BONDED RAPID PALATAL EXPANSION - AN IMPORTANT ADJUVANT IN MULTIPHASIC ORTHODONTIC THERAPY

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Introduction

It is ironic that out of the three planes of space, the transverse dimension of the maxilla is the first to cease growth. It is also the most readily adaptable dimension of the craniofacial complex. The clinician thus tries to take the advantage of this fact to rapidly increase the transverse dimension of maxilla to improve the prognosis during active growth of an individual.

But in cases nearing end of growth, or in adulthood, orthopaedic forces are applied laterally against the posterior maxillary dentition, producing separation of the mid-palatal suture. This is clinically and radiographically seen as diastema between upper central incisors. The term 'Rapid Palatal Expansion' (RPE) therefore is akin to distraction osteogenesis without osteotomy.

Case Report-1

A 14 year old girl was brought by her parents with the chief complaint of irregular front teeth. She had a well balanced facial structure. Her oral hygiene was good. She presented with a Class II division 1 subdivision (left) with severe crowding in the maxillary and mild crowding in the mandibular arches. She also had bilateral crossbite of the buccal segments. Upper dental midline was shifted to the right by 3mm.

Model and cephalometric appraisal were suggestive of Class II skeletal and dental pattern with a transverse maxillary discrepancy. Treatment objectives were to correct crossbite, crowding, molar relation and midline shift. A triphasic treatment plan was formulated :-

Phase I : RPE. This phase consisted of two sub-phases : an active phase during which the appliance was to be regularly activated twice a day and a passive phase during which a Hawley's appliance was used.

Phase II & III : Fixed appliance therapy and subsequent retention.

For the initial phase a 'maxi straight leg' Hyrax screw (*Dentaurum CO*) with a total expansion capability of 11mm, each full rotation (i.e. 4 turns) giving an expansion of 0.9mm, was used.

The appliance was bonded to the upper bicuspid and first molar teeth using commercially available LC Glass Ionomer luting cement (Fig.1). The patient was advised to avoid hard and sticky food, to brush after every meal, to maintain regular oral hygiene and to turn the key of the screw from back to front once every 12 hours.

The patient was first recalled after 24 hours of bonding. An expansion routine of one quarter turn every twelve hours was formulated. On the 4th day after bonding there was first clinical evidence of a midline diastema between the upper central incisors.

This patient was reviewed at weekly intervals. Clinically the diastema was maximum at the end of two weeks (3mm). Thereafter, there was spontaneous closure of the diastema clinically. The periodic occlusal radiographs were indicative of a progressively increasing separation of midpalatal suture during the course of RPE therapy.

The patient was on active RPE therapy for 34 days. Expansion achieved was 9mm (Fig-2). Presently patient is on short retention prior to fixed appliance therapy.

Case Report-2

A 17 year old girl reported to the department with the chief complaint of a strong dislike for her front teeth due to their irregular appearance. Her facial structure was well balanced. Intraoral examination revealed a Class II molar relation with severe crowding in the maxillary and mandibular arches, rotation of the upper incisors, crossbite of the right buccal segment, upper dental

Fig. 1 : Appliance bonded to upper bicuspid and first molar teeth

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Fig. 2 : Expansion achieved after 34 days

Fig. 3 : Expansion achieved after 29 days

midline shift to left by 2mm and an exaggerated curve of Spee of 2mm. The case was diagnosed as Angle's Class II div I with severe crowding and transverse maxillary deficiency.

The primary treatment objectives were to correct crossbite, crowding, curve of Spee and midline shift. A triphasic treatment plan comprising RPE and its subsequent retention in the first phase and fixed appliance followed by retention therapy in the second and third phase respectively, was planned.

After bonding the RPE appliance, the patient was reviewed every 24 hours for the first 4 days thereafter once every 7 days. The diastema, which was first discernible clinically seven days after the appliance was bonded, reached a maximum of 2mm, 14 days after bonding of the appliance. Clinically there was spontaneous derotation of the maxillary central incisors. The weekly occlusal radiographs were indicative of progressively increasing wedge like separation in the region of the inter-maxillary suture.

The patient was on active RPE therapy for 29 days. Expansion achieved was 6mm (Fig-3).

Discussion

The bondable type of RPE appliance is more economical [1-3], easy to fabricate and overcomes the conventional drawbacks by utilizing the latest light cured Glass Ionomer cements.

Inferior displacement of the maxilla is decreased with the use of bonded appliance as it covers the max-

illary posterior occlusobuccal segments. The appliance serves not only as an expansion device but also intrudes on the freeway space through the vertical thickness, having a splint like action [1]. The appliance transfers an apically directed force on the maxillary and mandibular teeth through a passive stretch of the musculature. Additionally, it increases rigidity by limiting the unwanted tipping, rotation and supra eruption tendency of teeth.

The greatest opening of the mid-palatal suture occurs anteriorly with progressively less separation towards the posterior. This was corroborated in the occlusal radiographs of the 2 patients taken at weekly intervals (Fig-2&3).

The clinicoradiological results confirmed that the increase in width of the maxillary dental arch was attained through a net separation of the two maxillary processes (orthopaedic effect) and buccal tipping of teeth and alveolar process (orthodontic effect). The various precise measurements, on the study models and the cephalograms aided towards assessment of the magnitude and proportion between orthopaedic and orthodontic effects of RPE (Table-1&2).

TABLE 1

Model analysis

Parameter	Pre treatment		Post treatment		Difference	
	CaseI	CaseII	CaseI	CaseII	CaseI	CaseII
ICI	16	17.5	16	17.5	0	0
AP	78	90	83	93	5	3

TABLE 2

Cephalometric analysis

Parameter	Pre treatment		Post treatment		Difference	
	CaseI	CaseII	CaseI	CaseII	CaseI	CaseII
IAI	5	6	10	10	5	4
IP	0	0	2.5	1.5	2.5	1.5
IT	62	59.5	65	61.5	3	2

(all measurements in mm.)

ICI - inter maxillary central incisor width

AP - arch perimeter

IAI - inter maxillary central incisor at root apex

IP - inter prosthion

IT - inter maxillary tuberosity

Extremely high motivational levels, excellent patient compliance and adequate knowledge about how to take care of the appliance contributed towards successful completion of palatal expansion.

On completion of active phase of RPE with the bonded type of hyrax screw, both cases showed a suf-

ficient increase in the upper dental arch width. The frank diastema considered the clinical hallmark of RPE was conspicuous by its absence. Periodic occlusal radiographs indicated the progressive separation of the mid-palatal suture. The bonded Hyrax RPE was found to be very versatile and effective in addressing the transverse discrepancy of the maxillary arch and served as an important adjuvant to fixed appliance therapy.

References

1. Spolyar JL. The design fabrication and use of a full coverage bonded rapid maxillary expansion appliance. *Am J Orthod* 1984;86:136-45.
2. Sarver DM, Johnston MW. Skeletal changes in vertical and anterior displacement of the maxilla with bonded rapid palatal expansion appliances. *Am J Orthod Dentofac Orthop* 1989;95:462-6.
3. McNamara JA, Brudon WL. Orthodontic and orthopaedic treatment in the mixed dentition: Needham Press. 1995.