

Case Report

Complete Denture Fabrication for a Patient with Limited Mouth Opening – A Case Report

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Abstract

Temporomandibular joint (TMJ) ankylosis is a severe disease that results in hypomobility of the TMJ and thus affects patients' daily functions of speech, mastication, and oral hygiene. For prosthodontists, restricted mouth opening commonly leads to challenging clinical scenarios. The following case report describes the case of a 43-year-old female with a history of TMJ ankylosis. The patient's maximum mouth opening from ridge to ridge was about 31 mm after left gap arthroplasty with temporalis muscle flap reconstruction. Complete dentures were fabricated through careful clinical procedures. As a result, the dentures improved the patient's appearance, chewing function, and maximum mouth opening. In conclusion, when treating a patient with limited mouth opening, a set of well-made dentures can improve the patient's functional abilities and esthetics.

Key words: complete dentures, gap arthroplasty, limited mouth opening, Temporomandibular joint (TMJ) ankylosis

Introduction

Temporomandibular joint (TMJ) ankylosis is a severe disease that affects the patient's TMJ, causing hypomobility of the jaw and, in turn, affecting the daily functions of speech, mastication, and oral hygiene¹. The etiologies of TMJ ankylosis include trauma, arthritis, infection, previous TMJ surgery, congenital defects, and idiopathic factors²⁻⁴. According to the literature, trauma is the most common etiology of TMJ ankylosis, accounting for 75% to 98% of cases^{3,5-8}. Epidemiological investigations have shown that the type of trauma and the patient's age are the most important factors related to ankylosis⁹⁻¹¹. Children can develop TMJ ankylosis very easily by overreacting to trauma because they have more growth potential than adults¹. Intracapsular condylar fracture destroys both the condylar head and the surrounding soft tissue more severely than other types of condylar fractures. Therefore, it is the most dangerous cause of ankylosis¹. The management of TMJ ankylosis is difficult and is mainly conducted through surgical intervention, even as there are no standard surgical procedures for treating it.

For prosthodontists, restricted mouth opening commonly leads to challenging clinical scenarios. Special attention should thus be paid in performing impression procedures and vertical dimension determinations, and in making jaw relation records and

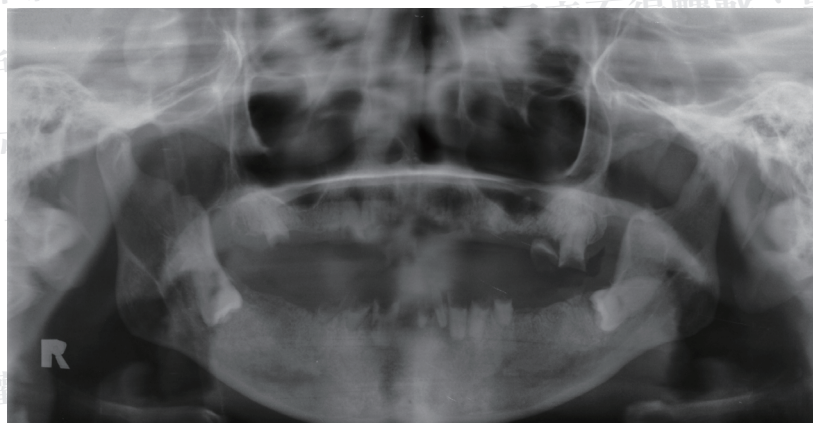


Fig. 1. Panoramic x-ray showing multiple residual roots, impacted lower third molars, and resected bilateral coronoid process.



Fig. 2. CT scan showing abnormal left TMJ with suspected TMJ ankylosis.

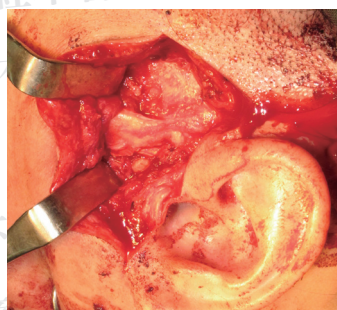


Fig. 3. Left gap arthroplasty with temporalis muscle flap for the treatment of left TMJ ankylosis.



Fig. 4. The maximum mouth opening was only 31 mm (from ridge to ridge).



Fig. 5. The best "smile". The patient's facial muscle control was poor.

determining prosthetic teeth arrangements. The following case report describes the case of a denture-rehabilitated patient with a history of TMJ ankylosis.

