Int. J. Oral Maxillofac. Surg. 2007; 36: 845–848
doi:10.1016/j.ijom.2007.05.004, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Technical Note
TMJ Disorders

Simultaneous genial distraction and interposition arthroplasty for management of sleep apnoea associated with temporomandibular joint ankylosis

R. Gunaseelan,
P. Anantanarayanan,
M. Veerabahu, B. Vikraman
*Rajan Dental Institute, #56, Dr Radhakrishnan Salai, Chennai 600004. India

R. Gunaseelan, P. Anantanarayanan, M. Veerabahu, B. Vikraman: Simultaneous genial distraction and interposition arthroplasty for management of sleep apnoea associated with temporomandibular joint ankylosis. Int. J. Oral Maxillofac. Surg. 2007; 36: 845–848.

Abstract. Temporomandibular joint (TMJ) ankylosis affects the growth of the mandible and results in gross facial deformities. A critical clinical feature of long-standing TMJ ankylosis is retrogenia, which when combined with an inability to open the mouth leads to severe compromise of the airway. A case is presented of obstructive sleep apnoea syndrome secondary to TMJ ankylosis that was corrected by a new technique employing simultaneous genial distraction along with interposition arthroplasty.

Accepted for publication 8 May 2007
Available online 5 July 2007

Temporomandibular joint (TMJ) ankylosis usually arises as a sequel to trauma, local and/or systemic infections, or systemic disease[2]. Mandibular hypomobility and retrogenia are the key consequences of the pathology[2] causing narrowing of the oro-pharyngeal space. This usually results in apnoeic episodes leading to hypoxia and secondary cardiac and respiratory problems[3]. Treatment techniques range from two-stage management, that is ankylosis release followed by correction of secondary deformities in the second stage, to one stage correction of skeletal deformities along with the ankylosis release[2,5,4]. Mandibular distraction performed simultaneously with arthroplasty plays a vital role in the management of airway embarrassment in the hypoplastic mandible[3,1,6], but is usually accompanied by two complications: (1) influence of active post-operative physiotherapy on the distraction process as well as the physical presence of the distractors in the occlusion-bearing segment during physiotherapy may affect outcome[4]; (2) distraction in the occlusion-bearing segment changes the dental occlusion and therefore necessitates orthodontic intervention. These disadvantages can be overcome by the technique advocated here of performing simultaneous genial distraction as an adjunct to ankylosis release in a patient

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with obstructive sleep apnoea syndrome (OSAS).

Case report

A 32-year-old male patient complained of inability to open the mouth since childhood, heavy snoring with repeated bouts of awakening during sleep, and a general feeling of sleepiness during the day. No positive history of trauma or infection could be determined. Clinically the patient presented with inability to open the mouth with a maximal interincisal opening of 2 mm. The patient also had features of micrognathia and retrogenia, and deviation of the chin to the left side (Fig. 1). The condylar movements on the left side were absent, whereas a modest movement prevailed on the right. Occlusal cant was evident, but presented functional interdigitation of teeth. A computed tomography scan of the joint area revealed bony fusion of the left TMJ and diminished joint space on the right. Lateral cephalograms revealed mandibular retrognathism with retrogenia. A 3D stereolithographic model was constructed to facilitate the diagnosis and plan treatment. A polysomnogram was obtained to evaluate snoring and apnoeic episodes during sleep. Sleep study revealed OSAS with an apnoea–hypopnoea index of 58.1, which is generally rated 'severe' and a mean oxygen saturation of 91% (98% maximum and 59% minimum). It also revealed episodes of bradycardia and changes on the electrocardiogram. The report indicated that a mandibular advancement procedure would benefit the patient.

Treatment design

Based on the diagnosis of TMJ ankylosis with secondary mandibular deformities and OSAS, a surgical plan of interposition arthroplasty with simultaneous genial distraction using an extraoral pin-fixated device was planned. The distraction would involve an extended genioplasty up to the first molar region with a step modification at the level of the mental foramen. The osteotomy was designed using the 3D model (Fig. 2) and the required advancement was calculated cephalometrically. The magnitude of distraction is adjusted by correlation of the planned movement by achieving optimal chin position simultaneously with favourable aesthetics and clinically ensuring cessation of OSAS symptoms[3]. An asymmetric distraction of 25 mm on the right side and 18 mm on the left was contemplated to accommodate correction of the deviation in the retrognathic chin.

