Bluegrass appliance for thumb sucking habit: A case report
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Abstract
Digit sucking habit is one of the most common learned patterns of behavior seen in children of preschool age and is a habit of concern to specialist in various fields as it can lead to malocclusion if it persists for a long time. Understanding the etiology, which includes psychological, physiological and anatomical and planning for behavior eradication is critical for the positive outcomes. Starting from counseling to appliance therapy, ample treatment modalities have been reported in the literature. One such intervention is bluegrass appliance in management of thumb sucking habit. This case report describes a 5½-year-old girl who reported to our department with a history of intense, high-frequency thumb sucking habit which was intervened with the use of bluegrass appliance.

Keywords: Bluegrass, habit breaking appliance, thumb sucking

Introduction
Habit is defined as a fixed practice produced by a constant repetition of an act. These repetitive behaviors are common in the infantile period, and these are initiated and terminated spontaneously. One of the most common repetitive behaviors in the infantile period is digit sucking. It is characterized by the placement of one or more digits to varying depths in the mouth. This habit is considered to be normal up to the age of 3-4 years. The prevalence of digit sucking habit as reported in the dental literature varied among different investigators from 1.7% to 47% in children. The habit may develop early in life and continue from infancy through primary, mixed and permanent dentition. If the habit continues into the mixed dentition, a malocclusion may develop. The adverse effect of digit-sucking habit can be seen in the form of proclined and flared maxillary and/or mandibular incisors, development of anterior open bite, and Class II malocclusion. The term digit sucking is synonymous with finger sucking or thumb sucking. It is defined as the placement of the thumb or one or more fingers in various depths into the mouth.

Thumb sucking is of 2 types:
1. Active: In this type, there is a heavy force by the muscles during the sucking and if this habit continues for a long period, the position of permanent teeth and the shape of mandible will be affected.
2. Passive: In this type, the child puts his/her finger in mouth, but because there is no force on teeth and mandible and hence this habit is not associated with skeletal changes.

Blue grass appliance for the management of thumb sucking habit was introduced in 1991 by Haskell and Mink, which is also known as habit correction roller and gained universal attention and acceptance. This appliance is considered as user-friendly, non-destructive, easy to wear, thus replacing the destructive habit. This appliance ensures not only positive reinforcement in the child but also helpful in avoiding the physical barriers associated with cribs. This paper describes the clinical case report of a 5½-year-old girl whose thumb-sucking habit was corrected using bluegrass appliance.

Case Report
A 5½-year-old girl accompanied by her mother reported to the Department of Pedodontics and Preventive Dentistry, MS Ramaiah University of Applied Sciences Bengaluru, with a chief complaint of thumb sucking habit since the child was 6 months old. The habit was only nocturnal, and it continued till the age of 4 years. However from the past 2 years the child has been reported to continue the habit of thumb sucking whenever she was idle during the daytime. On examination, the child was in primary dentition stage and was free of any carious lesion and no skeletal abnormality was detected because of the habit. On extra oral examination, right hand thumb finger showed callous formation [Figure 1a]. All the other methods of habit cessation attempted had failed in this patient. Thus appliance therapy was planned. As the child was very young to
wear a removable appliance a fixed habit breaking appliance, i.e., a bluegrass appliance was planned. Accordingly the second primary molars were banded, and impression was made. The appliance was fabricated on the cast using a 0.045 stainless steel wire, the roller was fabricated using cold-cure acrylic and the appliance was soldered on to the bands. In the second appointment, the appliance was cemented using glass ionomer cement luting cement [Figure 2]. After 2 weeks the patient was recalled for a check-up, mother gave a positive feedback about the regression of the habit. There was observable changes on the thumb finger [Figure 1b], while follow-up check-up after 2 months showed a marked reduction in the habit and the callous formation on the thumb had resolved completely [Figure 1c]. Patient was asked to wear appliance for at least 6 months after the reversal of habit to avoid relapse of the habit. The child was able to discontinue the sucking habit and showed no relapse or return to the habit during the 6 months of post-treatment follow-up period. After that period, the appliance was removed.

