DOI: 10.1051/odfen/2013207

J Dentofacial Anom Orthod 2013;16:307

CLINICAL NOTE

Determining the spatial position of the maxilla: Using the Ditramax® system

Olivier SOREL

Figure 1
Bicephalic eagle of the Emperors of the Orient painted on the ceiling of the vestibule of the Lascaris Palace, an aristocratic dwelling in Nice dating from the first half of the XVII^e century. This representation is constructed so as to maintain perfect axial symmetry that the two heads sublimely epitomize.

The symmetry of the construction plan for a human being goes way back to the very beginning of the evolution of life on earth. Ontogeny reproduces to some extent phylogeny. 500 Ma (million years ago) during the Cambrian Period, the chordate nervous system appears most notably in Stomochordates that gave rise to vertebrates. The notochord is a cartilaginous rod, located on the dorsal side, that supports and protects the neural tube and that will evolve into the spinal column

Address for correspondence:
O. Sorel
Centre de soins dentaires
2, place Pasteur
35000 Rennes cedex
sorelolivier@wanadoo.fr

in vertebrates. This cord determines the axes of symmetry: the cephalo-caudal axis, the dorso-ventral axis and the axis of right-left symmetry (fig. 1).

This symmetry is global and is expressed almost perfectly in the region of the cephalic extremity of man. But trying to trace these axes of symmetry can turn out to be a very delicate undertaking. The notion of symmetry is difficult to grasp because the landmark points are never perfectly aligned and when examined meticulously, symmetry is a chimera. Dyssymmetry is the rule; our eye is accustomed to accept these imperfections that in no way detract from the appearance of the face.

In any therapeutic treatment plan involving the use of prosthetic or orthodontic rehabilitation for cases of ''normal'' dyssymmetry, it is still necessary to know how to assess it in terms of diagnosis, etiology and prognosis. In adults, the head is fully formed and diagnosis is usually sufficient. In children, in adolescents and certain progressive forms in adults (condylar hypoplasia) it is of the utmost importance to look for the etiology of the dyssymmetry in order to make a prognosis about its evolution, to take this into account when planning treatment and to adapt this therapeutic response to the needs of the individual.

The clinical examination is the basis of any diagnostic approach (Fig. 2). It provides information from a perspective that is accessible to everyone: the practitioner, the patient and all concerned. This is when our treatment choices will have an impact on the

