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Reconstruction of Temporomandibular Joint Using Distraction Osteogenesis: A Case Report

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Temporomandibular joint (TMJ) ankylosis is one of the major complications following trauma and local or systemic infections and is rarely associated with systemic diseases such as ankylosing spondylitis and rheumatoid arthritis (1,2). The reconstruction of mandibular deformities in a patient with long-term TMJ ankylosis is challenging. The multiple requirements include reconstruction of the TMJ, reconstruction of mandibular asymmetry and soft tissue facial augmentation.

Distraction osteogenesis (DO) has become a popular method for the management of the congenital and acquired mandibular deformities. After McCarthy introduced the first clinical application in a human mandible in 1992, many successful results have been reported with distraction osteogenesis for mandibular lengthening and widening and alveolar ridge augmentation (3-6). In recent years, papers involving TMJ reconstruction with distraction osteogenesis have been published (7,8).

In this article, a patient with long-term TMJ ankylosis treated with distraction osteogenesis is described.

Case Report

A 17-year-old male patient was referred to our clinic with limitation in mouth opening. His medical history revealed severe otitis media at age 6 and consequent difficulty in mouth opening when he reached 12. Finally,

at age 16, the interincisal distance decreased dramatically, hindering his eating and articulation.

Clinical examination revealed a 4mm interincisal distance with a 6mm symphyseal deviation to the right with a retrognathic appearance. Radiographic evaluation suggested a large extra-capsular bony ankylosis in the right TMJ (Figure 1).

Under general anesthesia with tracheotomy, the exposure of the surgical site was achieved using preauricular and submandibular incisions. Gap arthroplasty and ipsilateral coronoidectomy provided an 18mm reduction in the vertical ramus height.

A 25 mm vertical line, 10 mm away from the posterior border of the ramus, and a 10 mm horizontal line, 10 mm away from the inferior border of the angulus, were outlined on the bone. This "reverse-L" shaped bony outline was osteotomized with saws and osteotomes at the mandibular ramus. The unidirectional distraction device was mounted parallel to the posterior border of the mandibular ramus, in the glenoid fossa direction, with two external pins introduced in each of the distal and proximal segments. The distraction was started 5 days after surgery at the rate of 1mm/day and aggressive physiotherapy was initiated in the postoperative first week. Advancement of the segment provided the formation of the condylar process. Activation was completed at the end of 14th day and the activator was left in place for another 40 days for



Figure 1. Clinical view of the patient demonstrating a 4 mm mouth opening and deviated chin to the ankylosed side.

consolidation. At the end of the fixation period the distractor was removed. Postoperative radiographic examination in the 6th month showed the condylar

construction of the transported segment (Figures 2,3). Two year follow-up examinations revealed a 34 mm mouth opening without any sign of re-ankylosis (Figure 4).

Discussion

TMJ ankylosis causes mandibular growth abnormalities due to the loss of function, especially when it occurs in childhood. These problems may be severe or mild, depending on the age of onset, the time elapsed until management, and the pattern of the process: unilateral or bilateral. TMJ ankylosis is usually characterized by a retrognathic appearance and deviation of the chin to the affected side. The first goal in the management of TMJ ankylosis is the resection of the ankylosed segment and reestablishment of the mandibular movement. Additional surgical procedures are required for the reconstruction of the TMJ and atrophic ramus. A number of surgical techniques for purpose have been reported, such as gap arthroplasty or interpositional arthroplasty, and reconstruction with costochondral graft, total joint prosthesis, free vascularized bone or total joint graft (1,9).

Currently, reconstruction of the condylar process and mandibular ramus with a costochondral graft and an interpositional temporal muscle-fascia flap is the most popular method for the treatment of TMJ ankylosis in childhood. Complete growth of the functioning atrophic

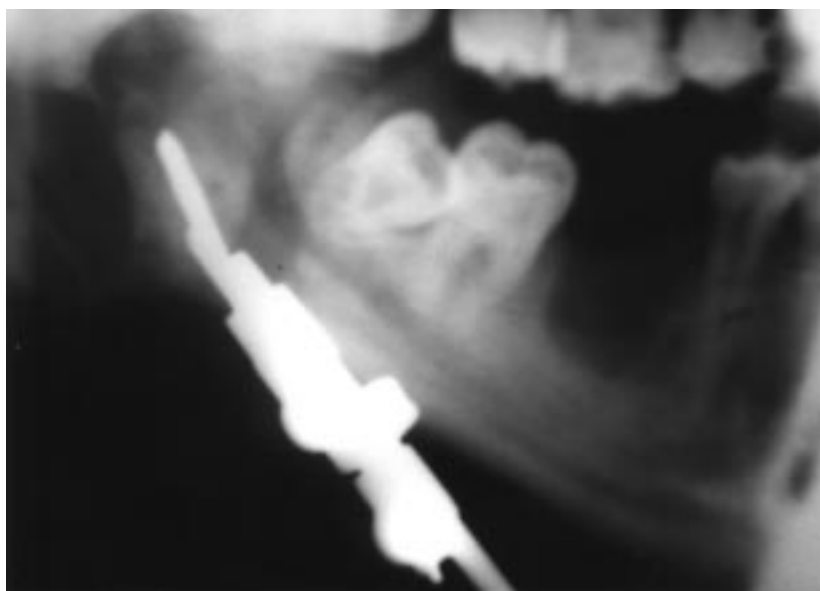


Figure 2. Radiograph of the distracted segment on the 8th day.



Figure 3. Radiograph of the neocondyle in the glenoid fossa in the 6th month.



Figure 4. Clinical view of the patient with a 34 mm mouth opening in the postoperative 2nd year.

mandible is achieved through the growing ability of the costachondral graft. It is suggested that as the chondral structure grows, it reconstructs both the mandibular condyle and the ramus. Despite the advantages of the costachondral graft, a number of complications have been reported such as the need for a second surgical site, pneumothorax, hemothorax, and infection, and fracture, resorption and excessive growth of the graft (10-12).

DO has many advantages including the lack of donor site, reconstruction with original tissue, optimal replacement of the lost tissue, and the augmentation of the soft tissue simultaneously with the bone. Therefore, DO is the preferred method among the alternative difficult surgical procedures in the maxillo-facial region for esthetic and reconstructive goals.

McCormick was the first to report the use of DO for the reestablishment of the condyle in two cases in 1997. It was demonstrated that the condylar process is reconstructed by the "L" shaped transported segment prepared at the posterior ramus, and asserted that the

articular disk is re-established with fibrocartilagenous tissue, surrounding this transported segment during the distraction process (7). Recently, clinical and experimental studies about the reconstruction of the structure and the function of the TMJ with DO have been reported (7,8).

Experimental studies also revealed the remodeling of the transported disk to the neocondyle. Histologically, the pseudodisk formed by fibrocartilagenous tissue is shown. However, it is stated that the thickness of this fibrocartilagenous tissue is 1/10 of a normal disk (13).

In our case, resection of the ankylosed bone segment and reconstruction of the TMJ was planned in order to maintain an appropriate maxillo-mandibular relation. A new condylar process was constructed and the vertical ramus was elongated with distraction of the transport segment. Two year postoperative examinations revealed uneventful healing with postoperatively acquired mouth opening. Continuity of the neocondyle was detected radiographically.

Despite the disadvantages involving skin scars caused by the extra-oral pins, the high cost, and the long treatment period, the method has the advantages of quite easy application, and contouring of atrophic hard and soft tissues by only guiding the primary callus. DO seems to be superior to conventional techniques in TMJ reconstruction when the advantages are taken into account.

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