Temporomandibular Joint Ankylosis Surgery with Silicon Sheet Interpositional Arthroplasty

Abstract

Background: Temporomandibular joint ankylosis frequently occurs succeeding untreated or not adequately treated mandible fractures. The treatment options include condylectomy and gap and interpositional arthroplasty. Condylotomy is usually performed only for cases of fibrous or early ankylosis because of difficulty of delineating the glenoid fossa in more severe cases. Gap arthroplasty has been criticized because of high recurrence and tendency to produce open bite deformities in recent years. Interpositional arthroplasty has gained popularity because of its satisfactory long-term results and low recurrence rates, but use of autogenously or alloplastic materials are still controversial. Alloplast materials tend to cause foreign body reaction, and extrusion and displacement are not uncommon. Conversely, autogenous grafts may cause significant donor site morbidity, and resorption eventually is almost inevitable.

Materials: Seven patients with Temporomandibular Joint (TMJ) ankylosis which were admitted to 15th Khordad hospital from year 2002 to 2004 were included in this study.

Results: Postoperative results showed mean preoperative and postoperative six months interincisor opening value to be 4 and 33 mm respectively. Postoperative hematoma was present in one patient on the second postoperative day after evaluation of hematoma by opening the wound. Primary saturation was accomplished on the sixth postoperative day. There were no other complications such as infection and recurrence.

Conclusion: In conclusion, using silicon in interpositional arthroplasty is an efficient and reliable method for treatment of TMJ ankylosis.

Key words: Temporomandibular Joint, Ankylosis, Surgery, Silicon

Introduction

The Clinical condition characterized by mandibular hypomobility caused by various factors is classified into two categories, true (intra-articular) and false (extra-articular) ankylosis. In addition, intra-articular ankylosis (true type) can further be sub classified as complete and incomplete forms, with the complete form having less than 5 mm of interincisor opening. Treatment of this situation is somehow controversial.
In recent years, interpositional arthroplasty has gained popularity because of its satisfying long-term results and low recurrence rates, but use of autogenous, or alloplastic materials are still controversial. Alloplastic materials tend to cause foreign body reaction, and extrusion and displacement are not uncommon. Conversely, autogenous grafts may cause significantly donor site morbidity and resection eventually is almost inevitable.

In this study, use of silicon sheet in interpositional arthroplasty was accomplished in seven patients between 2002 and 2004, and its long term results and complications were studied.

Materials and Methods
From 2002 to 2004, seven patients (2 males and 5 females) with Temporomandibular Joint (TMJ) ankylosis were admitted to the 15th khurshid hospital (center of plastic and reconstructive surgery of Shahid Beheshti University). Mean age of the patients was 24.5 years (range: 18-32 years). Six cases were unilateral (87%). Left TMJ in 4 (57%) and right TMJ in 2 (28%) cases were involved and the last one was bilateral form (15%). The actual cause was trauma (falling down) in all (100%) cases. Mean follow-up period was 14 months (range: 10-22 months).

Limited mouth opening and difficulty in eating were the most common complaints. Deviation of the mandible to the affected side and facial asymmetry was noted in 5 (71%) cases. Crossbite and ramus shortening was also noted in two cases. Class II malocclusion in all cases and micrognathia was observed in three cases (43%).

Mean preoperative interincisor opening that included anterior open bite was 4 mm range (3-5 mm). The surgical procedure is consisted of preauricular incision, followed by subfacial technique. TMJ becomes completely free from surrounding soft tissues, and then by fine burn very narrow groove and gap is induced, making a new TMJ, and if necessary with or without coronoidectomy. silicon sheet is placed into the gap. The silicon sheet was prepared in dimensions similar to the created TMJ space as a partition between bony surfaces, and sutured to the surrounding soft tissues by 4-0 nylon sutures. In all cases, suction drains were used. Mouth opening closing exercise were begun at the first postoperative day and continued for at least 6 months.

Results
Postoperative hematoma formation by drain obstruction was noted in one patient on the second postoperative day and after drainage, pressure dressing was applied. Then, primary saturation was accomplished on the sixth postoperative day.

There were no other complications such as infection and recurrence. Mean postoperative interincisor opening values were remarkably different with average of 34 mm (range 31-38 mm), and finally a satisfactory result was achieved (Figures 1-3).

Fig-1: 18-year-old man with left TMJ Ankylosis

Discussion
Surgical treatment of TMJ ankylosis was first described more than 100 years ago. Humphry first described condylectomy in 1856 and Verneuil in 1860 used the temporal muscle to define interpositional arthroplasty.
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Currently, variations of condylectomy, gap arthroplasty, and interpositional arthroplasty are widely used. In gap arthroplasty, excision is frequently made from the mandibular neck level, and it is necessary to excise at least 1 cm segment to prevent recurrence. The TMJ works like a type III lever, with the fulcrum on the articular surface. Gap arthroplasty has the unique disadvantage of converting the TMJ into a type I lever, with the fulcrum on last molar tooth. Hence, the fulcrum is advanced anteriorly to the working power. In addition, open bite deformities in bilateral cases, premature occlusion and contralateral open bite deformities in unilateral cases, and high recurrence rates are not common. Conversely, it is a short and easy operative procedure. Because condylectomy aims to produce a gap at or below the level of ankylosis, condylectomy and gap arthroplasty are considered the same from this point of view.

Although there is a consensus over the reduced recurrence rates with use of interpositional material placed between the excised bone segments, use of alloplastic Proplast (Vitek, Inc., Dallas, TX), Teflon (DuPont, Wilmington, DE), silicon, methyl methacrylate or autogenous material (fascia lata, muscle, skin graft, cartilage, bone) is controversial.

Costochondral cartilage grafting has been recommended in children because this graft can act as growth center to obtain mandibular
development in the hypoplastic side. On the other side, growth potential for both cartilaginous grafts was reported to be unpredictable. Guyuron and Lassou20 reported no growth in three, suboptimal growth in one, and overgrowth in four patients in whom costochondral cartilaginous grafting was used. Furthermore, donor site morbidity and undeterminable resorption pattern are the main disadvantages of all autologous grafts.

Use of alloplastic material for the prevention of recurrence in ankylosis surgery began in the early 1930s. In 1947, Risdon28 used gold plates. Walker29 described the use of silicon for ankylosis surgery in 1958. Christensen30-32 and Morgan33 reported the vitalium prosthesis after bone segment excision in this region.

Although early reports concerning Proplast (Vitek, Inc. Dallas, TX)33-35 use were hopeful, biomechanical degeneration was noted 34, 35. In 1992, Fontenot and Kent reported the in vitro lifespan of Proplast to be 3 years. There are many studies concerning the use of silicon in this region for obtaining long-term successfull results.

The elastic nature of silicon material enables it to be easily shaped to fit into the condylar gap and to maintain vertical ramus height. Absence of donor site morbidity and resorption made it superior to the alternatives. Foreign body reaction was not observed; which were noted to be the main disadvantage of silicon use. Pseudarthrosis formation was noted in these patients, which was analogous to TMJ without meniscus.

In conclusion, silicon use in interpositional arthroplasty is an efficient and reliable procedure for the treatment of TMJ ankylosis.

References

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