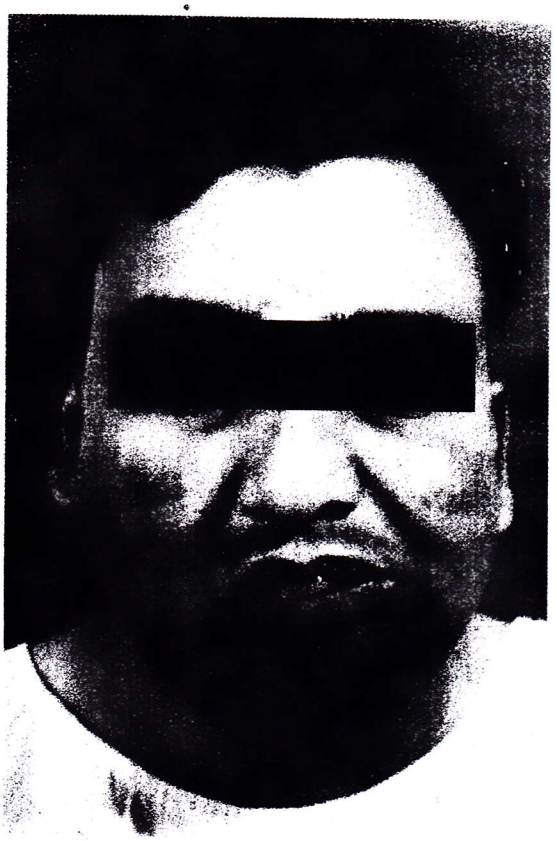

Fig. 1. Preoperative photo of the patient.

Surgical procedure

The procedure was performed under general anaesthesia. The left joint was accessed through an Al-Kayat–Bramley preauricular approach. An interposition arthroplasty was done with a temporalis myofascial flap. Bilateral intraoral coronoidectomy was performed, which enabled a passive mouth opening of 35 mm. The joint was mobilized adequately to ensure free movement and the resected coronoid process was used as an autograft to reconstruct the deficient ramal height. The chin and the parasymphyseal area were exposed bilaterally with an intraoral circumvestibular incision. An extended genioplasty up to the mandibular first molar with a step modification in the region of the mental foramen was performed (Fig. 2). An external pin-fixated distraction device was used and the anchorage pins were fixed percutaneously as

Fig. 2. Stereolithographic model showing osteotomy design.

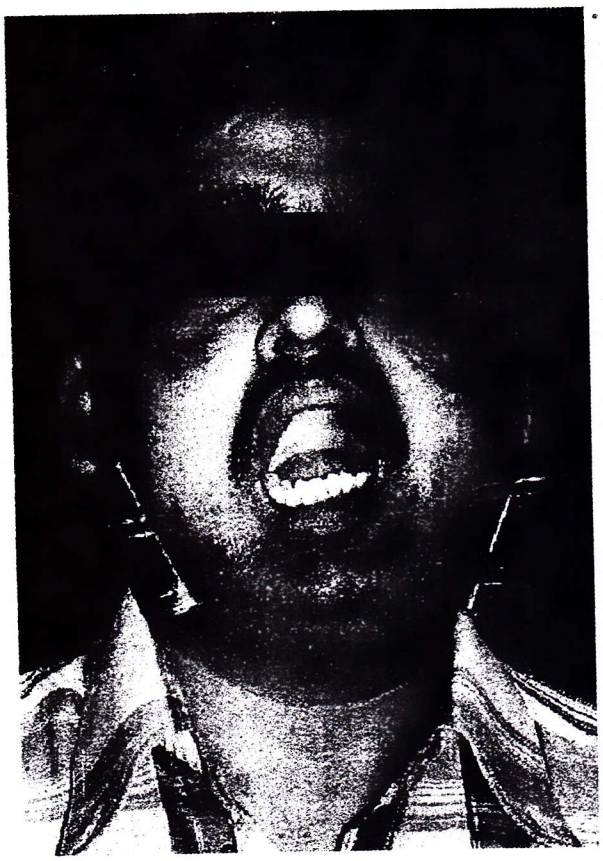

Fig. 3. Postoperative photo showing mouth opening during consolidation phase with distractors in situ.

Fig. 4. Preoperative lateral cephalogram showing constricted oropharyngeal shadow.

verified on the 3D model. The distraction devices on either side were secured and activated to ensure movement. The wounds were closed in layers. The patient was placed on routine antibiotics and anti-inflammatory drugs. The immediate post-operative period was uneventful and the patient was discharged in 3 days.

