

Technique Report

Prosthodontic rehabilitation of patient with prolonged TMJ dislocation reduced by midline mandibulotomy

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Abstract

Prolonged temporomandibular joint (TMJ) dislocations are rare but challenging and result in the impairment of essential functions such as speaking and chewing. The methods used to manage such prolonged dislocations in previous studies have varied widely from manual reduction to numerous surgical methods such as midline mandibulotomy, condylectomy, condylotomy with or without coronoidotomy, and eminectomy. The following case report describes the prosthodontic rehabilitation of a patient with complete dentures and a history of prolonged TMJ dislocation reduced by midline mandibulotomy. Through our multidisciplinary cooperative efforts, the patient's chewing function was restored along with a satisfactory esthetic appearance.

Key words: complete dentures, midline mandibulotomy, prolonged TMJ dislocation

Introduction

Temporomandibular joint (TMJ) dislocation is defined as displacement of the condyle from the glenoid fossa and reportedly accounts for 3% of all articular body luxations. TMJ dislocations occur for a variety of reasons, including extreme mouth opening during yawning, trauma to the mandible, dental treatments, and bronchoscopy. Otherwise, an imbalance in the TMJ neuromuscular function or a structural deficit can also induce a TMJ dislocation.

These dislocations can be further subclassified into the acute, chronic recurrent, and long-standing/prolonged types. Acute cases are relatively common events that can be reduced by manipulating the mandibular condyle downward and backward into the glenoid fossa with or without local anesthesia or sedation. Huang et al.¹ reported that prolonged dislocations are rarer, with most resulting from acute dislocations that were left untreated or were inadequately treated for 72 hours or more.

The methods used to manage prolonged TMJ dislocations in previous studies have varied widely. For example, numerous surgical methods have reportedly been used to reduce such dislocations, including midline mandibulotomy, condylectomy, condylotomy with or without coronoidotomy, myotomy, sagittal split mandibular osteotomy, meniscectomy, and eminectomy.³ Relatedly, because of the rarity of prolonged TMJ dislocations, no standard guidelines for their treatment have been developed thus far. The following report describes the interdisciplinary treatment of a patient with a prolonged TMJ dislocation that was reduced by midline mandibulotomy and then rehabilitated with complete dentures.

Case report

A 71-year-old female patient reported to our hospital with the chief complaint of an inability to close her mouth and chew food due to bilateral joint dislocation after gastroscopy for more than 3 weeks. The patient was completely edentulous and had no prior history of TMJ dislocation. Medically, she reported a history of cataracts and mild mental retardation. She had also received 2 mandibular implants in the regions of teeth 33 and 43 and had had conventional complete dentures fabricated at a dental clinic 1 year ago. On thorough clinical examination, it was found that the patient was experiencing muscle spasms because of a long-standing TMJ dislocation. Examination of the TMJs revealed pain and tenderness on palpation over the bilateral TMJ region.

Manual manipulation was attempted but could not be successfully applied on her first visit to our department, so she was referred to the oral and maxillofacial surgical department for further treatment. Radiographic examinations were taken and showed a bilateral dislocation of the patient's TMJs (Figs. 1-2). Because the patient had experienced considerable pain and was unable to relax her muscles, a further attempt at manual reduction was performed with an injection of local anesthesia, but still to no avail. It was then explained to the patient that reduction under general anesthesia or other more invasive surgical procedures might be necessary. Considering the patient's age and the risks of a surgical intervention, the patient's family decided to transfer her to another hospital for a second opinion. However, they returned 19 days later for further evaluation because the treatments attempted in the meantime, including reduction under general anesthesia, acupuncture, and physical therapy, had all been unsuccessful.



Fig. 1 Initial panoramic x-ray image showing bilateral TMJ dislocation



Fig. 2 CT scan showing bilateral condyles anterior to articular eminence

Various treatment modalities were discussed in detail, and informed consent was obtained from the patient and her family, after which the patient was admitted to our hospital. A variety of surgical techniques were proposed for reducing the prolonged bilateral TMJ dislocation, including pulling downward and backward from both mandibular angles with the help of transosseous wires and the use of a bone hook passed over the sigmoid notch to apply force. Unfortunately, the condyles were still not correctly placed after the application of this technique. Consequently, a midline mandibulotomy was performed, and this allowed the bilateral hemimandibular segments to be easily manipulated such that reduction was finally achieved (Fig. 3). X-rays taken immediately after the surgery with a C-arm x-ray system confirmed that the condyles

