



Autogenous Coronoid Process for Condylar Reconstruction in TMJ Ankylosis Patient: A Case Report

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ABSTRACT

Temporomandibular joint (TMJ) ankylosis is one of the most disruptive maladies that can afflict the masticatory system. It is characterized by difficulty or inability to open the mouth due to fusion of the temporal and condyle of the mandible, resulting in facial deformity, malocclusion and dental problems. Various autogenous and allogenic grafts are available for condylar reconstruction after gap arthroplasty. This case report describes use of autogenous coronoid process for condylar reconstruction in 12 year old female patient.

Keywords: Ankylosis, Coronoid process, Gap arthroplasty, Temporalis Facia, Temporal mandibular joint.

INTRODUCTION

Ankylosis is stiffening or fixation of a joint. [1] Temporomandibular joint (TMJ) ankylosis is characterized by inability or difficulty to open the mouth. [2] The most common causes of which are trauma, infection, and systemic diseases such as rheumatoid arthritis. [1] Present classification includes bony, fibrous, fibro-osseous, complete and incomplete. The management and Reconstruction of ankylosis of the TMJ in terms of function and aesthetics is still challenging problem in oral and maxillofacial surgery. Historically, release of the ankylosis by gap arthroplasty alone resulted in poor occlusion and function. To overcome this, reconstruction of the joint with various autologous grafts such as costochondral or sternoclavicular

graft, metatarsal, coronoid process, reshaped ankylotic mass, and alloplastic material have also been used. [3,4] The main goals of reconstruction are: improvement of mandibular form and function, reduction of disability and pain, excessive treatment cost; and prevention of further morbidity. [5] Autogenous grafts derived from distant sites such as costochondral and sternoclavicular are well established, but have their disadvantages such as exploration of the second surgical site, donor-site morbidity, bone resorption, and unpredictable growth. [6,7] Alloplastic prosthesis have achieved popularity, but are of limited use because of their cost and availability, in developing countries. The mandibular coronoid process as a bone graft has been widely applied in

the cranial-maxillofacial field for a long time. In patients with TMJ ankylosis, it is mandatory to perform a complete resection of mandibular coronoid process to avoid a possible reankylosis. If the resected coronoid process is used as a new donor source for condylar reconstruction, exploration of 2 surgical sites and donor-site morbidity is readily avoided. Currently, promising results have been achieved in experimental studies on goats, in which the autogenous coronoid process is used for condylar reconstruction. However, we lack knowledge concerning the clinical effects of this approach, because the relevant reports are limited. Therefore, in the present case we report our experience with autogenous coronoid process graft in patients with TMJ ankylosis and try to determine the efficacy and long term fate of the coronoid process for reconstruction of the ramus/condyle unit in ankylosis of the TMJ.

CASE REPORT

A 12 year old female patient reported to department of oral maxillofacial surgery at Narsinhbhai Patel Dental College and hospital, Visnagar with complaint of inability to open mouth since last 3 years. Patient's parents gave history of pus formation in lower jaw which was drained by a private dentist 8 years back. After that patient's parents noticed mouth opening gradually reduced to one finger. Pt had difficulty in eating food and esthetic problem. Clinical examination revealed facial asymmetry due to fullness on right side of the face and flatness on left side of the face (Fig.1) and patient had preoperative maximum mouth opening of 10 mm (Fig. 2). No TMJ movements like protrusive, excursions, rotatory and translator were possible. Jaw deviated towards right side while opening the mouth. Hard tissue examination showed mixed dentition, posterior cross bite on right side and occlusal cant.

A panoramic radiograph revealed radiopaque mass at right side of TMJ region (Fig. 3(a)). The 3D CT scan report suggested deformity of right

side TMJ noted with hypoplastic deformed head, sub condylar region, loss of articular cartilage {Fig 3(b) & (c)}. Radiographic evaluation of axial 3-D CT suggested shortening of ramus on right side by 21 mm when compared to left side. Final diagnosis was made as right side bony intra-articular TMJ ankylosis secondary to infection.

