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Human Body Posture before and after Maxillofacial Surgery

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Abstract

The aim of this study is to observe how the posture is affected by maxillofacial fractures and how it is improved after maxillofacial surgery. The procedure for all tests is non-invasive and it's formed by a Multi Sensor Electronic Baropodometric Platform, a PodoScanalyzer (2D), the D.B.I.S Software witch calculates the values of the B.P.I. Index , Body Analysis Kaptur System and Dynamic Image System. Using the Baropodometer we evaluate the balance of the human body, oscillations of the pressure centre, visual information of poor posture. a group of 10 patients with different maxilla fractures were investigated before surgery and after. For each patient there were made two analyses. A dynamic analysis which determined how the maxilla fracture affects the walking, and how it is improved after the surgery, and a stabilometry analysis which determined how the maxilla fracture affects the standing posture of the body, and how it is improved after the surgery. As conclusions, the body posture is affected by the maxillofacial fractures and improves after the surgery.

Keywords: posture; maxillofacial surgery; baropodometer

1. Introduction

The posture is the human body behavior in relation with the environment in which he lives, and in relation with the laws that governs these environment, first of all the force of gravity. To do this, man has developed a specialized structure to overcome gravity, called the tonic postural system of vertical stability. [4, 5]

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Posture is the relative alignment of the various body segments with one another. The stress applied to the body segments is minimal when the person has a good posture and therefore the body alignment is balanced. When a person has a poor posture, the body's alignment is out of balance causing exaggerated stresses to various body segments. [1, 2, 3]

Over time this continual stress, even at low levels produce musculoskeletal disorders and create anatomical adaptations. The body's efficiency will be affected and the accumulation of the trauma causes psychic and physical stress.[6]

2. Aim

The aim of this study is to observe how the body posture is affected by maxillofacial fractures, and how improves after maxillofacial surgery.

3. Methods

For this study it is used a modular electronic baropodometric detection platform (with a length of 160 cm, Multi Sensor with 25,600 sensors on 40cm width and 2 walkways of 80cm each), an optoelectronic system composed from an infrared video camera, a PodoScanalyzer for recording the patient's foot under pressure by determining the length, circumference and geometry with length, angles and width. The software used to analyse and interpret the data was the Milletrix Software. It recorded the static, dynamic and stabilometry analysis. The D.B.I.S. software (Digitalized Biometry Images System) calculates the B.P.I. index which indicates the numerical values of the entire investigation. The entire system is non-invasive. [8]

Using the above described baropodometer a group of 10 patients with different maxilla fractures were investigated before surgery and after. For each patient there were made two analyses. A dynamic analysis which determined how the maxilla fracture affects the walking, and how it is improved after the surgery, and a stabilometry analysis which determined how the maxilla fracture affects the standing posture of the body, and how it is improved after the surgery.

For the dynamic analysis the patient is asked to walk on the pressure plate (baropodometer) a few times before the data recording, to calibrate the baropodometer. In this analysis the gravity centre point's trajectory, speed and the pressure distribution on the footprint are recorded. [7]

The stabilometry analysis consists in requiring the patient to stand on the pressure plate and remain in an orthostatic, natural and relaxed position for 2 minutes. In this analysis the patient's oscillations, radar balance and pressure distribution are recorded.

4. Results

In Fig. 1 and Fig. 2 are presented the dynamic analyses of a patient. In these figures are presented the gravity center trajectory and the pressure distribution on the footprint.

In Fig. 3 and Fig. 4 are the stabilometry analyses of a patient. In these figures are presented the pressure distribution on the footprint and the radar balance.

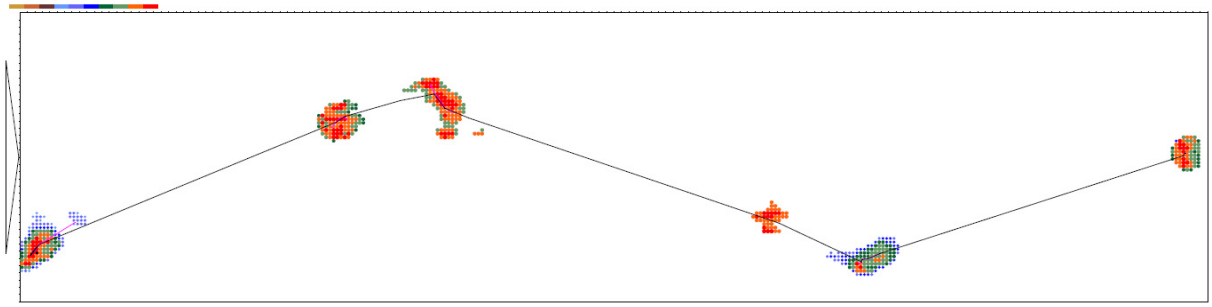

Fig. 1. Dynamic analysis of a patient before maxillofacial surgery.

