The «alphs»... or what is the efficient face of bite planes?

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(Cf. Marino A. (1999) Postural stomatognatic origin reflexes. . Gait and Posture, 9, suppl.1, S3.)

Abstract

A very discreet mechanical stimulation of the labial mucosa, realized by a small extra thickness pasted on the vestibular face of incisive teeth, brings about an important, immediate and non-specific modification of the control of orthostatic posture. The conclusion of this experience, though it is coherent with the nonlinear dynamic nature of the fine postural control system, deserves being confirmed by other works because it queries too many explanatory models of the therapeutic efficiency of occlusal gutters.

Introduction

Since the first publication from Costen (1936) on relationships between posture and mandible, practically no basic works - except perhaps those from Batini *et al*. (1974) and from Meyer (1977) - were published to light the road of therapeutists. Progressively however, in dental surgery offices, a practice compelled recognition thanks to its efficiency: the wearing of a bite plane (see Hartmann & Cucchi, 1993 for a review), and in fact Bonnier (1996) showed that these prostheses in mouth can modify the

functioning of the control of orthostatic posture.

Whatever be models, mechanical and/or neurophysiological, that guided the idea of the different types of bite plane, they all end at the manufacture of a prosthesis that put something like a hood on whole or part of an arcade. These gutters therefore have three faces that contact adjoining anatomical structures: a face between cusps, a vestibular face and a lingual face. Traditionally therapeutic efficiency of gutters was attributed solely to its presence between cusps that, by modifying occlusion, would act, mechanically and/or neurophysiologically, on the positioning of ATM and on tonic balance of masticator muscles. Till now, as far as we know, nobody put forward the hypothesis that stimulations of the jugal and/or lingual mucosa, due to the presence of the gutter, could be, at least partly, responsible for the efficiency of these prostheses.

This hypothesis has been suggested to us by works of podologists that underline the outstanding postural efficiency of very discreet plantar stimulations (Villeneuve-Parpay *et al*.., 1995). As this hypothesis is in accordance with the «butterfly effect» of the fine postural control system, a non-linear dynamic system (Gagey *et al*.., 1998), we have decided to test it.

Material and Methods

The protocol of this first experimental approach is voluntarily very simple: a population of patients frequenting a dental consultation has been recorded on a stabilometric platform before and after the fitting of a prosthesis on the vestibular face of some teeth.

Alphs

After mordanting with acid, for 10 seconds, of the vestibular faces of the four superior incisive teeth (11, 12, 21, 22), rinsing with water and drying with air, a very fine thickness of TRANSBOND 3M®, a composite photopolymerizable material, was applied. The polymerization was obtained by a 10 seconds exposure to the light from a halogen lamp, emitting in the frequency band 400/500 nm. Fit at the center of the crown of each incisive tooth, roughly round, these pasted prostheses had approximately a two millimeters diameter and a one-millimeter thickness; we call them «Alphs».

Population

Fifty-seven patients who came to an orthognathodontic consultation have been selected only on the criterion of their acceptance to participate in this experience after they had been duly informed of conditions of the protocol. Patients of this population did or didn´t show symptoms that are usual in this kind of consultation: crackles and/or pains of the TMJ, headache, cervical pain, rachialgias and sometimes dizziness. (Mean age: 24 years ± 6; 41 women, 16 men)

Recordings

Patients were recorded on a stabilometric platform DYNATRONIC DYN 50®, built according to the standards of the Association Française de Posturologie (Bizzo *et al.,* 1985), in the open eyes and closed eyes situations, and standard conditions of the Association Française de Posturologie (A.F.P., 1985), few minutes before and after the fitting of the alphs.

Signal analysis

For signal analysis, the parameters retained by the Association Française de Posturologie, whose statistical values in a normal population of reference are published (A.F.P., 1985), were calculated; that is to say: the X and Y-mean positions of the center of pressure, the area of the confidence ellipse that contains 90% of the sampled positions of the center of pressure (Takagi *et al*., 1985) and the parameters LFA and VFY described in Normes85 (A.F.P., 1985).

Statistical analysis

A comparison to zero of the mean of matched differences of these parameters before and after the fitting of the alphs, was made by the Student´s t-test.

Results

The distribution of each of studied parameters, before and after the fitting of the alphs, is presented in the form of a histogram, the Gaussian curve of the theoretical normal distribution of the parameter is drawn as reminder. Class interval for all histograms is always equal to half standard deviation of the theoretical normal distribution. The Student´s t shown on drawings corresponds to the comparison to zero of the mean of matched differences between the two histograms.

