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Surgical challenges after misdiagnosis of mandibular condylar fracture: A case report

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ABSTRACT

TMJ ankylosis is a partial or complete loss of movement in mandible that occurs as a result of several causes. Trauma is the most common cause of TMJ ankylosis. Surgical procedures are aimed at restoring anatomic structure, function and providing growth potential as well as preventing reoccurrences. In this paper, we are introducing a case of 28 years old woman, who suffered from unaesthetic appearance and TMJ ankylosis since the age of 5 but her treatment has been delayed due to misdiagnosis of her problem. She underwent two bilateral condylectomies with and without costochondral grafting, condylar shaving, and orthognathic surgery to solve a problem that could have been avoided. Costochondral graft has been suggested as the "Gold Standard" for TMJ reconstruction in the growing patient but overgrowth and reankylosis are two of its unwanted outcomes that happened after her first and second surgeries. Although the results of TMJ reconstruction is not fully in surgeons hand, with respect to our knowledge about these operations, it seems reankylosis, overgrowing and all other post-operative complications can become preventable.

Keywords: Misdiagnosis, TemporomandibularJoint ankylosis, Costochondral graft, Temporomandibular reconstruction.

Introduction

TMJ ankylosis is a partial or complete loss of movement in mandible that occurs as a result of several causes including trauma, local or systemic diseases [1]. Trauma is the most common cause of TMJ ankylosis. It can also occur as a result of TMJ surgery or tumors in TMJ area [2,3].

TMJ ankylosis can negatively affect chewing, swallowing and even speaking and if occurs in growing patient, it can lead to mandibular deformity and growth impairment. Due to growth impairment of lower face, the patient's face becomes asymmetric and the chin deviates to the affected side. Deformed alveolar process and hindered oral feeding (chewing and swallowing) can deteriorate the oral hygiene and lead to developing caries and periodontal disease. On the other hand, psychosocial problems of these patients

are another concern. Unaesthetic appearance and lack of willingness to participate in social activities with their peers along with disability to enjoy food as much as others do can negatively affect their quality of life and may lead to depressive disorders [4,5]. TMJ ankylosis usually can be diagnosed by clinical examination and imaging studies, such as plain films, orthopantomograms, computed tomography (CT) scans, MRI, and three-dimensional reconstruction [6].

Treating TMJ ankylosis can be so challenging. Surgical procedures are aimed at restoring anatomic structure and function, correcting occlusal and facial deformities, providing growth potential as well as preventing reoccurrences [7]. Different approaches with variety of techniques have been described in literature such as Gap arthroplasty with or without interpositional material and gap arthroplasty with immediate or delayed reconstruction with autogenous bone, such as costochondral grafts, grafts using fibula, clavicle, iliac crest, or metatarsal head and there are some method using alloplastic material however, there is no single technique that is universally accepted to obtain successful results [4,8]. Total joint replacement should be considered as the first method in management of TMJ ankylosis and can be useful in treatment of children with failed, overgrown, or ankylosed CCG grafts [3].

Due to technical difficulties and high incidence of reoccurrence, the surgical procedures can have its complications and even in the best surgical hands and surgical intention, complications can develop. There is no indication to suggest that a failure in surgery is necessarily a surgeon's or patient's fault [9,10]. Here we are introducing you a case of 28 years old woman went under four different operations and suffered from unaesthetic appearance, ankylosis, and overgrowth of TMJ since she was 5.

The aim of this paper is to present a long-term follow-up until the end of facial growth in a patient with TMJ ankylosis that treated by condylectomy and reconstruction with CCGs and to see whether such an extended period of post-surgical follow-up is necessary or not.

Case Report

A 28 years old female reported to the oral and maxillofacial surgery department of the Taleghani medical center, complaining of elongation of the mandible and openbite. She gave the history of falling on her face of about 2 meters height at the age of 5. Since then she noticed that her mouth opening was progressively getting less. She told us that her treatment had been delayed due to poor family finances in early childhood, cultural status, and later by the doctor, she consulted who told her that no treatment was necessary at that time.

