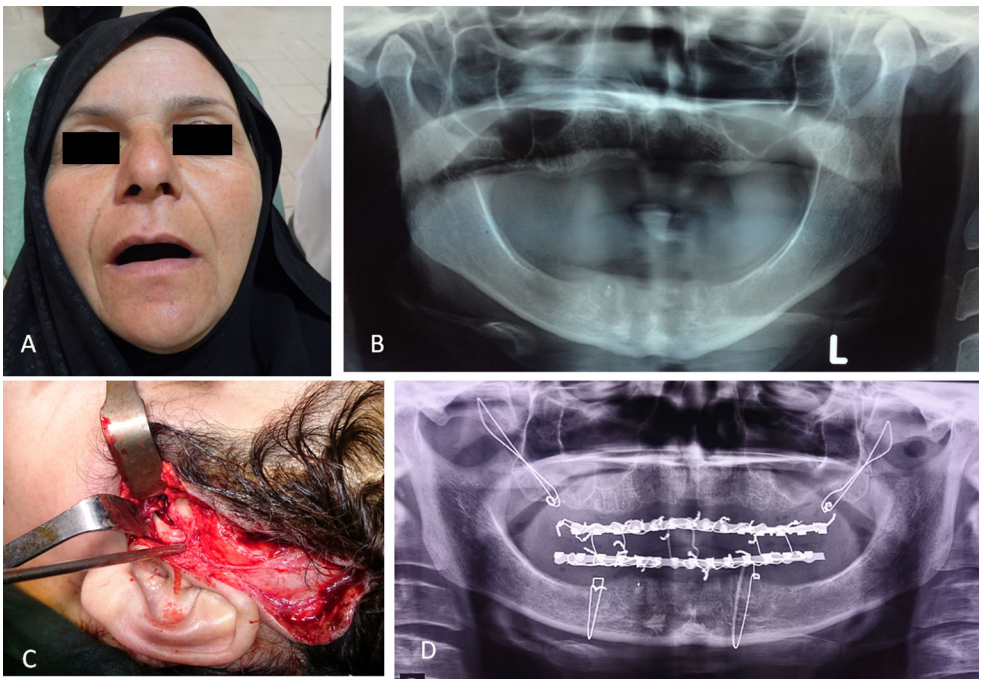

Fig. 1 **a** Clinical view demonstrating anterior open bite due to chronic bilateral TMJ dislocation, **b** panoramic view revealing bilateral anterior TMJ dislocation, **c** open reduction of the left TMJ after fibrous tissue excision, **d** postsurgical panoramic view showing TMJ reduction

