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Treatment of Temporomandibular Joint Ankylosis with Temporalis Superficial Fascia Flap

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Abstract

Background: Different interpositional materials have been used to prevent recurrence after gap arthroplasty in temporomandibular joint ankylosis. In this study, the temporalis superficial fascia flap was evaluated as an interpositional material after condylectomy. **Materials and Methods:** 9 Cases of unilateral or bilateral temporomandibular joint ankylosis were evaluated in this study with a follow-up of 12 months. The Al-khayat approach was used as the surgical technique with the inferiorly based temporalis superficial fascia flap. **Results:** 9 Patients (6 female and 3 male) had a preoperative maximal inter-incisal opening of 3 to 10 mm. During the last follow-up observation after surgery, patients had a maximum inter-incisal opening of 40 to 45 mm. Paresthesia or anesthesia of the temporal branch of facial nerve was absent in all cases. There were no signs of re-ankylosing in any of the patients. **Conclusion:** The findings of this study showed that the temporalis superficial fascia flap is a good alternative as an interpositional material in treatment of temporomandibular joint ankylosis. **[GMJ. 2013;2(4):183-6]**

Keywords: Ankylosis; Temporomandibular joint; Superficial fascia flap

Introduction

Ankylosis of temporomandibular joint (TMJ) refers to adhesion of bones or fibrosis of Joint anatomical components which may finally lead to loss of function in the joint [1]. This condition is likely to occur in both children and adults. Since the occurrence of TMJ ankylosis in children inhibits normal growth of the mandible, the importance of prompt diagnosis and early intervention for treatment of the disease should be highly considered in these patients [2]. Successful treatment of TMJ requires a thorough understanding of the disease's etiology, and failure in treatment would trouble the patient with hypomobility of the mandible [3]. TMJ ankylosis is classified into different categories, based on the position (intra or extra capsular), involvement of tissues (bony, fibrous or fibro osseous) and the extent of adhesion and rigidity of bones (complete or partial) [4]. In contradistinction to true ankylosis, in which the structures within the joint are affected, false ankylosis may be caused by structures outside the joint, hyperactivity or muscle spasms, coronoid hyperplasia, and fracture of depressed zygomatic arch [5]. The most common causes of ankylosis are: trauma (31-98%), systemic or local infections (10-49%), systemic diseases (10%) and neoplasms [4]. It is believed that trauma as the most common cause of TMJ ankylosis can re-

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duce the mobility of the joint by formation of intra-articular hematoma, scar, and extra bone at the site of injury [6]. The goal of treating patients with TMJ ankylosis is prevention of recurrence, achieving normal growth and occlusion, improving the appearance, restoring function, and motion of mandible which is a tough challenge especially in children. Hence, complete removal of fibrous or bony mass is an important step in the treatment of patients with joint ankylosis [2]. The main treatment is done through surgical intervention and interpositional materials which are used to avoid further Joint ankylosis [7]. Patients are treated by gap arthroplasty using diverse types of interpositional grafts such as TMJ meniscus, temporalis fascia or muscle, fascia lata, skin, ear cartilage, fat, alloplastic materials and xenografts [2,8]. The use of alloplastic materials has been associated with complications such as migration and reaction of foreign bodies [9]. The benefits of temporalis myofascial flap in remodeling and reconstruction of glenoid fossa include its close proximity to the joint that removes the need for additional surgery and its adequate blood supply as an autogenous source [10,11]. Inferiorly based temporalis myofascial flap is typically supplied with deep temporal artery (anterior and posterior branches), the terminal branches of the maxillary artery, as the main source of perfusion. Also the central artery of the superficial temporal artery branches is involved in the perfusion of this flap [12].

The objective of this study was to evaluate the results of using temporalis myofascial flap in patients suffering from TMJ ankylosis. The flap is used as an interpositional material for creating a new covering for the joint after arthroplasty or condylectomy and preventing the recurrence of ankylosis.

Materials and Methods

In this study, 9 patients, between 8-59 years-old, who had been referred to Oral and maxillofacial clinics under supervision of Dental branch of Tehran Islamic Azad University, Tehran, Iran, in 2012 and treated by condylectomy due to TMJ ankylosis after trauma were included. After careful examination with panoramic radiography and Computed tomography (CT) scan in axial and coronal sections and confirmation of diagnosis of TMJ ankylosis, patients underwent surgery. The Al-khayat approach and the 7-stage protocol of TMJ ankylosis treatment, introduced by Fisher, Perrott and Kaban in 1990, was the chosen surgical technique for all the patients [4]. The aim of this protocol is to enable patients to achieve the maximum mouth opening (MMO), circa 32.8± 83 mm, therefore, it is crucial to perform the protocol step by step to accomplish a successful treatment.

