

# A Retrospective Study of the Use of the Bluegrass Appliance in the Cessation of Thumb Habits

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## Abstract

**Purpose:** The purpose of this study was to evaluate the use of the Bluegrass appliance in ceasing the thumb-sucking habit.

**Methods:** Patient records of 41 subjects, ages 4 to 20 years of age, who attended the University of Kentucky Pediatric Dental Clinic for the treatment of a thumb-sucking habit with the Bluegrass appliance, were reviewed. Of the 41 subjects, 30 were included in the study. Data collected from the records included age, sex, past dental history, past medical history, history during treatment with the Bluegrass appliance, patient and/or parental/legal guardian report of cessation of the habit, and total treatment time.

**Results:** Of the 30 subjects included in the study, the results showed that in 28 (93%) of the patients, the thumb habit was ceased after insertion of and complete treatment with the Bluegrass appliance. The average reported treatment time for the cessation of the habit was 12.3 weeks $\pm$ 12.2 weeks. The mean total treatment time for the thumb habit with the Bluegrass appliance was 30.3 weeks $\pm$ 17.7 weeks, with 6 (20%) of the patients requiring reinsertion of the appliance during treatment.

**Conclusions:** The results of this study suggest that the Bluegrass appliance is an effective treatment option for the cessation of a thumb-sucking habit with limited treatment complications. (*Pediatr Dent.* 2003;25:587-590)

**KEYWORDS:** THUMB-SUCKING, HABIT APPLIANCE, BLUEGRASS APPLIANCE

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Thumb-sucking has been described as a common childhood behavior, manifestation, or habit that is considered normal up to the age of 3 to 4 years.<sup>1-3</sup> The incidence of thumb-sucking has been reported from 13% to 45%, and up to 90% in some countries.<sup>4,5</sup> Although most children who start sucking their thumbs usually cease the habit by the age of 2.5 years of age, some 5% to 20% of children between the ages of 6 to 12 years continue the habit. Gellin reported the prevalence of thumb-sucking to be 14% in children 6 years old and 6% in children 11 years.<sup>6</sup>

The risks associated with thumb-sucking are dependant upon its frequency, intensity, duration, and position in which the digit is placed in the mouth.<sup>3,7</sup> Dentoalveolar changes associated with chronic, prolonged thumb-sucking include malocclusions,<sup>8,9</sup> anterior openbite, unilateral crossbite, atypical root resorption, mucosal trauma, and abnormal facial growth.<sup>3,10,11</sup> Some of the changes in the anterior region of the maxilla can be seen before the age of 3.<sup>12</sup> Callus formation, irritation eczema, alopecia, parony-

chia, herpetic whitlow, digital deformations, and increased chance of poison ingestion are all potential nondental complications associated with thumb-sucking.<sup>13,14</sup>

Regardless of the aforementioned risks associated with chronic thumb-sucking, it is very important that the parent maintain a sympathetic, patient, and understanding attitude toward the child. Parental nagging, threats, and criticism can actually worsen the problem rather than improve it. The parent should initially ignore the habit rather than force the child to stop. Any attempts to cease the habit before the age of 2 years can create neurotic symptoms and personality problems.<sup>15</sup>

When the risks of treatment outweigh the benefits, which rarely occurs before 4 years of age, the dentist should be hesitant to interfere. Current literature suggests that the treatment of thumb-sucking by the dentist is appropriate if the child is older than 4, if the problem is chronic, and when the problems associated with thumb-sucking are incipient and/or the child has requested help in stopping the

habit.<sup>16-19</sup> Any chronic thumb-sucking after the age of 4 years may lead to complications in health, social standing, and relationships with peers, parents, and siblings.<sup>20</sup> The habit is chronic if it occurs over 2 settings (ie, home, school, or day care) and during both day and night. If it is a meaningful habit and the child is over 4 years of age, the dentist should be hesitant to interfere.<sup>21</sup> For example, when the child experiences a loss (ie, family member or pet), fear, or pain, thumb-sucking becomes a temporary adaptive coping strategy.<sup>7</sup> In this case, the benefits do not outweigh the risks, and the clinician should not attempt to treat the habit.