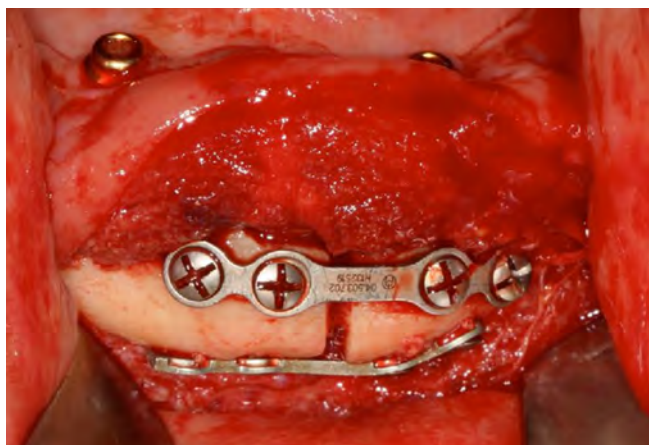


Fig. 3 Photograph showing midline mandibulotomy and fixation with bony plates

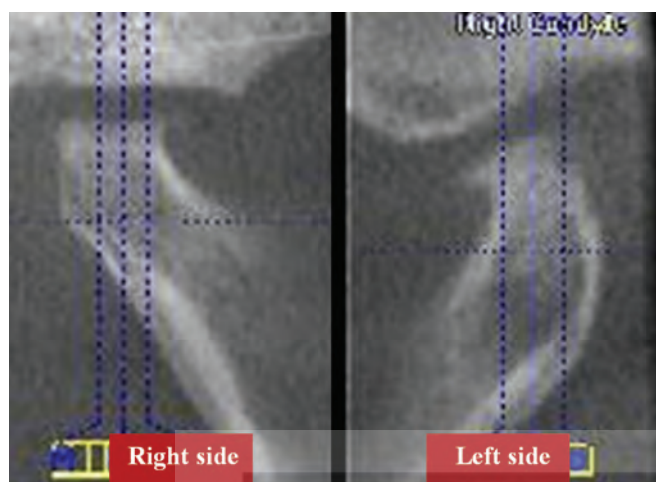


Fig. 4 X-ray images showing osseous changes of bilateral condyles

were placed exactly within the glenoid fossa. The osteotomy site was fixated with bony plates, and a maxillomandibular suspension with miniscrews and wires was then applied with the patient's upper denture and 2 mandibular implants for 12 days. The patient was discharged after being advised to abstain from wide yawning and the chewing of hard foods.

At 3 months after the operation, the patient presented to the department of prosthodontics with the complaint that she was unable to wear her existing complete dentures and found it difficult to eat with them. CBCT and MRI examinations found bilateral condyle osteoarthritis with anterior disc displacement but no mouth opening limitation and no pain or tenderness on palpation over the TMJ region. The condyles were assessed for the presence of osseous changes using lateral images (Fig. 4). An extra-oral examination revealed a concave lateral profile, reduced facial height, relative prognathism, and the collapse of lower facial soft tissue without the old dentures. On intra-oral examination, the residual ridge showed severe bone resorption and flabby gums over the maxillary anterior region. The two implants (4.0x10 mm) with locator abutments (Osstem US II, Osstem Implant Co., Busan, Korea) were properly placed over the severely resorbed mandibular ridge, and no mobility was detected (Fig. 5). However, the gingival tissues around the implants showed slight inflammation, and both old dentures displayed poor esthetics and incorrect occlusal relations.



Fig. 5 Photographs of the intra-oral view of edentulous status

The main objective of the treatment was to achieve esthetic and functional rehabilitation by restoring and reestablishing stable occlusion as soon as possible. Various treatment options were discussed with the patient and her family, including the repair of the old dentures and the fabrication of new dentures. We first checked the old dentures and removed a thin layer from the tissue surface. Then the tissue side was relined with relining material (Flexacryl Hard, Lang Co, USA) and the dentures were inserted into the patient's mouth. After determining the vertical dimension through its association with the rest position, as well through phonetic and esthetic methods, the centric relation was recorded with aluwax (Aluwax Dental Products Co, U.S.A.). The upper and lower dentures were mounted on a semi-adjustable articulator (Artex® CT, Austria) to adjust the occlusion with self-cured acrylic resin (Tokuso Curefast, Tokuyama Dental Co, Japan). Next, relining material (Flexacryl Hard, Lang Co, USA) was applied to the tissue side and the patient was instructed to close her mouth. After complete setting of the material, the dentures were removed, the excess material was trimmed away, and finishing of the dentures was completed. No discomfort was noted during a further 6-month follow-up period,

