

A modified palatal crib appliance for children with predetermined thumb-sucking habit - Case report

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يهدف هذا التقرير إلى عرض تعديل لتصميم جهاز حنكي كايح لمص الاصبع. يتكون الجهاز من طوقين معدنيين على الرحى الأولى الدائمة مع امتداد هيكل معدني يغطي الجزء الأمامي من سقف الحنك. طبق الجهاز على طفل بعمر ٨ سنوات من المصريين والمستمرين لعادة مص الاصبع. دلت النتائج على فعالية الجهاز في وقف عادة مص الاصبع.

OBJECTIVE: The aim of this case report was to introduce a modified design of palatal crib habit breaking appliance that can be used for children with predetermined thumb-sucking habit. **APPLIANCE DESIGN AND TESTING:** The appliance is made of two bands on the upper first permanent molars and an extended metal framework to cover the anterior of the palatal roof. The appliance was applied for 4 months on an 8-year-old boy who persistently continued the habit of thumb-sucking. **CONCLUSION:** The appliance proved to be very effective for arresting thumb-sucking habit.

INTRODUCTION

Digit-sucking habit is a common oral habit seen in children and it is characterized by the placement of one or more digits to varying depths in the mouth. The prevalence of such habit in children in reports of different investigators varies from 1.7% to 47%.¹ However, the majority of investigators are in agreement that digit sucking habit is still the most common oral habit seen in children and the thumb is the mostly used digit.²⁻⁴ The adverse effect of digit-sucking habit can be seen in the child's dentition in the form of proclined and flared maxillary and/or mandibular incisors, development of anterior open bite, and Class II malocclusion.^{3,4} Other effects which can also arise from such habit are deviation in root morphology, swallowing pattern, speech defect and deformation of the child's digit.⁵

Wide ranging methods have been proposed in the literature for helping children to quit digit-sucking habit.⁶⁻⁹ The majority of these methods fall under the general heading of operant procedures, sensory attention procedures or habits awareness technique. The operant procedures include contingency reinforcement, habit reversal and reframing, while sensory attention methods are designed to interrupt the

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sensory feedback experience with digit-sucking habit either by appliance therapy or response prevention therapy such as the application of hot or bitter tasting substance on the digit. Awareness of the extent and consequences of digit sucking is another technique that was often used to help children to quit the habit and is covertly used by almost all treatment methods. Some of these methods showed more success rate than others in eliminating digit sucking habit in children. Appliance therapy which involves the use of orthodontic appliances to arrest the habit is commonly used in dental practice. Such appliances are either removable or fixed and it is often used in children when behavioral approach becomes unsuccessful. The idea of using appliances is to make the habit physically difficult to be continued and reminds the child to remove the digit from the mouth. Many appliances have been designed to accomplish habit cessation such as palatal crib, palatal arch, lingual spurs and Hawley retainer with or without spurs. Although a number of studies found the usual design of fixed palatal crib very effective in arresting the habit, there are nevertheless reports in the literature which indicated failure

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in using palatal crib appliance to stop the habit.¹⁰⁻¹² In addition, some children may derive enjoyment from the habit and become unwilling to participate in any covert or overt treatment methods, while others have an attitude of resisting any intervention by the dentist to stop such habit. Moreover, when removable or fixed appliances are applied in order to interrupt the sensory feedback of sucking habit, some children tend to overcome this either by removing the appliance or by adjusting their digit insertion into the oral cavity. These children often appear during clinical examination as super-active with strong mind and predetermined not to discontinue the habit even when the consequences of habit, if continued, are thoroughly explained. Before any attempts are carried out to stop the habit in children, it is important first to establish whether the habit is meaningful or not. In other words, is the habit maintained by some underlying psychological disturbance (meaningful) or not (non-meaningful).¹³ The age of the child, the duration, frequency of the habit, child cooperation and motivation are all important factors to be considered for the success of any intervention.^{14,15}

The aim of this case report was to introduce a modification in the usual design of palatal crib habit breaking appliance which was applied on a child who was predetermined not to discontinue the thumb-sucking habit and to present its treatment outcome.

