

The Posturostabilometric Evaluation of Children 8 - 12 Years with the Physiological and Distal Occlusion

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Abstract

In recent years, attention to disturbances in the postural system in various pathological processes of specialists working in various fields of medicine, increased. It was learned that not only anatomical damage, but also functional changes in the dental and musculo-skeletal system can affect the occurrence and maintenance of balance disorders, crippling spine (according to doctors - Osteopaths: Palano D. 1994, Weber B. 1995 and Marino in 1999 - the causes of scoliosis in young people are anomalies of occlusion, and most of all - distal occlusion) [1,2]. For this reason, dentists in the future will have to study and evaluate some of the general imbalance of each individual patient, because in each case, we'll be able to rebalance the postural system by correcting anomalies of occlusion.

Keywords: Posturostabilometric; Children; Physiological; Distal Occlusion

Many authors have noted the correlation between occlusion and postural balance: D. Alpini., *et al.* [3], Reint H Geuze [4], C. Tardieu., *et al.* [5]. Several authors recommend stabilometric evaluation [4,6] for the further examination of patients with dentofacial anomalies. Stabilometric evaluation is indicated for the planning of the rehabilitation process, dynamic monitoring (to monitor the treatment and consistent correction of the treatment process), evaluate long-term outcome and long-term prognosis.

Aim of the Study

The aim of our study was to evaluate the stabilograms of children with physiological occlusion and determine the degree of influence of removable devices for moving the mandible forward on postural balance.

Materials and Methods

A total of 72 children were examined: 35 children with physiological occlusion and 37 children with distal occlusion.

Orthodontic treatment for children 8-12 years old was carried out using the Persin appliance for treating distal occlusion.

All children underwent stabilometric evaluation on the biopostural platform BioPostural System (Galbiati, Italy).

Biopostural system is an analytical system consisting of a thin sensor platform, equipped with a special software for receiving and storing the results of the studies. Research time - 20 seconds.

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Basic stabilographic parameters were evaluated: Ellipse surface, its length and the resulting center of gravity.

Standard stabilometric analysis was conducted with the patient standing on a platform, first with eyes open and then with eyes closed. In addition to the main analysis, we conducted stabilometric evaluation of children in four conditions: mandibular rest position and maximum intercuspidal position, without and with the Persin appliance for treating distal occlusion, either simultaneously with the unit and in the course of orthodontic treatment.

The Results of the Study

For children 8 - 12 years with physiological occlusion, average data rates for the statokineziograms according to the age were obtained (Table 1). Maximum swaying of the resulting center of gravity occur at a distance 0,5 cm in the sagittal and transverse directions (Figure 1). Were found a significant increase in the basic parameters in children with distal occlusion (Figure 1): the length of statokineziogram with open eyes increased by 1.9 times ($p < 0.01$), the Sway area increased by 2 times ($p < 0.01$), and the Ellipse Surface increased 5.5 times ($p < 0.01$).

Groups of children	Crossed distance, mm		Sway area, mm ²		Ellipse Surface, mm ²	
	Open eyes	Closed eyes	Open eyes	Closed eyes	Open eyes	Closed eyes
Normal occlusion, M ± m	39,5 ± 5,1	59,5 ± 9,2	4 981,3 ± 643,5	7 034,8 ± 1 377,3	8,00 ± 3,1	15,7 ± 4,3
Distal occlusion, M ± m	78,7 ± 11,8	100,3 ± 19,5	9 883,0 ± 1 460,6	12068,7 ± 2 954,4	44,4 ± 13,9	48,7 ± 12,2
P	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01

Table 1: Comparison of statokineziograms of children with physiological occlusion (FO) and children with distal occlusion.