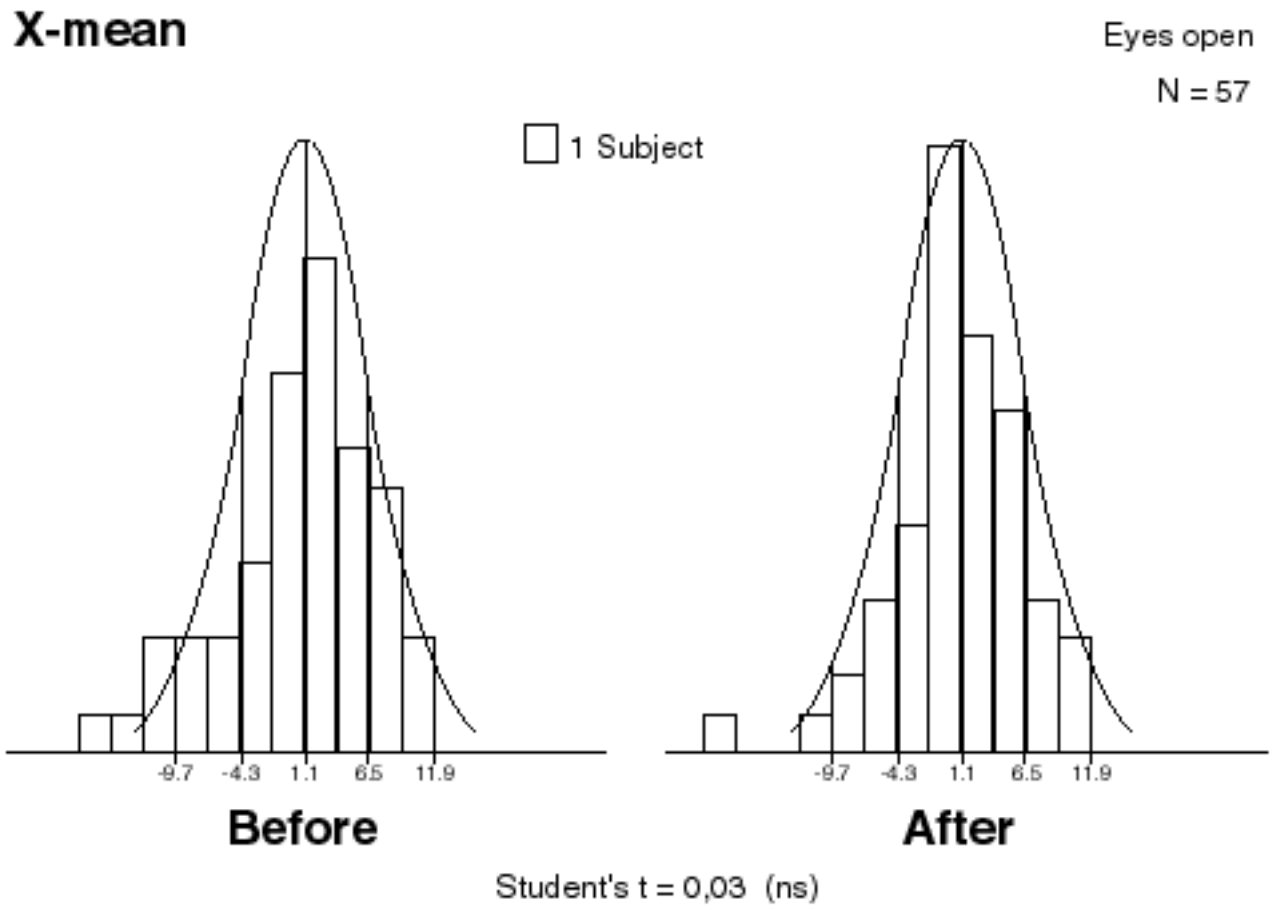

FIG. 1- Distribution of the X-mean parameter before and some minutes after the fitting of the alphs. Eyes open situation. N= 57, ns.

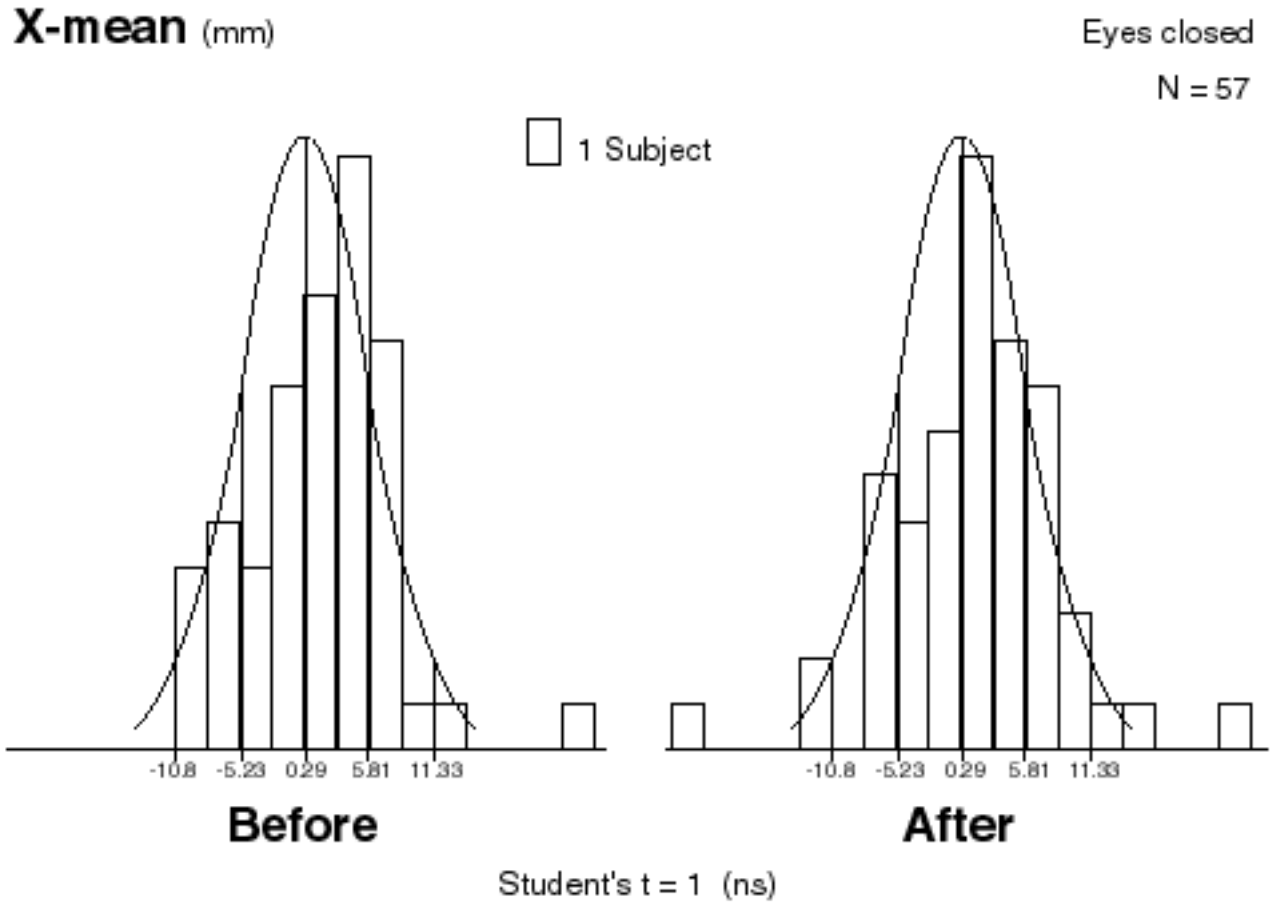

FIG. 2- Distribution of the X-mean parameter before and some minutes after the fitting of the alphs. Eyes closed situation. N= 57, ns.