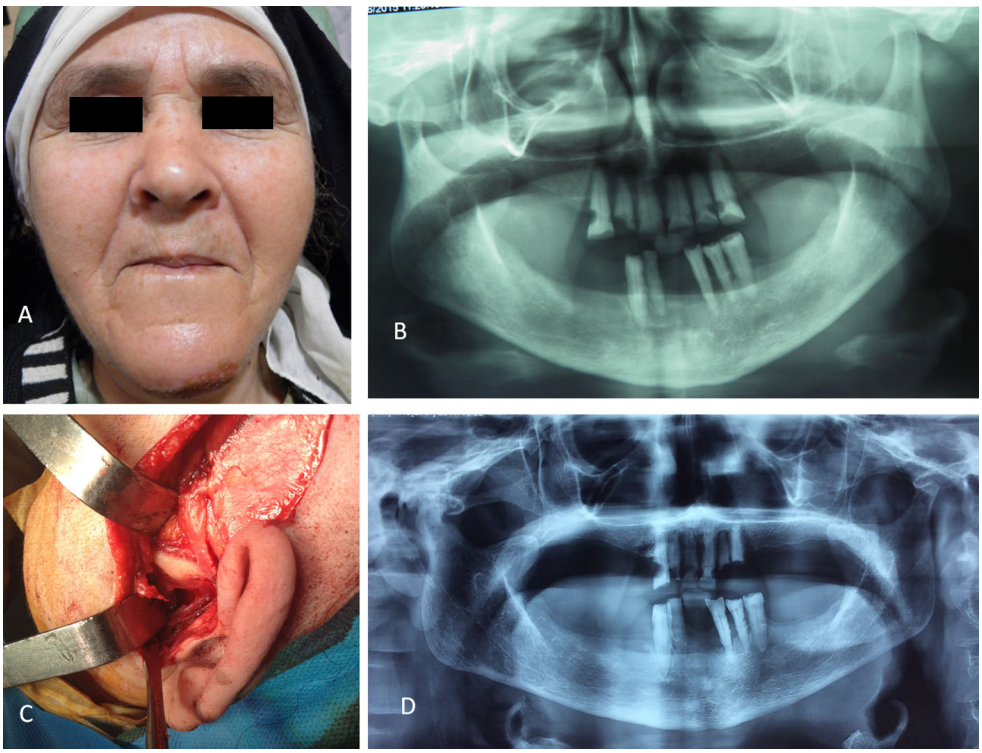

Fig. 2 **a** Clinical view of open lock TMJ, **b** panoramic view showing bilateral TMJ dislocation, **c** excision of the fibrous tissue from the glenoid fossa, **d** panoramic view three years after reduction

Case 3

A 73-year-old woman was referred by ENT specialist for the management of long-lasting TMJ dislocation since 4 months ago. She stated that she has experienced severe pain during eating and after that she could not close her mouth completely. All previous attempts for manual reduction were unsuccessful. Clinical examination revealed an anterior open bite while wearing denture. Panoramic view revealed bilateral TMJ dislocation (Fig. 3).

Because of the chronic nature of dislocation, preparations were made for open reduction through a preauricular approach. After the induction of general anesthesia and deep muscle relaxation, before starting the surgery the last attempt for close reduction was done that was unsuccessful. After that, the mandible was reduced by the same procedure as the previous cases and the jaw was immobilized with MMF in centric occlusion for 10 days. At two-month follow-up, she complained of limited maximum mouth opening (MMO) (25 mm) which was due to refusing postoperative physiotherapy. After ten sessions of TMJ physiotherapy with TENS and ultrasound, the MMO reached 40 mm and during 3-year follow-up she did not had any further TMJ dislocation.

Discussion

Long-standing TMJ dislocation usually occurs when a case of acute dislocation is left untreated or is inadequately treated. Over time the anterior dislocation of the condyle provokes the retrodiscal tissue to become overstretched and hypertrophic and also joint capsule and temporomandibular ligament to be collapsed into glenoid fossa which occupy the condylar head place and produce a vigorous physical obstacle against reduction. Also in the case of chronic dislocation, lateral pterygoid muscle spasm and shortening will further impede TMJ reduction.

The more time elapses from the initial dislocation, the more complex procedure needs to reduce the dislocated condyle. In 2011, Huang et al. presented six cases of long-standing TMJ dislocation. In their series, they found that dislocations lasting more than 30 days could not be treated by conventional manipulation even under general anesthesia with deep muscle relaxation. They suggested that when long-standing dislocation has persisted more than 4–12 weeks, it is best treated by open reduction [6]. In consistent with the result of Huang and et al., our series demonstrated that open reduction was obviously necessary in the treatment of TMJ dislocations longer than 3 months and any further attempts for close reduction were vain.

During reviewing the literature for methods of chronic TMJ dislocation treatment, a variety of different techniques

