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CASE STUDY

NONSURGICAL RAPID MAXILLARY EXPANSION IN YOUNG ADULT FEMALE

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ABSTRACT

Transverse maxillary deficiency is one of the frequently observed entities in patients who seek orthodontic treatment and is often characterized by crossbite which may be unilateral or bilateral as well as anterior crowding. Rapid maxillary/palatal expansion (RME/RPE) is able to eliminate posterior crossbite and the transverse discrepancy between the dental arches due to maxillary constriction. Increase in arch perimeter appears to be the important effect of this treatment. Evidences indicate that rapid palatal expansion may be used without surgery in young adults. The purpose of this paper was to report a case of the RME without surgery in an 18-year-old female adult. The palatal expansion was accomplished by means of a Hyrax device. Good results were achieved after the treatment completion.

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INTRODUCTION

Transverse maxillary deficiency is one of the frequently observed entities in patients who seek orthodontic treatment and is often characterized by crossbite which may be unilateral or bilateral as well as anterior crowding (McNamara, 2000). Maxillary constriction is a discrepancy secondary to genetic, environmental, and functional factors, premature loss of deciduous teeth, abnormalities in tooth anatomy or eruption sequence, oral digit habits and buccal respiration during critical growth periods configure important etiological factors for this malocclusion (Ribeiro, 2009; Alpern, 1987). RME is able to eliminate posterior crossbite and the transverse discrepancy between the dental arches due to maxillary constriction (Haas, 1961). The gain in arch perimeter appear to be the important effect of this treatment (Shyamsunder, 2011). Although the main objective of RME is to correct maxillary constriction, its effects are not limited to maxilla only. The maxilla is associated with 10 bones in the face and head, so RME may affect structures directly or indirectly related to the maxilla (Bishara *et al*., 1987), mandible (Timms, 1974), nasal cavity (Hass, 1980), pharyngeal structures and the pterygoid process of the sphenoid bone (Starnback *et al.*, 1964). Before commencing the treatment involving RME, it is important to know the maturation level of the patient (Gungor *et al.*, 2012).

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It is documented in the literature that maxillary sutures close around 14-15 year-old in females and 15-16 year-old in males (Baydas *et al.*, 2006). Based on the maturation level of palatal suture, the nonsurgical RME treatment has been considered a successful in children and adolescents because their palatal suture is not closed (Altug altac *et al*., 2006). In adults, the surgically assisted RME is the main alternative for treatment to transversal maxillary discrepancies. However, complications of the surgical procedure can be a difficulty in these patients (Lanigan, 2002). In recent years, the non-surgical RME has been employed as another possibility for treatment skeletally mature patients (Altug altac *et al*., 2006). The aim of the present study is to report a case of non-surgical RME in an 18-year-old female patient.

Case report

An 18-year-old female came to the department of Orthodontics and Dentofacial Orthopaedics, Government Dental College and Hospital Srinagar for orthodontic treatment. A clinical examination and orthodontic records revealed skeletal and dental Class I malocclusion, bilateral crossbite with a skeletal deficiency in the transverse dimension of the maxillary arch, crowding in both upper and lower arches, increased overbite, negative deficiency in maxillary and mandibular arch perimeter [Figure 1].

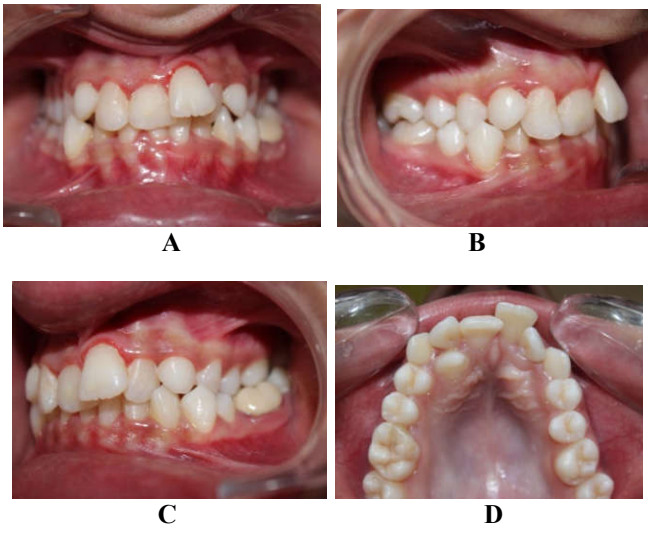

Figure 1. Pretreatment intraoral photographs; (A, B and C) Front and lateral views showing the severe crowding and bilateral posterior crossbite; (D) Occlusal view showing the maxillary transverse deficiency