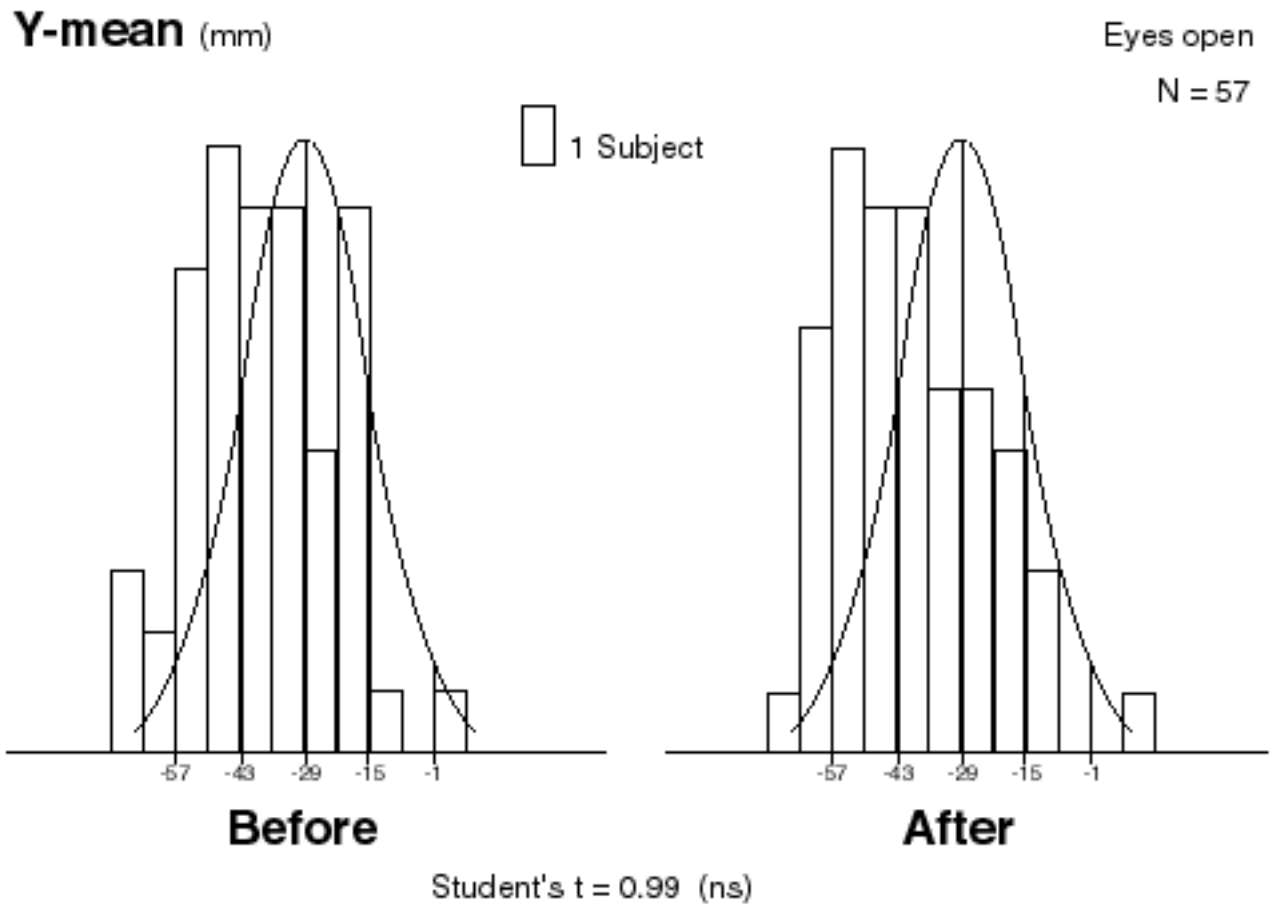

FIG. 3- Distribution of the Y-mean parameter before and some minutes after the fitting of the alphs. Eyes open situation. N= 57, ns.