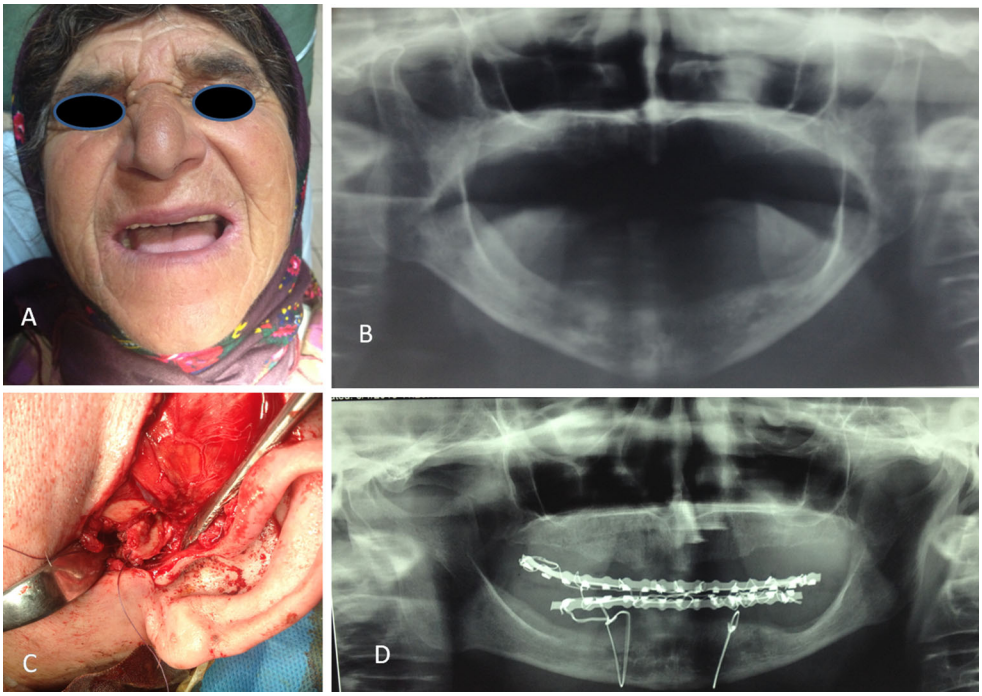

Fig. 3 **a** Open lock of edentulous patient with chronic bilateral TMJ dislocation, **b** panoramic view of bilateral TMJ dislocation, **c** meniscoplasty with retrodiscal tissues wedge resection, **d** postoperative panoramic view showing TMJ reduction

will be found. Condylectomy, condylotomy with or without coronoidotomy, coronoidectomy alone, inverted L-shaped ramus osteotomy, modified vertical ramus osteotomy, periosteal stripping, traction with wire to lower border, midline mandibulotomy and meniscectomy have been reported in the literatures [7–10].

In 1981, Lewisg 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 Bristow's elevator was used to apply a strong force in the downward and posterior direction to the dislocated condyle [11]. During open approach to the TMJ through preauricular incision, we applied this maneuver using an Obwegeser periosteal elevator for downward and backward push of the dislocated condyle.

Although condylotomy or modified condylotomy had been experienced successfully for the treatment of chronic non-reducing TMJ disk dislocations, they cannot play an effective role in the reduction of chronic condylar dislocation [12, 13].

Myotomy of lateral pterygoid muscle fibers attachment to the condylar head had been described by Bowman in 1949. The main purpose of this treatment was creating scar tissue anterior to the joint capsule, limiting excursion of the condyle [14]. Although our treatment protocol included lateral pterygoid muscle myotomy, we did not intend to create scar tissue against TMJ; instead we attempted to facilitate the reduction of dislocated condyle by releasing the shortened and spastic lateral pterygoid muscle fibers attachments to the condylar head, and also this procedure prevents TMJ dislocation recurrence since it eliminates the forces responsible for pulling the mandible into the dislocated position [15].

In 1973, Laskin introduced an intraoral surgical approach to perform temporalis muscle myotomy [16]. This procedure limits the mandibular range of motion and allows only rotational movement of the condyle. Since the temporalis muscle myotomy may limit postoperative maximum mouth opening and it has no obvious effect on the recurrence after TMJ dislocation, we did not perform it as a part of our treatment plan.

Vertical and oblique ramus osteotomies have been described by many authors for managing TMJ dislocation, but these techniques have some potential disadvantages such as damage to the inferior alveolar nerve, less bone contact, and impingement/impaction of the coronoid process on the condylar process, causing restriction of jaw movement [17, 18]. In 1976, Adekeya et al. described a technique of inverted L-shaped ramus osteotomy to ensure maximal bone contact which is necessary for stability and healing [8].

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 recurrent TMJ dislocation [19, 20].

On the other hand, some authors suggested the augmentation of the articular eminence for treating recurrent dislocation or hypermobility of the TMJ by autogenous bone grafts [21].

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 upward movements of the condylar head [22].

Meniscoplasty and meniscectomy are relevant procedures done when the altered disk morphology and the position cause dislocation or prevent self-reduction [23]. In these situations, if the disk is abnormally stretched out, it is "tightened" by taking a wedge of tissue out behind the disk and suturing the edges together, and if the disk is damaged beyond repair, it must be removed. If an excessively damaged disk is not removed, it may continue to cause recurrence after surgery.

Total joint replacements [24] should be considered when all other conservative treatments fail in managing chronic protracted and chronic recurrent dislocations, especially those with associated degenerative joint diseases.

The particular strength of this study includes the long-term follow-up of the patients as well as using the same surgical procedure for all patients.

The number of study subjects must be considered as a shortcoming of this study. Another weakness of our study is that patients had not undergone MRI scans at the baseline evaluation to assess position, morphology and mobility of disk and condyle as well as the evaluation of adjacent structures [25].

Conclusion

A comprehensive review of literature is needed to assist clinicians choosing the best surgical approaches for the treatment of patients with chronic TMJ dislocation. Although our treatment protocol was successful in these three cases, further studies with larger sample size are required to confirm the efficacy of this technique.

All procedures performed in this study were in accordance with the ethical standards of Mashhad University of Medical Sciences and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

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