The decision for the dentist to utilize an oral appliance should be done after consultation with the parents of the child. Ample time should first be given for the child to stop the habit on his/her own. If this is unsuccessful, the use of a reminder (ie, taste aversion, Band-Aid on finger) or reward system should be used.<sup>16,24</sup> If the alternative treatments are unsuccessful and the child is motivated to stop, appliance therapy should be considered.

The palatal bar, crib, and Bluegrass appliances are all well tolerated and accepted by children. Haryett found that 81% of children stopped sucking with the use of a palatal bar when compared to a control group.<sup>22</sup> Mink and Haskell reported that, of 24 patients treated with the Bluegrass appliance, all were successful and with none having to be reinserted.<sup>23</sup> Mink and Haskell first published the use of the Bluegrass appliance in 1991.<sup>23</sup> It is a fixed dental appliance composed of a hexagonal Teflon roller on a palatal wire (Figures 1 and 2). It is also a nonpunitive appliance that reminds the child to keep his finger out of his/her mouth.

Prior to placement, the purpose of the appliance should be explained to the child. This will help the child perceive the treatment as a reminder. Once placed, the child usually stops the sucking habit within the first month of placement. It is recommended that the child present for the first follow-up within 2 weeks of placement to evaluate patient tolerance and treatment progress. Subsequent follow-ups should be monthly or bimonthly, with total treatment time ranging from 4 to 6 months. Its use, along with parental positive reinforcement, has shown considerable success in stopping the thumb-sucking habit.

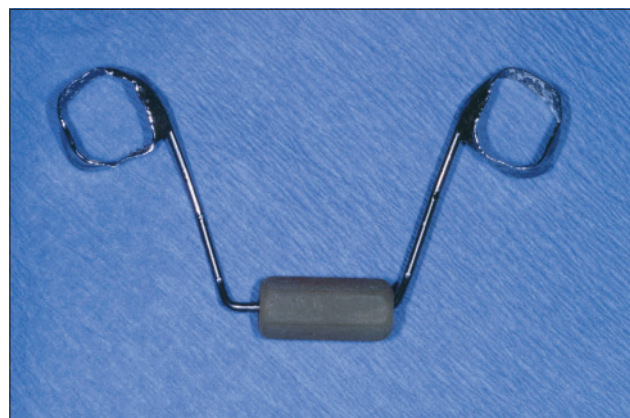


Figure 1. Extraoral view of the Bluegrass appliance.

The advantage of the Bluegrass appliance is the use of the roller. The smaller size of the appliance due to the roller allows it not to be seen from outside the mouth. An additional advantage is that the roller can act as a neuromuscular stimulant for the tongue, which can aid patients in speech therapy. The disadvantages are the eating and speech difficulties associated with initial placement of the appliance, which usually subside within 2 to 3 weeks, and the expense of treatment.

The aim of the present retrospective study was to determine the effectiveness of the Bluegrass appliance in ceasing the thumb-sucking habit. The length of treatment, patient tolerance, and success/failure of treatment with the Bluegrass appliance were evaluated by reviewing the patient's dental record.

## Methods

Complete records of 41 subjects who attended the University of Kentucky Pediatric Dental Clinic over a period of 7 years for the treatment of a thumb-sucking habit with the Bluegrass appliance were included in the study. Of the 41 subjects, 30 (73%) were included in the study. Of the remaining 11 subjects, 6 were still in active treatment and 5 had not presented for follow-up since the placement of the Bluegrass appliance. All 11 subjects were excluded from the study due to insufficient data. Data collected from the records included age, sex, past dental history, past medical history, history during treatment with the Bluegrass appliance, patient's and/or parental/legal guardian's report of cessation of the habit, and total completed treatment time. Treatment history with the Bluegrass appliance included whether or not the appliance was reinserted, caused discomfort due to improper placement or distortion, and/or became broken following insertion.

