DENTUM 2008;8(3):108-111

Effects of labial stimulators on the level of labial incompetence and length of the upper lip

José Durán[1]
Josep M. Ustrell[2]
Alberto Carrasco[3]
Pablo Echarri[3]
Miguel Merino Arends[4]

[1]Professor of Orthodontics, University of Barcelona
[2]Professor, University of Barcelona
[3]Orthodontist
[4]Graduate Dentist, Central University of Venezuela, Masters in Orthodontics, Autonomous University of Barcelona

Correspondence:
José Duran von Arx
Mao, 19 bajos
08022 Barcelona

Abstract

Functional re-education is a mainstay of the "MFS" treatment philosophy. Lip function control improves labial incompetence and therefore atypical swallowing. The "MFS" labial stimulator is studied in this work, finding improvement in labial incompetence and the length of the upper lip.

Keywords: "MFS" labial stimulator. Labial incompetence. Length of upper lip. Functional re-education.

Summary

Functional re-education is a mainstay of the "MFS" treatment philosophy. Lip function control improves labial incompetence and therefore atypical swallowing. The "MFS" labial stimulator is studied in this task, finding an improvement in labial incompetence and the length of the upper lip.

Key words: "MFS" labial stimulator. Labial incompetence. Length of upper lip. Functional re-education.

Introduction

Post-treatment stability is of great importance in the field of orthodontics.[1,2] Proper functional control, specifically labial incompetence and atypical swallowing, is a fundamental pillar in achieving stability.[3-5]

Stimulation of the lips involves two different effects on a muscular level: The increase in orbicular muscle tone, on one hand, and action on tongue posture, placing it further back or posterior in the oral cavity.

Labial incompetence and short upper lip in mouth-breathing patients.[6,7]

Patients who are in the habit of breathing through the mouth have labial incompetence due to the passage of air through the mouth during respiration as a result of a blockage on the upper respiratory tract level. Labial incompetence is one of the most characteristic clinical signs in this group of patients.

Lack of contact between the lips creates inhibition of the vertical development of the upper lip, shortening it over time. A short upper lip promotes the onset of a gingival smile and its morphology is altered, adopting a slight raise in the philtrum of the lip, resulting in an "m"-shaped position.

Current treatments for controlling labial incompetence

There are different types of elements in the designs of functional devices for achieving labial incompetence control in mouth breathers. However, their efficacy is limited. In myofunctional re-education[8,9], various exercises are repeatedly used by the patient at home. These achieve sealing of the lips by stretching. In order to achieve this, different physical elements (cardboard cards, gaming chips, buttons, cords) are used by the patient to perform prehensile exercises.

Current treatments to lengthen the upper lip

Prehensile exercises, used to improve labial incompetence, promote lengthening of the upper lip. Regardless, vertical development of the upper lip is not an easy task as it is initially associated with the presence of labial incompetence, in addition to the presence of mouth breathing. Therefore, the protocol followed in MFS for elongating the upper lip goes through an initial phase of suppressing mouth breathing, before introducing the stimuli needed to generate automatic stimuli that will encourage the patient to perform lip exercises while the MFS stimuli are present.

Procedures used in the MFS philosophy to correct labial incompetence and elongate the upper lip.[9,10]

"MFS" uses "stimulating buttons" made with removable devices in order to "cross" the upper and lower lips over each other. During this exercise, the lips come into contact and, most importantly, the upper lip is stretched in order to pass over the "stimulating buttons".

MFS then used vestibular arches as removable devices with the anterior sector elevated to the vestibular fundus. This served to apply linear stimuli in the mouth, which cause the lips to overlap and stretch vertically in such a way that results in contact between them.

The lip exercises (closing them), generated by stimuli introduced by the MFS philosophy, provide an immediate effect on the position of the tongue. When the patient stretches the lips in a position that slightly opens the mouth, the lingual musculature moves the tongue to a more backwards position. This is an effect associated with the muscular law that governs the activity of agonist and antagonist muscles.

"MFS" labial stimulator.

This is a prefabricated horizontal "eight"-shaped element (Figure 1) that contains flanges at the level of the superior and inferior edges that are lodged in the vestibular fundus of the mouth. These flanges have sinuous shapes to avoid contact with the upper and lower labial frenum. The patient uses them on a daily basis whilst asleep. Different sizes of labial stimulators have been developed (Figure 2) in different forms (Figure 3).

The "labial stimulator" acts in the mouth on the orbicular muscles by the upper and lower sinuous flanges that encourage the lips to overlap. This "overlapping" of the lips over the thin flanges of the device cause the lips to enlarge and more closer to each other. Continuous exercise of the lips produces "automatic stimulation" through the permanent action of the "labial stimulator" the entire time the patient has the device in the mouth.

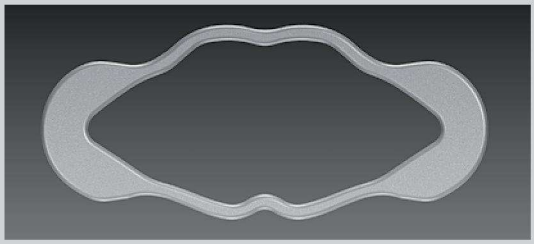

Figure 1.
Labial stimulator.

