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Invisalign Teen for thumb-sucking management. A case report

ABSTRACT

Background *Currently and with increasing frequency, treatments with Invisalign orthodontic devices are aimed also to adolescent patients: this evolution involves the management of some atypical characteristics, and among them also thumb-sucking.*
Case report *A 13-year-old adolescent girl with protracted thumb sucking and dentoalveolar open bite is presented. Infantile neuropsychiatric assessment was required before and after treatment. Small areas of the aligners were occlusally flipped like a bite ramp, in particular on the palatal surface of the upper incisors, in order to discourage thumb sucking. The selection of an invisible orthodontic device was shown to be interesting because it does not impact on the fragile and complex neuropsychiatric situations. Moreover, the active daily application of the device further motivates young patients. The vertical attachments were fundamental in repositioning the front teeth and to close the dentoalveolar open bite. Treatment was ended in eight months with no behavioural or neuropsychiatric consequences in the short period. Invisalign was shown to be a useful device for orthodontic correction even in the complex management of adolescent thumb sucking.*

Keywords *Aligner; Early treatment; Open bite; Oral bad habit; Thumb sucking.*

Introduction

Invisalign treatment is aimed also to adolescent patients (Invisalign Teen): this approach requires the adjustment to the exclusive and typical features of this age. For example the cooperation in applying the aligners, an important factor in the clinical management, is performed using wear indicators that show the time of their application [Tuncay, 2009]. The loss of the half-masks, the possible availability of virtual models of the personal dental arch, an updated device are all important features in adolescence. An uncommon clinical feature noticeable in an adolescent patient is thumb sucking. Winnicoth has described thumb sucking and pacifier as a transitional phenomenon, as a source of excitement and oral satisfaction in the first months of life and subsequently a substitute of the maternal image [Winnicott, 1960]. These phenomena play a major role at the time of lulling as a defence against anxiety and mainly to sustain the development of the abilities of the mental representation of the child with respect to the mother. Therefore, sucking can be considered psychoanalytically transitional and a physiological stage in the development of the child psyche [Modeer et al., 1982; Mahalsky,1983].

With the mouth and the fingers the newborn starts to discover the first leg of the path towards learning. Fingers are the most natural and immediate substitutes for the breast nipple. Probably, the child associated thumb sucking to pleasant stimuli connected with food intake and the illusion to have the mother close to him; he feels reassured, relaxed and sleeps peacefully [Tseng and Biagioli, 2009]. Therefore thumb-sucking is considered a physiological behaviour of first infancy (4 years of age), at times it lasts and from a habit it becomes a bad habit at the school age.

The persistence of this bad habit beyond a certain age (7 or 8 years) can be worth of a neuropsychiatric approach because it represents the manifestation of a lack of affection [Friman et al., 1989; Peterson et al., 1994]. In the western societies thumb sucking is common in infancy (50% of 2-year-olds) and it affects 15% of 8-year-old children and 8% of those of 11 years [Svedmyr, 1979; Larsson, 1985; Lindsten, 1996; Bishara et al., 2006].

There are complex reasons for the habit persistence beyond infancy, sometimes on the verge of pre-adolescence. The consequences of thumb sucking on the dental and maxillofacial development depend on the intensity, duration, environmental impact, primary malocclusions and possible development of secondary outcomes. With the age increase also the risk increases. However, it has been established that an intermittent habit, even if prolonged to six years, is not always the cause of malocclusions. Moreover, if they do develop they may end spontaneously when the bad habit is stopped. At the oral level, orthodontic (vertical, sagittal, transverse plane) and functional consequences (swallowing, breathing, chewing, phonation) stem from the bad habit of thumb sucking [Larsson, 1987; Caprioglio et al., 2000; Warren et al., 2005; Cozza et

al., 2007; Dimberg et al., 2010; Yemitan et al., 2010; Mistry et al., 2010].