Patients were then scheduled for routine evaluations as appointments were available. Cessation of the habit was determined by the patient and/or parental/legal guardian confirmation as a notation in the patient's chart. The total treatment time was determined when the appliance was removed, as noted in the patients' chart.

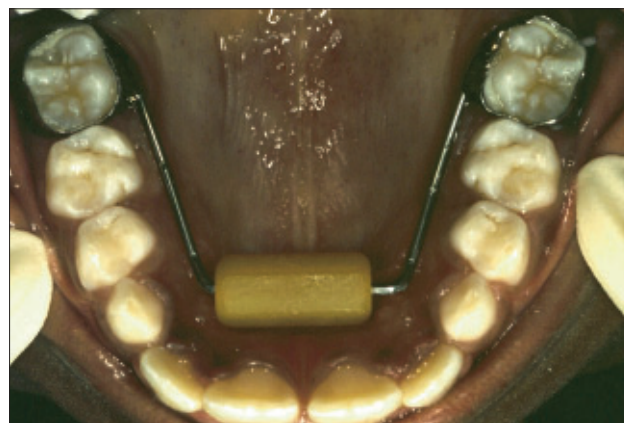


Figure 2. Placement of the Bluegrass appliance.

**Table 1. Length of Time for Habit Cessation**

| Time in weeks | No. | (%) |
|---------------|-----|-----|
| 0-4           | 11  | 37  |
| 5-8           | 6   | 20  |
| 9-12          | 2   | 7   |
| 13-24         | 5   | 17  |
| >24           | 4   | 13  |

Mean (weeks) 12.3±12.2; range (weeks) <1 to 44 The remaining 7% of patients had unsuccessful treatment.

**Table 2. Length of Time for Total Treatment**

| Time in weeks | No. | (%) |
|---------------|-----|-----|
| 0-24          | 13  | 43  |
| 25-36         | 10  | 33  |
| 37-48         | 2   | 7   |
| 49-72         | 2   | 7   |
| >73           | 1   | 3   |

Mean (weeks) 30.2±17.7; range (weeks) 8 to 96. The remaining 7% of patients had unsuccessful treatment.

**Table 3. Bluegrass Appliance Reinsertion**

| Reason for reinsertion               | No. | (%) |
|--------------------------------------|-----|-----|
| Refabricated                         | 2   | 7   |
| Improper placement and/or distortion | 4   | 13  |
| Total                                | 6   | 20  |

## Results

Of the 30 patients reviewed, 20 (67%) were female and 10 (33%) were male with a mean age of 9 years and 2 months±3 years. Ages ranged from 4 years, 10 months to 20 years, 11 months. None of the patients were medically compromised.

The average reported treatment time for the cessation of the habit was 12.3 weeks±12.2 weeks. Of the 10 patients, 11 (37%) did so in 4 weeks or less. In 6 (20%) patients, their habit ceased in 5 to 8 weeks. Two (7%) and 5 (17%) of the patients ceased their thumb-sucking habit in 9 to 12 weeks and 13 to 24 weeks, respectively. In 4 (13%) patients, it took longer than 24 weeks for their habit to cease (Table 1).

The mean total treatment time for the thumb-sucking habit with the Bluegrass appliance was 30.3 weeks±17.7 weeks. Thirteen (43%) of the patients completed treatment in 24 weeks or less. Ten (33%) patients completed treatment from 25 to 36 weeks. Two (7%) patients completed treatment in 37 to 48 weeks and in 49 to 72 weeks, respectively, and 1 (3%) patient completed treatment in 73 weeks or more (Table 2).

Of the 30 patients, 6 (20%) of the patients had to have the appliance reinserted during treatment. In 2 (7%) patients, the appliance broke after insertion and had to be refabricated. Four (13%) of the patients had to have the appliance reinserted because of improper placement and/or distortion after insertion. (Table 3).

