



Treatment of Temporomandibular Joint Reankylosis by Submandibular Anchorage Technique with Temporalis Myofascial Flap

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Abstract

Management of temporomandibular joint (TMJ) ankylosis is challenging for the oral and maxillofacial surgeon because it involves the mouth opening, dentofacial deformity, diet problem, and quality of life. Although surgical techniques to treat TMJ ankylosis have improved, reankylosis is a persistent problem. The temporalis myofascial flap provides good material for interpositional arthroplasty, because of its good vascular supply, anatomic proximity, and adequate thickness. This case report examines the efficacy of submandibular anchorage to prevent reankylosis by inhibiting flap dislocation.

Key words: Temporomandibular ankylosis, Temporalis myofascial flap, Reankylosis, Interpositional arthroplasty, Submandibular anchorage

Introduction

Temporomandibular joint (TMJ) ankylosis results in a limitation of the mouth opening. This disorder can result in an array of problems with diet, facial deformity, and poor oral hygiene[1]. During the developmental stages of childhood these functional limitations adversely affect nutrition and speech development and cause psychological impacts.

Surgical treatment of TMJ ankylosis removes the ankylotic mass and maintains joint movement, allowing a normal mouth opening and improving the quality of life by reducing the risk of dentofacial deformity. However, in most cases, surgery itself is not easy because of a fusion with

the skull base and the possibility of injury to the maxillary artery and middle meningeal artery[2]. A major problem is reankylosis, which generally requires gap arthroplasty.

Surgical techniques such as gap arthroplasty and interpositional arthroplasty use autogenous and alloplastic materials to treat TMJ ankylosis. Total joint prosthesis is a more recent technique frequently performed. Of these procedures, autogenous temporalis fascia flap is most common, having advantages of a good blood supply, no need for a second surgical site, proper thickness, less deformity, less donor site morbidity, and good clinical results[1,3,4]. However, to address the risk of reankylosis caused by flap dislocation, Balaji[5] and others proposed a modified temporalis anchorage.

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In this case report, we discuss a submandibular anchorage technique on a patient after performing interpositional arthroplasty through the temporalis myofascial flap.