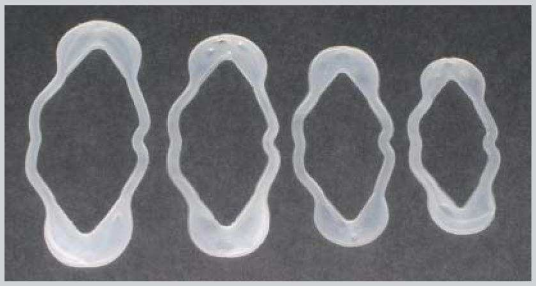

Figure 2.
Different sizes of labial stimulators

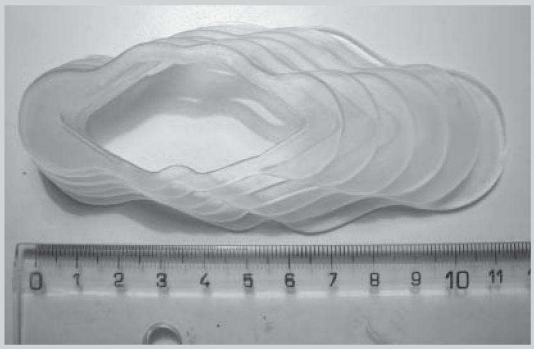

Figure 3.
Different forms of labial stimulators

Working hypothesis

Automating the lip exercises through the repetitive use of the "labial stimulator" should provide morphological changes in the lips that should be evaluated clinically.

Therefore, we propose that there is a possibility to change the shape and length of the lips with the use of the "nasal stimulator".

Aims of this study

The aims of this study are the following:

- To determine the teleradiographic changes in the length of the upper lip, after having used the "labial stimulator" on a daily basis, including during the at night, for six months.
- To determine the changes seen on lateral teleradiography on labial incompetence after having used a "labial stimulator" for six months.

Materials and methods

The working protocol that has been followed is:

We selected a sample of forty (40) patients who met the following criteria:

– Age between six (6) and nine (9) years of age..
– Labial incompetence greater than three (3) millimeters.
- No severe malocclusion:
  - Class I molar and canine.
  - No marked crowding of the incisors as this can maintain labial incompetence as this can maintain labial incompetence.
  - Not have a tooth size discrepancy greater than three (3) millimetres.
- No agenesis or supernumerary teeth. - No otorhinolaryngological problems that could be the cause of mouth breathing.

Each underwent lateral teleradiology of the cranium with the lips in a relaxed position. The following parameters were measured:

- Length of the upper lip as measured by the Ricketts cephalogram, distance (in millimeters) from the anterior nasal spine to the inferior limit of the upper lip.
- Level of labial incompetence, measuring the shortest distance between the lower part of the upper lip and the upper part of the lower lip.

We selected the proper size for the "labial stimulator" for each patient and informed them to use it on a daily basis and at night.

After six months using the "labial stimulator", another teleradiograph was carried out, using the same parameters as the first.

The results were compared and statistical analysis was carried out.

Results

Of the forty patients who started the study, four (4) were excluded due to lack of cooperation in the use of the apparatus or because they stopped using it. The following results were obtained (Table 1):

In order to contrast the hypothesis, a level of significance of a=0.05 was used.

There was an association between the initial and final lengths (r=0.683; p>0.0005), while no association was found between the initial and final values for the incompetence variable (r=-0.193) (Tables 1-5).

We compared the means using Student's t test for paired data, and noted significant differences between the before and after, in two variables, with very small error probabilities.

The 95% confidence interval of the mean differences was calculated for both variables (Tables 6-10).

We can confirm that the labial stimulators achieved an increase in the values for length of the upper lip (p<0.0001) and this change (mean of 1.014 millimetres) was between 0.77 and 1.26 millimetres, with a 95% level of confidence. In addition, we can confirm that there was a decrease in labial incompetence (mean: 3.652 millimetres) (p<0.0001) and the 0.95% confidence interval for this decrease is 3.34-3.97.

Discussion

Measuring the resting position of the lips has been a difficult point to execute when carrying out teleradiograph recordings. The correct positioning of the patient's head in the cephalostat tends to make this difficult. When carrying out a radiographic recording for each patient, the intention was to achieve a relaxed position of the lips by instructing the patient to close their eyes and inhale deeply three times before slowly letting the air out. Once these breaths were taken, the patient was asked to abstain from swallowing abstains from swallowing

Table 1. Descriptive statistics

	N	Minimum	Maximum	Mean	Stand. dev.
Age	36	6	9	7.64	0.867
Initial length	36	20.5	24.0	22.806	0.9508
Final length	36	20.5	25.0	23.819	0.8464
Initial incompetence	36	3.5	5.5	4.292	0.6138
Final incompetence	36	0.0	2.5	0.639	0.5929