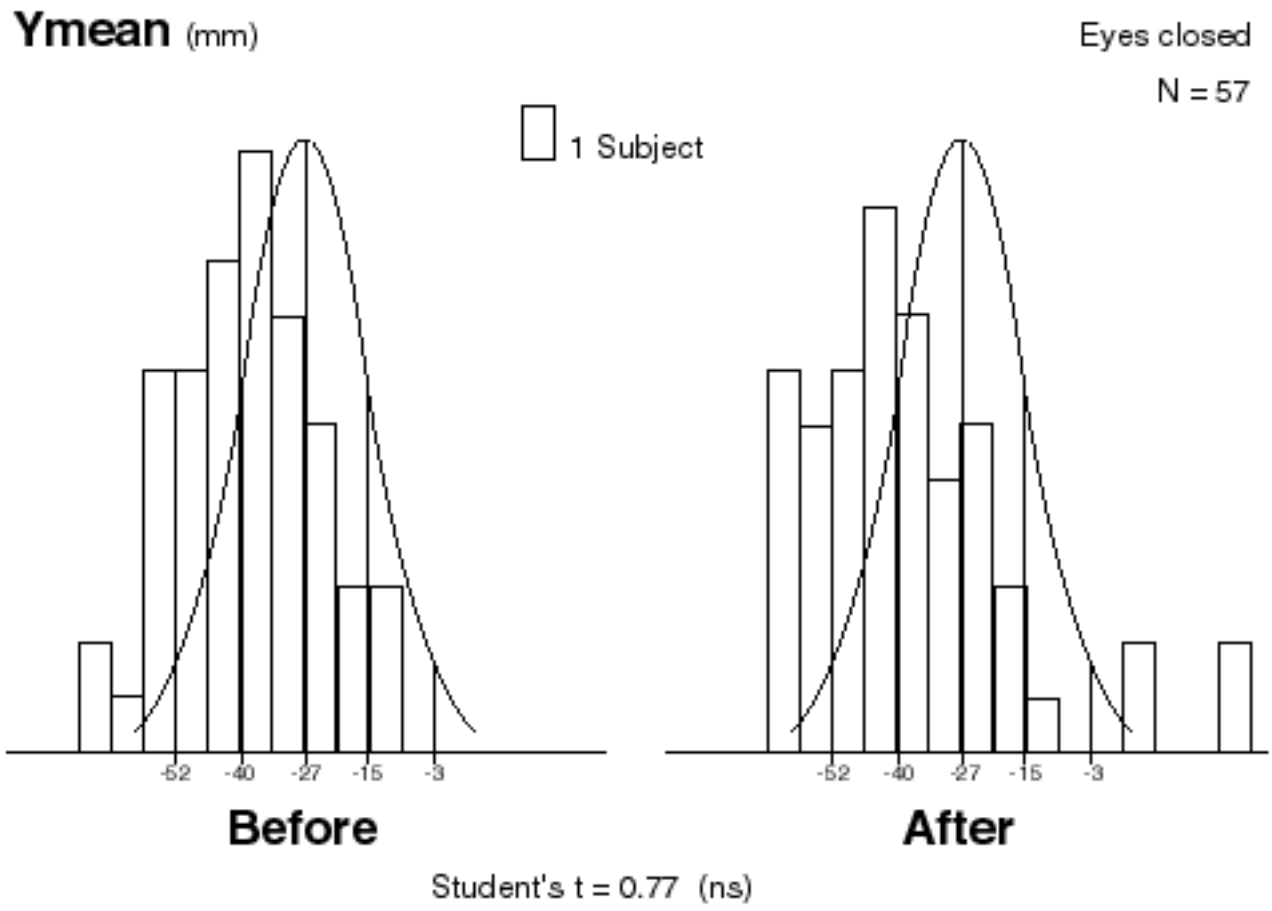

FIG. 4- Distribution of the Y-mean parameter before and some minutes after the fitting of the alphs. Eyes closed situation. N= 57, ns.