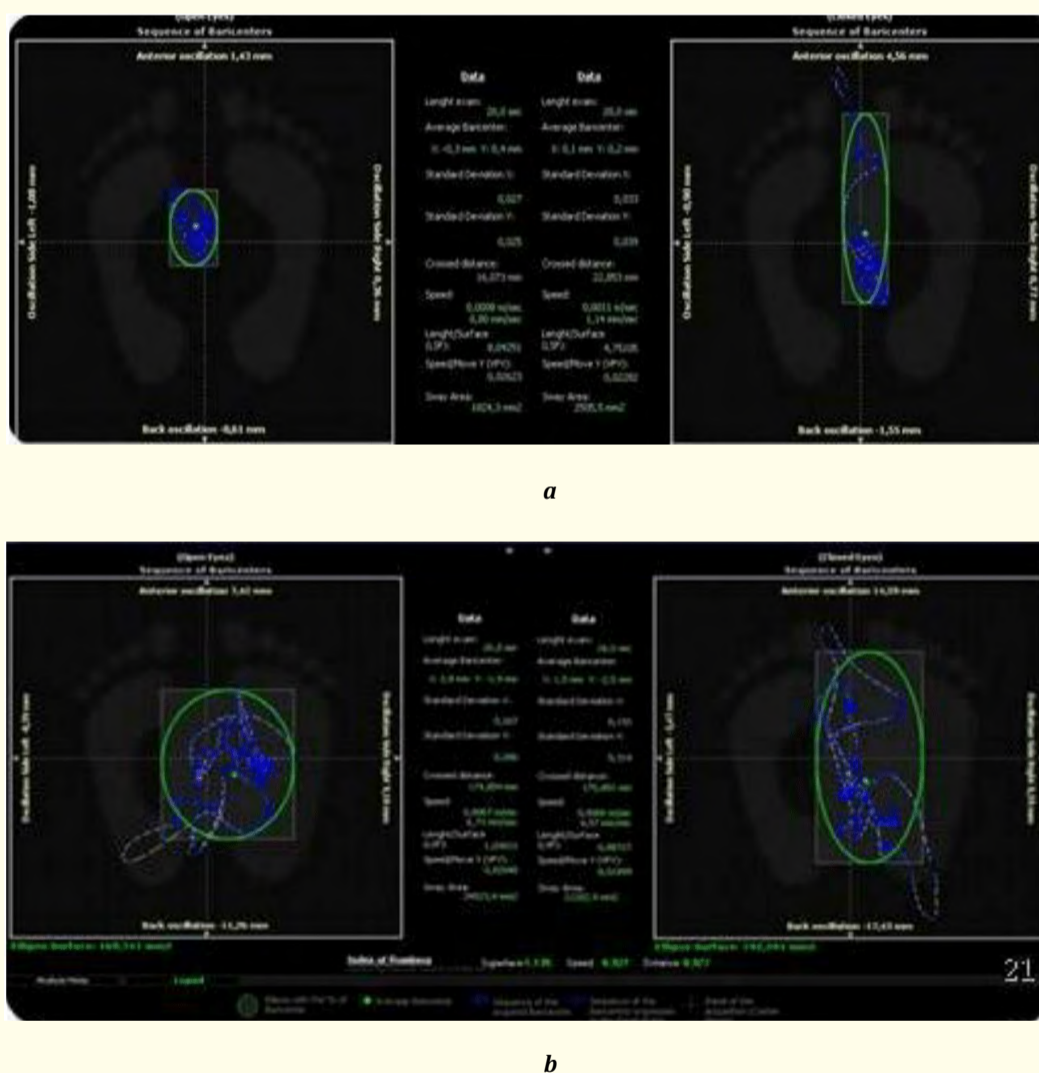


Figure 1: Stabilography of children with a) normal and b) distal occlusion.