The patient was informed about the possibility of surgically assisted RME (SARME) for correction of maxillary transverse discrepancy because she was adult. Patient was given the details about this procedure. However, she had concerns regarding this approach and refused the surgical option. It was then decided that non-surgical RME should be performed before commencing fixed orthodontic treatment. The patient was informed about the procedure, sequelae, pros and cons of this therapy. Measurements of transversal discrepancies were performed on maxillary and mandibular casts using various model analysis. The expansion measured for correction of maxillary discrepancy was approximately 8 mm. A maxillary Hyrax appliance was fabricated and installed, and the patient was instructed to turn the screw 90° twice a day for 2-3 weeks [Figure 2].

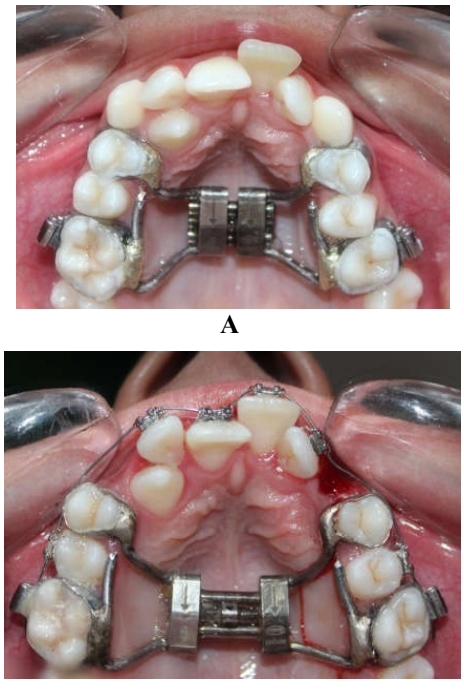

Figure 2. Treatment, intraoral photographs; (A) Hyrax appliance installed; (B) Occlusal photograph after 2 weeks (transversely expanded maxillary arch)

After ten days, the expansion measured was 10 mm, and the patient presented a midline diastema of approximately 3-4 mm. An occlusal radiograph was taken to confirm the midpalatal suture split. It was observed that the patient did not complain of pain symptoms or mucosal changes during activation. The bilateral crossbite was treated and maxillary transverse discrepancy was addressed [Figure 3].

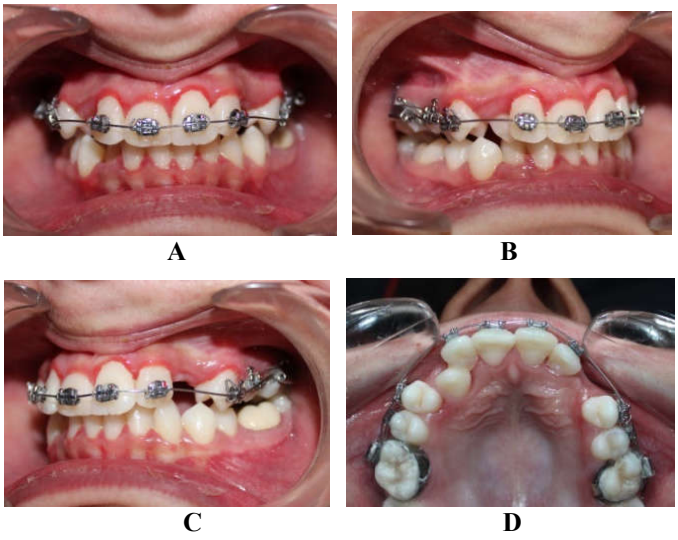

Figure 3. Post-expansion and after fixed appliance being put, intraoral photographs; (A, B and C) Front and lateral view showing the bilateral posterior crossbite correction; (D) occlusal view showing the maxillary transverse discrepancy correction

Composite was put on the expansion screw threads to prevent the screw from unwinding. To allow osteogenic formation in the midpalatal suture, a retention phase of 3 months was instituted. After the retention phase, the patient was put on preadjusted edgewise fixed appliance. The space gained was used to align the crowded teeth into proper alignment. [Figure 4]