so a primary impression of the maxillary and mandibular edentulous ridges was made using irreversible hydrocolloid impression material and poured with type III dental stone to produce a diagnostic cast on which the custom trays were made. Using the selective-pressure technique, in the upper arch, wax spacer was applied to cover the incisive papilla, rugae, midpalatine raphe, and flabby tissue (Fig. 6); in the lower arch, wax spacer was applied to cover the entire alveolar ridge except at the retromolar pad area. The trays were checked in the patient's mouth and adjusted so that the borders of each tray were uniformly 2 mm short of the vestibules. Border molding was completed with green modeling compounds (Impression Compound Sticks; Kerr Crop, CA, USA). For the final impression, relief holes (Fig. 6) were made and the upper tray was loaded with vinylsiloxanether impression material (Identium, Kettenbach, Germany), and the lower tray was loaded with polyether impression material (Impregum Penta soft, 3M ESPE). Master casts were made with die stone (Fig. 7). In order to prevent recurrent dislocation, the jaw relations were re-evaluated and recorded with a decreased vertical dimension (-3mm), and then a face bow transfer was done and transferred to the semi-adjustable articulator. The teeth

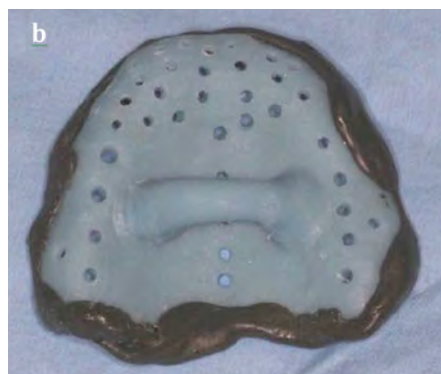
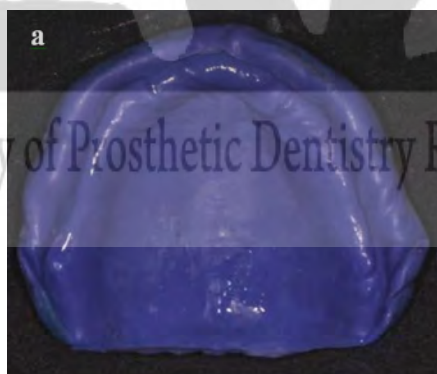


Fig. 6 Photographs of upper individual tray with (a) spacer and (b) relief holes

Fig. 7 Photographs of (a) upper final impression with Identium and master cast and (b) lower final impression with Impregum and master cast

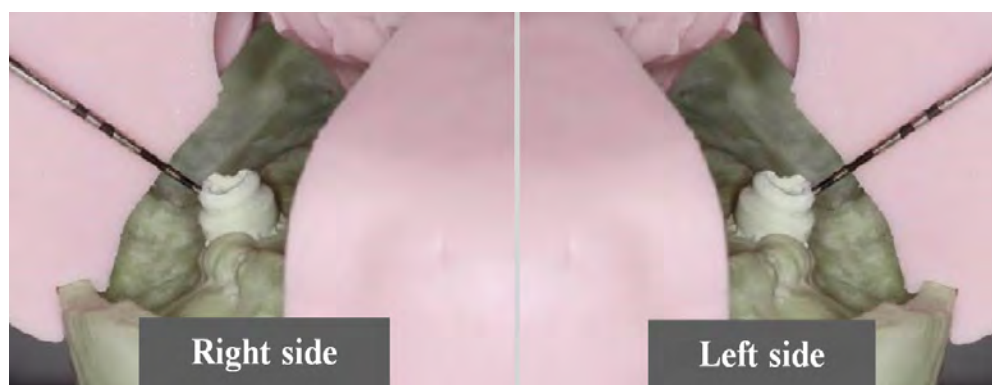


Fig. 8 Image showing inadequate restorative space (3 mm) over the lower buccal side