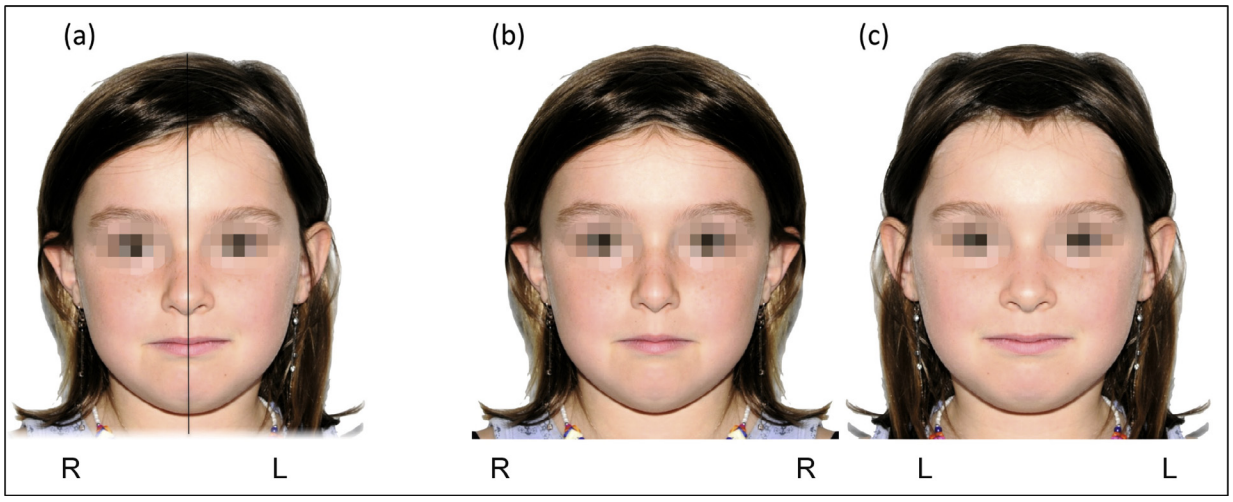

Figure 2

Facial photograph of a subject with normal dyssymmetry on which an axis was traced to divide the face into two halves, (b) photographic montage of the right facial half with the same right half reversed and printed next to the original right facial half and (c) the same montage made from the left facial halves. The appearance of these two hemifaces displays the differences in the scope of ''normal'' symmetry, note the differences at the levels of the oval shape of the face, the mouth, and the nose. Without these montages, the differences would be imperceptible.

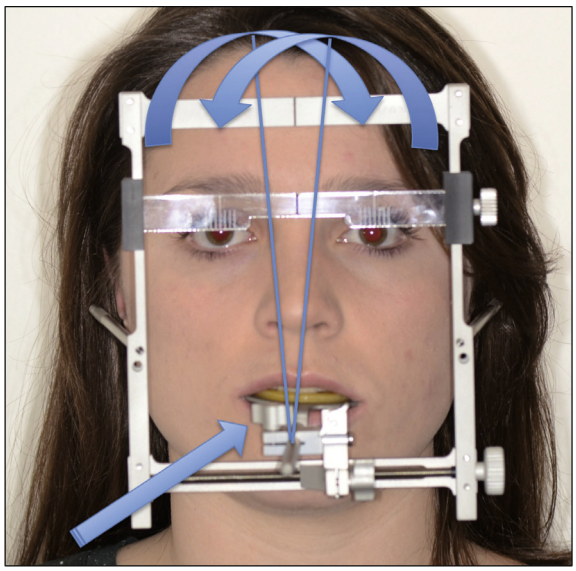

Figure 3
After placing the bitefork in the mouth (held by the patient by biting on it), the frame is secured and oriented based on the patient's characteristics. The ''horizontal '' plane is oriented based on the axis of the bi-pupillary line by tilting the frame around the axis of the bitefork so that the two pupils line up with the guide ruler.

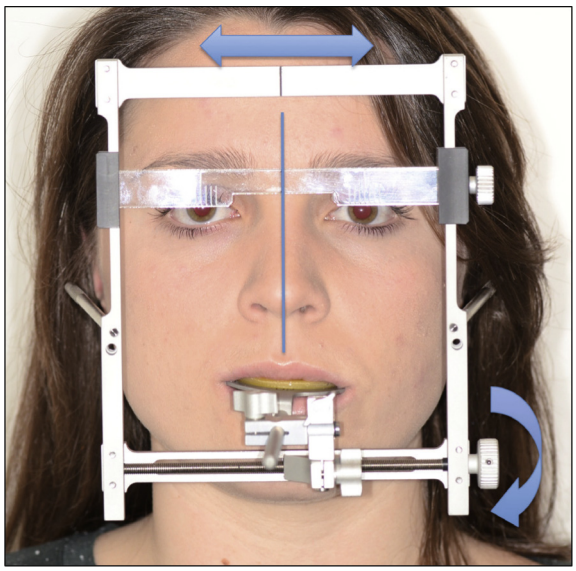

Figure 4
The frame is centered either on the median saggital plane or midway between the inter-pupillary length, by adjusting the side wheel.

daily lives of our patients. Certainly, because of this, a meticulous level of observation is so important.

Additional assessments will help us by providing less subjective data that complete, refine and inform those already drawn from the clinical examination and therefore allow us to exclude or to confirm our clinical hypotheses. At this point, a diagnosis can be established.

In this context, using the Ditramax® System can be an additional aid in orthodontics for assessing the position of the maxillary arch within the face.

