

# Combination of double-sliding advancement genioplasty and prearthroplastic distraction osteogenesis in cases of TMJ ankylosis with severe mandibular atrophy

### ABSTRACT

The aim of this study is to present a case of facial asymmetry secondary to unilateral long-standing temporomandibular joint (TMJ) ankylosis managed by a staged treatment protocol. Treatment for facial asymmetry secondary to unilateral TMJ ankylosis can have varied approaches followed by different workers according to their experiences. This predistracted arthroplasty versus prearthroplastic distraction debate has been at the center stage in literature for quite some time. Hereby, we present a case followed by the latter approach along with double-sliding genioplasty to correct chin asymmetry. A 25-year-old male patient with a history of facial trauma 15 years ago reported a complaint of inability to open mouth and gradually developing facial asymmetry. The patient was thoroughly evaluated using radiographs and cephalometric analysis to establish the diagnosis of TMJ ankylosis with facial asymmetry and suspected sleep apnea. The patient was treated according to our institutional protocol of prearthroplastic asymmetry correction followed by ankylosis release along with double-sliding genioplasty to correct residual deformity at a later date. Correction of facial asymmetry before ankylosis release provides a more evidence-based approach as supported by the current literature. Plus, any residual deformity can be rectified using orthomorphing procedures such as genioplasty. Since there is an ongoing debate in the current literature about sequencing in the treatment of facial asymmetry cases, the presented case adds to the argument that the approach followed herein provides for more favorable outcome.

**Keywords:** Double-sliding genioplasty, facial deformity, temporomandibular joint ankylosis

### INTRODUCTION

The treatment of temporomandibular joint (TMJ) ankylosis involves restoring the function of the joint and correction of associated facial asymmetry. The correction of facial deformity can be done by distraction osteogenesis, orthognathic surgery, advancement genioplasty, or a combination of any of these procedures. The correction of facial asymmetry along with arthroplasty can also be done in the same stage.<sup>[1]</sup> If not in the first stage, it can be done in the second stage of the surgical treatment. Prearthroplastic mandibular distraction osteogenesis is indicated in some cases such as those with obstructive sleep apnea (OSA), because there is an evidence in the literature that if correction of such deformities is not done before arthroplasty, it can lead to severe patient discomfort during physiotherapy leading to the lack of physiotherapy,

eventually leading to the risk of reankylosis.<sup>[2]</sup> In cases with a severe chin deformity, a double-sliding genioplasty can give better results as it can provide up to 20 mm chin advancement with a good surface contact.<sup>[3]</sup> We have

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documented a similar case of bilateral TMJ ankylosis with associated severe mandibular atrophy, surgically treated with prearthroplastic distraction osteogenesis, and second stage surgery comprising TMJ interpositional arthroplasty and double-sliding genioplasty for the correction of chin deformity.

### CASE REPORT

A 25-year-old male patient reported to the oral and maxillofacial surgery outpatient department, King George's Medical University, Lucknow, India, complaining of reduced mouth opening, severe snoring, episodes of apnea during sleep, and a bird-like unpleasant facial appearance, giving a history of trauma due to fall from height 15 years before. On clinical examination, there was the complete absence of mouth opening, a severely retruded mandible, and the absence of TMJ movements on palpation [Figure 1]. Signs of mild OSA were seen during polysomnography.<sup>[4]</sup>

Computed tomography (CT) revealed huge bony TMJ ankylosis bilaterally with a retruded mandible with bilaterally enlarged coronoid processes. The posterior airway space was consistently reduced [Figure 2]. A bilateral mandibular body discrepancy of 11 mm and a chin discrepancy of 17 mm were calculated based on CT measurements and cephalometric analysis.

The phase of surgical treatment commenced with prearthroplastic mandibular distraction osteogenesis with the placement of extraoral uniplanar distractors bilaterally over the body region between 2<sup>nd</sup> and 3<sup>rd</sup> molars. Distraction was started after a latency period of 5 days and 11 mm distraction was done bilaterally. Clinically, an Angle's Class I molar relation was achieved after the completion of distraction phase. The distractors were retained in the patient thereafter for the period of consolidation [Figure 3].

Second-stage surgery was planned after 4 months of consolidation phase. Bilateral TMJ osteoarthrectomy and interpositioning with temporalis fascia was done along with bilateral coronoidectomy. Simultaneous correction of chin deformity was done with a double-sliding advancement genioplasty. A planned chin advancement of approximately 17 mm was achieved with intraoperative mouth opening of 45 mm [Figure 4].

A satisfactory chin and facial profile were obtained postoperatively with promising soft tissue changes in the chin [Figures 5 and 6]. The posterior airway space was



Figure 1: Depicts preoperative frontal view (a), Lateral profile views (b and c), and occlusion with reduced mouth opening (d)

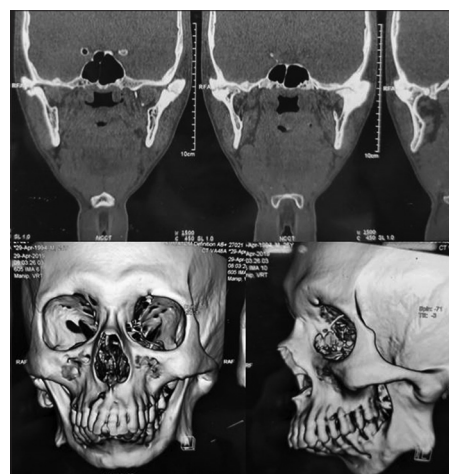


Figure 2: Depicts preoperative computed tomography images of the patient



Figure 3: Panoramic radiographs during different stages of distraction

also satisfactory with no signs of OSA in postoperative polysomnography.

