



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 7, pp. 18423-18425, July, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

AUTOGENOUS RECONSTRUCTIVE OPTIONS FOR RAMUS-CONDYLE-UNIT IN TMJ ANKYLOSIS: A PILOT STUDY

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DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0807.0505>

ARTICLE INFO

Article History:

Received 18th April, 2017
Received in revised form 10th
May, 2017
Accepted 06th June, 2017
Published online 28th July, 2017

Key Words:

Ankylosis, Reconstruction, Arthroctomy,
Sternoclavicular Graft, Costochondral Graft

ABSTRACT

Background: TMJ ankylosis is an incapacitating disease of Temporomandibular joint causing restriction in jaw movements. Surgery remains the mainstay of the treatment. However the decrease in ramal height following arthroctomy remains an issue in comprehensive functional treatment. To achieve this, various reconstructive options, both autogenous as well as alloplastic have been tried with variable amount of success. The present comparative study presents the preliminary results of reconstruction of TMJ with those where no reconstruction was done.

Material and Methods: 10 patients with TMJ ankylosis (unilateral or bilateral) were divided into 2 groups Group A in which reconstruction was done using Sternoclavicular graft or Costochondral graft following arthroctomy. Group B in which no reconstruction was done following arthroctomy

Results: All patients were treated with arthroctomy and there was no recurrence noted in any case. The group A patients showed better functional results such as mouth opening and lateral excursion as well as gain in ramal height.

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INTRODUCTION

TMJ Ankylosis occurs when the condyle of mandible is fused to glenoid fossa by bony or fibrous tissue and results in reduced mouth opening or inability to open the mouth. It is an incapacitating problem, occurring mainly in children and commonly associated with trauma or infection.

The treatment of TMJ ankylosis is surgical, either gap arthroplasty, interpositional arthroplasty, and/or joint reconstruction using autogenous grafts or alloplastic material.¹ The multiplicity of autogenous and alloplastic materials currently used to reconstruct the temporomandibular joint (TMJ) clearly indicates absence of an ideal graft that can simulate the complex anatomy and functions of a missing TMJ. We are presenting preliminary findings of a prospective study designed to evaluate the postoperative anatomical and functional adaptation of different autogenous grafts for reconstruction of the Ramus -condyle-unit (RCU) in patients with TMJ ankylosis.

MATERIAL AND METHOD

10 patients diagnosed with TMJ ankylosis (unilateral/bilateral) fulfilling the inclusion criteria, reporting to the department of Oral and Maxillofacial Surgery at Babu Banarasi Das College

of Dental Sciences, Lucknow, were divided into two groups depending upon whether reconstruction done for RCU or not: Group A: In this group 5 patients, TMJ ankylosis released by arthroctomy and the ramus condyle unit (RCU), was reconstructed using various autogenous grafts (sternoclavicular/costochondral)

Group B: In this group 5 patients, TMJ ankylosis released by arthroctomy and followed by interposition with temporalis muscle or fascia without reconstructing RCU.

Functional adaptation of reconstructed TMJ was studied under following criteria-

1. Maximum mouth opening
2. Range of mandibular movement
3. Deviation on mouth opening
4. Height of Ramus of Mandible restored and growth thereafter during 1 month, 3month.
5. Height of Graft Lost, if any.

Preoperative assessment included a thorough history and physical examination to determine the cause of ankylosis, measurement of maximal incisor opening (MIO), photographs and orthodontic evaluation of skeletal pattern, occlusion and facial symmetry. Assessment of clinical parameters included

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mouth opening, lateral excursion, and protrusive movements at regular follow up.

Radiographic analysis included panoramic, cephalograms, postero-anterior (PA) view of chest and CT scan in cases to clarify the osseous status of the TMJ outline if not clearly depicted in panoramic view. The PA chest radiograph was taken to assess the thickness of the clavicle/ribs and any abnormality present.

Cephalometric analysis was carried out using SASSOUNI and SOTEREANOS analysis of a PA cephalogram. The difference in length between the two mandibular rami was assessed by dropping a perpendicular from the mastoidale to the bigonial line on each side and measuring the distance. Lateral cephalograms was analyzed pre- and postoperatively to determine the length of the graft to restore the height of the ramus and to determine mandibular growth following grafting. The condylar-gonion and condylon-pogonion lengths were measured on the lateral cephalogram to assess any significant changes subsequent to grafting.

Regular follow up was carried out weekly, for a month, then at 3 months intervals for all the parameters described above.