Case Report

1. Brief history and clinical examination

A male child aged 12 years came to our department

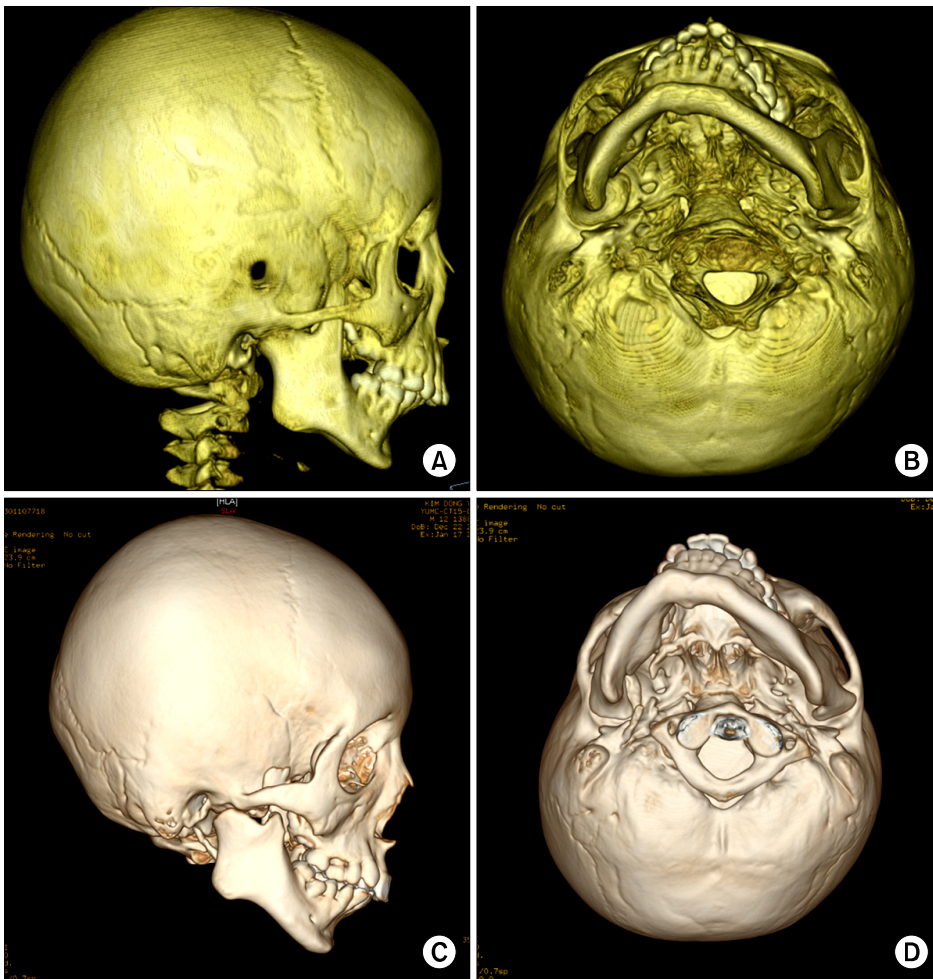


Fig. 1. Serial 3-dimensional reconstruction model by computed tomography scan. (A, B) Primary ankylosis at 5 years old. (C, D) Reankylosis after gap arthroplasty at 12 years old.

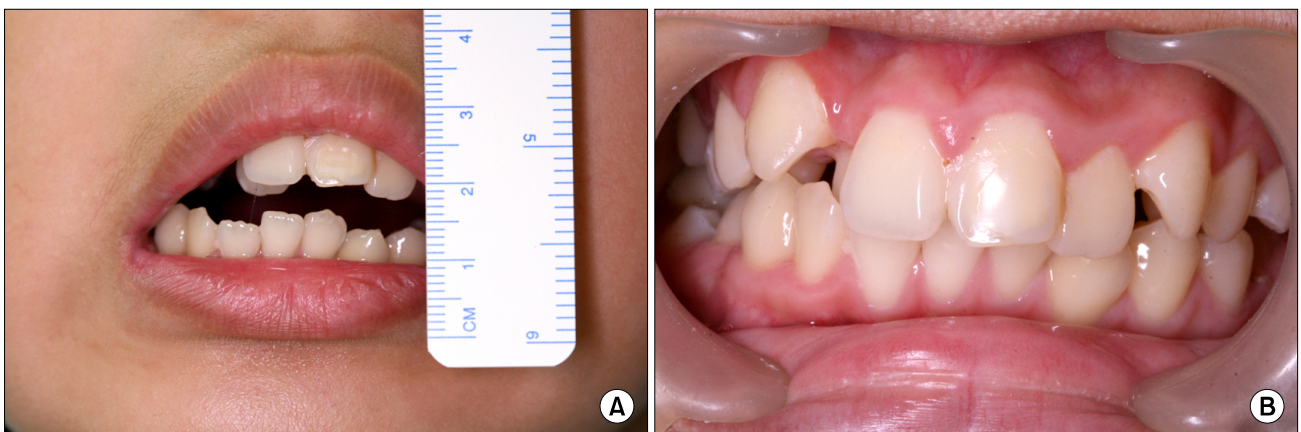


Fig. 2. Preoperative clinical photo. (A) Maximum mouth opening. (B) Occlusion.

with a chief complaint of mouth opening limitation. The patient had no noticeable past medical or trauma history. However, seven years ago, the patient underwent gap arthroplasty and coronoidotomy on the temporomandibular joint. After the surgery, there was a temporary increase in the size of the opening, but as time passed, reankylosis gradually occurred. As a result he was admitted for surgical management (Fig. 1).

Upon clinical examination, the maximal mouth opening was measured at 5 mm. A lateral excursion to the right of 2 mm and to the left of 0 mm along with protrusive movement of 1 mm with a right side deviation resulted from the right TMJ ankylosis (Fig. 2). The facial computed tomography scan and magnetic resonance imaging (MRI) showed there was ankylotic mass on the right condyle head (Fig. 3, 4). The left condyle had a favorable structure of articular disk and joint space in the MRI.

We removed the ankylotic mass and performed interpositional arthroplasty with temporalis myofascial flap and

coronoidotomy on left TMJ to improve the range of mouth opening.

2. Operative technique

The surgery was performed with general anesthesia. Due to a difficult airway, nasotracheal intubation was performed with a fiberoptic endoscope.

