

Rehabilitation of Function and Esthetics using Modified Nance Palatal Arch in a Five Year Old Child

E Radhika^{1*} E Rajendra Reddy² L Vinay Kumar³

¹Senior Resident, Department of Pedodontics and Preventive Dentistry, Government Dental College and Hospital, Afzalgunj, India.

²Professor and Head, Department of Pedodontics and Preventive Dentistry, Kamineni Institute of Dental Sciences, Narketpally, India.

³Senior Lecturer, Department of Pedodontics and Preventive Dentistry, Kamineni Institute of Dental Sciences, Narketpally, India.

ABSTRACT

Background: Development of normal occlusion depends on the preservation of arch length in primary, mixed and early permanent dentition periods. Premature loss of posterior teeth result in complications of space loss and missing anterior teeth can pose functional, psychological and aesthetic derangements which have a negative impingement on the child behavior. The purpose of this paper was to describe the rehabilitation of deciduous anterior and posterior teeth in a 5-year-old child by employing a new and an innovative technique for the replacement of maxillary incisors integrated in the design of ordinary Nance Palatal Arch space maintainer. The novel appliance constructed fully contented the requirements of the patient for aesthetics and at the same time maintained the space for posterior teeth.

Keywords: Early childhood caries, Modified Nance palatal arch, Aesthetics.

INTRODUCTION

The premature loss of primary tooth may be due to early childhood caries, traumatic injury, radiation or developmental defects. Premature loss of primary posterior teeth leads to mesial migration or tipping of the adjacent tooth, which leads to loss of arch length, thus affecting the structural balance and functional efficiency by causing crowding or ectopic eruption and even impaction of permanent teeth¹. This entails the arch length preservation by means of space maintainers to prevent the need of eventual complex orthodontic treatment.

Premature loss of primary anterior teeth may leads to a number of sequelae such as minimum space loss, linguodistal inclination of teeth, midline shift, increased shyness, psychological trauma, tongue thrusting, forward resting posture of the tongue, delayed eruption, speech problems and low self-esteem^{2,3}. All these factors impels the requirement of an appliance for

the reinstatement of the anterior teeth that satisfies both aesthetics and functional needs.

Pulpectomy is an important treatment option in primary teeth with irreversibly infected or necrotic pulps due to caries or trauma. Rehabilitation of grossly lost tooth structure due to extensive caries or teeth after pulp therapy by means of stainless steel crowns is a viable treatment option in pediatric dentistry.

Traditionally, the treatment of choice for premature loss of bilateral maxillary posterior teeth is the placement of a Nance appliance which was first described by Nance in 1947. This appliance consists of bands on the molar teeth and a palatal acrylic button in the region of the rugae palatinae in the anterior part of the palate. The bands are connected to the button using a 0.9 mm round stainless steel wire⁴. This case report presents the modification of conventional Nance Appliance, where it acts as a space maintainer in the posterior

Received: Apr. 19, 2017; Accepted: June. 27, 2017

*Correspondence Dr. E Radhika.

Department of Pedodontics and Preventive Dentistry, Government Dental College and Hospital, Afzalgunj, India.

Email: drradhikabh@gmail.com



Fig 1: Preoperative frontal view.



Fig 4: Postoperative maxillary view.



Fig 2: Preoperative mandibular view.



Fig 5: Postoperative mandibular view.



Fig 3: Preoperative maxillary view.



Fig 6: Fabricated modified Nance palatal arch appliance on cast.

segment and as an esthetic, fixed prosthesis replacing maxillary incisors in the anterior segment.

CASE REPORT

A 5 year old boy accompanied by his mother to the outpatient department of Pedodontics with the chief complaint of pain in

lower left back tooth region since 10 days. There was no relevant medical history. Patient has visited local dentist 6 months back and underwent restoration in relation to 85. On clinical examination, there was a decay in relation to 54, 52, 51, 61, 62, 64, 74, 75 and 84, root stumps in relation

to 55, 65 and GIC restoration in relation to 85 (Figures 1, 2 and 3). Child's mother gave history of night bottle feeding upto 3 years of age. History also revealed inappropriate diet and improper oral hygiene practices. The entire treatment protocol and an option of placement of modified Nance Palatal arch were explained and consent was obtained from the parents.



