

Management of Adult Transverse Malocclusion with Surgically Assisted Rapid Palatal Expansion

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An-18-year old male patient reported to the Department of Orthodontics, SVS Institute of Dental Sciences, Mahabubnagar, with a chief complaint of irregularly placed upper and lower front teeth and restless sleep. On extra oral examination the patient presented with mild convex profile, competent lips and normal nasolabial angle and mentolabial sulcus with no gross asymmetry. Intraoral examination showed severe crowding in both the arches, Class I molar and canine relationship bilaterally, narrow maxillary arch, blocked out upper right canine, upper right lateral incisor and posterior unilateral cross bites, upper midline shifted to right side by 3mm. Cephalometric examination showed that patient exhibited Class I skeletal jaw bases (ANB: 20) with normal mandibular plane angle (FMA: 260), upright upper anteriors (UISN: 1020) retroclined lower anteriors (LI-MP: 720), with normal nasiolabial angle (1080) as shown in [Table/Fig-1]. Model analysis suggested 7mm expansion is possible in the upper arch and 5mm of space can be gained in the lower arch.

DIAGNOSIS AND TREATMENT PLAN

Angle's Class I malocclusion on skeletal Class I jaw basis with constricted upper and lower arches on normo-divergent growth pattern. Patient had no gross facial asymmetry with normal TMJ function and airway analysis was done to confirm Obstructive Sleep Apnea (OSA). The treatment objectives were to correct obstructive sleep apnoea, to expand constricted arches, to relieve crowding in both the arches, to achieve coinciding midlines and to correct cross bites. Based on these treatment objectives three different treatment options were presented to the patient. First: expansion of arches using Hyrax appliance. Second: all first premolar extractions along with orthodontic expansion. Both these options were not able to

correct skeletal malocclusion and abnormal breathing problem. Third: surgically assisted rapid palatal expansion in upper arch and mid-symphyseal distraction in the lower arch. This will not only correct the transverse malocclusion but also helps to improve the snoring problem.

TREATMENT PROGRESS

[Table/Fig-2] shows pre-adjusted edgewise appliance with 0.022"x0.028" MBT slot was used. Pre-surgical changes include alignment and levelling of upper and lower arches for a period of seven months using sequential NiTi and stainless steel wires and some amount of expansion was done with TPA and fixed orthodontic therapy.

Before surgery Hyrax appliance were cemented in the upper and lower (lingual side) arches. Surgical procedures done were: two-piece Lefort I osteotomy in upper arch and mid-symphyseal distraction in lower arch. Post-surgically, activation schedule of one quarter turn morning and other in the evening, total of 1 mm distraction was done daily for a period of 10 days. so that we



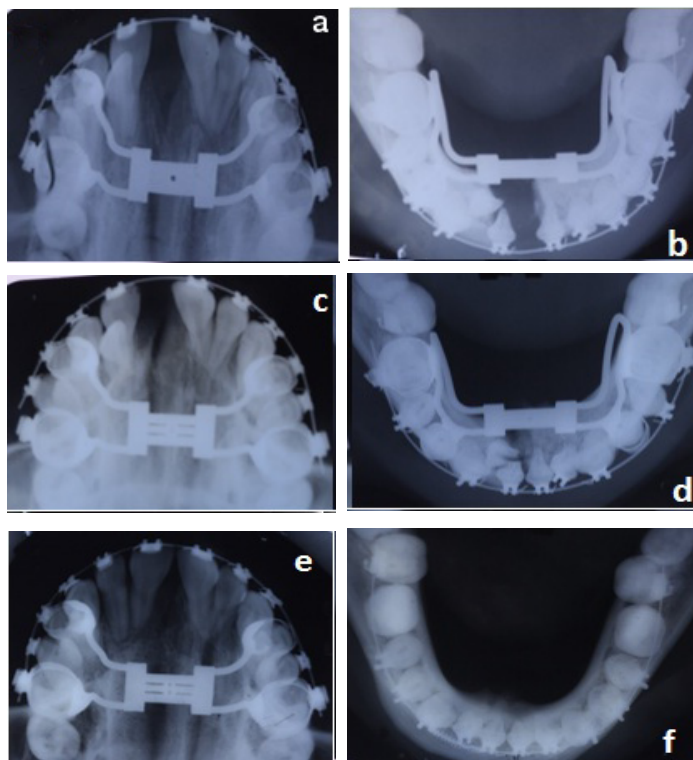
[Table/Fig-1]: Pre-treatment photographs and radiographs.



[Table/Fig-2]: Intraoral photographs showing leveling and alignment.



