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Lower Lip Sucking Habit Treated with a Lip Bumper Appliance

Derya Germeç;^a Tülin Uğur Taner^b

ABSTRACT

The patient was an 11-year-old girl with a lower lip sucking habit with increased overjet, maxillary generalized spacing, and mandibular incisor irregularity. Hyperactivity of the mentalis muscle and deepening of the labiomental sulcus because of the abnormal sucking habit was observed. Orthodontic treatment was started with a lip bumper appliance to break the lower lip sucking habit and continued with fixed orthodontic mechanotherapy. The lip bumper appliance therapy resulted in the elimination of the lower lip sucking habit, musculus mentalis hyperactivity, and labiomental strain in addition to a gain in arch length, improvement of the lower incisor inclinations, and overjet reduction.

KEY WORDS: Lip sucking, Habit, Mentalis hyperactivity, Lip bumper.

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The position and stability of the dentition are influenced by the equilibrium between their surrounding muscular forces.^{1,2} Extraoral forces exerted by the orbicularis oris and buccinator muscles are balanced by the opposing forces of the tongue.³ Any prolonged change in this balanced muscle function caused by parafunctions, such as lip sucking, lip biting, tongue thrusting, can alter the equilibrium, initiate morphologic change in the normal configuration of the teeth and supporting bone, and result in a malocclusion.^{4,5}



The manifestation of an acquired malocclusion varies according to the type, localization, severity, frequency, and longevity of the habit, but elimination of the abnormal habit is fundamental for treatment and future stability. In cases with a lip sucking habit, the lip bumper appliance is a good treatment alternative for breaking the habit and correcting the resultant malocclusion.⁴ Treatment effects of the mandibular lip bumper appliance, such as arch length gains, control of molar rotation, and anchorage, are well discussed in several studies.^{6–11} However, its use in correcting the lower lip sucking habit has not been demonstrated previously.

The purpose of this case report was to present the treatment for a patient having a lower lip sucking habit with a mandibular lip bumper appliance.

CASE REPORT [Return to TOC](#)


Diagnosis and etiology

An 11-year-old girl with a skeletal Class I malocclusion and large overjet reported a chief complaint of a lower lip sucking habit. Her medical history showed no contraindication to orthodontic therapy. Facial photographs showed an orthognathic profile with mentalis muscle hyperactivity and a deep labiomental sulcus caused by her abnormal habit ([Figure 1a through c](#) 


Her intraoral examination revealed a Class I molar relationship with an overjet of 10 mm. The maxillary anterior teeth were protruded with diastemata between them. The mandibular anterior teeth were lingually collapsed. Symmetrical upper and lower midlines were noted ([Figures 2a through e](#)  and [3a through e](#) 

Radiological examination

The hand-wrist radiograph evaluation revealed that the patient was at the onset of puberty. Carious lesion of the right lower first molar and all the third molars were observed on the panoramic radiograph. The treatment of the carious lesion was advised to the patient.

Cephalometric measurements showed average maxillary and mandibular positions with a maxillary depth angle of 89° and facial depth angle of 90° . A lower facial height angle of 44° and a facial axis angle of 89° indicated a mesofacial growth pattern. The maxillary incisor teeth were inclined labially (A1-Po angle = 26° and A1-Po distance = 6 mm) and the mandibular incisor teeth were inclined lingually (B1-Po angle = 11° and B1-Po distance = -3 mm). The distance from the right and left lower molars to the PTV line was 32 and 30 mm and their angulation with the corpus axis was 96.5° and 96° , respectively. The lower lip and upper lip to esthetic plane distances were -4 and -2.5 mm, respectively ([Figure 4a through c](#) 


Cast evaluation

The maxillary model analysis showed an intercanine width of 33.5 mm, an intermolar width of 49.7 mm, and an arch depth of 31.6 mm. Mandibular intercanine width, intermolar width, and arch depth were 26.7, 40.1, and 20.5 mm, respectively ([Table 1](#) ). The amount of maxillary diastemata was seven mm. Three millimeter of crowding was measured in the mandibular model analysis. A Bolton analysis revealed a 1.9 mm discrepancy in the mandibular dental arch.

Treatment plan


Treatment objectives included the elimination of lower lip sucking habit and reduction of the increased overjet to improve function and facial esthetics. For these purposes, we planned to start phase I orthodontic treatment with a lip bumper appliance. After the elimination of lower lip sucking habit, phase II fixed orthodontic therapy was indicated to align and level the dental arches.



Treatment progress


Phase I. After banding of both lower first molars, a prefabricated lip bumper appliance was placed at the level of the gingiva two to three mm in front of the lower incisors and four to five mm away from the buccal segments ([Figure 5](#) ). The appliance was fixed to the molar tubes to eliminate any risk of patient compliance and was removed for hygienic considerations weekly. The lip bumper appliance was adjusted in successive appointments to reactivate it to its original position. After three months, the lower lip sucking habit was completely eliminated.