Fig 7: Post operative frontal view.

Behavior shaping of child was done during 1st appointment. GIC (Fuji IX) restoration was done in relation to 62, 54 and re-restoration in 85, followed by stainless steel crown in relation to 54. The further visits included invasive procedures such as pulpectomy in relation to 52, 61, 64, 74, 75 & restored with stainless steel crowns in relation to 64, 74 and 75 (Figures 4 and 5). In the last phase of the treatment extraction of 55, 51, 65 & 84 was done under local anesthesia, followed by fixed space maintainers i.e., Band and loop in relation to 84 (Figure 5) and modified Nance Palatal Arch appliance in maxilla (Figure 4). Considering the age of the child, the appliance was planned which not only restore the form and function in the posterior region but also the aesthetics in anterior region of the upper arch.

Fabrication of appliance:

Molar bands (0.006 inch thickness and 0.18 inch width) were fabricated on the right and left maxillary first permanent molars. The crown portions of 52, 61 and 62 were grinded till the cervical level. A full mouth alginate impression was made for both maxillary and mandibular arches. Under laboratory procedures, stone models were cast from the impressions. With 19 gauge stainless

steel wire, a Nance palatal arch was made and the wire lay passively across the anteroinferior aspect of the palate. The distal end of the wire in contact with the palatal surface of the maxillary molar bands and was soldered.

In the anterior region of the upper cast, a trial wax up was done with trimmed acrylic teeth. The acrylic teeth were formerly of adult size, which had to be trimmed to the primary tooth sizes of 52, 51, 61 and 62. After cold mould seal application and cold cure acrylic resin insertion, the appliance was removed from the cast (Figure 6). After trimming, finishing and polishing, the appliance was cemented on 16 and 26 with luting glass ionomer cement (Fuji I) and occlusion was checked for any premature contact (Figures 4 and 7). A conventional band and loop space maintainer was cemented irt 84 (Figure 5).

Prior to discharge of the patient, instructions were given regarding oral hygiene maintenance and consumption of soft diet for first few hours. The patient was recalled after one week to check any impingement of the appliance and the parents were instructed to report to the clinic every three months. Both the patient and the parents were satisfied with the treatment and the aesthetics.

DISCUSSION

There are many morphogenic and environmental influences which manage the occlusal development and a disorder in any of these elements may influence the occlusion. One of these factors is the premature exfoliation of the primary teeth⁵. The prevalence of early primary tooth loss has been estimated to be as high as 28.9%, with a range of 4.3 to 42.6%⁶. Premature loss of maxillary primary incisors due to caries or trauma in very young children leads to psychological problems and lack of self-esteem.

The premature loss of primary posterior teeth may lead to inadmissible tooth movements and loss of arch length which can be prevented by space maintenance. Developmental stage of occlusion, as well as differences in maxillary and mandibular arches are important factors to be considered while space management. Space closure occurs more rapidly in maxillary arch than the

mandibular arch⁷. Seward (1965) found the rate of closure of maxillary edentulous space is 1.5 mm/year, whereas 1.0 mm/year in case of mandible⁸. Mandibular permanent molars move anteriorly, they show only mesial tipping into the available space leading to loss of space, whereas the permanent maxillary molars rotate mesiopalatally around the large palatal root which acts as a pivot causing rotation as well as bodily movement. Hence, contributing to greater loss of space in maxilla than in the mandible. The loss of space is more in premature loss of second primary molar than the first primary molar, with greater mesialization of the permanent first molar occurring during its active eruption phase⁷. This impels the use of an appliance to maintain the position of the teeth. Conventionally, Nance palatal arch is used in case of bilateral loss of both the primary molars in maxilla.

