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Review Article

Management of Thumb Sucking During Early and Late Mixed Dentition Using Palatal Crib: Report of Two Cases

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ABSTRACT: Thumb sucking is one of the most commonly seen oral habit. Prolonged thumb sucking result in the initiation of malocclusion such as posterior cross bite, maxillary constriction, and anterior open bite. Generally, treatment strategies include intervention by eliminating the habit and correction of the malocclusion. This report present two cases of thumb sucking habit and their treatment for one child in the early and another one in the late mixed dentition using fixed palatal crib. The appliance was successful in treatment of thumb sucking habit with the advantage of easy fabrication and excellent compliance of the patients.

Key words: Thumb Sucking, Fixed Palatal Crib, Habit Breaking Appliance, Interceptive Orthodontics.

Introduction

The concern about sucking habits is evident from the number of articles appearing in scientific journals in the past 70 years.[1] Prevalence of digit sucking habit varies significantly from one population to another.[1] Nonnutritive sucking behaviors are considered normal in infants and young children.[2] Normally about two third of such habits are self-limiting by the age of 4-5 years with no long term consequence.[3] However, prolonged sucking beyond 5 years can lead to various types of malocclusion including open bite, cross bite, increased overjet, crowding and increased probability of developing Class II malocclusion.[3-5] Intensity, duration and frequency of the habit practiced dictate the severity of malocclusion.[3-5]

Persistent of long time nonnutritive sucking habits have been connected with increased overjet, decreased overbite, decreased maxillary arch width, posterior cross bite, and anterior open bite.[4,5] The American Academy of Pediatric Dentistry (AAPD) suggested that management of an oral habit is necessary at any time the habit is associated with undesirable dentofacial growth or unfavorable effects on child oral health or when there is a possibility that the oral habit will lead to undesirable sequelae in the permanent dentition.[6] The objectives of the treatment are concentrating to decrease or eliminate the habit and reducing potential harmful effects on the dentofacial complex.[6] The cessation of harmful habits and the re-establishment of normal occlusion are among the key roles played by interceptive orthodontics.[2] For instance, anterior open bite tends to self-correct when the habit is eleminated.[7,8] Conversely, if not intercepted early, non-nutritive sucking habits can render relatively simple malocclusion treatment extremely complex.[7,8]

Treatment of thumb sucking mainly depends upon the willingness of the child to stop the habit.[3,4] The therapy should be advocated to the child as an aid, but not as a punishment and also to provide psychological support to help the child adjust to it.[3-5] Various therapeutic approaches include counseling the child, reward system, remainder therapy using a habit limiting appliance.[3-5] If the behavior modification technique fails, then the preferred treatment modality is using the appliance therapy.[3,4] The literature describes different approaches to intercept finger sucking such as the use of palatal crib which yielded satisfactory results.[9-13]

The purpose of this report is to present two cases of thumb sucking habit and their treatment for one child in the early and another one in the late mixed dentition using fixed palatal crib. The appliance was successful in treatment of thumb sucking habit with the advantage of easy fabrication and excellent compliance of the patients.

Case Reports

Case 1

A 6-year-old healthy Saudi girl with no notable medical history presented to the pediatric dentistry clinic with the chief complaint “To fill the decayed teeth and align the upper

anterior teeth." The child was ranked the third between five siblings. The patient/father reported a history of active thumb sucking habit since one-year old. The intra-oral examination showed that the patient was in the early mixed dentition with molar relationship as distal step on the right side and flush terminal plane on the left. Canine relationship was Class II on the right side and Class I on the left, anterior 9 mm open bite and negative overjet with maxillary midline shift to right by 1-mm and mandibular midline shift to the left side 2-mm. Figure 1 showing the pretreatment intra-oral photographs.

Figure 1. Pretreatment intra-oral photographs of case 1.