RESULTS

Table 1 Group A

Age	Sex	Type of ankylosis	Type of reconstruction
16	F	Bilateral	Sternoclavicular joint
12	M	Unilateral	Sternoclavicular joint
12	M	Unilateral	Costochondral joint
15	F	Bilateral	Costochondral joint
7	F	Unilateral	Costochondral joint

Table 2 Group B

Age	Sex	Type of ankylosis	Type of reconstruction
11	M	Unilateral	No reconstruction
12	M	Bilateral	No reconstruction
18	M	Unilateral	No reconstruction
10	F	Bilateral	No reconstruction
9	F	Unilateral	No reconstruction

Table 3 Maximum mouth opening group A

S.No	Pre op	Post op 1 week	Post op 2 week	Post op 1 month	Post op 3 months
1.	6 mm	30 mm	32mm	37mm	35 mm
2.	8 mm	18 mm	22mm	26 mm	32 mm
3.	7 mm	35 mm	35 mm	38 mm	36 mm
4.	22 mm	34 mm	38 mm	38 mm	40 mm
5.	4 mm	35mm	35 mm	38 mm	38 mm

Table 4 Maximum mouth opening group B

S.No	Pre op	Post op 1 week	Post op 2 week	Post op 1 month	Post op 3 months
1.	5 mm	36 mm	30	38mm	38 mm
2.	10mm	40 mm	36 mm	41 mm	40 mm
3.	6 mm	32 mm	34mm	36mm	36 mm
4.	4 mm	40 mm	38 mm	42 mm	40 mm
5.	8 mm	30mm	35 mm	36 mm	36 mm

A total of 10 patients, 5 male and 5 female were included. The age ranged from 7 years to 18 years. 5 patients had unilateral ankylosis and 5 had bilateral ankylosis.

Range of pre operative mouth opening was 4 mm to 22 mm. most of the patient had nil lateral excursion in pre operative measurements. Few patients with unilateral ankylosis has protrusive movements of 1-2 mm.

Height of the ramus was shortened in all cases where no reconstruction was done whereas in reconstruction group height of the ramus was restored to a range of 38- 42 mm.

DISCUSSION

Salins described the ankylotic mass as being abnormal bone that replaces the TMJ and results in restriction of mandibular movement². Ankylosis of the TMJ occurs when the condyle is fused to fossa by bony or fibrous tissue. It is an incapacitating problem, occurring in children and commonly associated with trauma or infection. It can impair mandibular growth and function which may result in severe facial asymmetry and mandibular retrusion³

The treatment of TMJ ankylosis is surgical, either gap arthroplasty, interpositional arthroplasty, and/or joint reconstruction using autogenous grafts or alloplastic material.^{3,4} *Rowe*⁵ laid down certain criteria for the restoration of ankylosed TMJ. He emphasized the release of ankylosis by cutting 1.5-2 cm of ankylosed bone, thus achieving functional articulation with adequate mouth opening. He noted that lost growth capability can be restored in young children by using an autogenous graft with growth potential, improving existing facial deformity. A similar treatment protocol was followed in the present study using SCG or CCG as a reconstruction material and was compared to non reconstruction.

Sarnet and *Laskin* noted that in humans the sternoclavicular joint and TMJ are similar anatomically and physiologically⁷. These factors have encouraged using SCGs in reconstructions of TMJ ankylosis. The sternoclavicular articulation has a growth center, and an interarticular fibrocartilage articular disc that simulates the meniscus of the TMJ^{1,6}

Wolford et al. reported that the Sternoclavicular graft (SCG) and TMJ are similar anatomically and physiologically. The head of the clavicle contains layers of cartilage that are similar to the mandibular condyle. The SCJ articulation has a growth centre and an interarticular fibrocartilage articular disc that simulates the meniscus of the TMJ. When a whole joint is used, the two adjacent synovial compartments and the strong fibrous capsule resemble those in the TMJ.⁷

Edward Ellis III, (1986) describe histologically the SCG and CCG during growth and to compare the histomorphologic features with those of the TMJ. Costochondral and sternoclavicular joints were obtained from infant, juvenile, adolescent, and adult. The CCG, however, did not resemble the condyle but appeared to be more similar to the growth plate in a long bone epiphysis during growth.⁶

Ayman A Shaker reported that the costochondral graft is a very useful technique in the management of Temporomandibular joint especially if it is associated with mandibular hypoplasia.⁸ In this study, none of the cases in either Group showed infection, nerve damage or recurrence post operatively till 3 months. In the present study, all the cases using the SCG showed complete regeneration of the clavicle during follow up. There was conspicuously significant adaptation and remodeling, which was confirmed by the appearance of the condyle.

While in group B, increase in height of ramus was seen at 3rd months follow up, which may be due to functional matrix theory.

To conclude, in treatment of TMJ ankylosis, this study favors reconstruction of the RCU for better joint function. Although the procedure is time taking and prone to complications which are self-resolving, the results attained with reconstruction of the RCU are more satisfactory and beneficial to the patient. In the reconstruction group, the results of reconstruction with Sternoclavicular graft showed more stable results in all follow-ups.

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How to cite this article:

Jasmeet Singh *et al.* 2017, Autogenous Reconstructive Options for Ramus-Condyle-Unit in Tmj Ankylosis: A Pilot Study. *Int J Recent Sci Res.* 8(7), pp. 18423-18425. DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0807.0505>