APPLIANCE DESIGN

The appliance is made of two bands on the upper first permanent molars with a metal framework extended palatally up to the mesial surface of the second primary molar. This is to cover the anterior part of the palatal roof. The metal framework is made from 0.8 mm stainless steel wire and consists of finger cribs facing down at the anterior part of the appliance and an extension of the metal frame facing up

at its posterior part. The metal framework is soldered via an extended wire to the palatal surface of the molar bands, and reinforced inferiorly by the application of cold cure acrylic resin without covering the finger cribs. Holes are made in the acrylic plate using carbide round bur to allow cleaning of the appliance (Figs. 1 a, b, c). The appliance is to be cemented on the first permanent molars using glass-ionomer cement (Figs. 2 a, b).

Fig. 1 (a, b, c). Shows the appliance in different views.



Fig. 1 a, b & c



Fig. 1b



Fig. 1c

Fig. 2 (a, b). Shows the appliance cemented in place.



Fig. 2a



Fig. 2b

CASE REPORT

The appliance was used on an 8-year-old boy who had the non-meaningful habit of persistently continuous thumb-sucking. Habit awareness alone and in combination with long sleeve pajamas¹⁶ and fixed palatal crib appliance had been applied and failed to make him cease the thumb-sucking habit. With the previously applied methods, the child found a way to his thumb and continue to practice the habit. The present appliance was inserted for approximately 4 months and the child was regularly checked in the dental clinic. Oral hygiene instructions were reinforced and any comments from parents and child on the appliance during treatment were recorded and taken into consideration.

This new appliance successfully arrested the thumb-sucking habit. The

child admitted that it was very difficult for him from the first day the appliance was fitted to practice the habit and the posterior framework extension of the appliance was very effective in preventing him from being able to position the thumb against the palatal roof and restore the pleasure of sucking. The anterior extended metal crib of the appliance was also essential in controlling the forward tongue posture. Speech and pattern of swallowing were the most affected function during the first few days of wearing the appliance as reported by parents, after which the child was able to adapt to the appliance. During the treatment period, the child attended the clinic at least once every month. The child was able to discontinue the sucking habit and showed no relapse and return to the habit during the 6 months of post-treatment follow-up period (Fig.3).

Fig. 3. Six month post-treatment follow up.



Fig. 3

DISCUSSION

Several clinical treatments have been proposed in the literature for stopping digit-sucking habit in children.⁶⁻⁹ Two methods that belong to "reminder therapy" technique are often used on children to cease digit sucking habit. These are the response prevention and the appliance therapy. The former is usually applied by parents and involves the application of bitter taste solution, thumb guard, mitten, wearing socks and other methods.^{6,17,18} The latter involves the use of orthodontic appliance either fixed or removable of various designs in order to make the

habit rather unpleasant and difficult to be practiced by affected children and is applied by the dentist. Fixed palatal crib appliance in its usual design still is the most commonly used appliance on children practicing digit-sucking habit.¹⁹ This appliance proved to be effective in many cases especially with cooperative children who showed the willingness to stop the habit. The idea of using the fixed palatal crib appliance is to make it physically difficult for the uncooperative child to continue the habit and to remind him/her to remove the digit from the mouth. However, the ordinary fixed palatal crib fails in some cases to stop such habit in children especially those who are uncooperative and predetermined to continue practicing the thumb sucking habit. Often they are able to adjust the insertion of their thumb and bypass the palatal crib and rest the thumb behind the crib to restore the sensory feedback of sucking habit. The modification added to the palatal crib appliance here was able to overcome this problem by providing enough extension and coverage for the anterior of the palatal roof where children usually position the thumb. In addition, any attempt from the child to push the thumb more backward and bypass the extension of the appliance elicits an uncomfortable feeling and there may be the feeling of gagging reflex. Development of anterior open bite among children practicing thumb-sucking habit is very common. As a result, the affected children tend to develop tongue thrusting habit or have the habit of forward positioning of the tongue in order to create a mouth seal.⁴ This was addressed by the anterior crib to control the forward position of the tongue and allow self correction for the front teeth to take place. The application of cold cure acrylic resin on metal framework strengthened the appliance and provided a smooth surface to prevent any harm that might occur to the tongue. To overcome

the problem of food impaction beneath the appliance, oral hygiene was reinforced by the use of compressed water via water pick device or place syringe through the holes which were made in acrylic plate to clean the food that becomes trapped.

The appliance has proved to be effective for arresting thumb-sucking habit in two other children who showed resistance to cease such habit using some other conventional methods. It is evident that further application of the present appliance on a larger number of children to evaluate its rate of success in arresting digit-sucking habit is required.

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