The diagnosis is essentially based on the parents' clinical history. As for the infantile neuropsychiatric approach, a preliminary familial history about the main steps of the child psychomotor development is appropriate. The available psycho-diagnostic instruments can be the standardised questionnaires given to the parents as for example the Child Behaviour Checklist, the interviews with parents and individually with the child, the observations of play-time and of topic drawings. It is considered necessary to act to stop the vice of sucking if it is present beyond the age of 5 and is associated with malocclusion, particularly in children with Class II and growth tendency to open bite. Therapy should be individual, considering the patient's age and the aetiological factors [Cipes and Miraglia, 1988]. The reasons why the child is thumb sucking together with the consequences that could stem from the discontinuation of the bad habit should not be underestimated. The child enjoys thumb sucking and feels satisfied. To suddenly and forcefully deprive the child from the habit could cause emotional troubles, be the cause of bad personal habits, leading to other unnatural behaviour (enuresis, stammer). Therefore, it is very important to have a clear understanding, be tolerant, show affection and never threaten drastic measures or coercion. The problem should be dealt with caution with parents, avoiding dramatization while stressing its relevance. In obstinate cases, particularly when the bad habit is protracted over the age of eight, consultation with an infantile neurologist before and after the orthodontic treatment is suitable. As for therapy, since the habit of sucking in many cases is transient, the parents should be strongly advised to ignore this behaviour, avoiding punitive attitudes that could reinforce it. Behavioural procedures as positive reinforcement when sucking is interrupted is effective as is the suggestion of the American Dental Association to praise the child when is not thumb sucking rather than scold him when he does it [Delacruz and Geboy, 1983; ADA, 2007; Bate et al., 2011]. In case of a rather mature child, able to be aware of the consequences of his attitude, the sole ability of persuasion of the dentist can be adequate if he is influential enough. This ability is usually attributed to doctors (the doctor told me so!) so that sometimes the simple visit to the dentist can be successful as compared to the failure of the parents. In case of major psychopathological or life-events (mourning, disease of the parent or of the child himself) when sucking represents a temporary adaptive strategy, psychotherapy is suitable independently of the dentist decision. The elimination of the bad habit of thumb sucking is achieved with the application in the oral cavity of devices provided with screens that prevent the introduction of the finger (as the conventional fixed grids) or dissuaders, small spurs soldered to the device that allow the introduction of the thumb into the oral cavity while making sucking unpleasant [Johnson and Larsson, 1993; Giuntini et al., 2008]. Some studies have shown that the dissuaders are more rapid than the grids in attaining the goal [Levrini et al., 1999] and orofacial myofunctional therapy is useful [Smithpeter and Covell, 2010].

Case report

The case reported concerns an adolescent girl of 13 years, characterised by molar Class I and dentoalveolar open bite (Fig. 1), this being the primary problem, the main reason for which the parent whished an orthodontic treatment. The secondary problem was the cause of the open bite, that is the persistent thumb sucking. Because of the age and after an exhaustive familial case history, a simple neuropsychiatric evaluation, before and after the hypothesised interruption of the habit, was carried out. Pregnancy was described with normal course and delivery. There was no problem concerning breast feeding and weaning which occurred timely and was well accepted by the child. Nutrition was always suitable. The sleep-awakening rhythm was regular with no problems in getting to sleep or night awakenings. Psychomotor stages were acquired at the right time. Day and night sphincter control was regularly achieved. First separations occurred with no problem. The adolescent attended the school successfully with no evident problems of adjustment to it. The parents described the daughter as being always happy with no problems and reported that she always had been sucking her thumb and they tried several strategies to let her stop this bad habit. The adolescent explained that thumb sucking was a pleasure and referred that she gladly accepted the proposal to wear the device to stop that habit, in particular if it was invisible. She stressed that she was willing to cooperate because she considered it right to stop the bad habit. Initially she seemed uncomfortable, at times she avoided to look at the interviewer (the neuropsychiatrist) or to answer the questions concisely. Subsequently, she was more helpful. Gesticulation was poor and the girl was

FIG. 1 Initial intraoral photograph showing dentoalveolar open bite.