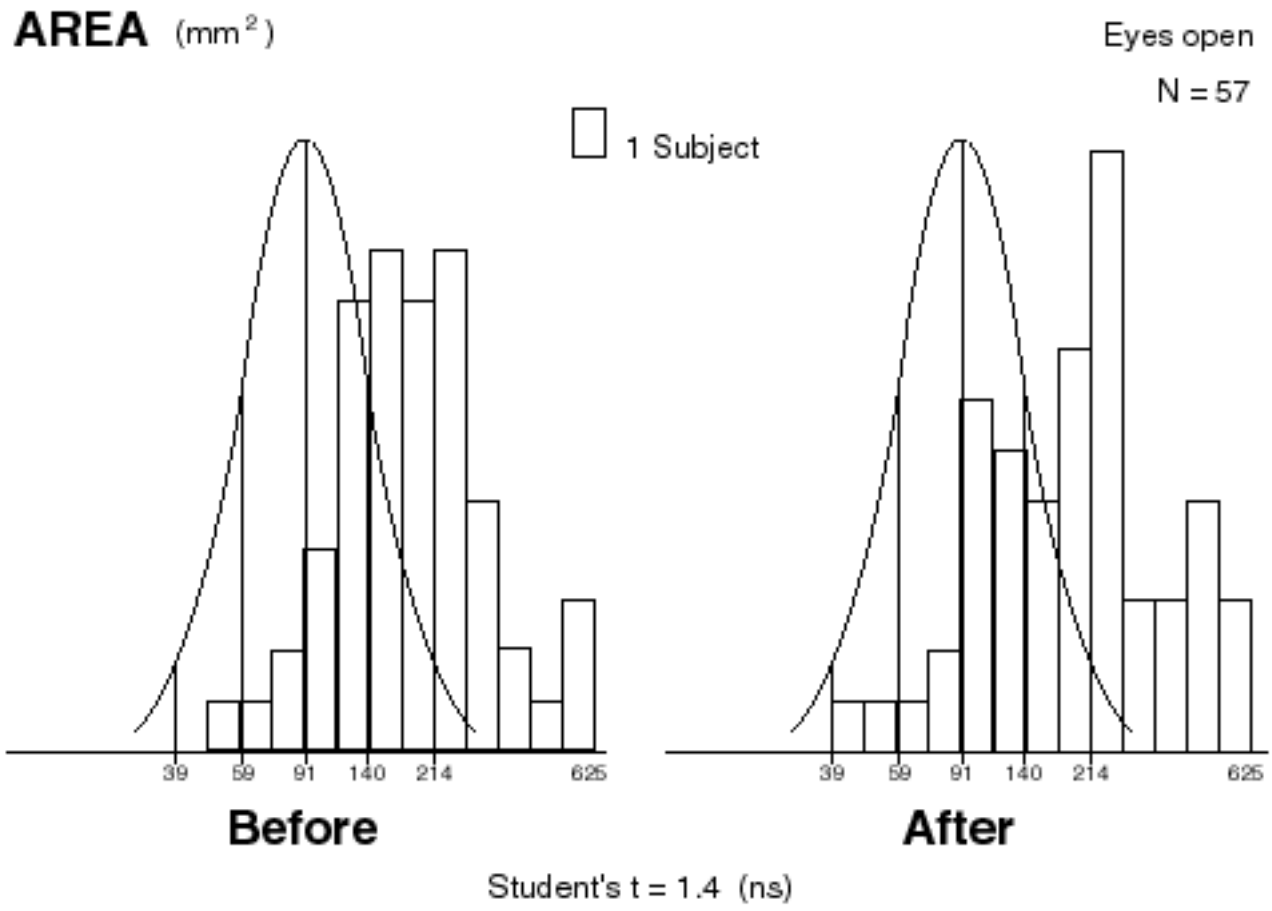

FIG. 5- Distribution of the SKG area before and some minutes after the fitting of the alphs. Eyes open situation. N= 57, ns. Note that the population is statistically abnormal ($p < 0.001$) according to the area parameter, as from a clinical point of view.

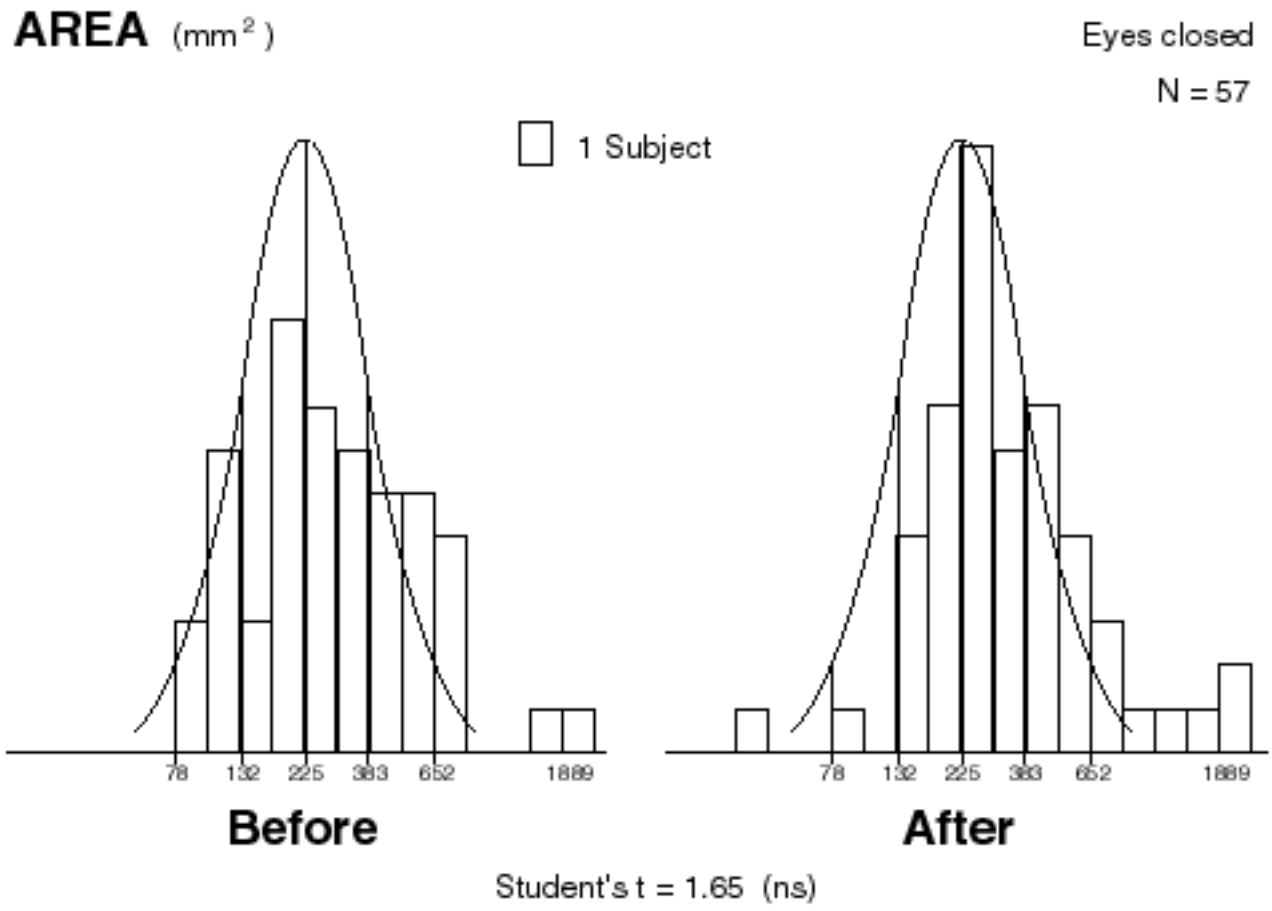

FIG. 6- Distribution of the SKG area before and some minutes after the fitting of the alphs. Eyes closed situation. N= 57, ns. Note that the population is statistically abnormal ($p < 0.02$) according to the area parameter, as from a clinical point of view.