Premature loss of deciduous maxillary anterior teeth leads to increase in arch length, shows interference with normal tongue placement and articulation⁹. The anterior teeth appear to be particularly important for the correct production of the (S) and (Z) sounds since their correct production necessitates forcing the air stream through an opening in the oral cavity which has to be small enough to produce friction noises. So, replacement of the extracted anterior teeth in a very young child is very important⁹. The progress of children in school, psychological well being and self esteem can also be adversely affected by the premature loss of upper anterior teeth.

Removable or fixed prosthesis can be used to replace prematurely lost deciduous teeth. Children do not wear removable appliances because of a number of factors, including: cooperation in wear, comfort of the appliance, difficulty in getting accustomed to the appliance, appliance breakage, loss of the appliance, and parental concern about a young child choking on the appliance during naptime and/or bedtime^{7,10}. Fixed appliances, on the other hand, if accurately designed, are less ruinous to the oral tissues and less of an annoyance to the paediatric patient thereby ensuring compliance and longevity of wear¹¹.

Modification of conventional Nance appliance with acrylic teeth in the anterior part, meets the obligation of a posterior space maintainer

and anterior fixed prosthesis in a young child. It promotes the speech, esthetics, prevents psychological disturbances and tongue thrust habits. The child has become habituated to this appliance and showed renovation in speech within 2-5 days. Both the parent and patient are educated and motivated to prevent frequent deterioration of the appliance.

CONCLUSION

Premature loss of primary teeth continues to be highly prevalent in India due to prolonged and night time bottle feeding habit, lack of knowledge of proper oral hygiene maintenance, abnormal food habits leading to malocclusion in developing permanent dentition. Preservation of arch length by means of a space maintainer prevents the necessity of complicated orthodontic treatment at a later stage. Restoration of anterior aesthetics and function with this appliance gave a humongous psychological boost for the child. This novel appliance fully satisfied the insistence of the patient for aesthetics and at the same time maintained the space for posterior teeth.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Kupietzky A, Eli Tal. The transpalatal Arch: An alternative to the nance appliance for space maintainers. *Pediatr Dent*. 2007 May-Jun;29(3):235-8.
2. Tandon S. Text Book of Pedodontics. 2nd ed. Paras Medical Publisher; 2008. p. 446-65.
3. Heilborn J.C, Kuchler E.C, Fidalgo T.K.S, Antines L.A.A, Costa M.C. Early primary tooth loss: prevalence, consequence and treatment. *Int J Dent, Recife*;10(3):126-30.
4. Singh Paramjit and Cox Shirley. Nance Palatal arch: a cautionary tale. *J Orthod*. 2009 Dec;36(4):272-6.
5. Dearing SG. Space loss and malocclusion. *N Z Dent J*. 1981 Apr;77(348):62-7.

6. Rickman G.A, El-Badrawy H. Effect of premature loss of primary maxillary incisors on speech. *Pediatr Dent*. 1985 Jun;7(2):119-22.
7. Bimal Chandra Kirtaniya, Jasneet Kaur, Bakshinder Singh Lyall, Vasundhara Pathania. Modified Nance Palatal Arch: An Aesthetic Approach To Missing Anterior Teeth - A Case Report. *Indian Journal of Dental Sciences*. 2015 June,7(2):54-6.
8. Dr. Swati Sharma, Dr. Abhishek Anand, Dr. Surendra Prasad, Dr. Kunal Kumar, Dr. Sumit Kumar Yadav, Dr. Achla Bharti Yadav. Aesthetic Rehabilitation with Fixed Appliance in Primary Dentition. *International Journal of Enhanced Research in Medicines & Dental Care*. 2015 September;2(9):15-9.
9. King NM, Anthonappa RP, Itthagaran A. The importance of the primary dentition to children—Part 2: effects of treating carious teeth by extraction. *The Hong Kong Practitioner* 2007 Mar;29(3):101-7.
10. Fred S. Margolis. The esthetic space maintainer. *Compendium*. 2001 Nov;22(11):911-4.
11. Klapper B.J, Sherwin R.S. Esthetic anterior space maintenance. *Pediatr Dent*. 1983 Jun;5(2):121-3.