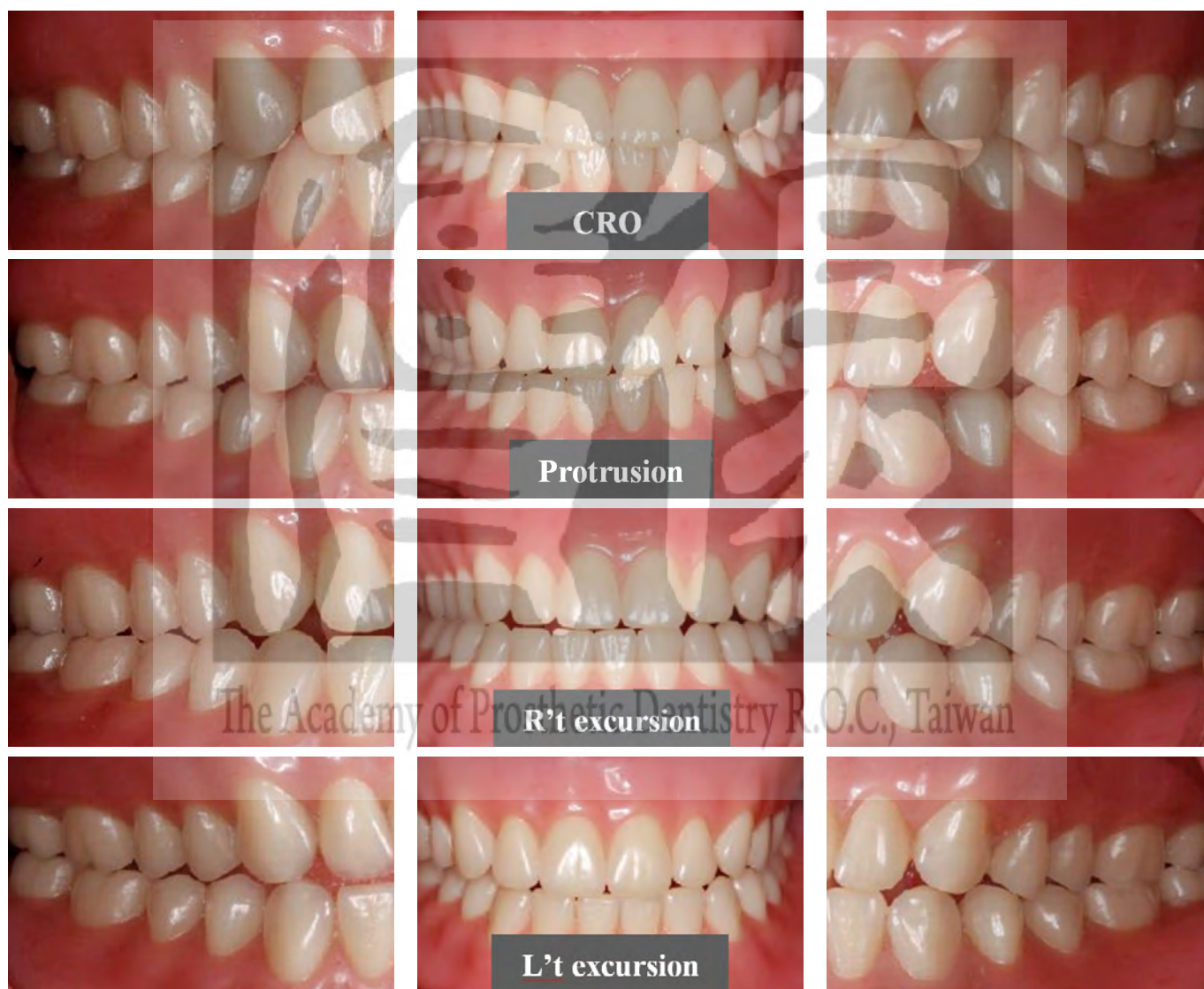


Fig. 9 Photographs of the definitive prostheses

were set up according to anatomic, functional, and esthetic guidelines, and their setting was accomplished with balanced occlusion. The wax dentures were tried in, and the esthetics and functions were evaluated again.

However, mounted casts with wax dentures showed that there was inadequate restorative space over the lower buccal side for the attachment system (Fig. 8). The definite treatment plan was thus modified to upper

and lower conventional complete dentures. The prostheses were processed with the Ivoclar injection molding system (Ivoclar Vivadent Inc., Amherst, NY) to decrease packing errors. After deflasking, the occlusion was adjusted, and the prostheses were finished and polished. Through a clinical remount procedure, the finished dentures were delivered with minor tissue side adjustments (Fig. 9). Clinical examination revealed no abnormal clinical signs, and the

patient showed good adaptation to the new prostheses and was very pleased with the results. The patient was asked to return every 3 months for an evaluation of the stability of occlusion and the TMJs.