First surgery:

6 years later (at the age of 11) she was referred to the oral and maxillofacial surgery department of Taleghani medical center with a maximum mouth opening of 2 mm between the left upper and lower incisors. Radiographs and clinical examinations showed bilateral condylar ankylosis. The patient was admitted for surgery and underwent bilateral condylectomy with bilateral costochondral graft. Access was by preauricular and lower border incisions. The 50-60 mm graft including about 10mm of cartilage was harvested from the fifth and the sixth ribs of the right side and the grafts were fixed to the lateral mandibular body and angle with miniscrews.

Second surgery:

In 4 years, she noticed a slight change in her facial appearance that gradually became worse. Due to preauricular bulge and chin deviation to the right side, she underwent another surgery and condylar shaving was performed.

Third surgery:

three years later (when she was 18), due to bilateral condylar overgrowth and mandibular prognathism, and regarding paraclinical studies such as lateral and posteroanterior cephalometry and OPGs that revealed the excessive growth of the mandible, an interceptive procedure performed and another bilateral condylectomy carried out.

Forth surgery:

This time the 28-year-old patient came to this department after two years of orthodontic treatment and by the chief complaint of appearance problems. On physical examination, her chin was slightly deviated to the left side and showed skeletal openbite with long face appearance. We consideredseveral aspects in planning her treatment:

1. Clinical assessment

2. Radiographic assessment (lateral skull cephalometry, posteroanterior cephalometry, orthopantomography, TMJ linear tomography).

3. Study models.

4. Photographic analysis.

5. Cephalometric analysis.

The patient presented with the followings: a retrognathic facial profile, vertical maxillary excess, transverse maxillary plane alteration, maxillary protrusion, anterior open bite, labial incompetence, micrognathia, undefined neck and labiomental angle, facial asymmetry, Class II molar relationships and Class III canine relationships, maxillary midline deviation and absence of the maxillary first right molar and left canine. The patient was again operated under general anesthesia through the nasoendotracheal route. For the superior maxilla, the plan was as follows: Le Fort I osteotomy, impaction of 5 mmand movement of midline 2 mm to the right. For the mandible, we planned to do bilateral sagittal split osteotomy. A counter-clockwise rotation performed, as well as a 6-mm advancement genioplasty and 4 mm of sliding to the right side. For soft tissue treatment, we planned an alar base cinch suture and V-Y sutures in the upper lip, and a suprahyoid muscles myotomy for the chin area.

Discussion

Trauma is the first common cause of TMJ ankylosis among the population and it is followed by other causes including infection, arthritis, prior TMJ surgery, congenital deformities, idiopathic factors, and iatrogenic causes [2,3,11]. When chin trauma occurs to a child, There is a risk of developing a condylar fracture along with a medial displacement of the fractured part [12], and it may lead to rupture of the articular capsule, hemarthrosis, intra and extracapsular hematoma, and possible rupture of the articular disc. A rupture of the articular disc may result in TMJ ankylosis. Hematoma following a traumatic event in TMJ of a young person has a high osteogenic feature, and the limitation of movement in the affected joint also provides conditions for TMJ ankylosis. The space between medially displaced fragments and skull base begins calcification and bone formation occurs [12]. This explanation corresponds very well with the radiologic appearance of such patients, including the present one. The treatment of the TMJ ankylosis should include surgery, even though there is no single method that is universally accepted to obtain successful results [8].