Case report

A 43-year-old female experienced a head injury due to traffic accident in December of 1994. She was diagnosed with an epidural hematoma (EDH) and a subdural hematoma (SDH) and underwent two craniotomies. However, her vegetative status persisted for more than two months. She was then referred to the NCKUH department of physical medicine and rehabilitation. Fortunately, the patient ultimately regained consciousness and was discharged from NCKUH, although she still suffered from some sequelae of the brain injury, including mouth opening limitation. The patient was subsequently brought to the NCKUH department of stomatology for oral rehabilitation in 1998. Her maximum mouth opening at that time was only 7 mm. Mouth opening exercise was suggested at that time, but the patient was uncooperative because of the brain injury. A surgical intervention including left interpositional arthro-

plasty and bilateral coronoidectomy under general anesthesia was then performed. However, severe mouth opening limitation and deviation to the left could still be observed after the surgery. The patient was then lost to follow-up for a long period of time (1998–2012). Recently, however, she returned to the NCKUH department of stomatology with her parents and asked for further management for her mouth opening limitation and dental rehabilitation. Although the patient had regained consciousness after a two-month period of vegetative status, her mental status after the head injury was child-like and she had forgotten everything, including her parents and even who she was. Moreover, her ability to control her facial muscles was poor, and her left eye was almost blind.

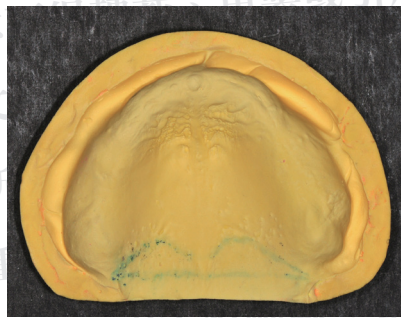


Fig. 6. The upper working cast.

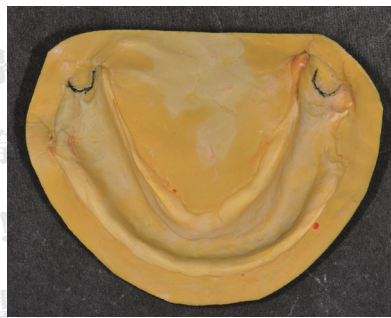


Fig. 7. The lower working cast.



Fig. 8. The occlusal scheme was set to achieve bilateral balanced occlusion. (a) CO contact. (b) Left balancing contact. (c) Left working contact. (d) Right balancing contact. (e) Right working contact.

A panoramic x-ray was taken that showed multiple residual roots, impacted lower third molars, and the resected bilateral coronoid process (Fig. 1). A CT scan showed an abnormal left TMJ, which led to the suspicion of TMJ ankylosis (Fig. 2). The patient's maximum mouth opening at that time was only 15 mm, and chin deviation to left side during mouth opening was also noted. On November 9th, 2012, the patient underwent left TMJ surgery, and all the residual roots and the impacted tooth #38 were extracted under general anesthesia. After exposing the left TMJ region, no evidence of bony TMJ ankylosis was observed, but it was revealed that a silicon sheet placed 14 years prior to the surgery had become encompassed by fibrous tissue. The silicon sheet was then removed, and a central perforation at about 6 mm was observed. The fibrous ankylosis mass was trimmed to create adequate space for the condyle head, and the left temporalis muscle flap was used for interpositional material (Fig. 3).

In October of 2013, complete denture fabrication procedures were started. The patient's maximum mouth opening at that time was only 31 mm

from ridge to ridge (Fig. 4). Figure 5 shows the best "smile" she could do. Upper and lower stock trays and alginate were used to make preliminary impressions. Then, upper and lower individual trays were made. After border molding, final impressions were made with additional silicone. After boxing, the working casts were poured (Figs. 6, 7).

Standard protocol was followed to determine the occlusal plane and vertical dimension with the occlusion rims first. Then, the vertical dimension was reduced by evenly reducing the height of the upper and lower occlusion rims. The rest position could not be used for reference due to the patient's poor control ability. Facial support and a phonetics test were used as guides to determine the vertical dimension.

