

Distraction osteogenesis for management of obstructive sleep apnea secondary to TMJ ankylosis

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ABSTRACT

Mandibular retrognathism due to temporomandibular joint (TMJ) ankylosis is one of the important contributing factors to the obstructive sleep apnea (OSA). Such patients suffer from number of apneic or hyponeic events during sleep, snoring, daytime sleepiness, fatigue, inability to concentrate, irritability. At the same time facial asymmetry due to TMJ ankylosis leads to a progressive lack of confidence. Distraction osteogenesis is a less invasive surgical technique in the management of OSA, secondary to TMJ ankylosis. This modality not only treats the OSA but also corrects the facial asymmetry at the same time, and the results have been gratifying.

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INTRODUCTION

Obstructive sleep apnea (OSA) is a frequent, albeit underdiagnosed problem in children. If left untreated, OSA may lead to substantial morbidities affecting multiple target organs and systems. The immediate consequences of OSA in children include behavioral disturbance and learning deficits, pulmonary hypertension, as well as compromised somatic growth. However, if not treated promptly and early in the course of the disease, OSA may also impose long-term adverse effects on neurocognitive and cardiovascular function, thereby providing a strong rationale for effective treatment of this condition.^[1]

Nonsurgical options for treating OSA include weight loss, alteration of sleep posture, oral appliance therapy, external nasal support devices, pharmacological therapy, and continuous positive airway pressure (CPAP) therapy.

Surgical treatment options include tracheostomy, mandibular osteotomy with genioglossus or inferior border advancement, uvulopalatopharyngoplasty, laser-assisted uvuloplasty, reduction glossectomy, internal and external nasal reconstruction, tonsillectomy and adenoidectomy, and advancement of the upper and lower jaws.^[2]

Airway obstruction has been noted to occur in seven different sites in the upper airway. Retrognathism or repositioning of the jaw is beginning to be appreciated as a significant risk factor in the development of OSA. Maxillomandibular advancement to increase the airway space was the logical treatment for these conditions. Large advancements of the jaws through traditional orthognathic surgery were accompanied with a high rate of relapse. Distraction osteogenesis is a technique that offsets these problems.^[3]

CASE REPORT

A 12-years-old female patient who had been operated for left TMJ ankylosis six months back, reported with the primary complaint of unaesthetic small chin. On further evaluation, patient revealed excessive day time somnolence, obnoxious snoring, disturbed sleep,

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dullness throughout the day and inability to concentrate. On clinical examination patient had short-neck, small chin-throat angle, fullness of the cheek on the left-side, flatness of the cheek on the right side, chin deviated to left side, mouth opening of 35 mm and prominent antegonial notch on the left side [Figure 1]. Orthopantomogram revealed evidences of surgery in left TMJ region (arthroplasty). Lateral cephalogram showed a decreased pharyngeal space [Figure 2].

Based on history, clinical examination, lateral cephalogram, and polysomnography, a diagnosis of obstructive sleep apnea due to reduced upper airway space secondary to left TMJ ankylosis was made. The treatment plan selected was distraction osteogenesis to advance the mandible by 11 mm that would increase the upper airway space and at the same time correct the asymmetry. The procedure was performed under general anaesthesia. An intraoral distractor was fixed in the left angle region [Figure 3]. Following a latency period of 5 days, the distraction device was activated at the rate of 1 mm/day till the desired

length was achieved, that is 11 mm. After 2 months of consolidation period the distractor was removed under local anaesthesia. A thorough postoperative clinical and lateral cephalometric examination were done in addition to polysomnography. Lateral cephalogram showed an increase in the pharyngeal airway shadow [Figure 4]. The polysomnogram showed an improvement in the respiratory distress index of 5 (presurgery was 51) and a mean oxygen saturation of 98% (presurgery was 84%). Two years after the surgery, the patient had stable clinical results. The patient does not suffer from snoring, day time somnolence or fatigue.

DISCUSSION

Obstructive sleep apnea (OSA) syndrome is a potentially serious disorder affecting millions of people around the world. Many of these individuals are undiagnosed whereas those who are diagnosed often exhibit poor compliance with nightly use of continuous positive airway pressure (CPAP), a very effective nonsurgical treatment. Various surgical procedures have been proposed to manage and, in some cases, treat OSA.



Figure 1: Preoperative photograph showing asymmetry of chin



Figure 2: Preoperative cephalogram



Figure 3: Intraoral distractor



Figure 4: Postoperative cephalogram



Figure 5: Postoperative photograph

Effective surgical management of OSA depends upon developing a complete database and determining different levels of obstruction, which may include nasal, nasopharyngeal, oropharyngeal, and hypopharyngeal/retrolingual, or a combination of these sites. A systematic approach to clinical evaluation, treatment planning, and surgical management are recommended and is likely to result in more predictable outcomes. Surgical treatment may involve various procedures that are performed in different stages depending on the patient's sites of obstruction. The most commonly performed procedures include nasal reconstruction, uvulopalatopharyngoplasty (UPPP), advancement genioplasty, mandibular osteotomy with genioglossus advancement, and hyoid myotomy and suspension. In more severe cases, maxillomandibular advancement (MMA) with advancement genioplasty may be indicated.^[4]

Surgeries in these cases are aimed at reducing the bulk of the tongue base or providing more space for the tongue in the oropharynx so as to limit posterior collapse during sleep. Most surgeries are done in combination and in a multi-step manner, with maxillomandibular advancement, typically being reserved for refractory or severe OSA, or for those with obvious and significant maxillomandibular deficiency.^[5] A protocol developed by the University of Alabama recommends Maxillomandibular advancement and uvulopalatopharyngoplasty for respiratory distress index greater than forty.^[6] Various authors have proposed distraction osteogenesis for maxillomandibular advancement, as a reliable surgical method to alleviate the narrow upper airway in growing OSA patients, especially those with severe craniomaxillomandibular deformities.^[7-12] In our case, the etiology of respiratory obstruction was retrognathic and hypoplastic mandible, advancement was planned and achieved through distraction osteogenesis. The positive outcomes were evidenced by patient's subjective response and duly confirmed by the decrease in respiratory distress index in the polysomnograph; as

well as, an increase in the pharyngeal airway shadow in the lateral cephalometric radiographs. Advantages of distraction osteogenesis include greater advancement possible, more stable results, non requirement of grafting, low-risk procedure, obviating the need for intermaxillary fixation in an already compromised airway and at the same time correcting asymmetry due to TMJ ankylosis that was the reason behind OSA in our case [Figure 5].

CONCLUSION

There are various nonsurgical and surgical treatment modalities available for obstructive sleep apnea, but distraction osteogenesis as a treatment option for patients of obstructive sleep apnea secondary to TMJ ankylosis seem to have more favorable results due to greater advancement possible, lesser chances of relapse, and correction of the deformity at the same time.

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