There are two mainly proposed methods In the literature recommendation for management of these patients. One is reconstructing the TMJ with an alloplastic material and the other one isreconstructing it with osteochondral graft [3]. Among all autogenous grafts used to treat these patients, CCG is known as the best option. Mainly because it maintains its ability to grow and regenerate and is biologically similar to the condylesand has been suggested as the "Gold Standard" for TMJ reconstruction in the growing patient [3,13]. But CCG has been reported to have unpredictable results in TMJ reconstruction [13,14]. The possible postoperative complications of CCGs include reankylosis, resorption, overgrowth, fracture, and pain [3]. In 1999 Ellen Wen-Ching Ko et al. reported continued overgrowth of the mandible in 7 of 10 children treated with costochondral grafts, that required orthognathic surgery to set back the mandible [15]. In that series, the authors used a graft of costal cartilage with 1 cm thickness, which is probably the cause of those overgrowing grafts. In this case, we observed the same problem. these patients need close follow-up for early intervention to remove the excessive cartilage in case of graft overgrowthand eliminate the need for additional orthognathic surgery. The growth rate of the graft depends on the thickness of the grafted cartilage and using a graft that has a thinner cartilage layer helps reduce the risk of its excessive growth [16].

In 2009 Kaban L B et al. reported that CCGs that include only 1 to 2 mm of cartilage, will not lead to problems with overgrowth [17]. There are some methods to prevent recurrences. Interpositional arthroplasty with Autogenous tissues, such as cartilage [18], temporalis muscle flap [19], dermis and fat are considered useful [3,20], as far as we know, there is no method with 100% successful results so to avoid possible complication of autogenous graft, alloplastic materials can be used but have high rate of failure [21-23]. patients with failed, severally operated or dysfunctional joints need total joint replacement utilizing an alloplastic materials, in contrast to performing another autogenous replacement that will lead to another failure. No secondary donor site morbidity, stable occlusion, a short hospital stay, and early mobilization of the joint are the advantages of alloplastic replacement of the TMJ [13,21,24]. But the lack of growth potential is a contraindication in growing patients such as the girl mentioned in this paper.

The variety of techniques described in the literature for the treatment of TMJ ankylosis reflects the complexity of the problem. It can be so challenging and Due to its technical difficulties and high incidence of reoccurrence, the surgical procedures can have its own complications. As we see in this paper, a patient underwent multiple surgeries to restore her aesthetics and function. Every time she went under surgery, she

dealt with the risk of nerve damage, general anesthesia, bleeding, and infection. Also because of accumulation of scar tissue, the surgery becomes harder on the site of previous operations [10]. Patients with TMJ ankylosis should be surgically treated as early as possible, because, the growth of the maxilla and mandible and inclination of the anterior teeth can be severely affected. Early intervention can be deterrent to normal mandibular growth and also improves psychosocial development because of a more normal appearance, the patient's nutrition, oral hygiene and ability to obtain dental treatment. We should mention that a close follow-up also plays an important role in the treatment of affected patients.

In this case, the patient was neglected because of many factors like poor family finances in early childhood, cultural status, and by doctors who misguided her. The results of TMJ reconstruction operation is not fully in surgeons hand and as in this patient, reankylosis and graft overgrowth were two unwanted outcomes of a CCG graft. Although the costochondral grafts showed an unpredictable growth pattern, it is still a good biologic reconstruction material when used with caution. The use of CCG for TMJ reconstruction in children can provide a functional joint with growth capacity. However, it is likely that excessive growth of the graft will lead to chin deviation and mandible prognathism in subsequent years. As we all know, due to the challenging nature of these operations, complication happens. But With respect to all aforementioned items, reankylosis, overgrowing and all other post-operative complications can become preventable.

Figure 1. At the age of 5. This picture was taken after her falling accident as you can see there is an evidence of TMJ ankylosis; Notice the slightly deviated appearance.