## DISCUSSION

A comprehensive treatment protocol for the management of TMJ ankylosis includes functional correction as well as the correction of residual facial deformity due to TMJ ankylosis.<sup>[5]</sup> Different sequencing is used in the treatment of such cases which differs from case to case.

Mandibular distraction osteogenesis is a widely used treatment modality in cases of TMJ ankylosis with mandibular

micrognathia. As stated by Papageorge and Apostolidis<sup>[6]</sup> in 1999, distraction osteogenesis has many advantages to correct the facial deformity caused by mandibular hypoplasia in TMJ ankylosis patients, just like the case reported here. The growth of callous can be controlled, it let the surrounding soft tissue to regenerate. Distraction osteogenesis may be opted for either before or after the TMJ arthroplasty. Andrade *et al.* proposed prearthroplastic distraction osteogenesis in cases with associated OSA. According to the author, if osteoarthrectomy is chosen as a treatment modality before distraction osteogenesis is such cases, the patient will have severe discomfort during physiotherapy which will lead to a lack of proper physiotherapy, eventually increasing the risk of TMJ ankylosis or even worsening of OSA.<sup>[2]</sup>

There has always been a debate for the treatment option to be preferred for the treatment of TMJ ankylosis patients with facial deformity. Some authors preferred arthroplasty before distraction. In a study by Chellappa *et al.*<sup>[7]</sup> in 2015, 10 cases of unilateral TMJ ankylosis were treated with prearthroplastic distraction and 10 with simultaneous arthroplasty and distraction. They concluded that the former has better control on distraction; contralateral nonankylosed joint may experience pain. Zhang *et al.*<sup>[8]</sup> in their study concluded that distraction osteogenesis as the first-stage treatment and arthroplasty or TMJ reconstruction as the second-stage treatment is suitable for the management of patients with TMJ ankylosis and secondary deformities, especially those with Obstructive sleep apnoea/hypoapnoea syndrome (OSAHS). In a systematic review by Chugh *et al.*<sup>[9]</sup> in 2021, it was concluded that prearthroplastic DO appears to be the best timing for the correction of dentofacial deformity in the mandible.

Treatment of facial asymmetry or facial deformity in patients with TMJ ankylosis may be achieved with the virtue of orthognathic surgery including advancement genioplasties, distraction osteogenesis, or a combination of these procedures. According to Wiese and Lawson *et al.*,<sup>[3]</sup>

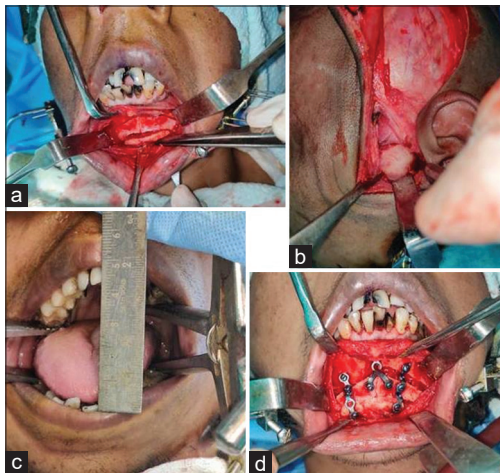


Figure 4: Intraoperative images showing superior and inferior cuts of double-sliding genioplasty before advancement (a), after advancement and fixation (d), exposed temporomandibular joint (b), and intraoperative mouth opening (c)

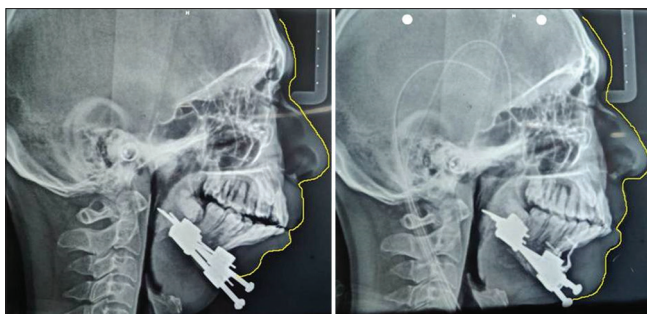


Figure 5: Lateral cephalograms before and after genioplasty showing a considerable increase in posterior airway space and facial profile



Figure 6: Postoperative clinical pictures showing improved facial profile and improved mouth opening



the limitation of single-sliding genioplasty is that chin advancement of no more than 10 mm is possible with this procedure. To overcome this limitation, they proposed a technique of “Double Sliding” or “Multiple sliding genioplasty” or “Tandem Genioplasty,” in which an advancement ranging from 20 mm to 30 mm could be achieved.<sup>[4,10]</sup> However, the limitation of this procedure is that this is not possible in cases with a compromised mandibular height.

## CONCLUSION

Double-sliding genioplasty can be advantageous in cases which require extreme chin advancement provided the available mandibular height is adequate. It can be proposed that cases with bilateral TMJ ankylosis with severe mandibular micrognathia and OSA can be treated with a second-stage surgical procedure consisting of prearthroplastic mandibular distraction osteogenesis and a second-stage surgery consisting of TMJ arthroplasty and simultaneous correction of chin deformity with a double-or single-sliding advancement genioplasty depending on the amount of advancement required.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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