After the vertical dimension determination, bite registration and facebow transfer were performed, and then the working casts were mounted on a semi-adjustable articulator. The zero-degree non-anatomical posterior teeth were selected, and the occlusal scheme was set to achieve bilateral balanced occlusion (Fig. 8). After packing, the upper and lower



Fig. 9. 6-month follow-up image. Stable occlusion was noted.



Fig. 10. 6-month follow-up image. Note the bilateral and even CO contact and the zero-degree non-anatomic posterior prosthetic teeth.



complete dentures were delivered, and their stability and retention were good (Figs. 9, 10). At first, the patient could not eat while wearing the dentures. At the 2-week follow-up, however, she could eat soft foods while wearing the dentures. At the 1.5-month follow-up, there was no specific complaint, and the patient and her parents were satisfied with the dentures. At the 6-month follow-up, the patient's maximum mouth opening had increased by 4.5 mm (from 31 mm to 35.5 mm) (Figs. 11, 12).

Discussion

The management of TMJ ankylosis is difficult and is mainly conducted through surgical intervention, even as there are no standard surgical procedures for treating it. Rather, a variety of techniques and interpositional materials have been used. Today, gap arthroplasty with interpositional graft has come to be seen as one acceptable method for the primary surgical management of TMJ ankylosis¹². A variety of interpositional materials have been used in this procedure, including the temporalis muscle and fascia, dermis, auricular cartilage, fascia lata, fat, lyodura, silicone, and various metals¹³⁻¹⁶. The temporalis muscle flap is the most commonly used interpositional material. The advantages of using this flap are as follows: (1) good blood supply; (2) close proximity to the surgical area, such that it can be easily accessed from the same incision; (3) easy preparation and harvesting; and (4) minimal cosmetic and functional morbidity at the donor site¹².



Fig. 11. 6-month follow-up image. The maximum mouth opening was increased by 4.5 mm (from 31 mm to 35.5 mm).

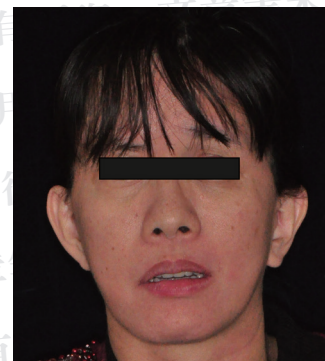


Fig. 12. The frontal view after delivery of the dentures.

According to a study conducted by He et al.¹, placement of an interpositional material between the ramus and the skull base is usually advocated to reduce the recurrence rate. The temporalis myofascial flap is the most popular interpositional graft and typically achieves good results¹⁷. When the medially displaced condylar head and disc are intact, lateral arthroplasty with temporalis myofascial flap is a good procedure for treating TMJ ankylosis.

For prosthodontists, restricted maximum mouth opening commonly leads to compromised impressions and prostheses. Therefore, a modification of the standard fabrication procedures is often necessary. In some cases, the mouth opening is so limited that placement of even the smallest available stock tray into the mouth is not feasible. Trimming the flange lengths and adding compound as necessary are often helpful means of addressing this issue. Furthermore, if a 1-piece tray cannot be used, then the stock tray may be cut in half and the halves approximated to form the preliminary cast¹⁸. Procedures have been introduced in which putty silicone is used as flexible trays washed with light body silicone for more details. After pouring, the resultant preliminary casts can then be used for making rigid sectional trays for final impressions¹⁹⁻²¹. In the present case, the smallest available stock tray could be slowly placed in the patient's mouth and so was used for the preliminary impressions.

In patients with limited mouth opening, entrance of the bolus is more easily accomplished by increasing the interocclusal space. Therefore, reduced vertical dimension is sometimes needed for these patients. Some experimental research studies have shown that a rapid adaptation can take place after changing the vertical dimension, leading to another rest position and the creation of a new interocclusal distance²². This seems to occur even after an increase that was greater than the original interocclusal distance. Such findings indicate that the adaptive capacity of the masticatory system is usually substantial and that the rest position alone is not a reliable basis for the determination of maxillomandibular relations. Relatedly, small variations in the vertical dimension are not so critical²². Lingualized or monoplane occlusion is favored in patients with limited mouth opening. The non-anatomic occlusal schemes generate less horizontal force.

For patients with limited mouth opening, special attention should be paid to fabrication procedures. Moreover, practical prosthodontic treatment goals are crucial in patients with compromised oral function.

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