The problem presented by dyssymmetry resides in the difficulty in choosing reference points. The developers of the Ditramax® system chose to anchor a bitefork on the maxillary arch (retained by clenching with the opposing arch) with a metallic tail that comes out of the mouth and on which slides a triple axis adjustable gimbal (wheels) that connects the bitefork to the frame.

The frame is therefore put in place based on the characteristics of the patient. The ''horizontal'' plane is oriented along the axis of the bi-pupillary line, a plexiglass guide ruler slides vertically so as to allow for adjustments on the center of the pupils. The position of frame must be adjusted by tilting it around the axis of the bitefork so that the two pupils align with the guide ruler. The anchor screw is then tightened (Fig. 3).

Next the frame is centered by adjusting the lateral anchor screw such that the median saggital plane is on the bi-pupillary line (Fig. 4).

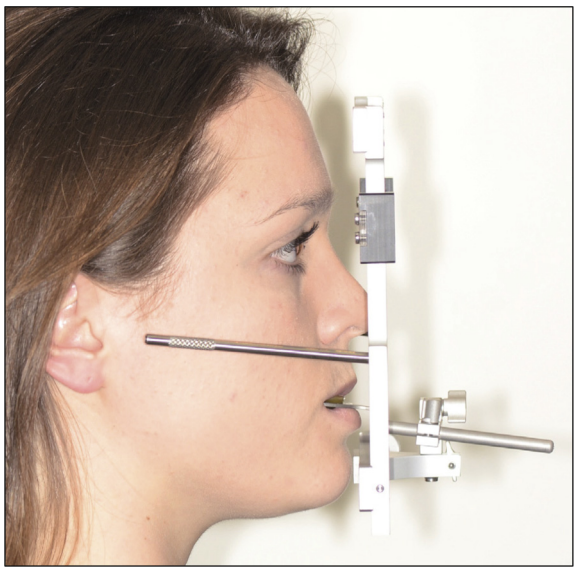

Figure 5
Regulation of the horizontal alignment in the saggital plane: the reference chosen is the plane of Camper passing through the tragions and the subnasal point . In order to do this it is necessary to align the two stems of Camper parallel to the plane of Camper by adjusting the gimbal using the wheel attached to the transverse axis.

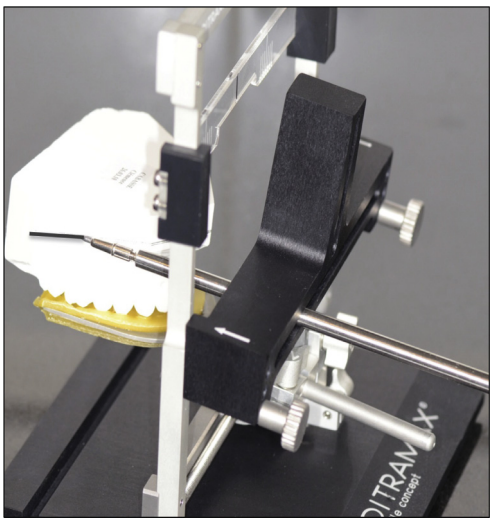

Figure 6
The stems of Camper are unscrewed from the frame and replaced by a marking guide (three levels of fixation are possible). The frame is put into place on the mounting table to slide in the preset mortises.
The model is set onto the bitefork and is scribed by a graphite stylus on the marking guide.

The last step consists in adjusting the horizontal with the saggital plane: the reference point chosen is the plane of Camper, a plane that passes through the tragions and the sub-nasal point. In order to do this, it is necessary to align the two stems of Camper parallel to the plane of Camper by adjusting the gimbal with the wheel (Fig. 5).

The next step consists in transferring the data onto the model.

Then the Camper stems are removed from the frame and a marker guide is added to it (three levels of fixation are possible). The frame is installed on the mounting table by sliding it into the preset mortises. The model is placed on the bitefork and the marks are made with a graphite point stylus: laterally parallel to the Camper plane and anteriorly parallel to the bi-pupillary line (Fig. 6). The vertical guide makes it possible to trace the median saggital plane (Fig. 7).