After taking necessary radiographs and intra-oral clinical examinations the diagnosis was established with the need to address presence of multiple carious teeth, deep fissures, poor oral hygiene, and active thumb sucking habit. In addition, there was constricted maxilla, deep vault, open bite, protruded maxillary anterior teeth, and retruded mandibular anterior teeth.

Treatment plan included behavior management, preventive phase, restorative phase which included restoration of all carious teeth, orthodontic phase included thumb sucking correction and orthodontic consultation. Orthodontic treatment plan included two phases: phase I in early mixed dentition stage and included correction of thumb sucking habit by constructing palatal crib habit breaker which may improve the open bite and phase II to observe if skeletal abnormality detected with presence of constricted maxilla and tendency of crowding to be able to treat by maxillary expansion and comprehensive orthodontic treatment after all permanent teeth erupt. Treatment of thumb sucking started after all restorations were completed.

Parents reported that other techniques for habit breaking were applied but were not effective. After explanation and discussing the advantages and disadvantages of using fixed palatal crib (Figure 2) treatment with the parent and the child, the appliance was placed in the maxillary arch for total of ten months, long enough for the thumb-sucking habit cessation.

Figure 2. Palatal crib appliance with abutments on the primary maxillary second molars.

Recall was established every month and adjustment of the appliance was performed whenever necessary. Figure 3 showing intra-oral photographs after six months.

Figure 3. Post-treatment intra-oral photographs after six months.

Thumb sucking habit was stopped and improvement of open bite was only about 1-mm, over bite about 1-mm, and over jet about 1-mm. The appliance was removed after 10 months (Figure 4).

Figure 4. Post-treatment intra-oral photographs after 10 months.

Case 2

A 11-year-old healthy Pilipino boy presented to the pediatric dentistry clinic with the chief complaint "To stop the habit of

finger sucking." The patient/father reported a history of finger sucking habit during day time and during sleeping. The intra-oral clinical examination showed that the patient was in the late mixed dentition with Class I molar and canine relationship on either sides. Over jet was 5-mm and overbite 1-2-mm, and protruded maxillary anterior teeth with coincident maxillary and mandibular midline. Figure 5 showing the pretreatment intra-oral photographs.

Figure 5. Pretreatment intra-oral photographs of case 2.

After taking necessary radiographs including lateral cephalometric and space analysis the diagnosis was established with the need to address presence of incipient carious teeth, deep fissures, fair oral hygiene, and active thumb sucking habit. In addition, there was constricted maxilla, deep vault, open bite, protruded maxillary anterior teeth, retruded mandibular anterior teeth.

Treatment plan included behavior management, preventive phase, and restorative phase which included restoration and fissure sealants. Then, orthodontic phase included thumb sucking correction and orthodontic consultation. Treatment of thumb sucking started after all restorations were completed.

Parents reported that other techniques for habit breaking were applied but were not effective. Patient was willing to stop the habit but needs help. After explanation and discussing the advantages and disadvantages of using fixed palatal crib (Figure 6) treatment with the parents and the child, the appliance was placed in the maxillary arch for total of 11 months, long enough to thumb-sucking habit cessation.

Figure 6. Palatal crib appliance with abutments on the permanent maxillary first molars.

Recall was established every month and adjustment of the appliance was performed whenever necessary. Figure 7 showing intra-oral photographs after six months.

Figure 7. Post-treatment intra-oral photographs after six months.

Thumb sucking habit was stopped and improvement of overjet and overbite was noted. Orthodontic consultation was completed and confirmed that Class I molar relationship were maintained and improvement of the position of the maxillary and mandibular teeth with over jet 3- mm and overbite 3-mm. The appliance was removed after 11 months and patient was seen after six months for recall (Figure 8).

Figure 8. Post-treatment intra-oral photographs after 17 months.