The path of the superficial temporal artery was marked and confirmed with Doppler. We performed the Al-kayat-Bramley incision, which extends from the pre-auricular incision upward to the temporal area[6]. To protect the superficial temporal artery from damage, careful dissection of the superficial temporal fascia was done, and using blunt dissection of loose areolar tissue also was done to prevent facial nerve injury. Upon performing a resection of the ankylotic mass on the right condyle, along with gap arthroplasty, more than a 10 mm gap was formed between glenoid fossa and condyle head.

Coronoidotomy on the ipsilateral side was performed in a prior surgery. In this surgery, contralateral side coronoidotomy was done by intraoral approach. Increase in the mouth opening to 25 mm was confirmed by hand manipulation during surgery.

The superficial temporal artery was used as a feeding vessel for the inferior based temporalis myofascial flap elevation from the infratemporal fossa[7]. This flap passed above the zygomatic arch and the gap between the glenoid fossa and condyle. The flap was passed to the medial side of the ramus. During the submandibular incision, the inferior border of the mandible was exposed, and an anchor-



Fig. 3. Preoperative panoramic view.

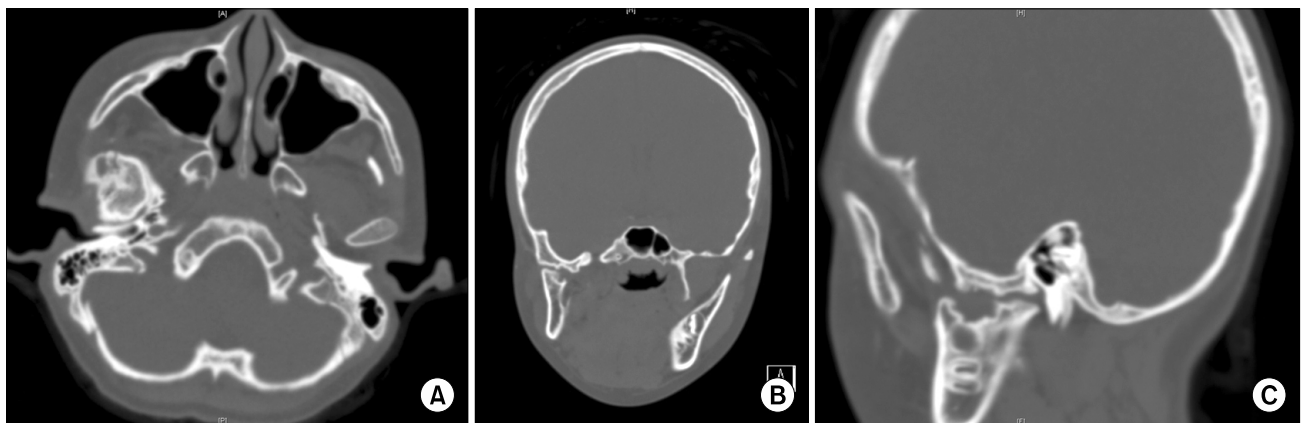


Fig. 4. Preoperative axial, coronal, sagittal view and 3-dimensional reconstructed model on computed tomography. (A) Axial view, (B) coronal view, (C) sagittal view.

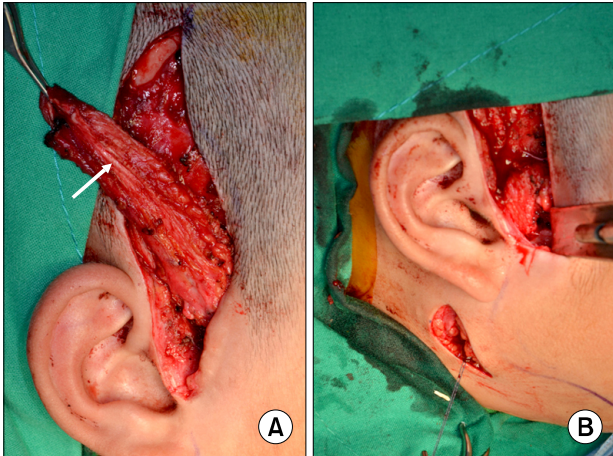


Fig. 5. Intraoperative photo. (A) Raised temporalis myofascial flap (arrow: middle temporal branch of superficial temporal artery), (B) submandibular anchorage by suture.



