CASE REPORTS

MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA AND FACIAL ASYMMETRY BY DISTRACTION OSTEOGENESIS OF MANDIBLE

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ABSTRACT

Micrognathia and obstructive sleep apnea syndrome (OSAS) are problems subsequent to temporomandibular joint ankylosis (TMJa) in growing patients. For patients with micrognathia and OSAS secondary to TMJa, it is important to restore proper mandibular form and posterior facial height, achieve occlusal stability and satisfactory mouth opening.

We report a 2-year follow-up of a patient with Micronesia and OSAS secondary to unilateral TMJ ankylosis of the right side. The patient had an operation of TMJa before she reported to us but mouth opening was limited. The treatment involved vertical ramus osteotomy, coronoidectomy and external distraction osteogenesis of her mandible. After the treatment of micrognathia oropharyngeal airway space was increased, patient was followed up for 2 years and the results remain uneventful.

Keywords: Obstructive sleep apnea, Micrognathia, Distraction osteogenesis and Mandible.

INTRODUCTION

In the past, oral and maxillofacial surgeons were consulted on patients with obstructive sleep apnea (OSA) only when other methods of treatment, such as continuous positive airway pressure, dental appliances, and soft tissue operations failed[1]. Maxillomandibular advancement (MMA) to enlarge the skeleton and thereby expand the soft tissue airway was a treatment of ''last resort.'' MMA is the most common and clinically effective application to treat OSA[2].

Untreated ankylosis of the temporomandibular joint (TMJ) in children results in serious adverse consequences of retrognathia, facial asymmetry and functional deformity. Patients with craniofacial anomalies have varying degrees of airway obstruction, which is usually secondary to micrognathia, retrognathia and resultant malposition of the base of the tongue[3]. Various surgical and non-surgical treatment methods have been advised for the treatment of this airway obstruction[4]. Mandibular distraction osteogenesis (MDO) is an orthopedic technique of new bone formation by gradual traction of a fracture callus formed between osteotomized bony segments.

The indications for distraction osteogenesis (DO) in patients with OSA include infants and children with airway obstruction as a result of congenital micrognathia or midface hypoplasia and in adults with mandibular retrognathia which can occur due to untreated TMJ ankylosis[5]. DO is mainly chosen if large magnitudes of advancement are needed and surgeon is likely unable to get successful skeletal expansion by traditional osteotomies[1].

The aim of this paper is to report a case of OSA treated with unilateral DO of the right side of the mandible.

CASE REPORT

A 16 years old female was referred to oral and maxillofacial surgery department, Pakistan naval ship's hospital, Shifa Karachi in March 2005 with a complaint of choking during sleep. The patient and her parents were not concerned about facial appearance. The patient had undergone a surgery for her TMJ ankylosis of the right side of mandibular condyle but her mouth opening was still just 10 mm. On examination there was occlusal canting, shifting of million to right, decreased posterior facial height on the right side. A consensus was made by a multidisciplinary team that the child's main problem was the micrognathia (which led

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to the placement of the floor of the mouth and tongue posteriorly, (Figure-1) and it was concluded that the patient requires an increase in ramus height and mandibular body. So it was decided to increase ramus height by vertical osteotomy of right ramus, coronoidectomy of the same side to improve mouth opening and a therapeutic augmentation of the mandible via distraction osteogenesis was planned.

Radiological investigations to help the procedure, included orthopentomogram, and computed tomography (CT) scan, it was decided that external fixators will be applied and used as external distractors because of the non availability of external and internal distractors at that time in Pakistan. Under general anesthesia and aseptic conditions the operative area was exposed through submandibular incision and the pterygomandibular sling was incised. After doing coronoidectomy vertical ramal osteotomy was completed and distal segment of the mandible was pulled down, posteroinferior edge of the mandible was shaved off to give it a shape of mandibular angle and the osteotomy site was fixed by using two 2.0 mm miniplates, later than bicortical corticotomies were completed. Four self tapping 2.0 mm pins were placed and the external fixator unit was applied (Figure-2). An incision was closed using 3/0 vicryl.

After waiting for a 7 day latency period, active distraction at a rate of 1 mm/day was commenced and lasted for 20 days. The patient felt relief from open on the 18th day from activation however little overcorrection was done to counter the relapse. After a consolidation period of 4 weeks the patient was examined clinically and radiologically to confirm ossification of the distraction sites and gain of desired lengthening (Figure-3).

As the mandible increased in size and the tongue was allowed more space anteriorly, normal breathing became possible. Facial asymmetry and midline shift were also corrected simultaneously. After 3 weeks patient was referred to the orthodontist for dental rehabilitation and the fixture was removed at the 9th week. Segmental osteotomy of the right maxillary segment was planned to correct the open bite but good results were obtained by orthodontic treatment so the plan was abandoned. The patient was further followed up for 1 and a half years, after every month and the results were uneventful. Genioplasty was

Figure-1: A patient with deviated chin and micrognathic mandible of the right side.