Phase II. At the beginning of phase II, the lip bumper was used for an additional one month to intensify its effects. The patient's orthodontic therapy continued with fixed orthodontic appliances to align and level the arches, close the diastemata and eliminate the overbite. Upper and lower 0.016-inch NiTi archwires were used for aligning the dental arches. Leveling was done with 0.016 × 0.022-inch NiTi and stainless steel archwires applied sequentially. At the final stage, 0.016-inch stainless steel archwires were used to close minimal diastemata in the upper arch by second-order bends. The duration of phase II treatment with fixed appliances was nine months. For retention, upper and lower Hawley retainers were worn.

Treatment results

Evaluation of phase I. At the end of phase I orthodontic therapy, lower lip sucking habit, musculus mentalis hyperactivity, and labiomental strain were eliminated ([Figure 6a,b](#) 

The lower incisors had moved labially, and the lower arch crowding and the collapse at the lower anterior area were spontaneously resolved with the overjet reduced. The lower canines moved forward to a Class I relationship and spaces were opened between the lower canines and first premolars. The upper incisor teeth had moved palatally and the diastemata were reduced ([Figures 7a through e](#)  and [8a through e](#) 

Superimposition of pretreatment and post-phase I cephalometric lateral radiographs revealed no significant changes in the skeletal measurements, whereas some dental changes were detected ([Figure 9](#) ). The upper incisor teeth were slightly uprighted and erupted,

and the lower incisor teeth were significantly labially inclined (4.5 mm). The right and left lower first molars were slightly uprighted (2° and 3°, respectively) and both were moved distally (one mm). Overbite was maintained, and the overjet was decreased to four mm. The patient exhibited a -2 mm lower lip-esthetic plane distance with an increase in the labiomental angle and protrusion of the lower lip.

Dental model evaluation revealed that maxillary intercanine width increased slightly to 33.7 mm. The intermolar width and arch depth decreased to 48.1 and 30 mm, respectively. In the mandible, the intercanine width decreased to 25.6 mm and the intermolar width was maintained, whereas arch depth was increased to 25.4 mm ([Table 1](#)). The superimposition of the pretreatment and post-phase I mandibular dental model tracings on the arch depth showed one mm of right and left lower first molar distalization.

Evaluation of phase II. At the end of fixed appliance therapy, a nice improvement in facial esthetics and good facial balance was achieved ([Figure 10a,b](#)). A functional Class I occlusion with ideal overjet (three mm) and overbite (one mm) was established. Lower dental arch crowding was eliminated ([Figures 11a through e](#) and [12a through e](#)).

The panoramic radiograph at the end of phase II treatment is shown in [Figure 13a](#). Superimposition of post-phase I and post-phase II lateral cephalometric radiographs revealed that the upper incisor teeth were further uprighted and the lower incisor teeth were further labially inclined ([Figure 13b](#)).

Dental model evaluation revealed that the maxillary intercanine width had increased to 34.4 mm, the intermolar width was maintained, and the arch depth was decreased to 28.1 mm. Mandibular intercanine and intermolar widths were increased to 26.5 and 40.8 mm, respectively. Mandibular arch depth was decreased to 24.3 mm ([Table 1](#)).

DISCUSSION [Return to TOC](#)

The lip bumper is a simple functional appliance and usually well tolerated by the patient. In orthodontics, lip bumpers have been used to gain arch length for the alignment of mild to moderately crowded dental arches,^{8,12-15} to correct molar rotations,⁷ to control anchorage loss,⁶ to improve labialis muscle activity,^{7,16} and to eliminate lower lip biting habit.¹⁶

In the case in this study, a lip bumper appliance was used to eliminate the lower lip sucking habit and improve labialis and mentalis muscle activity. The sucking habit was prevented by the labial shield of the appliance. After treatment, the lower lip position was improved.

The lower incisors inclined labially and the overjet was corrected because of the elimination of the lower labialis and mentalis muscle forces in response to unopposed pressure from the tongue. Mandibular first molars were slightly uprighted because of transmitted labial forces at the molar tubes by the appliance. Similar dental changes after lip bumper therapy have been reported in other studies.^{4,8-10,16}

After lip bumper therapy, mandibular intercanine width was slightly decreased (1.1 mm), intermolar width maintained, and arch depth increased by 4.9 mm. This decrease in lower intercanine width may have been because of the anterior movement of lower canines to a narrower part in the mandibular arch. The increase of arch depth may be explained by the proclination of the lower incisor teeth and moderate uprighting of the lower first molars in accordance with the findings of O'Donnell et al¹¹ and Grossen and Ingervall.¹⁷ After fixed appliance therapy, the anteroposterior and transverse dimensions of dental arches did not change.

In the case in this study, lip bumper therapy led to desirable results within four months. Treatment time with the mandibular lip bumper appliance was reported to range between six to 33 months in previous studies.^{4,8-11,18,19} The relatively shorter period of treatment time in the case in this study might be because of the use of a ligated appliance, which eliminated the patient compliance problems.