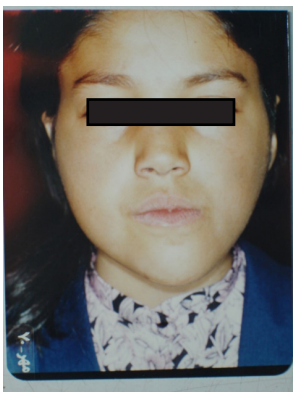
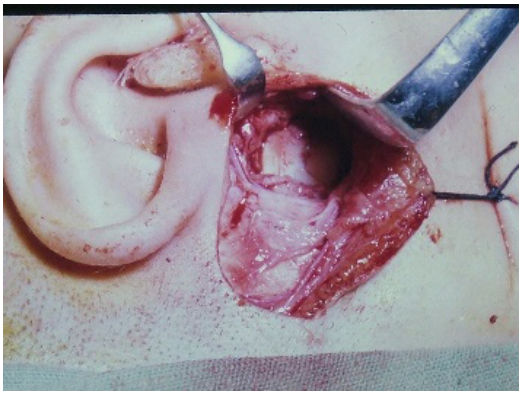


Figure 2. Pre-operation picture of our patient at the age of 11. Clinical examinations showed bilateral condylar ankylosis hence she underwent CCG surgery.



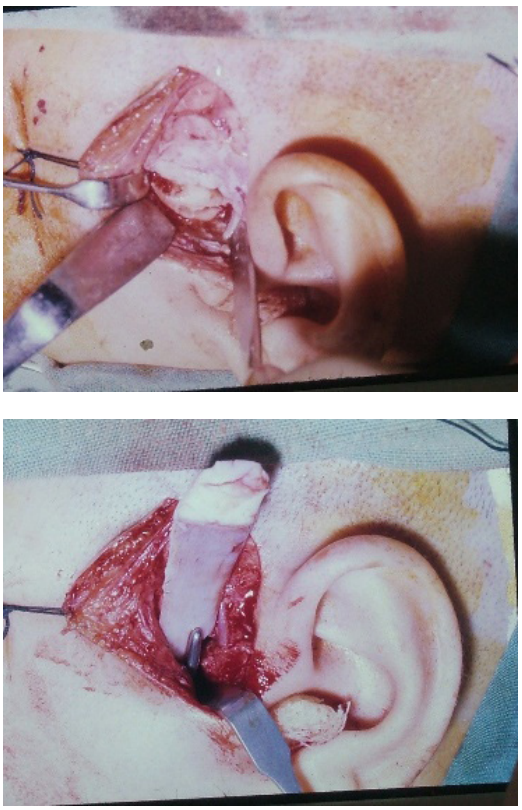


Figure 3. CCG surgery (first surgery) procedures. She underwent bilateral condylectomy with bilateral costochondral graft. Preauricular Access and lower border incisions were made. The 50-60 mm graft including about 10mm of cartilage was harvested from the fifth and the sixth ribs of the right side and the grafts were fixed to the lateral mandibular body and angle with miniscrews.

Figure 4. Preoperation picture of the second surgery. She noticed a preauricular bulge and chin deviation to the right side. Condylar shaving performed.

Figure 5. Preoperation picture of 3rd surgery. Bilateral condylar overgrowth and mandibular prognathism are visible. Bilateral condylectomy performed.

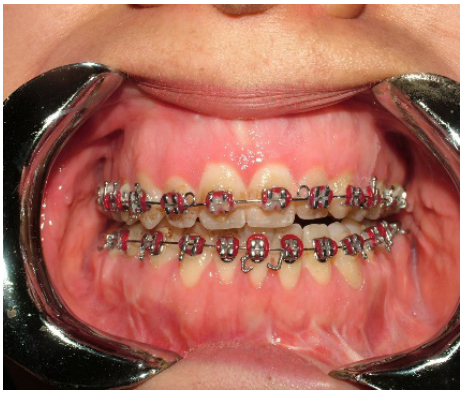


Figure 6. Post operation picture of her 4th operation. Following 2 years of orthodontic treatment, she underwent aesthetic surgery due to her chief complaint of unaesthetic appearance. Her chin was slightly deviated

to the left side and showed skeletal openbite with long face appearance. Here as you see some asymmetries are still visible.

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