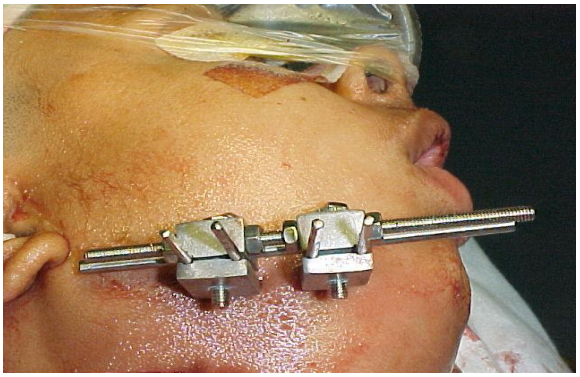

Figure-2: External fixator applied.

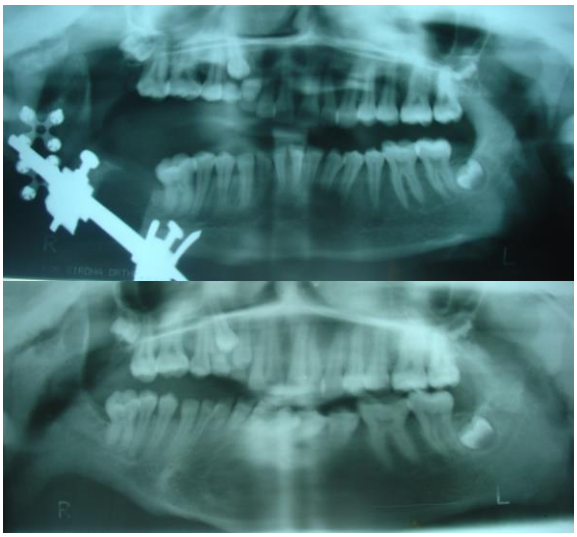

Figure-3: Pre and post operative OPG of patient, postoperative showing device in place and gain of 2 cm mandibular length.

also planned but the patient was not concerned.

DISCUSSION

Successful treatment of OSA can be achieved by a variety of medical and surgical modalities. These include tonsillectomy / adenoidectomy, tongue-hyoid suspension, glossopexy (tongue-lip adhesion) subperiosteal release of the floor of the mouth, temporomandibular joint arthroplasty, mandibular lengthening procedures, maxillary and midface osteotomies and tracheostomy[6]. Because of the magnitude, morbidity, and the potential instability of standard surgical techniques for large expansions of the facial skeleton, the use of DO as a minimally invasive alternative has become common place[7].

Distraction osteogenesis has been used to achieve mandibular lengthening in patients with mandibular hypoplasia and obstructed airways. Relief of respiratory obstruction is thought to be secondary to the advancement of the tongue-base as the tongue muscles move forward with the mandible[3]. After osteotomy, DO is used to induce new bone formation along with soft tissues between two vascularised osteotomised bone segments which are gradually separated by a mechanical device (distractor).

Generally DO consists of four consistent phases: osteotomy and device placement; latency period of primary healing from 1 to 7 days; active distraction; at a rate of 0.5-1.5 mm/day; and consolidation phase ranging from 6 to 16 weeks[8]. Patients and families should be informed that the overall length of treatment and the number of postoperative visits are significantly increased after DO when compared with standard osteotomies. Because patients play an important role in the execution of the DO, there is a greater requirement for patient understanding and cooperation.

Distraction devices have become smaller and less cumbersome. Buried, miniature devices are better tolerated by patients, but because midcourse corrections are not possible, they require more precise and sophisticated treatment planning to ensure the correct vector of distraction[1]. Multislice CT scan was found to be a practical imaging technique to evaluate the morphological changes in the airway and the mandible after distraction osteogenesis[9].

Advantages of external distractors include relatively easy placement, avoidance of complex plate bending, ability to modify the vector of distraction during the activation phase, and ability to remove the appliance in the office or OPD without the need for a second operation or general anesthesia[10]. In the above mentioned case external fixator was used to successfully manage a case of obstructive sleep apnea that is cost effective and still can be used in poor patients however external devices are sometimes inconvenient and cumbersome and may be uncomfortable.

Studies have shown that distraction osteogenesis is an effective and the best management option for correcting obstructive sleep apnea related with mandibular hypoplasia[11], and many of the complications associated with DO can be avoided with good surgical technique and postoperative care[8].

In conclusion DO is a safe, effective and rapid technique to treat OSA related to micrognathia particularly in cases that require a large degree of mandibular advancements.

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