Discussion

The dental practitioner is often met with stares of parental concern when the palatal crib with or without “spurs” is suggested as the habit breaking appliance of choice for digital sucking. Emotional problems, difficulty with speech and eating, and iatrogenically “self-inflicted” injuries may occur with such appliances. This type of appliance tends to be regarded as a punishment rather than a supportive treatment. Dentists always face a challenge to decide whether to treat a child with thumb sucking or not. In a child >4 years of age who has a chronic habit and the child requests an aid to stop the habit, as dentist a decision must be made by us whether to treat the patient with an dental appliance or not. Before considering the placement of intra-oral appliance, easier and less expensive treatment methods like reminder therapy and use of reward system should be considered, even then if the child fails to overcome the habit then a intra-oral appliance can be planned.

An oral appliance was constructed by Haskell and Mink in 1991 to eliminate thumb sucking utilizing the principles of positive reinforcement. This appliance was described as an easy to wear appliance that did not have the problems associated with traditional palatal cribs. This idea came from the equine industry; where a bit with copper rollers were used to distract irritable horses. A modified, six-sided roller machined from Teflon™ (E.I. du Pont de Nemours and Co., Inc., Wilmington, DE) to permit purchase of the tongue was constructed to slip over a 0.045 stainless steel wire which was soldered to molar orthodontic bands previously fitted and in place on a poured plaster model. The bands can be placed on either the maxillary first molars or on the primary second molars. The roller itself is placed in the most superior aspect of the palate in the same general location as the plastic button of a “Hays-Nance” type appliance. This position does not cause obstruction with eating and presents minimal disturbance to speech, unlike hay-rake and cage-type appliances. The Teflon™ rollers must not be in contact with the palatal tissue so that patients can roll them with their tongues. The device works on the principle of counter conditioning response to the original stimulus of thumb sucking. The Teflon roller not only acts as a reminder, but also as a distraction to the patient. The child should be told to rotate the roller instead of sucking the thumb. The advantage of this appliance over the other is a distraction and the success of eliminating the habit. In studies done by Haryett et al. and Haskell and Mink confirms the elimination of this habit in 28 patients thus proving this appliance to be an effective treatment option for stopping thumb sucking habit. The span of treatment with this appliance is accepted to be 24 weeks.

In a retrospective study by Greenleaf and Mink suggests that 76% of the patients required 36 or lesser for treatment of the habit. It is indicated for children who are in the early or late mixed dentition period of development, have an on-going thumb sucking habit which is affecting the dentition, and have expressed a desire to stop the thumb sucking. However, our patient was in the primary dentition stage, and both the child and parent were willing to undergo the treatment to intercept the habit. Therefore, we planned a non-punitive reminder therapy using a modified Bluegrass appliance. The main advantage of this appliance is that the roller is placed instead of cribs/rakes, and also it is less bulky. The size of the roller is smaller and is not to be seen from outside the mouth, and an additional advantage is

Figure 1: (a) Callous formation seen on the digit of the patient. (b and c) Marked reduction in callous formation seen at 2 weeks and 2 months follow-up respectively

Figure 2: Intraoral view of the appliance cemented
that the roller act as a neuromuscular stimulant for the tongue, which aids the patient in speech therapy.\textsuperscript{[14]} Though it has a few disadvantages like eating and speech difficulties for the first few days after placement, it subsides later.\textsuperscript{[15]} This reminder therapy has been proven to eliminate thumb sucking habit with few disadvantages when compared with other appliances.

**Conclusion**

The non-punitive bluegrass appliance is an effective treatment option in cessation of thumb sucking habit with limited treatment complications. It is also comfortable for the patient and successfully intercepts the thumb-sucking habit within a short period.

**References**