Discussion

Any treatment of oral habits needs to consider the child's development, comprehension, and ability to cooperate.[6] Thumb sucking habit treatment modalities include counseling of patient/parent, behavior modification methods, myofunctional treatment, appliance therapy, or referral to other providers including, but not limited to, orthodontists, myofunctional therapists, psychologists, or otolaryngologists.[6,14] Use of an appliance to manage oral habits is indicated only when the child wants to stop the habit and would benefit from a reminder.[14]

On regard to deleterious habits control, there seems to be a consensus towards the need for early intervention.[10,15] One of our cases reported and validated this idea since the treatment began at six-year-old. During the transitional dentition phase several treatment modalities are offered to intercept

deleterious habits. The decision to use palatal crib as aids in the control of finger sucking in these cases was due to their efficacy, as reported in the literature.[9,11] We were concerned about the cessation of the harmful habit as soon as possible in order to take advantage of the physiologic period of the maxillary incisors eruption.[16] We were expecting incisors to return to the normal pattern of eruption once all mechanical barriers were removed and habit eliminated.

Digit-sucking habit can be treated with the use of removable or fixed appliances. However, this must be based on the child's willingness and should not be used as a means of punishment but rather explained as a tool to assist the child in overcoming his or her digit-sucking habit.[14] Patient compliance is a problem associated with removable habit breaking appliances.[18-20] Hence, fixed breaking appliances can be of great advantage. In cooperative children who express a willingness to cease digit sucking but who require additional assistance, either response prevention therapy or appliance therapy may be successful.[10]

Associations of the sucking habit with anterior open bite and increased overjet in the primary dentition have been reported.[21] There is no agreement on their effect in the molar region.[21,22] However, prevalence of malocclusions associated with sucking habits was positively correlated with duration and intensity of the habits.[21] A study reported the relationship between sucking habits and malocclusion in the primary dentition, showed a higher prevalence of open bite in the thumb- or finger-sucking group compared with age matched controls without oral habits.[23] Another study evaluated the outcome of sucking habits in Saudi Arabian children aged 3 to 5 years and reported a strong correlation between the oral habit and open bite.[1] Prolonged sucking habits and hyperdivergent facial features are substantial risk factors for anterior open bite in the mixed dentition.[24] The study also pointed out the significance of both mechanical, external factors (such as digit or dummy sucking) and structural characteristics of the craniofacial skeleton as risk factors for dentoalveolar malocclusions such as anterior open bite.[24] Clinically, a rational diagnosis should include the identification of patients with prolonged sucking habits associated with excessive vertical dimension of the face as candidates for developing an anterior, dentoalveolar open bite.[24]

Palatal cribs of various designs have been used successfully to overcome digit-sucking habits and are designed to prevent both the comfortable positioning of the digit against the palate and any associated tongue thrust, thereby allowing the natural force of the lips to correct an anterior open bite.[14] The basic design utilizes the permanent first molars or the primary second molars as abutments with a major connecting wire of 0.04-inch stainless steel orthodontic wire extending anteriorly along the palate. The wire forms a crib at the level of the maxillary canines, which extends vertically lingual to the level of the incisor edges of the lower anterior teeth. However, the appliance should not lead to any occlusal interferences and should have sufficient clearance to allow for the lingual movement of the maxillary incisors.[14] Several minor problems have been reported with the use of palatal cribs. Children with palatal cribs may be initially upset regarding the appliance and experience difficulty eating sticky and hard foods.[10,14] These are usually accommodated within three to four weeks.[10,14] In addition to that, transient changes in speech, such as slurring and lisping, are corrected once the appliance is removed at the completion of treatment, if not during the active treatment stage.[14] Palatal irritation following insertion of the appliance has been reported in some children and may reflect poor fabrication.[14] Loss or loosening of palatal cribs has also been reported in a small minority.[14] The risk of dental caries and lack of patient cooperation may contraindicate the use of appliance therapy in some children.[10,14]

Summary

Fixed palatal crib can be effectively used to correct thumb sucking habit. It can act as a reminder to discontinue the habit and reduces the appliance wear time. It is easy to fabricate and demonstrated good improvement of the dentoalveolar relationships. When diagnosis and early treatment are properly carried out, excellent results can be achieved, which substantiates this case report

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