CONCLUSIONS [Return to TOC](#)

A lip bumper appliance was very beneficial in eliminating the lower lip sucking habit, correcting the malposed occlusal and functional relationships because of this abnormal habit, and restoring the facial esthetics.

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TABLES [Return to TOC](#)

TABLE 1. Dental Model Measurements at Pretreatment, at the End of Phase I and Phase II Treatments

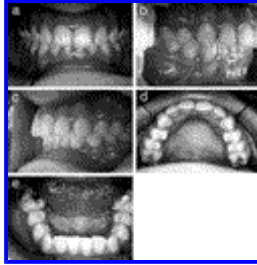
Measurement (mm)	Pretreat- ment	At the End of Phase I	At the End of Phase II
Maxillary intercanine width	33.5	33.7	34.4
Mandibular intercanine width	26.7	25.6	26.5
Maxillary intermolar width	49.7	48.1	48.1
Mandibular intermolar width	40.1	39.8	40.8
Maxillary arch depth	31.6	30.0	28.1
Mandibular arch depth	20.5	25.4	24.3

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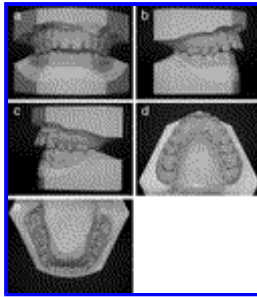
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FIGURE 1. (a) Pretreatment extraoral facial photograph. (b) Pretreatment extraoral lateral photograph. (c) Pretreatment extraoral lateral photograph with lower lip sucking habit



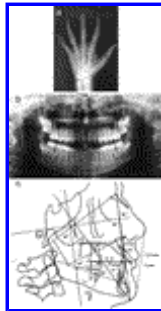
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FIGURE 2. (a–e) Pretreatment intraoral photographs



[Click on thumbnail for full-sized image.](#)

FIGURE 3. (a–e) Pretreatment study models



[Click on thumbnail for full-sized image.](#)

FIGURE 4. (a) Pretreatment hand-wrist radiograph. (b) Pretreatment panoramic radiograph. (c) Pretreatment lateral cephalometric tracing and measurements



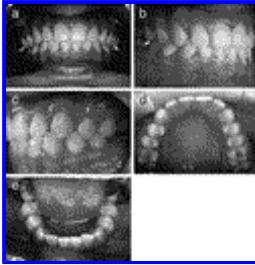
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FIGURE 5. Lip bumper appliance in mouth



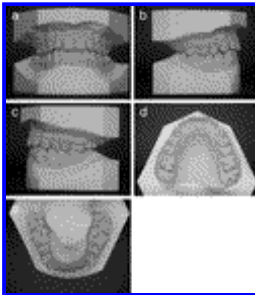
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FIGURE 6. (a) Extraoral facial photograph at the end of phase I. (b) Extraoral lateral photograph at the end of phase I



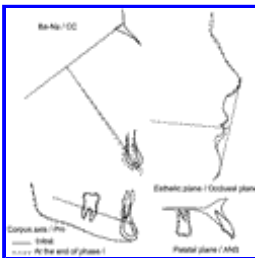
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FIGURE 7. (a–e) Intraoral photograph at the end of phase I



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FIGURE 8. (a–e) Study models at the end of phase I



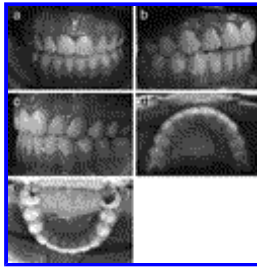
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FIGURE 9. Superimposition of pretreatment and post-phase I cephalometric tracings



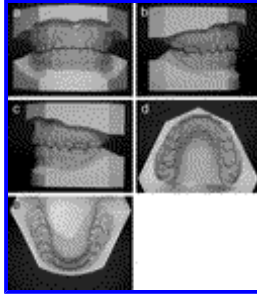
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FIGURE 10. (a) Extraoral facial photograph at the end of phase II. (b) Extraoral lateral photograph at the end of phase II



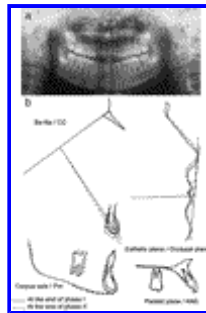
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FIGURE 11. (a–e) Intraoral photographs at the end of phase II.



Click on thumbnail for full-sized image.

FIGURE 12. (a–e) Study models at the end of phase II



Click on thumbnail for full-sized image.

FIGURE 13. (a) Panoramic radiograph at the end of phase II. (b) Superimposition of post-phase I and post-phase II cephalometric tracings

^aResearch Assistant, Department of Orthodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

^bAssociate Professor, Department of Orthodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Corresponding author: Derya Germeç, DDS, Department of Orthodontics, Faculty of Dentistry, Hacettepe University, Sıhhiye, Ankara 06100, Turkey (E-mail: dgermec@hotmail.com)