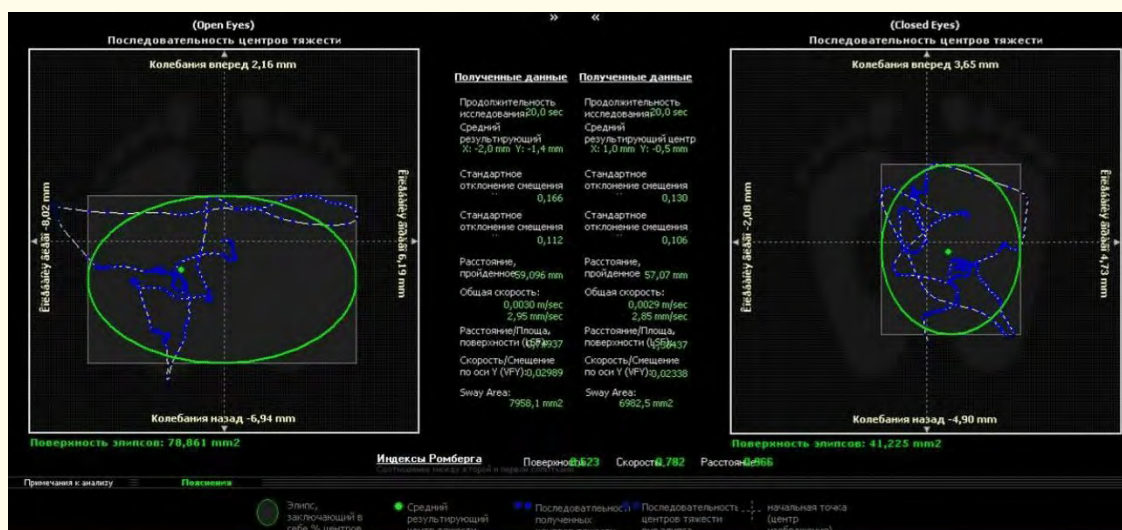
In children with distal occlusion average resulting center of gravity in 18% of cases is within the normal range, in 54.5% move forward, whereas in 27.5% of cases we observe back displacement.

During this study in children with physiological occlusion in a state of mandible rest position and at maximum intercuspidal position no significant changes of stabilometric parameters were revealed, whereas in children with distal occlusion of both age groups maximum intercuspidal position led to improvement of stabilometric parameters in 62% of cases: the crossed distance decreases 1.6 times, the sway area - 2 times, the ellipse surface decreases by 1.7 times (Table 2).

	Crossed Distance, mm		Sway area, mm ²		Ellipse Surface, mm ²	
	Mandible rest position	Maximum intercuspidal position	Mandible rest position	Maximum intercuspidal position	Mandible rest position	Maximum intercuspidal position
M±m norm	43,1 ± 3,4	46,9 ± 5,2	5790,0 ± 450,2	5938,8 ± 750,3	9,9 ± 2,2	10,5 ± 1,4
M±m before	87,1 ± 7,2	55,3 ± 8,3	12522,6 ± 957,2	7575,8 ± 934,2	38,1 ± 3,4	21,5 ± 4,2
P	< 0,01	< 0,01	< 0,01	< 0,1	< 0,01	< 0,01

Table 2: Comparison of statokineziograms of children with physiological occlusion (FO) and children with distal occlusion in a state of mandible rest position and maximum intercuspidal position.

Average resulting center of gravity in children with distal occlusion in state of maximum intercuspidal position improved in 55% of cases (Figure 2).



Mandible rest position

Mandible rest position

Figure 2: Changing of the resulting center of gravity's position in maximum intercuspidal position in children with distal occlusion.

Despite improvement of statokineziograms in children with distal occlusion in state of maximum intercuspidal position, parameters do not correspond to the children with physiological occlusion.

Studying of children whose treatment was carried out with the Persin appliance for treating distal occlusion demonstrated improvement in main stabilometric parameters (Figure 3) in 85% of cases: the crossed distance decreased by 2 times, the sway area decreased by 2.8 times, the ellipse surface decreases 5.2 times.