DISCUSSION

The duration of a TMJ dislocation plays an important role in its prognosis, as delayed treatment can lead to spasms of the masticatory muscles as well as fibrosis of the retro- and peridiscal tissue, which will increase the difficulty of treatment and necessitate more complex procedures. According to a study by Huang et al., any attempts to reduce such luxations with closed manipulation in patients who had had the luxation for more than 4 weeks were unsuccessful, and either direct or indirect open reduction was suggested instead.¹ In the present case, a series of treatments were performed, starting with a minimally invasive conservative technique and progressing to more invasive surgical procedures.³ A midline mandibulotomy eliminated the structural resistance, which allowed for the reduction of each joint individually without direct exposure as Lee et al. showed in their case.^{2,4} Still, as an invasive approach, this technique entails potential complications including lingual hematoma, malocclusion, damage to the root apex, and nonunion. However, healing of the segmented mandible is more predictable than healing following joint exposure, and jaw function recovered uneventfully in nearly all of the cases in the reviewed literature.

Temporomandibular disorder is a disease with multiple causal factors. In hindsight, it was unclear whether the long-standing TMJ dislocation or the surgery induced osteoarthritis in the patient in the present case; however, for this fully edentulous patient, it was imperative to limit the patient's movement through a reduced vertical dimension, control the patient's diet, and schedule regular follow-up appointments before proceeding to the definitive stage. Furthermore, joint replacements may be considered when all other conservative treatments fail, especially in cases involving associated degenerative joint problems.

With severe ridge resorption patients, dentists are challenged to improve the support, retention, and stability for dentures. In general, the mean denture-bearing area for an edentulous

mandible is 14 cm,² whereas the mean denture-bearing area for an edentulous maxilla is 24 cm.²⁻⁵ In this case, extension into the deeper retromylohyoid area to gain further retention without interfering with the supporting tissues (2 implants) or causing pain seemed to improve the outcomes. In patients with flabby tissues, the force exerted when making impressions and during mastication can displace or distort the flabby tissues, resulting in compromised denture retention as a consequence of the loss of the peripheral seal. Many techniques have been proposed to help overcome this problem, such as various techniques relating to tray design and the use of different impression materials. Lynch et al. suggested the use of additional relief space or relief holes over flabby tissue, and in the proposed approach, the impression is made in one step.⁶⁻⁷ Watson et al. proposed the window technique to minimize the movement of flabby ridges during function; however, its controlled application is still a matter of concern.⁸ In this case, the use of relief spacer and relief holes combined with low viscosity impression material seemed to provide acceptable final results.

References

1. Huang I, Chen CM, Kao YH, Wu CW. Management of long-standing mandibular dislocation. *Int J Oral Maxillofac Surg.* 2011;40(8):810–814
2. Lee SH, Son SI, Park JH, Park IS, Nam JH. Reduction of prolonged bilateral temporomandibular joint dislocation by midline mandibulotomy. *Int J Oral Maxillofac Surg.* 2006;35:1054–6.
3. Baur DA, Jannuzzi JR, Mercan U, Quereshy FA. Treatment of long term anterior dislocation of the TMJ. *Int. J. Oral Maxillofac. Surg.* 2013; 42: 1030–1033
4. Rattan V, Rai S, Sethi A. Midline Mandibulotomy for Reduction of Long- Standing Temporomandibular Joint Dislocation. *Craniomaxillofac Trauma Reconstruction* 2013;6:127–132
5. Zarb GA, Bolender CL, Eckert S, Jacob R, Fenton A, Mericske-Stern R. *Prosthodontic Treatment for Edentulous Patients*, 13th ed. St Louis: Mosby; 2013: 161-179
6. Lynch CD, Allen PF: Case report: Management of the flabby ridge: re-visiting the principles of complete denture construction. *Eur J Prosthodont Restor Dent* 2003;11:145-148
7. Lynch C, Allen P: Management of the flabby ridge: using contemporary materials to solve an old problem. *Br Dent J* 2006;200:258-261
8. Watson RM: Impression technique for maxillary fibrous ridge. *Br Dent J* 1970;128:552