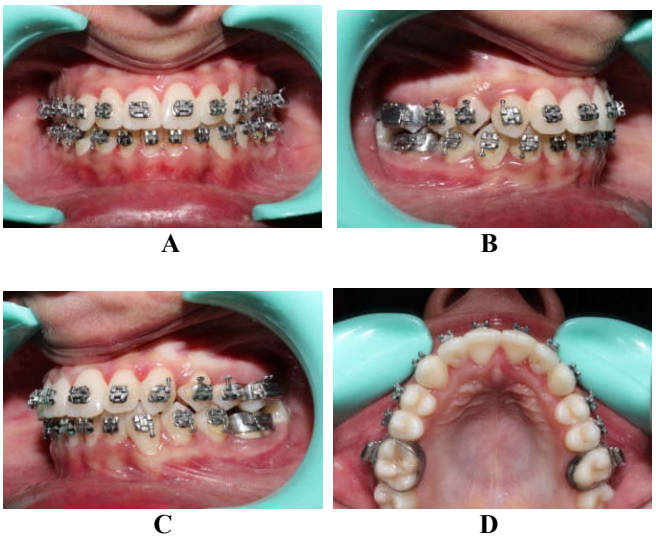

Figure 4. Post-treatment intraoral photographs before appliance removal; (A, B and C) Front and lateral view showing corrected bilateral crossbite with Class I molar and Class I canine relationship; (D) Occlusal view showing the corrected maxillary transverse discrepancy

DISCUSSION

The main objective of RME is skeletal expansion of the upper jaw without expanding the teeth in their alveoli. Therefore,

RME is considered as an orthopedic approach (Arat *et al*., 2003). However, it has been suggested that skeletal effects of the RME tend to be less significant with skeletal maturity because of the increased rigidity of the articulations of the maxilla with other bones of the face (Wertz, 1970). In adults, the sutures offer greater resistance and to overcome this resistance, surgically assisted RME has been advocated. However, surgery itself has some disadvantages like it is costly and requires either outpatient surgery or hospitalization with attendant morbidity and time loss from work (Handelman *et al.*, 2000). Instead of this, if nonsurgical RME in young adults proves to be effective and skeletal changes could be accomplished, the disadvantages of surgically assisted RME might be overcome. Herold (Herold, 1989) reported a net increase of 3.2 mm in intercanine width in his long-term study in which the Hyrax appliance was used. Moussa found a net increase of 3.6 mm in intercanine width in their long-term study (Moussa *et al*., 1995). In a study of long-term effects, McNamara reported that inter-first-premolar width increased by 4.9 mm with RME followed by fixed appliance treatment and relapsed 0.6 mm in the long term, leaving a net increase of 4.3 mm (McNamara Jr *et al*., 2003). The present case showed a procedure of non-surgical RME in an 18-year-old female patient. The increase in transverse dimensions and midline diastema reveals the skeletal effect of the Hyrax appliance and clinical success was judged by the evidence of the creation of a midline diastema. Capelozza Filho described about the non-surgical RME in young adult patients as a very good possibility of maxillary expansion. In their study, although non-surgical expansion may fail in some patients because of painful reactions, the rapid palatal expansion in younger adults was completed successfully. Other similar studies also support the use of non-surgical RME in young adults (Capelozza Filho *et al*., 1996). Alpern and his colleagues did a study in which the maxillary arch of 82 patients under 25 years of age was expanded using non-surgical approach. They found good success rate for expansion (Alpern, 1987). Studies evaluating long-term stability have also produced encouraging results. Northway et al did follow-up of 15 patients ranging in age from 15 to 39 for 11 years; none of the patients experienced a recurrence of their crossbite (Northway, 1997). The most commonly used devices for non-surgical RME are Hyrax and Hass appliances.

Conclusion

RME followed by fixed appliance therapy have been considered an effective treatment option to gain space in the dental arches in order to relieve tooth-material/arch-size discrepancies of mild-to-moderate degree. This treatment approach may be particularly effective in patients who present with a narrow maxilla. The non-surgical treatment of transverse maxillary deficiency seems to be a considerable possibility in younger adults. The orthodontist must decide for each individual adult patient whether it is best to expand its maxilla with non-surgical or surgical approach. Every patient should be analyzed separately.

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