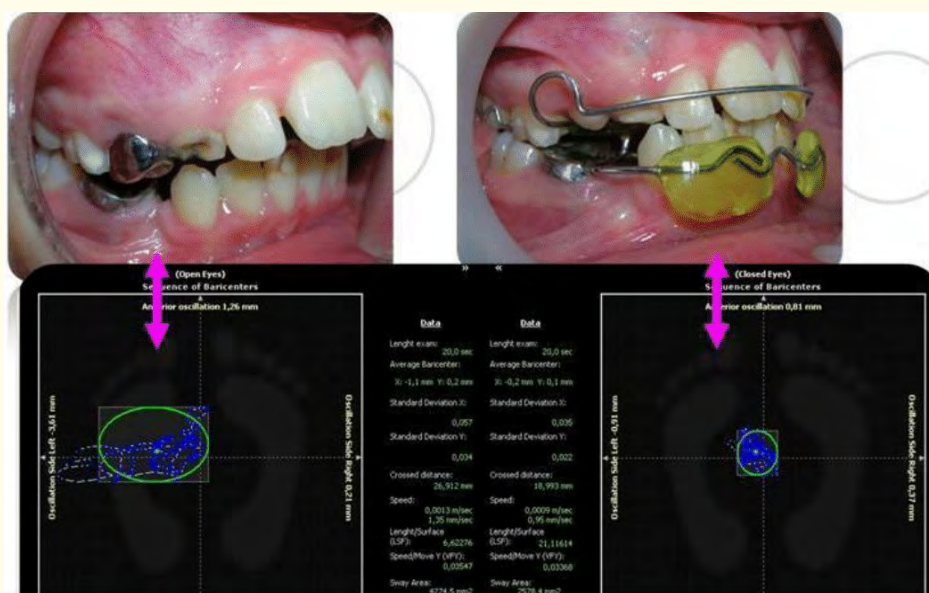


Figure 3: Stabilograms' changing during orthodontic treatment.

	Crossed distance, mm		Sway area, mm		Ellipse surface, mm	
	Mandible rest position	Maximum intercuspidal position	Mandible rest position	Maximum intercuspidal position	Mandible rest position	Maximum intercuspidal position
M ± m, before	89,2 ± 10,7	117,8 ± 18,4	10926,9 ± 1 321,9	14240,11 ± 2 807,2	47,1 ± 10,4	52,4 ± 9,1
M ± m, c Persin appliance	33,1 ± 3,4	46,9 ± 5,2	2790,0 ± 450,2	5 938,8 ± 750,3	5,9 ± 2,2	10,5 ± 1,4

Table 3: Stabilograms' changing during orthodontic treatment.

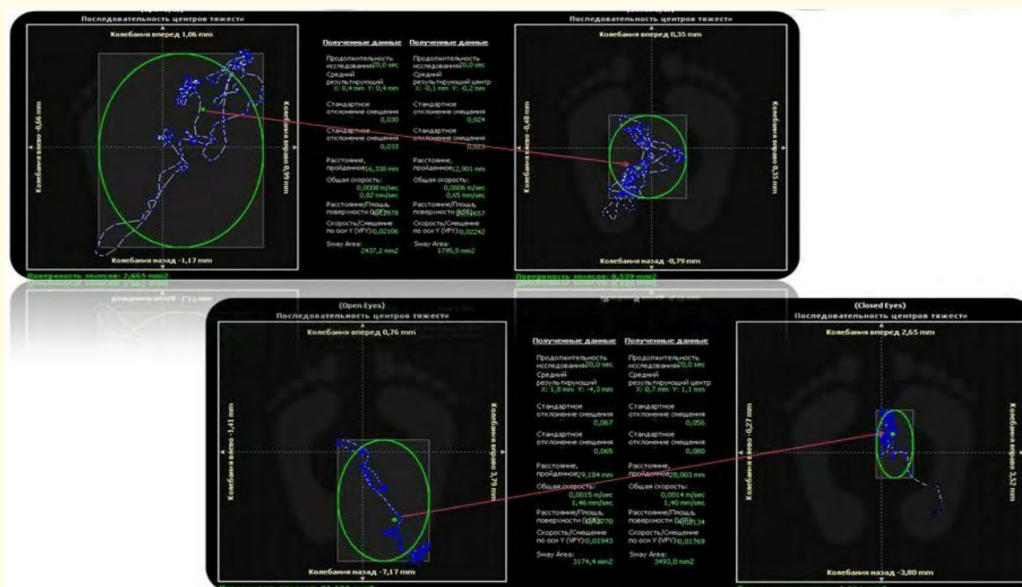


Figure 4: Examples of the resulting center of gravity's recovery right after Persin appliance for the treating distal occlusion adjustment.

In monitoring of conducted orthodontic treatment the improvement of stabilometric parameters remains stable in case of the second stabilometric examination after 3 and 6 months in 75% of patients (Figure 5).



Figure 5: Posturostabilometric changes before and after treatment with Persin's appliance for treatment distal occlusion.

Conclusions

In children with physiological occlusion maximum intercuspidal position showed no significant change of stabilometric parameters. In children with distal occlusion in maximum intercuspidal position postural balance improved in 62% of cases. During treating children with orthodontic functional appliances for the mandible moving forward there is a significant improvement in postural balance.

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