[Table/Fig-3]: HYRAX placed before surgery and surgical photographs.



[Table/Fig-4]: Occlusal radiographs before surgery, after consolidation period and post alignment.

(a) Upper occlusal radiograph shows radiolucent V shaped notch immediately after expansion. (b) Lower occlusal radiograph shows radiolucent area between centrals immediately after expansion. (c, d) Upper and lower occlusal radiograph shows after the consolidation period of 12 weeks. (e, f) After 5 months post-surgical alignment of anteriors were done in both the arches.



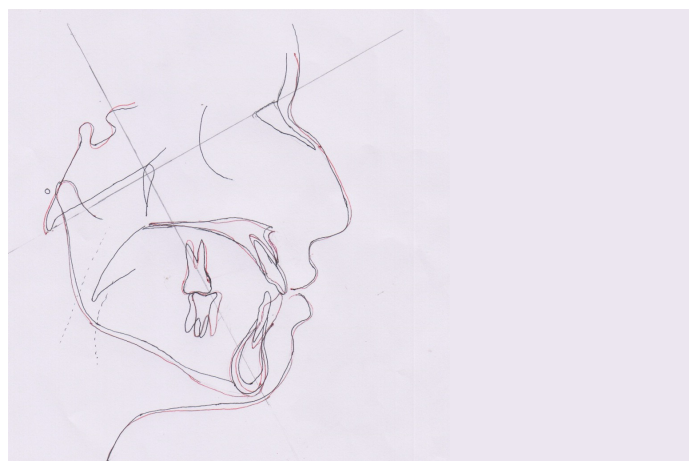
[Table/Fig-5]: Post-treatment photographs and radiographs.

achieved approximately 8mm expansion in upper arch and 7mm in lower arch as shown in [Table/Fig-3].

Post surgically orthodontic tooth movement was started after the consolidation period of 12 weeks by confirming with the radiographic evidence of new bone formation as shown in [Table/Fig-4].

[Table/Fig-5] shows post treatment photographs and radiographs. After a total period of 20 months, we were able to correct the transverse skeletal problem and achieved normal occlusion. Superimposition of the pre-treatment and post-treatment landmarks can be seen in [Table/Fig-6].

It was intended to place settling elastics for one month but case was debonded before the completion of settling phase as the patient has to leave the country for further studies. The consequences of premature debonding were explained to the patient and consent for the same was obtained.



[Table/Fig-6]: Superimposition on Basion-Nasion at CC point Black line-pretreatment, Red line- posttreatment.

DISCUSSION

As the discrepancy was skeletal, surgical procedures were performed in both the arches: SARPE in the upper arch and mid symphyseal distraction in the lower arch [1-3]. In the present case, classical Lefort I osteotomy was done and the para-median split was made from the anterior nasal spine up to the alveolar segment between 11 and 12. In the mandibular arch, mid-symphyseal osteotomy was done using surgical saw and osteotome was used to complete the cut through buccal and lingual cortex. In both the arches, Hyrax was activated to verify the split and diastema was observed. The amount of expansion achieved with surgical procedures is: upper arch-6mm at the molar region and 8mm at the premolar region; lower arch-7mm at both premolar and molar region. It has been reported that SARPE has improved the nasal breathing also and also provides good stability [4-6]. Apart from these beneficial effects, SARPE may sometimes result in severe pain, extrusion of maxillary teeth, periodontal breakdown, root resorption, alar base flaring and increased anterior facial height, which are to be considered during treatment. Airway analysis was done to confirm OSA. For this analysis two measurements are used upper and lower pharynx.

Upper pharynx: This width is measured from a point on the posterior outline of the soft palate to the closet point on the pharyngeal wall. This measurement is taken on the anterior half of the soft palate outline. The average nasopharynx is 15mm-20mm in width. In this patient the upper pharynx had 4mm width which indicates airway impairment.

Lower pharynx: This width is measured from the point of intersection of the posterior border of the tongue and the inferior border of the mandible to the closet point on the posterior pharyngeal wall. The average measurement is 11mm-14mm which is in support of our case. In this patient the lower pharynx is of 5mm width. So we referred the patient to Otorhinolaryngologist to confirm the diagnosis [7].

The shortcomings of this study includes: finishing is not good because of premature debonding as the patient was going to United States. Other findings like increased FMA angle, increased soft tissue profile angle and mentolabial sulcus. Surgical expansion is a widely used procedure for the correction of skeletal transverse discrepancies. This article described an adult transverse malocclusion associated with snoring problem which was treated by surgical expansion using Le Fort I osteotomy in the maxillary arch and mid-symphyseal distraction in the mandibular arch.

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