A written, informed consent was taken prior to the procedure. Patient was operated under general anesthesia with the use of fiber-optic intubation. The right temporal region was shaved preoperatively. Cotton soaked in antibiotic ointment placed into the external auditory meatus. Approach to the TMJ region was gained using modified Al-Kayat and Bramely's pre-auricular incision. The incision was made through the skin and subcutaneous connective tissues (including temporoparietal fascia) to the depth of the temporalis fascia (superficial layer). Blunt dissection with periosteal elevator undermined the superior portion of the incision (above the zygomatic arch) so that a flap can be retracted anteriorly for approximately 1-1.5 cm. Exposure of Ankylotic mass was done. . Excision of the ankylotic bony mass was carried out using saw. To avoid injuring the internal maxillary artery or pterygoid plexus of veins, the osteotomy was completed very carefully with a curved chisel (Fig. 4). The ankylotic mass was removed along with coronoid process. Recontouring of coronoid process was done (Fig.6). A thin layer of temporal deep fascia and muscle was harvested from an area posterior and superior to the ear in order to avoid any branches of the facial nerve, taking care not to harm the deep temporal muscle blood vessel. The flap was inserted over the glenoid fossa and sutured with the zygomatic periosteum. Recontoured coronoid was used as a graft and was attached to ramus using titanium delta plates and screws (Fig. 7). Patient had 40 mm intraoperative mouth opening (Fig. 8). The wound was then closed in layers, and the negative mini drain was placed. No signs of re-ankylosis with 1.5 year follow-up.