Table 2. Contingency initial incompetence *final incompetence

		Final incompetence						
		0.0	0.5	1.0	1.5	2.0	2.5	Total
Initial incompetence	3.5	1	2	4			1	Initial incompetence
	4.0	6		2	1	1		
	4.5	1	7	1	1			
	5.0	2	2	1				
	5.5		2	1				
Total		10	1	9	2	1	1	

Table 3. Initial contingency length *Final length

		Final length							
		20.5	22.5	23.0	23.5	24.0	24.5	25.0	Total
Initial length	20.5	1		1					2
	21.0		1		1				2
	22.0				2	1			3
	22.5			1	3	3	2		9
	23.0			2	2		2		6
	23.5				1	3	5		9
	24.0				1	1		3	5
Total		1	1	4	10	8	9	3	36

Even so, we could not ensure that the lips were in a truly rested position. Therefore, this is a methodological aspect that needs to be resolved for future studies of labial incompetence and the relaxed position of the lips.

In light of the results obtained, confirming the difference between the values for improvement of labial incompetence (mean of 3.652 millimeters) versus those of elongation of the upper lip (mean of 1.014 millimeters) would be of interest. This leads us to believe that the difference between the two values (2.638 millimeters) must be attributed to "postural" changes of the lips, changes in the length of the lower lip or changes related to other nearby structures.

Conclusions

In light of the statistical data obtained, we can confirm the following conclusions:

- After having used the "labial stimulator" on a daily basis, and during the night, for six months, teleradiography confirms that there is a mean increase in the length of the upper lip of 1.014 mm.
- After having used the "labial stimulator" for six months, teleradiography reveals a mean closure of the labial incompetence of 3.652 mm.

References

1. Duran J. Preparation of clinical results of individualized MFS (multifunction system) positioners. *Ortodoncia clínica* 2002;5(4):136-44.
2. Ustrell JM, Camps D, Durán J. Postorthodontic retention with a rigid resin splint. *Bull Group Int Rech Sci Stomatol Odontol* 1993;36(3-4):127-32.
3. Durán J. Multifunction System "MFS". Form and function: Current information on the issue. *Ortodoncia clínica* 2003;6(2):79-88.
4. Padros E. How to quantify functions and posture in orthodontic consultation. *Ortodoncia clínica* 2004;7(4):174 204.
5. Echarri P, Perez JJ. Medical history, clinical examination and study of models. In Echarri P. *Diagnosis in orthodontics: multidisciplinary study* Barcelona: Ed. Nexus 2002;57-102.
6. Duran J. "MFS" technique: Diagnosis of the functional matrix: coding. Ortodoncia clínica.
7. Durán J. Multifunction System "MFS". The 8 keys to the functional matrix. *Ortodoncia clínica.* 2003;6(1):10-3.
8. Duran J. "MFS" biomechanics in the treatment of non-skeletal open bites. *Ortodoncia clínica.* 2004;7(1):36 43.
9. Duran J. "MFS" biomechanics in the treatment of skeletal open bites. *Ortodoncia clínica.* 2004;7(2):62-73.
10. Duran J. Treatment of Class-I malocclusions: moderate crowding, overbite and open bite. In: Duran J. *Fixed "MFS" mechanics. Clinical atlas.* First edition. Barcelona: Ed. Nexus 2004;53-88.
11. Duran J. Questions and answers on the "MFS" philosophy. In: Duran J. *Fixed "MFS" mechanics. Clinical atlas.* First edition. Barcelona: Ed. Nexus 2004;11-30.

	N	r	Sig.
Initial length y final length	36	0.683	0.0005
Initial incompetence y final incompetence	36	-0.193	0.259

Table 4. Relationships

	Frequency	Percentage
-2.50	2	5.6
-2.00	3	8.3
-1.50	8	22.2
-1.00	11	30.6
-0.50	6	16.7
0.00	5	13.9
0.50	1	2.8
Total	36	100.0

Table 5. Initial length - final length

Initial length - final length				
Mean	Standard deviation.	t	g.l.	Sig.
-1.014	0.722	-8.43	35	P<0.0001

Table 6. Comparison of means

Initial length - final length			
		95% confidence interval of the difference	
Mean	Standard deviation	Lower limit	Upper limit
- 1.014	0.722	- 1.258	- 0.770

Table 7. Estimation of the difference in length

	Frequency	Percentage
1.0	1	2.8
2.0	1	2.8
2.5	5	13.9
3.0	5	13.9
3.5	2	5.6
4.0	14	38.9
4.5	4	11.1
5.0	4	11.1
Total	36	100.0

Table 8. Initial incompetence - final incompetence

Initial incompetence - final incompetence			
Mean	Standard deviation	t	g.l. Sig.
-1.014	0.722	-8,,43	35 p<0.001

Table 9. Comparison of incompetence means

Initial incompetence - final incompetence			
		95% Confidence Interval of the difference	
Mean	Standard deviation	Lower limit	Upper limit
3.652	0.932	3.337	3.968

Table 10 Estimation of the difference in incompetence