

# An Oral Screen for Early Intervention in Lower-Lip-Sucking Habits

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**O**ral habits such as finger and lip sucking, nail biting, bruxism, and tongue thrusting may be part of normal child development, but may also be symptoms of deep-rooted neuroses or abnormal facial growth. In any case, these habits create undue pressure on the immature, highly malleable alveolar ridges, and can lead to malpositioning of teeth, aberrant breathing patterns, speech abnormalities, facial musculature imbalances, and psychological problems.<sup>1</sup> Early diagnosis and effective intervention are critical, before the detrimental effects fully manifest themselves.

There are two major types of lip habits. Wetting, licking, or biting may involve both lips, although the lower is more commonly affected.<sup>2</sup> Signs of this habit include irritated and chapped areas above and below the vermilion border.<sup>3,4</sup> Fortunately, lip wetting or biting does not usually contribute significantly to malocclusion.

Forceful wedging of the lower lip between the upper and lower teeth presents two clinical variants.<sup>5</sup> Lip sucking involves pulling the entire lip, including the vermilion, into the mouth. In the mentalis habit, the vermilion border of the

lower lip may be everted, with its lingual aspect elevated into the mouth, creating a sublingual contracture line between the lip and the chin and causing the skin around the chin to appear puckered.<sup>6</sup> Both of these sucking habits seem to occur more often in children with prominent upper incisors, often accentuating the outward flaring of those teeth.<sup>3,6,7</sup> Prominent upper incisors are more susceptible to trauma; in addition, the lip-sucking habit may adversely affect the patient's swallowing pattern and damage the malleable alveolar arches.<sup>8</sup> Occasionally, lower-lip sucking may be severe enough to cause lingual tipping of the lower incisors.<sup>9</sup>

Intraoral appliances can be used to keep the lips from wedging between the teeth, thus helping to correct both the malocclusion and the swallowing pattern.<sup>5</sup> An alternative approach is to assume that the lip habit is caused by excessive overjet, and that when the overjet is reduced orthodontically, the habit may disappear.<sup>5</sup>

The following case of forceful lower-lip sucking, leading to a significant lower alveolar collapse, was treated effectively with a simple myofunctional appliance—the oral screen.

## Appliance Design

The oral screen holds the buccal and labial muscles away from the teeth and investing tissues, thus eliminating any restrictive influences from that tissue. This approach differs from the conventional “push-out-from-within” action of other removable appliances, which expand without relieving external muscle forces and force the new dentoalveolar morphology to adapt. The oral screen, like the Fränkel appliance and bionator, acts as an artificial “ought-to-be” matrix that allows the muscles to exercise and adapt. Relieving the dentition from constant neuromuscular constriction of the buccinator-orbicularis oris mechanism facilitated the significant lower



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anterior expansion shown below.

## Case Report

A 4-year-old female child was referred to the unit of Pedodontics and Preventive Dentistry with the chief complaint of protrusive upper anterior teeth and crowding in the lower anterior region. She had a history of abnormal speech.

Clinical examination revealed a lower-lip-sucking habit, a non-functional upper lip, and a hyperactive lower lip (Fig. 1). The patient also exhibited a tongue-to-lower-lip seal during swallowing. The lower anterior alveolus had collapsed lingually, the lower anterior region was crowded, and the child had a distal-step malocclusion, with protrusion of and spacing between the upper anterior teeth. Cast analysis showed an overjet of 10mm, spacing of 6.75mm in the upper

anterior region and 1.75mm in the lower incisor region, and an overlap of 3.5mm between the lower lateral incisors and canines.

The lower-lip-sucking habit was diagnosed as a deleterious, compulsive, functional, muscular pressure habit, either primary or secondary to the increased overjet, that had resulted in the collapse of the lower anterior alveolus.<sup>8</sup> After the patient was determined not to be a mouth-breather, a custom-made acrylic oral screen with a holding loop was prescribed.

Upper and lower casts were poured from type IV dental stone, with special attention to accurate reproduction of the depths of the vestibular sulcus and labial fold, and articulated. A holding ring was bent from .032" round stainless steel wire. Because the screen was intended to retrocline the upper incisors and upright the lower alveolus, the lower anterior region was



**Fig. 1** 4-year old patient with lower-lip-sucking habit, lingually collapsed lower alveolus, upper anterior spacing, lower anterior crowding, severe overjet, and distal-step malocclusion.

blocked out with plaster, so that the screen would contact only the upper anterior teeth. This would ensure adequate space for labial movement of the lower anterior alveolus, but would avoid interference with habitual occlusion when the screen was in the mouth. The oral screen was outlined on the casts and fabricated from clear, unfilled, self-curing acrylic resin, then finished and polished (Fig. 2).

The patient was instructed to wear the appliance full-time, removing it only for eating and brushing. Exercises were prescribed to improve lip competence by pulling on the hold-

ing ring and closing the lips against the pressure.

The lip-sucking habit was remarkably reduced after 15 days, and completely eliminated after three months of appliance wear. Some up-righting of the lower anterior alveolus could be seen at this point. After another three months of retention with the same appliance, the lower anterior alveolus and teeth had uprighted significantly, and the lower anterior teeth were contacting the palate in occlusion (Fig. 3). The upper incisors had been slightly retroclined. The overjet was reduced to 3.5mm, the upper anterior spacing to 4.5mm, the lower incisor spacing to



Fig. 2 Oral screen with holding ring.



Fig. 3 Improvement after six months of wearing oral screen.



Fig. 4 Patient three years after treatment, with no recurrence of lip-sucking habit and permanent teeth erupting in equilibrium.

.75mm, and the overlap between the lower lateral incisors and canines to 1.5mm. Concomitantly, the midline diastema was reduced, the swallowing pattern seemed to have become more normal, and the soft-tissue profile was improved by a forward positioning of the lower lip.

There has been no recurrence of the lip-sucking habit, and the lower alveolus and dentition have remained stable during three years of follow-up observation (Fig. 4).

### Discussion

The frequency, intensity, and duration of lower-lip sucking were so extreme in this case that the lower incisors were pushed lingually along with the alveolus. A lip bumper or other orthodontic mechanotherapy was not considered effective enough to prevent the patient's forceful wedging of the lip between the teeth. An oral screen forces the child to compress the lips, circumventing the habitual swallow and its accompanying acrobatic lip and tongue movements.<sup>9</sup> Thus, it not only helps break the lip-sucking habit, but also protects the lower incisors from the excessive pressure of the mentalis muscle and enhances the pressure of the tongue against the lower anterior teeth in swallowing.<sup>9</sup> Improving the balance of forces allows the complex of bone around each tooth to be molded into a more natural contour, ensuring that the teeth will stabilize in their new positions when the swallowing pattern is normalized. The acrylic Denholtz splint also utilizes the forces of the natural muscular matrix rather than biomechanical forces,<sup>9</sup> but it achieves its incisor correction too slowly to have been useful in the present case.

Oral-screen therapy was initiated only after confirming that the patient was a natural nasal breather. Because the appliance was not designed to change the mode of breathing, it produced no undesirable side effects such as congestion of the nasal mucosa.<sup>10</sup>

### Conclusion

Lower-lip sucking, although it may appear innocuous at the outset, can have severely deleterious effects. The oral screen is a safe and simple myofunctional appliance that can be effectively used to intercept such lip habits in a young child, before the habit has become deeply ingrained.<sup>1</sup>

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