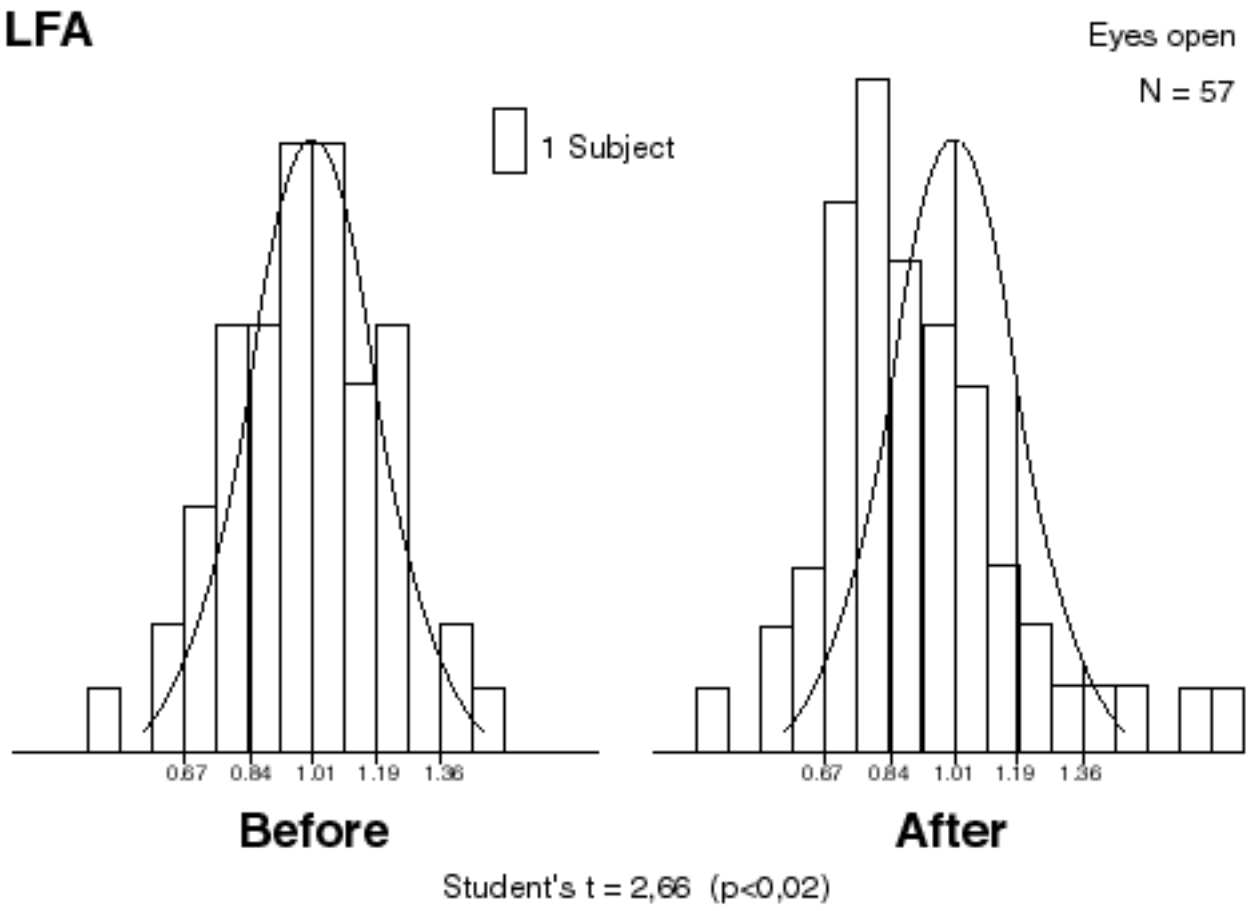

FIG. 7- Distribution of the LFA parameter before and some minutes after the fitting of the alphs. Eyes open situation. N= 57. There is a statistically significant difference ($p < 0.02$) between the two distributions.

