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Obturator Quad Helix - Two in One Appliance

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Abstract

Cleft lip and palate is the most common congenital facial defect. The expansion of the collapsed arch is mandatory before the secondary alveolar bone graft surgery for the better correction of the malocclusion and long-term retention. The quad-helix which is in use for a long period has been modified with the self-cure acrylic buttons bilaterally in the palatal dehiscence area to prevent nasal regurgitation that indirectly improved the overall health of the child patient.

Keywords

Quad helix, Cleft lip and palate, Expansion of maxilla.

Introduction

Cleft lip and palate is one of the most common craniofacial defects, causing difficulty in feeding, speech, function, aesthetics as well as psychological problems. The a etiology of cleft lip and palate is multi-factorial, with both genetics and environmental factors[1,2].

Pre-surgical maxillary expansion is done before the secondary alveolar bone graft procedure. Patients who undergo maxillary expansion before surgery are found to have successful outcomes as arch expansion allows better positioning of alveolar segments provides more space and access for oral surgeons, corrects transverse and anterior discrepancy, and achieves good arch form for orthodontic alignment of the teeth[3].

Both Rapid Maxillary Expansion (RME) and Slow Maxillary Expansion (SME) are used in patients with cleft lip and palate. RME appliances commonly used are Hyrax/ Hass type of expanders. SME appliances are quad helix and modifications in quad helix are used for maxillary expansion. Both appliances produce significant skeletal transverse gains with negligible periodontal bone changes.

This case report described the technique of slow maxillary expansion using a novel modified quad helix [obturatorquad helix] appliance in a patient with bilateral cleft lip and palate and collapsed maxillary arch. The appliance was useful in bringing out anterior maxillary expansion more than posterior expansion in gaining proper arch form.

Case report

A 7-year-old female child reported to the Department of Pedodontics and Preventive Dentistry, SCB Dental College and Hospital, Cuttack. The chief complaint of the patient was difficulty in eating because of nasal regurgitation and collapsed upper arch. The previous history of cleft lip and palate repair was present. The patient was referred for the orthodontic correction of the upper arch before secondary alveolar bone graft surgery. The facial profile of the patient was concave with prognathic premaxilla. Intraoral examination revealed posterior crossbite from primary canine to primary second molar [Fig. 1]. The teeth present were maxillary right permanent first molar (16), right primary second, first molars, canine, lateral incisor (55,54,53, 52), right hypoplastic permanent central incisor (11), retained left primary central incisor (61), left hypoplastic permanent central incisor(21), left primary lateral incisor, canine, first, second molars (62, 63, 64, 65). The maxillary right and left primary first molars (54, 64), and left primary lateral incisor (62) were grossly decayed [Fig. 2]. The treatment planning was done to expand the collapsed arch and then to extract the grossly decayed teeth.

Appliance fabrication

1. The banding was done on maxillary primary second molars (55,65)
2. Quad helix wire framework was fabricated with 0.036” stainless steel wire.
3. The wire framework was soldered to the bands
4. Self-cure acrylic buttons were added in the palatal dehiscence area bilaterally in the terminal part of the wire framework of the quad helix [Fig. 3].

Treatment procedure

1. The fabricated appliance was cemented to maxillary primary second molars (55,65) with the help of luting GIC cement [Fig. 4].
2. The blue bitebonded on a maxillary primary second molar (55) and on primary canines (53,63) to increase the freeway space.
3. The appliance was activated intraorally with the three-prong plier described by Birine et al., 1980[4].
4. The patient was advised to maintain proper oral hygiene to avoid discomfort related to mucositis.
5. After, the active treatment period of 4 months, the posterior crossbite was corrected. The inter-canine distance measured from the palatal cervical area of 53 to 63 increased from 26mm to 35mm postoperatively.

6. Quad helix was removed after the retention period of 1 month [Fig. 5].
7. Extraction of maxillary retained left primary central incisor (61) and grossly decayed left primary first molar (64) restoration of 54 and patient was advised for secondary alveolar bone graft surgery.

Discussion

Maxillary arch expansion is the most commonly used method for relieving crowding and the posterior crossbite in patients with repaired cleft lip and palate. Patients who undergo maxillary expansion before surgery were found to have successful outcomes[5]. It allows better positioning of alveolar segments along with other advantages such as better accessibility ofthe surgical site and achieving better closure of flaps post-surgery. However, there is no standardized protocol for maxillary expansion.

Quad helix appliance was introduced by Ricketts in 1978[1]. It causesorthopedic palatal expansion in the mixed dentition stage[6].Quad helix is used to carry out slow maxillary expansion of the maxillary arch. It has been reported that when quad helix appliance is used in non-cleft patients, there is more posterior expansion than anterior region[7,8]. On comparing the expansion ability of quad-helix and hyrax both hadsimilar expansion in dental and skeletal part[9]. Having been used extensively all over the world, this appliance has been modified to suit individual requirements in different patients. Such modifications include incorporation of the tongue spikes,the extension of anterior arm on to the incisors,Hexa-helix[10]. Some patients need anterior bite opening along with the expansion of the maxillary arch. Incorporating the anterior bite plane to the quad helix is useful in such situations.

In this article, we have incorporated acrylic buttons bilaterally to the terminal part of quad helix wire framework so that it can act both as an expander and obturator.

Figures

Fig 1: Frontal View

Fig 2: Maxillary Occlusal View

Fig 3: Quad Helix with Acrylic Button Bilaterally

Fig 4: Appliance in Situ

Fig 5: Post Expansion Maxillary Occlusal View

Conclusion

Obturator Quad Helix is a versatile appliance that is simple in design, easy to fabricate, comfortable for the patient and economical for the operator and the patient.

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