In 28 (93%) of the patients, the treatment with the Bluegrass appliance was effective at stopping the thumb-sucking habit with none of the patients requiring retreatment with or reinsertion of the appliance once it was removed and treatment was completed.

## Discussion

It is the challenge of the dentist to decide whether or not to treat a child with a thumb-sucking habit. If the habit is chronic, the child is greater than 4 years of age, and the child requests aid in stopping the habit, the dentist

must make the decision whether or not to treat the patient with a dental appliance.<sup>8-11,23</sup> Reminder therapy and use of a reward system are acceptable treatments that should be attempted prior to placement of any dental appliance. These treatments are easier and less expensive for the patient.

If the child has failed at the aforementioned combined treatments, the dentist should consider placing an intraoral appliance. The Bluegrass appliance offers an advantage over the palatal crib due to its lack of bulk. The presence of the Teflon roller acts not only as a reminder, but also as a distraction to the patient. The child can be told to "turn the roller" instead of sucking his or her thumb. The distraction and the success of eliminating the habit give the Bluegrass appliance an advantage over other dental appliances.

The elimination of the habit in 28 patients confirms the findings of Haryett<sup>22</sup> and of Haskell and Mink<sup>23</sup> that dental appliances are an effective treatment for stopping thumb-sucking. However, the large percentage of patients requiring reinsertion of the appliance offers a significant disadvantage. This problem can be corrected numerous ways, and should be considered prior to fabrication and placement. The appliance should be fabricated with at least a 0.036 gauge wire. Prior to bonding, the dentist should evaluate the appliance for proper fit and adequate clearance from the palate and other oral structures. Once placed, the appliance should not interfere with occlusion, and after bonding the excess cement should be removed to prevent any gingival problems.

Of the 2 patients whose habit was treated unsuccessfully with the Bluegrass appliance, 1 patient did not show for his first follow-up until 24 months after initial placement of the appliance. The parent of the second subject reported that the child removed the appliance within the first month of placement. The patient then did not show up for his next visit until 9 months after the initial placement of the appliance. Treatment for both these patients was terminated due to noncompliant follow-up and was charted as unsuccessful.

The mean treatment time for habit cessation for the patient varied from days to months. The cessation of the habit was dependent upon the report by the patient and/or the parent/legal guardian of the patient at the time of

the first follow-up appointment. Since the total treatment time was dependent upon when the thumb-sucking stopped, the importance of patient follow-up should be stressed to the parent/legal guardian. It is recommended that the patient return for frequent follow-ups, with the initial follow-up being 1 to 2 weeks after placement to obtain accurate information regarding progress towards habit cessation.

The length of time for treatment with the Bluegrass appliance is generally accepted as 24 weeks.<sup>23</sup> In this study, the mean treatment time was 30.2±17.7 weeks, with 23 (76%) of the patients requiring 36 weeks or less for treatment of the thumb-sucking habit. This finding suggests that 36 weeks of treatment may be necessary for some patients. Again, the length of treatment is dependent upon when the patient stopped the habit. It is recommended that treatment last 4 months after the habit has been stopped.

Limitations of the study include the fact that the 30 patients of the study may not represent the total group of 41. The time period from initial placement of the appliance to data collection for the 5 patients who did not present for follow-up ranged from weeks to months. Unsuccessful attempts of contacting those patients requiring follow-up were made by phone and mail. Lack of data substantiating treatment excluded them from the study. The remaining 6 patients were still in active treatment.

Collection of data was dependent upon the subjective chart entries of other dentists and parental report. The motivation of the patient to cease the habit and parental positive reinforcement are both part of treatment, but were not noted in the chart. Therefore, the role of both cannot be evaluated by this study.

## Conclusions

1. The results of this study suggest that the Bluegrass appliance is an effective treatment option for the cessation of a thumb-sucking habit with limited treatment complications.
2. Depending on when the thumb-sucking habit stops, some patients may require up to 36 weeks of total treatment.

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