Fig. 6. Postoperative panoramic view.

ing suture placed at the periosteum at the exposed mandible inferior margin. Another suture was done for fixation of the interpositioned flap through formation of a hole in the condyle head (Fig. 5).

3. Postoperative care

A compression dressing was applied and the patient given a soft diet. Medication for pain control and muscle relaxants were prescribed. The day following surgery, the physiotherapy program was started to prevent hypomobility caused by fibrous adhesion. Tongue depressor technique self jaw-opening exercise was performed. There was no facial nerve injury after surgery. After surgery, the formation of a sufficient gap on the right TMJ was observed by panoramic view (Fig. 6). The patient was observed for six months. There were no late complications of reankylosis or malocclusion. Intraoperative and immediate postoperative mouth opening was measured at 25 mm.



Fig. 7. Postoperative clinical photo.

The mouth opening measured at the six month exam was 22 mm (Fig. 7).

Discussion

TMJ ankylosis etiology is multi-factorial. Trauma is the most common cause, often resulting from condylar fractures[8]. Limited jaw joint movement often occurs because of excessive bone formation from intra-articular hematoma and as a result, bony ankylosis can occur. Other factors such as infection or rheumatic disease, ankylosing spondylitis and psoriasis can cause TMJ ankylosis[9].

Surgical management for TMJ ankylosis has developed in a variety of ways. Surgical methods include condylectomy, gap arthroplasty, interpositional arthroplasty, and total joint replacement[10]. Disc interposition has advantageous biologic features, but can be used only when the disc still exists on the medial side of the condyle. Cartilage is not reasonable because it ossifies easily. Total joint reconstruction is being performed more often but it is better done after growth is fully completed.

For gap arthroplasty, an approximate 10 to 20 mm gap is required and there is a possibility of reankylosis due to osteoblastic growth. In reality, after several surgeries, reankylosis can occur from heterotopic bone formation[10]. Thus, a variety of materials are used for the interposition, which aids in prevention of reankylosis. In fact, a study comparing gap arthroplasty with interpositional arthroplasty, showed that the effects of the treatment outcome was similar but for gap arthroplasty, reankylosis is reported more often[3,11]. Among these interpositional materials,

many cases using temporalis myofascial flap have been reported[12,13].

With the temporalis myofascial flap, there is a sufficient blood supply from the anterior and posterior temporal artery that branches from maxillary artery, and the middle temporal artery that branches from superficial temporal artery as well, and anatomically has advantageous proximity to the surgical site, thus making it easier to gather[14,15]. Placing the flap between gaps after removing ankylotic bony mass can assist in prevention of reankylosis and fibrous adhesion. However, when interpositional arthroplasty was performed using temporalis myofascial flap, the possibility of reankylosis by postoperative muscular pain, inappropriate postoperative physiotherapy, and flap dislocation was reported. In reality, at the time of surgery, after removing the large ankylotic mass, especially in the past, the flap was fixed to the capsule or ligament through the suture. Often this structure was weak or non-existent, resulting in flap dislocation[16].

In this case, the suture was done by forming a hole in the condylar head and placing the flap to the inferior border of the mandible at the medial side of the ramus, and fixation was done by securing, with the suture, the medial pterygoid muscle and the periosteum through the inside angle flap. This primarily prevents flap dislocation and secondarily allows the mandible to move in its natural articulating movement, reproducing physiologic conditions similar existing TMJ anatomy. Feinberg and Larsen[17] explained that in mandible movement, the flap naturally moves in the anterior direction and functions similarly to a disc.

Compared to previous studies, the increase in mouth opening was indeed small. However, after surgery, postoperative follow-up showed the opening was maintained and not reduced. In this study, the patient was challenging because he has a past history of surgery, gap arthroplasty and coronoidotomy on right side, and recurrence of TMJ reankylosis. So in addition, a coronoidotomy on the contralateral side was performed to improve mouth opening during surgery. To reduce the risk of reankylosis, anchorage by suture was performed and maintenance of proper gap width was observed after surgery in panoramic view.

Temporalis myofascial flap is a widely used material in interpositional arthroplasty. It has satisfactory results and

fewer complications. However, an additional anchoring technique is proposed that can lead to a better result by preventing postoperative fibrous adhesions or reankylosis from flap dislocation due to instability.

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