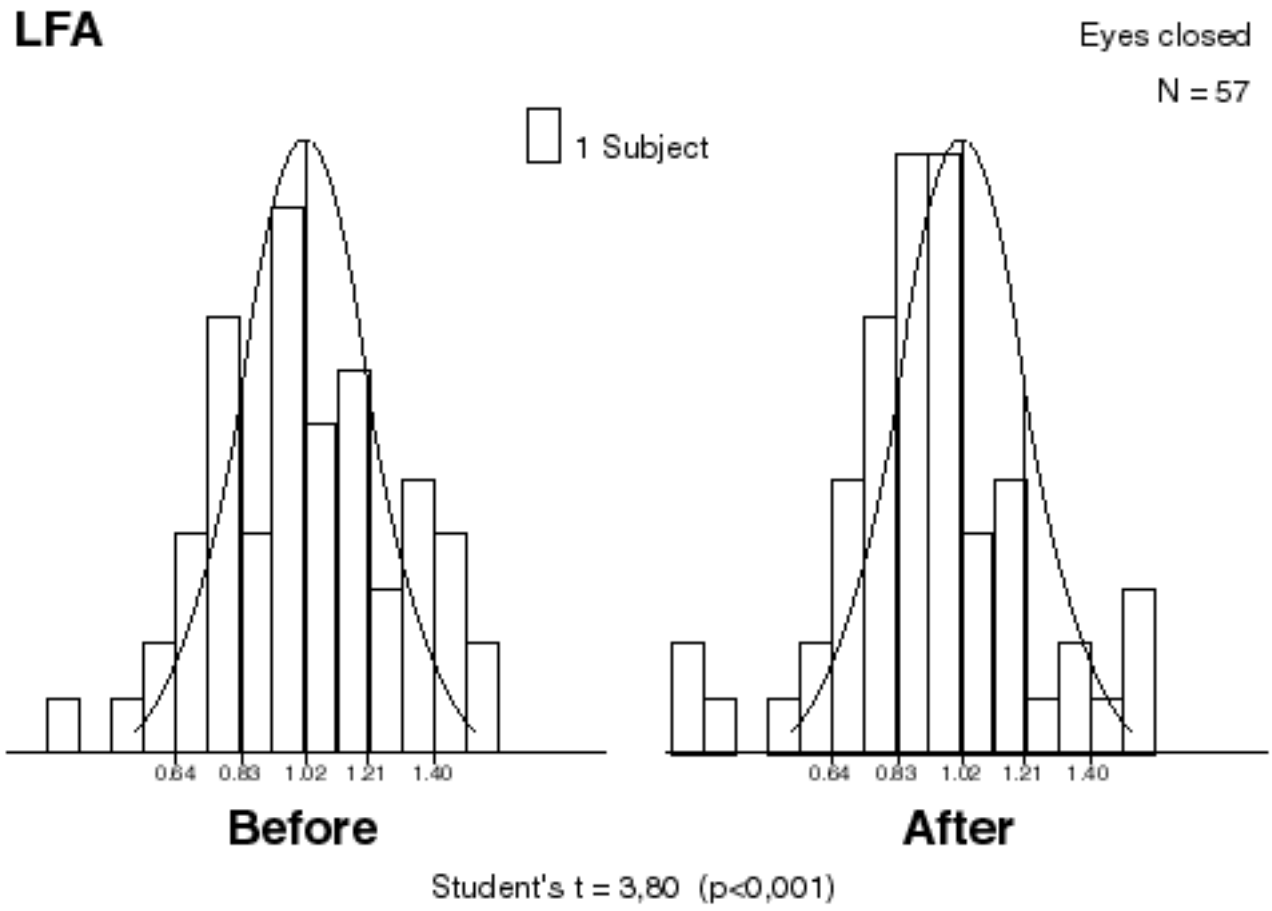

FIG. 8- Distribution of the LFA parameter before and some minutes after the fitting of the alphs. Eyes closed situation. N= 57. There is a statistically significant difference ($p < 0.001$) between the two distributions.

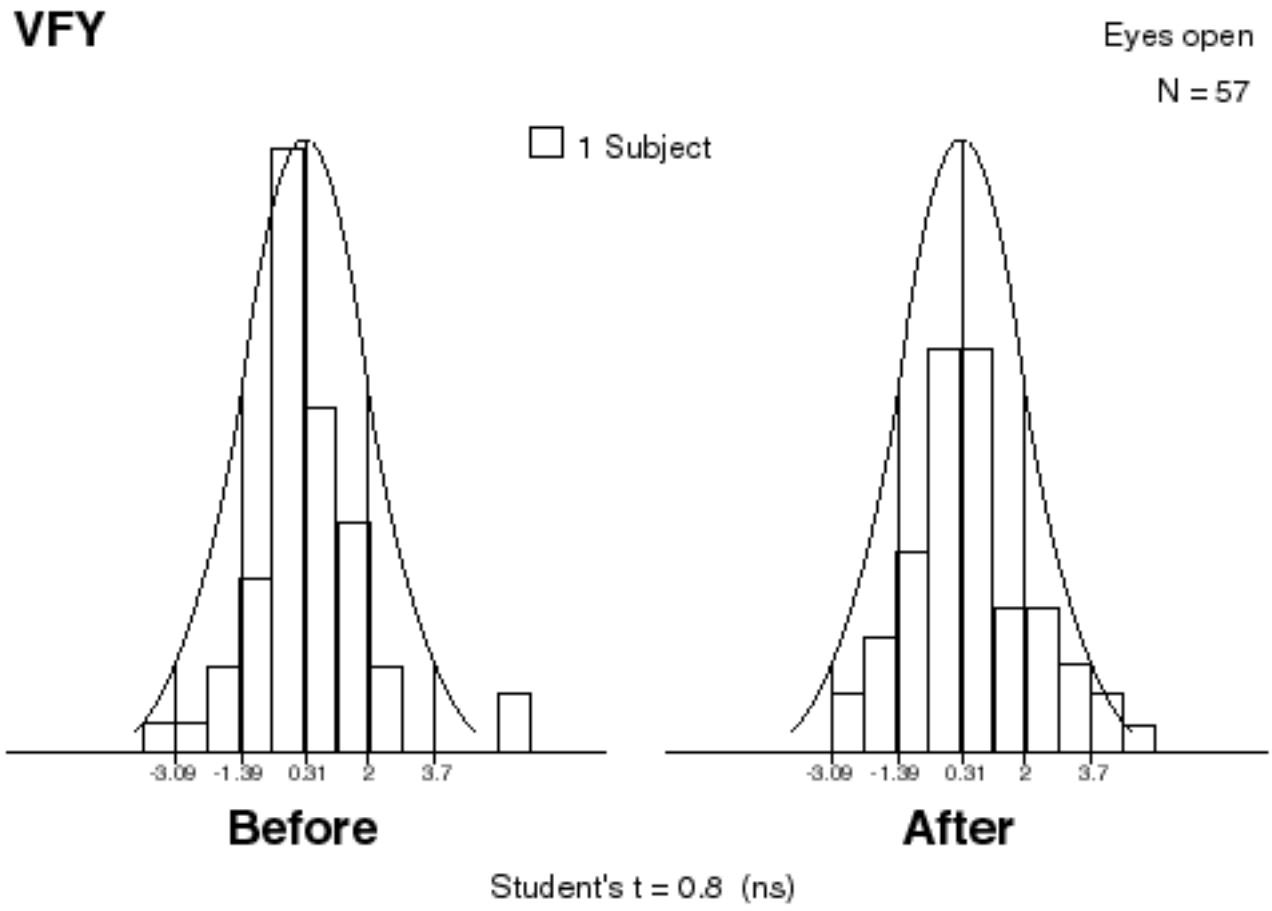

FIG. 9- Distribution of the VFY parameter before and some minutes after the fitting of the alphs. Eyes open situation. N= 57, ns.