Fig. 1 Elongation on left side and fullness on right side



Fig. 2 Pre operative mouth opening



Fig. 3(a) Pre Op OPG

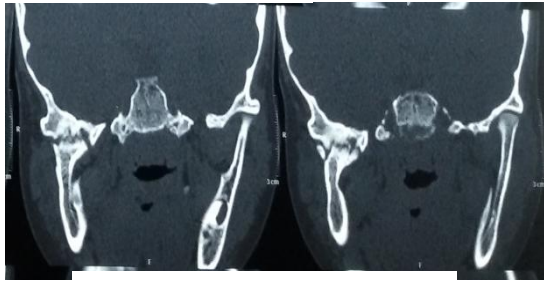


Fig. 3(b) coronal views of CT

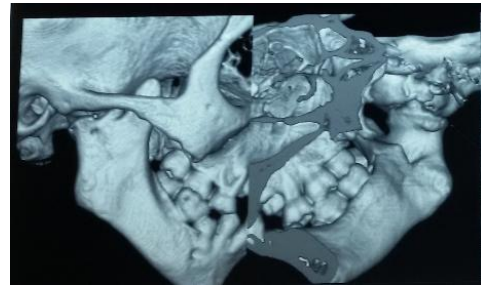


Fig. 3(c) 3D view



Fig. 4 Osteotomy cut



Fig. 5 measurement of space after gap arthroplasty

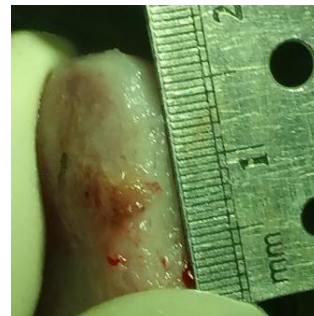


Fig. 6 Reshaping of coronoid to condylar form



Fig. 7 coronoid graft placed with delta plates and screw



Fig. 8 Intra Op mouth opening

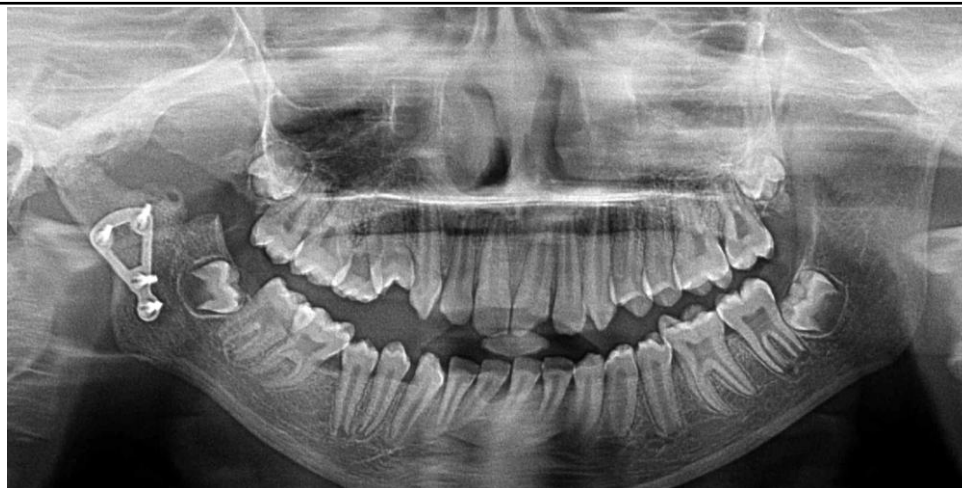


Fig. 9 Post op OPG after one month

Discussion

TMJ Ankylosis is a major debilitating disease on the Indian subcontinent. In most cases treatment is delayed due to poor availability of medical and dental facilities in rural areas. This condition is usually discovered late by parents when they find that a child is unable to eat or has a deformed face.^[8,9] This delay leads not only to a progressively enlarging ankylotic mass, an enlarged coronoid process and masticatory muscle atrophy but also to diminished growth of the facial skeleton and poor general health.

Various treatment methods of TMJ Ankylosis have been described in the literature and three basic techniques have been developed for surgical correction of disease: 1. Gap arthroplasty

2. Inter positional arthroplasty: Various materials have been used to interpose between glenoid fossa and ramus. Autogenic materials such as temporalis muscle, temporomyo-fascial flap, temporalis fascia, skin graft, costal cartilage, auricular cartilage, masseter muscle, buccal fat pad graft, and allografts such as human amniotic membrane, fresh disc allograft, and alloplastic materials included silicone plates have been used. 3. Total joint reconstruction: Autogenous material including costochondral graft, iliac crest, fibular, sternoclavicular, metatarsal, posterior border of ramus for reconstruction, coronoid, ankylotic mass and alloplastic devices for TMJ reconstruction.^[10]

Costochondral grafts have been recommended and most widely used in children, because those grafts

can act as a growth center to obtain mandibular development. But it has drawbacks like morbidity at the donor site, graft resorption, and an unpredictable growth pattern. The sternoclavicular joint is similar to the TMJ both morphologically and histologically. However, its use has disadvantages including fracture of the clavicle and the presence of a scar.

In the patients with TMJ ankylosis, if the coronoid process is not involved by the ankylosed bone it can be removed from the same surgical field, an acceptable procedure for condylar reconstruction could be free grafting of the coronoid process. In addition, previous experiment in adult goats showed that the grafted coronoid process could gradually remodel to a neo-condyle with functional shape and structure. Khadka and Hu,^[3] had first reported the use of the coronoid process for condylar reconstruction and later Zhu et al^[11] conducted an experimental study in goats. Zhu et al,^[2] reported postoperative improvement in mouth opening to 35-45 mm with only one case of reankylosis in 15 patients. Hu et al also found satisfactory mean (SD) mouth opening of 33.13 mm after 12 months in their 10 cases. In another study Liu et al^[12] compared the results of coronoid process pedicled on a temporalis muscle graft and free coronoid process graft in patients with ankylosis of the TMJ. They concluded that a pedicled coronoid graft had minimal deviation on mouth open in and less resorption, and better long term results than autogenous free coronoid process grafts.

In the present case, our experience revealed that the mandibular coronoid process is a viable alternative source of autogenous bone for reconstruction of the mandibular condyle, especially in patients with TMJ ankylosis.

The merits of using the coronoid process are apparent. First of all, the second surgical site and donor morbidity is avoided. Second, the coronoid process in patients with TMJ ankylosis is longer and thicker. So, it can provide enough length for condylar and ramus replacement as well as sufficient strength for TMJ loading force. Third, the coronoid process is much stiffer than costochondral graft, which facilitates the use of rigid internal fixation and allows the jaw movement immediately after surgical procedure. Therefore, less bone resorption occurs and owing to its membranous origin.^[13] On the other hand, a limitation of this new approach is that the coronoid process cannot be used as a substitute for condylar reconstruction if ankylosed bone involved it.

Thus the use of coronoid process can yield successful outcome for reconstruction of TMJ following ankylosis release as suggested in the present case. With this technique we can increase the vertical height of ramus which causes open bite on grafted side and with the help of orthodontic appliances, supra eruption of teeth can correct occlusal cant too.

Conclusion

Release of ankylotic mass followed by reconstruction of Condyle has become an accepted protocol for the management of TMJ ankylosis. Reshaped coronoid process graft is not used routinely in clinical practice in recent arena. The reports of TMJ reconstruction with coronoid process including the present case have suggested satisfactory clinico-radiological outcomes in short term follow-up. Thus, more studies are necessary in this direction to measure the long term effectiveness of this technique in growing patients.

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