FIG. 2 Small parts of the aligners occlusally flipped in order to discourage thumb sucking.

moody. She had a fragile image of herself, she was shy and expected positive outcomes. Probable self-devaluation and sadness emerged. Anyway, resources of adaptation and positive evolution drives were present. Neuropsychiatric evaluation regarding the use of the oral device in order to stop thumb-sucking was positive, however the patient needs to be re-evaluated after the discontinuation of the bad habit, to make sure that no worsening effect had occurred. There was Class I molar occlusion with slight upper and lower dental crowding. There was secondary atypical deglutition voluntarily well controlled by the patient. Reeducation of atypical deglutition was not considered and myofunctional therapy to improve lip competence was performed. It was molar skeletal Class I with normal divergence. Invisalign Teen was then applied with some proper adjustments: small parts of upper incisors palatal surface were occlusally flipped (Fig. 2) in order to discourage thumb sucking. This method makes sucking less pleasant for the patient and inhibits the bad habit (Fig. 3). Orthodontic treatment was also associated with a cognitive behavioural therapy, particularly for parents. Vertical attachments were fundamental in repositioning the front teeth and to close the dentoalveolar open bite (Fig. 4, 5). One month after the aligners application, the patient stopped thumb sucking. During the meeting following the removal of the orthodontic device the adolescent gladly stated that she stopped sucking. On observation, the adolescent seemed available for the interview. Both the mother and the adolescent have stressed improved

FIG. 3 Thumb sucking is made less pleasant for the patient and thus the device inhibits the bad habit.

FIGG. 4, 5 Vertical attachments in the computer simulation and on the teeth

FIG. 6 Final intraoral photograph showing the closure of the dento alveolar open bite.

social relations and the familial dynamics. The treatment lasted 10 months with 16 upper and 11 lower aligners. There was excellent collaboration from the patient. At the end of treatment the open bite was correct and the adolescent was again glad to report that she had stopped thumb sucking (Fig. 6).

Discussion

Thumb sucking, frequent in the infantile population, is worth an opportune re-evaluation for the often associated neuropsychiatric correlations. The role of the dentist is to illustrate the problem to the parents advising them not to force the patient to stop sucking. Secondarily, after the evidence of concomitant malocclusions, he should determine whether an infantile neuropsychiatric consultation is advisable. Without overstepping the boundaries of

neuropsychiatry, for the paediatric dentist it may be useful the collection of a complete case history by administering a questionnaire to the parents and topic drawings to the child. Drawings represent a symbolic universe for children; free from aesthetical purposes, they express sensations and feelings through images.

If the dentist thinks that there is a neuropsychiatric damage, then a specialist should be consulted before the application of a device to remove the bad habit. In fact, the infantile neuropsychiatrist plays a major role in the understanding of the reasons that led the child to thumb sucking and pinpoint possible problems after the bad habit is stopped.

Beyond the eight years of age, in case of prolonged sucking, we prefer to consult an infantile neuropsychiatrist to manage the case with his competence. In particular, we ask the neuropsychiatric if the application of devices that limit or make thumb sucking less pleasant is feasible or rather leave to his care the patient to solve first the behavioural problem and secondarily perform the orthodontic procedure. If the psychiatrist gives us a green light, we apply the device that limits the sucking and after the bad habit has stopped we require a new neuropsychiatric assessment to be sure of the absence of neuroevolutive disorders.

In the case presented here we favoured Invisalign Teen. The choice of an invisible device as Invisalign Teen in an adolescent thumb-sucking patient is of particular interest for the following reasons:

- the use of an oral invisible device does not impact on the fragile and complex neuropsychiatric situation. The use of a conventional fixed orthodontic device (for example a grid) could further increase the basic problems of the bad habit, being frustrating and depressing with respect to peers;
- the device should be always applied and it is of the utmost importance when sucking must be dissuaded constantly while at the same time the teeth should be straightened. This constant active application of the device (removed and replaced after oral cleansing at least three times a day) further stimulated the patient and acted as a constant remainder;
- the frequent association in this case of open bite requires that the orthodontic device makes its closure easy, independently of the elimination of the cause, thus thumb sucking. Usually the dissuaders and the grids rule out only the cause, while Invisalign treatment rules out the cause and at the time the open bite is closed.

In this case, Invisalign Teen proved to be useful to solve the occlusal problem as well as to eliminate a bad habit.

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