Follow up

The immediate postoperative mouth opening was 28 mm, which improved to 35 mm with physiotherapy (Fig. 3). A latency period of 7 days was allowed, after which activation was started at a rate of 1 mm twice daily. The distraction achieved preoperative goals of 25 mm on the left side and 18 mm on the right. The patient reported that his apnoeic episodes had ceased and snoring reduced considerably. The distraction devices were in situ for a period of 8 weeks for consolidation. Serial radiographs (OPGs and lateral cephalograms) were repeated at 2-week intervals, which showed acceptable distraction and increase in the dimensions of pharyngeal shadow indicating a more patent airway (Figs 4 and 5). Mouth open-

Fig. 5. Postoperative lateral cephalogram showing more patent oropharyngeal shadow.

Fig. 6. Postoperative intraoral view demonstrating maintenance of preoperative dental occlusion.

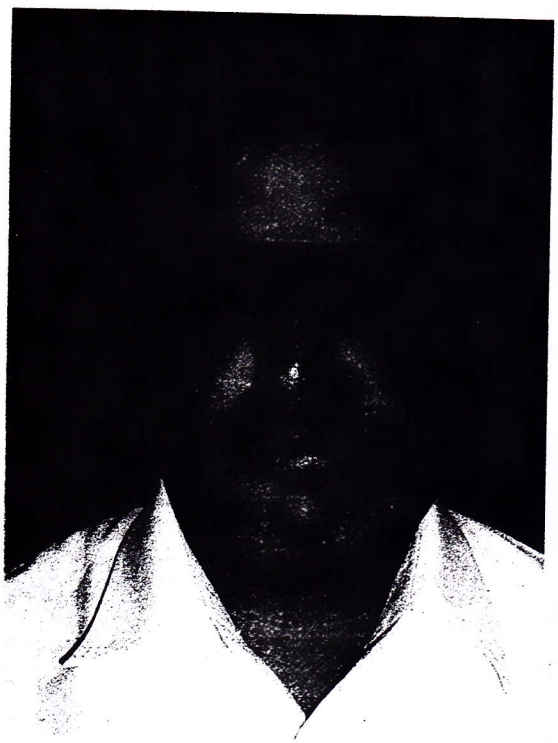

Fig. 7. Postoperative photo of patient showing stable results.

ing after the consolidation phase remained at 35 mm. Postoperative review after 4 months showed satisfactory stability of the distracted segment while maintaining the preoperative occlusion (Figs 6 and 7). The patient was sent for a repeat polysomnogram to assess postoperative OSAS status, which revealed a reduction in apnoeic episodes with a favourable apnoeic index (11.2). Oxygen saturation was also at an acceptable mean of 94% with the minimum recorded being 89%. Episodes of bradycardia during sleep were insignificant.

Discussion

OSAS is a condition caused by upper airway obstruction, characterized by hypopnoeic–apnoeic episodes during sleep, which in extreme conditions may be accompanied by severe secondary cardiac and respiratory problems[2]. The priority in patients suffering OSAS is to relieve them of it at the earliest. This report discusses one adult patient with severe OSAS secondary to mandibular retrognathia due to TMJ ankylosis, which posed a difficult combination of a respiratory pathology with a functional problem of restricted mouth opening. After a thorough assessment of the primary pathology and OSAS, a simultaneous procedure for correcting both was done. Earlier reports refer to simultaneous distraction and arthroplasty, where the distraction is done in either the body or the angle of the mandible[5]. We suggest that in adults, where the growth potential of the mandible is exhausted, if dental occlusion is stable and functional, the use of distraction in the non-occlusion bearing segment of the mandible, will not only correct the secondary deformity and the OSAS, but will also not interfere with the immediate postoperative outcome of the patient. However, in children this may not be the treatment of choice considering the severity of mandibular hypoplasia (class II skeletal/dental relationships with or without apertognathia). This report is based on a short-term assessment and relapse may be kept in mind while evaluating long-term results.

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Address:
Parameswaran Anantanarayanan
Rajan Dental Institute
#56
Dr Radhakrishnan Salai
Chennai 600004
India
Tel: +91 44 28472266
Fax: +91 44 28472410.
E-mail: gunaraga@md2.vsnl.net.in