Brief description of the operation steps includes:(1) Complete removal of ankylotic mass; (2) Dissecting and stripping of temporal, masseter, and pterygoid muscles, excision of scars from ramus, and coronoidectomy of the ipsilateral side; (3) Coronoidectomy and stripping of temporal, masseter and medial pterygoid muscles of the contralateral side; the third step is performed only if the evaluated amount of MMO in the second step is less than 35 mm; (4) Constructing of a new covering for the joint; (5, 6) remodeling of condyle with costochondral grafts; (7) Physiotherapy of the joint.

Results

The study was conducted on 9 patients (6 females and 3males) between 8-59 years-old. 5 patients were suffering from ankylosis of the right joint and 4 patients of the left. None of the patients had an MMO more than 10 mm before surgery and the least MMO (3 mm) was observed in a 19 years old male with history of joint ankylosis for 10 years. Bilateral condylectomy and coronoidectomy were done for this patient. Contralateral condylectomy was exclusively done for one of the patients and the other 8 patients underwent only ipsilateral surgery of the involved joint. 8 patients underwent coronoidectomy in the ankylotic joint and bilateral coronoidectomy was performed for 5 patients. In eight years old patient condylectomy of the ankylotic joint was performed plus reconstruction with costochondral graft from the sixth rib. Two of the patients were edentulous and underwent condylectomy for construction of complete dentures. All decisions were made with regard to the 7-stage protocol. All patients were followed up with an interval of one week, one month and then monthly for one year after the surgery which revealed no

sign of paralysis in any of the five branches of the facial nerve. After discontinuation of Mycophenolate mofetil (MMF), soft nutritional diet and exercises helped patients to expedite the movements of mandible; such as, lateral excursive motion, passive range of motion, and active range of motion.

All patients complained of inability to chew properly. The condition improved in less than 3 months.After one year the MMO increased to 40-45 mm in all patients which confirmed the success of the operation. The 8 years old patient who had received costal cartilage graft for reconstruction of the joint was referred to Orthodontics clinic to prevent deviation of mandible. The patient who had undergone bilateral condylectomy received therapy for correction of maxilla canting with facial advancement genioplasty.

Discussion

Treatment of TMJ ankylosis is a challenging process. Arthroplasty without tendon interposition can cause deviation of mandible and has a high risk of recurrence (more than 53%) [8,13]. Interpositional material is suggested to be used to decrease risk of recurrence. A combination of physiotherapy and surgery is the best method to maintain function of joint and prevent risk of recurrence. The extent of the removed bone and type of the interpositional materials are two important factors that determine the success rate of the operation [1]. Some advantages of using temporalis fascia or muscle in oral and maxillofacial surgery can be mentioned: Accessibility at the incision site, high vascularity, less morbidity in the donor site, both fascia and muscle can be used if a high extent of the graft is needed, less chance of damaging the facial nerve [12]

Smith *et al.* have mentioned that the first use of temporalis fascia and muscle as interpositional materials for treatment of TMJ ankylosis was done by Verneuil in 1872 [14]. Umeda *et al.* used temporalis fascia and muscle in 81 patients (115 TMJ) for treatment post-traumatic ankylosis, congenital anomalies and defects caused by tumor resection. Results of their study indicated that inferiorly based myofascial temporalis flap, if carefully dissected, will remain stable [12]. Cluster et al used myofascial temporalis flap in 182 cases of maxillofacial reconstruction resulting from trauma, anomalies, tumors, and ankylosis of TMJ. No complications were observed, therefore, they concluded that the method can be implemented with minimal morbidity [15]. Recurrence of TMJ ankylosis is one of the main problems of treatment. Raveh *et al.* proposed that radical removal of TMJ bone is essential in prevention of recurrent ankylosis [16]. Chossegros *et al.* also emphasized on early physiotherapy and type of interpositional material as important factors in preventing the recurrence [17]. Various types of myofascial temporalis flaps have been reported. Larsen and Feinberg have developed a technique using a pedicled temporalis muscle-pericranial flap for replacement of the TMJ disc [18]. Temporalis fascia with or without muscle is also used in a technique introduced by Kaban and Perrott [11]. In this study, temporalis myofascial flap (muscle and fascia), used in treating patients, acts as a preventive factor for joint ankylosis and restores physiological movement of the disc. Patients were followed up for one year and presented no sign of paralysis of the facial nerve.

Conclusion

These findings indicated that temporalis myofascial flap is an acceptable material in treatment of bilateral or unilateral TMJ ankylosis.

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