



## **Role of Interpositional Dermal Graft in Management of Recurrent Temporomandibular Joint Ankylosis: A Case Series of Three Patients**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors SM and KK wrote the draft of the manuscript. Author SJ managed the literature searches. Authors KK and VP designed the figures, managed literature searches and contributed to the correction of the draft. Authors KB and SNSK provided the case, the figures and supervised the work. All authors read and approved the final manuscript.*

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**Case Study**

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### **ABSTRACT**

The Temporomandibular Joint (TMJ) ankylosis is a condition of the joint that causes problem in mouth opening, mastication, digestion, speech, hygiene and appearance. The treatment of TMJ ankylosis poses a significant challenge because of high incidence of recurrence and technical difficulties. Various soft tissue grafts like temporalis fascia and temporalis muscle, collagen membrane and dermal fat pad have been used in the surgical management of TMJ ankylosis. We present a series of three recurrent cases of TMJ ankylosis in which we used dermal fat graft as interpositional graft.

**Keywords:** *TMJ ankylosis; abdominal dermal fat graft; Interpositional gap arthroplasty.*

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## 1. INTRODUCTION

The Temporomandibular joint (TMJ) ankylosis is a condition of the joint that causes problem in mouth opening, mastication, digestion, speech, hygiene and appearance. There is restriction or total failure of the joint movement leading to limited mouth opening. TMJ ankylosis causes serious disfigurement due to disturbance of mandibular development in growing period of life thus having an impact on the psychologic development of patient and can place patient's life under distress and jeopardy [1,2].

The treatment of TMJ ankylosis poses a significant challenge because of high incidence of recurrence and technical difficulties. A gap of 10-20 millimetres is required in arthroplasty without interposition to prevent re-ankylosis. There is loss of ramus height, no support for the rotating mandible and a tendency to have contralateral open bite and deviation on opening, with the gap of 10 to 20 mm [3]. Hence, it is not an ideal method of management for TMJ ankylosis. Thus, a minimal gap of not more than 10 mm with interpositional material becomes mandatory to prevent re-ankylosis. Various soft tissue grafts like temporalis fascia and temporalis muscle, collagen membrane and dermal fat pad have been used in the surgical management of TMJ ankylosis [1,2].

The use of autogenous tissue (temporalis flap) as an interpositional material was reported first by Verneuli in 1860. The use of temporalis muscle as the interpositional material in the TMJ surgery has its own merits and demerits. Murphy [4] reported the use of autogenous fat for interposition graft in 1914 but it was not much supported at that time since its lack of strength and had profound atrophic tendencies. Most of the surgeons considered temporalis muscle and fascia as the interposition material for few decades. The temporalis flap was considered as the ideal interpositional material due to its close proximity, minimal risk of nerve damage, increased vascularity and with some postoperative exercises it helps in reducing reankylosis. Although temporalis muscle has many advantages, it has drawbacks too such as pain during movement due to nerve compression which leads to difficulty in mouth opening and an ugly bulging in the temporal region of that side [2]. In 1994, Steinberg and Hohn reported two cosmetically advantageous sites (suprapubic and inguinal fold) for harvesting dermal fat graft with primary linear closure [5].

G. Dimitroulis in his various retrospective clinical studies in 2004, 2008 and 2011 concluded that autogenous dermal-fat interpositional graft is an effective procedure for the prevention of re-ankylosis and reported about the fate of dermal fat graft by using magnetic resonance image. They also concluded in 2011 that neo adipogenesis inhibits the growth of new bone and cartilage by inhibiting the regeneration of the new condylar head [6,7,8]. Thus, we present a series of three recurrent cases of TMJ ankylosis in which we used dermal fat graft as interpositional graft in TMJ ankylosis.

## 2. PRESENTATION OF CASE

Three patients reported to the Department of Oral and Maxillofacial Surgery with inability to open the mouth. Patients were in the age range of 15-35 years with history of previous TMJ ankylosis surgery. On examination, patients were diagnosed with one unilateral and two bilateral true osseous TMJ ankylosis. The diagnosis was done on the basis of clinical examination and 3D CT scan.

On clinical examination, patients showed zero mouth opening with facial asymmetry, bird like appearance and prominent anti gonial notch (bilateral for bilateral ankylosis patient, left side for unilateral ankylosis) (Fig. 1). Radiographic examination revealed absence of normal TMJ anatomy with bony ankylotic mass in TMJ region.

The patients were operated between the period of October 2014 to March 2015. Gap arthroplasty with interpositional dermal fat graft was done in all the three cases. Alkayat-Bramley incision was used to gain access to the TMJ [9,10,11]. The ankylosed mass was removed to create a gap of 10 mm. Adequate mouth opening of 40mm was achieved intraoperatively.