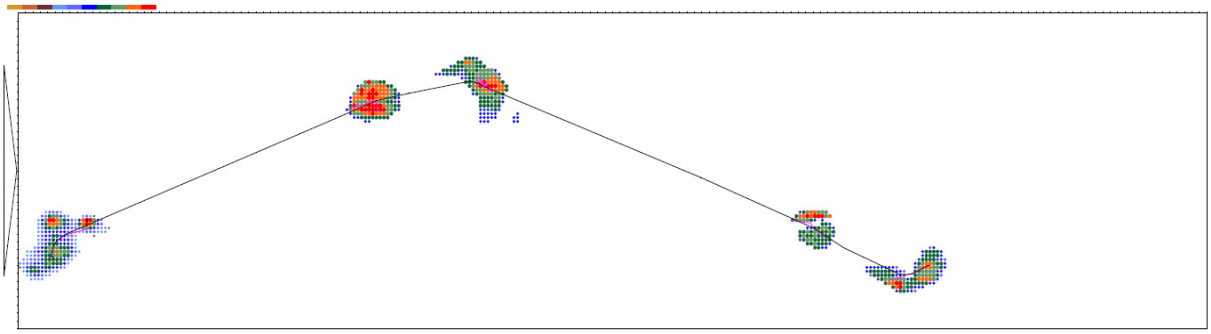

Fig. 2. Dynamic analysis of a patient after maxillofacial surgery.

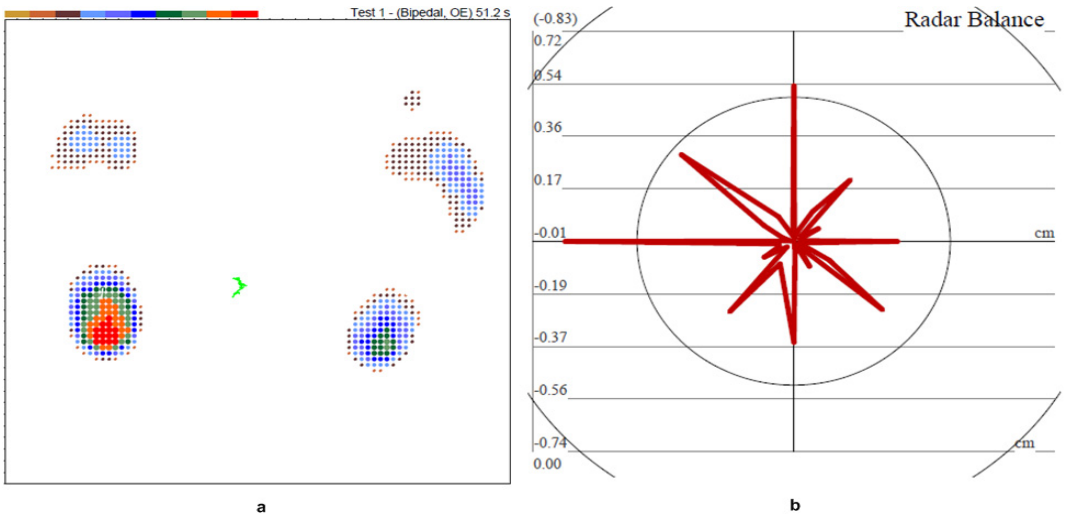

Fig. 3. Stabilometry analysis of a patient before maxillofacial surgery.

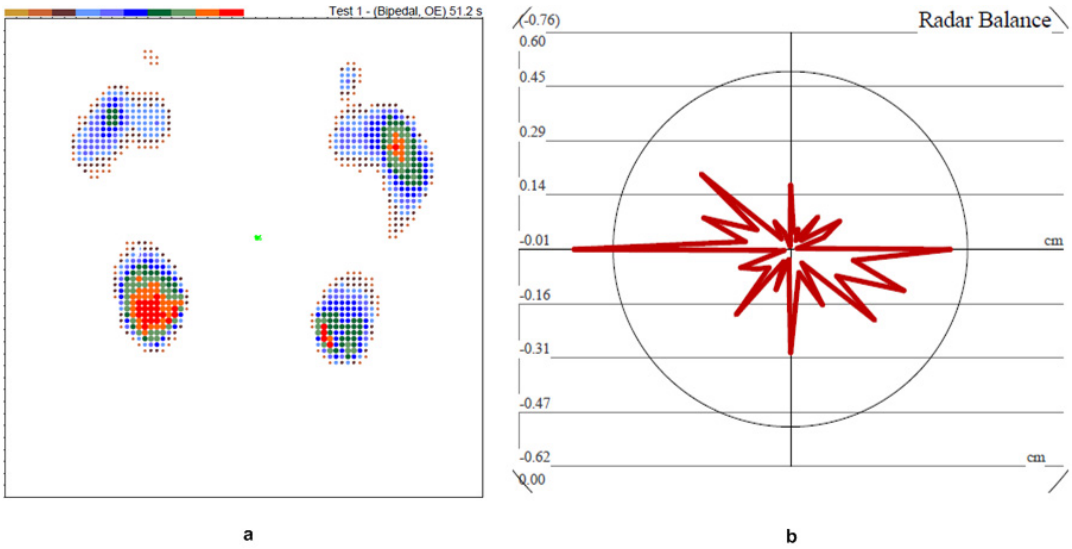

Fig. 4. Stabilometry analysis of a patient after maxillofacial surgery.

5. Conclusion

After a careful examination of the data and statistical analysis, a clear distinction between the results of the analyses before the maxillofacial surgery and after it, became apparent. The body posture is affected by the maxillofacial fractures and improves after the surgery.

The use of the baropodometer is recent technology and there are very few studies about its use as it is normally used for clinical purposes, which explains the little existence of academic articles on this matter. However, recent research has proven it to be an excellent methodology for assessing balance by means of the dislocation of the pressure center.

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