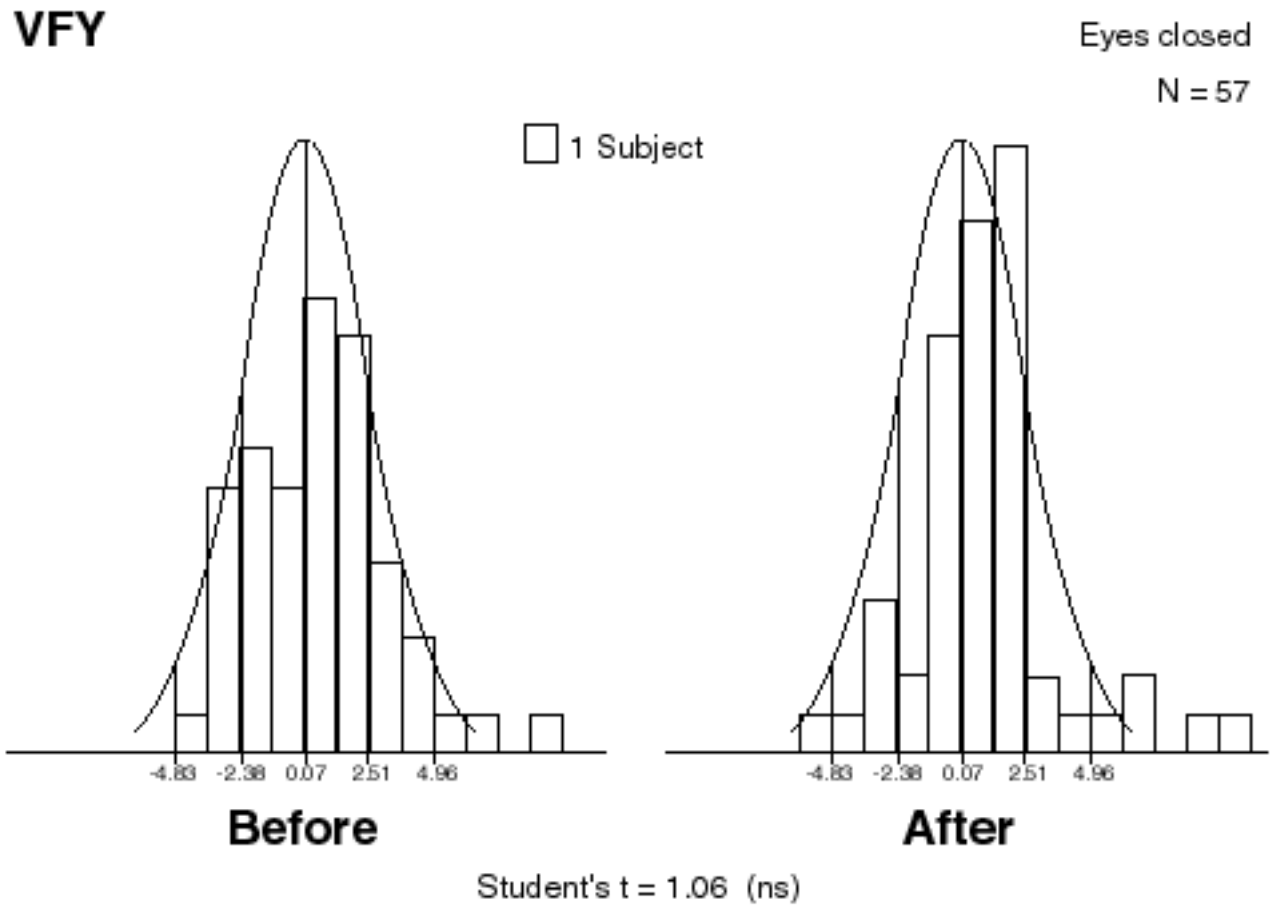

FIG. 10- Distribution of the VFY parameter before and some minutes after the fitting of the alphs. Eyes closed situation. N= 57, ns.

Discussion

The fitting of alphs on the vestibular face of the superior incisive teeth of these ´dental´ patients brought about a statistically very significant reduction of the LFA parameter (length as a function of area) that evaluates the energy expenditure required from the subject to control his orthostatic posture (A.F.P., 1985; Nagayama *et al*., 1987; Vallier, 1994; Imaoka *et al*., 1997). Thus, a minimal oral stimulation is able to modify the control of orthostatic posture in a very significant manner.

The hypothesis seems therefore validated that stimulations of the

jugal (and/or lingual) mucosa due to the presence of the gutter could be responsible, at least partly, of the effect of these prostheses on the control of orthostatic posture.

Nothing in this experience, indeed, allows us to assert that this jugal stimulation is the only origin of the gutters recognized efficiency, but conversely it is no longer possible not to take into account the effect of this stimulation when tempting to explain the gutters beneficial role.

It is possible that this effect of the alphs is not specific, simply in relation with a modification of the subject's general vigilance level. This remark however can also apply on gutters whose it has never been demonstrated that they have a specific effect on the postural system.

Surer after this experimental work and its results, we sought to evaluate therapeutic efficiency of the alphs on patients that suffer from a postural deficiency syndrome (Da Cunha, 1987). Results of this evaluation are not yet rigorously established but it seems possible already to tell that alphs as gutters have a real efficiency to cure disorders of the fine postural control system, and particularly those that demonstrate some relations with abnormal occlusion.

And even it seems that, in certain conditions, effects obtained by the fitting of alphs vary systematically in function of the place where they are pasted; this specific effect of the alphs on the functioning of the postural system would be a novelty. But for the moment that is only a clinical feeling which deserves to be verified.

CONCLUSION

A very discreet mechanical stimulation of the labial mucosa, realized by a small extra thickness pasted on the vestibular face of incisive teeth, brings about an important, immediate and nonspecific modification of the control of orthostatic posture. The conclusion of this experience, though it is coherent with the nonlinear dynamic nature of the fine postural control system, deserves being confirmed by other works because it queries too many explanatory models of the therapeutic efficiency of occlusal gutters.

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