An elliptical skin incision of about 7x3 cm was made in the inguinal region to harvest the dermal fat graft. The dermal fat graft procured was de-epithelised (Fig. 2). The subcutaneous fat was trimmed to fill the gap created in TMJ region making sure that all the dead spaces were eliminated. The graft was passively placed into the gap (Fig. 3) and then secured with 3-0 vicryl. Layer-wise closure was performed.

Physiotherapy was commenced 7 days postoperatively for mouth opening and continued thereafter to maintain the improved mouth opening.



Fig. 1. Profile view of the patient showing bird like appearance



Fig. 2. Incision marking for dermal fat graft (inguinal region) and de-epithelialised dermal fat graft



Fig. 3. De-epithelialised dermal fat graft *in-situ*



Fig. 4. MRI 6 month follow up showing dermal fat graft in arthroplasty gap

Postoperatively patients were followed up for 9-15 months and they reported significant improvement in mouth opening with no recurrence. Follow up was done with MRI, showing dermal fat graft *in situ* (Fig. 4 above).

The patients were also evaluated for complication at donor and recipient site. In the follow up period, none of the patients suffered from re-ankylosis and they were able to make protrusive and lateral movements within couple

of month following surgery. All the patients had satisfactory mouth opening and no reduction in mouth opening was reported post operatively (Fig. 5).



**Fig. 5. Post operative mouth opening**

### 3. RESULTS AND DISCUSSION

TMJ ankylosis is a rare condition that leads to chronic and severe limited opening. In India, trauma to the TMJ was documented as a major etiologic factor for TMJ ankylosis. There is a unanimous agreement that surgery plays an integral role in the management of TMJ ankylosis. The two primary objectives of surgery are a) To establish jaw movement and jaw function by surgical release of the ankylosis b) To prevent relapse by interpositional grafting, early jaw mobilization and intensive physiotherapy. Lot of autogenous, allogenic, alloplastic and xenografts materials have been used as interpositional materials since earlier days. The autogenous materials commonly used as interpositional graft are muscle, fascia, cartilage, skin and fat for the management of TMJ ankylosis [2,12].

A pedicled graft is more successful and widely used as interpositional graft since it helps in the prevention of recurrence. Temporalis muscle and fascia are broadly used pedicle graft by many surgeons as interpositional material due to its proximity to operated site and prevention of need for another surgical site for graft harvesting. However, in cases of recurrence TMJ ankylosis, where previously temporalis myofascia is already being used, abdominal dermal fat graft is a good alternative.

Dimitroulis introduced the use of use of abdominal dermal fat as interpositional graft for the management of TMJ Ankylosis and he also showed the positive outcomes of dermal fat graft in terms of increased mouth opening and improved jaw functions [7]. Quick and easy graft procurement, minimal donor site morbidity, easy sculpture to fit neatly into any size cavity, hidden scar (below the belt line) and reduction in the occurrence of excessive joint fibrosis and heterotopic calcification there by consequently providing improved range of motion are said to be the advantages of using dermal fat graft. The interpositioned fat tissue nicely thrives and can be adapted to the gap and allows the functional movement. The viable fat tissues help to prevent reankylosis due to neo-adipogenesis [10,13,14,15].

The most possible complications of abdominal fat graft harvest include seroma, infection and haematoma. Wolford et al. [15] reported a 6.9% incidence of seroma formation requiring aspiration. Postsurgical abdominal seromas are typically evacuated with percutaneous drainage and aspiration under local anaesthesia. Infection rates are consistent with any other surgical procedure, with an incidence of around 3%. We observed no such complications in our patients.

Post operatively, we waited for seven days to commence the mobilization of mandible. This allowed early healing process of the surrounding tissue and interposition graft which lead to favourable outcome through pseudo-articular formation. S. Gandhiraj [1] also followed the same principle in his study.

MRI was done to assess the status of the fat graft in the arthroplasty gap of the procedure to the TMJ. Dimitroulis in his study supported the use of MRI to assess effect of dermal graft [8].

Physiotherapy also plays an important role in the management of patients with TMJ ankylosis as this helps to maintain the mouth opening obtained during the surgery.

### 4. CONCLUSION

The result of using free abdominal dermal fat as interpositional graft in our case report were highly satisfactory and encouraging, and supports the role of dermal fat graft as the interposition material in TMJ ankylosis cases especially in children. It is also a safe and effective procedure with minimal complications which can be easily avoided or taken care of.

## CONSENT

The authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images'.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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