Even though we fully understand the benefits of these marks for manufacturing a prosthesis, they are also very useful in orthodontics where determining treatment objectives remains the crucial factor.

In every case, Ditramax®[2] provides simple and useful data that complete the clinical examination where it is easy to make mistakes especially due to parallax. On the other hand, in cases of extreme dyssymmetry that affects the entirety of cranio-facial structures its usefulness is more limited (Fig. 8).

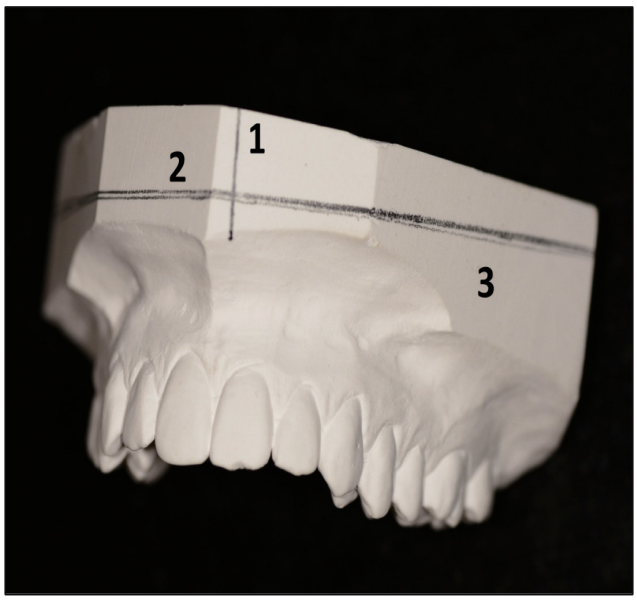

Figure 7
The vertical guide allows tracing of the median saggital plane (1). The horizontal guide laterally allows tracing of a line parallel to the plane of Camper (2) and anteriorly a line parallel to the bi-pupillary line (3). The divergence between the tracing and the base of the model clearly delineates the usefulness in linking its orientation to the anatomical landmarks of the face.

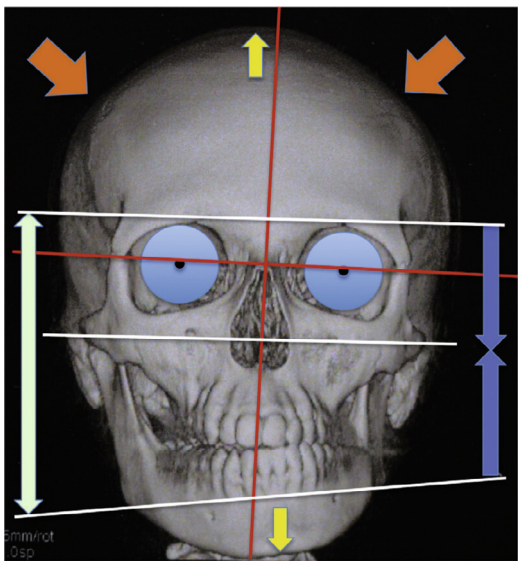

Figure 8
3D reconstruction from a scan of the face, frontal view. Image clearly visualizes the hypo-development of the left half of the face as compared to the right half. This asymmetry affects the whole cranio-facial complex as shown in the asymmetry of the vault (orange arrow) and the inversion of the obliqueness of the ''horizontal'' planes. In this particular case, the bi-pupillary landmark seems to reach its limits by accentuating a plane that contributes to the asymmetry. Its high location magnifies the deviation of structures that are the farthest from this line (chin, top of the skull shown by the yellow arrows).

The Ditramax® was designed by prosthetic technicians[4,5]. This tool is very available and easy to use. The system makes it possible to trace lines on the maxillary model that situates it in space in relationship to the particularities of the patient's face. This remedies the major defect of the American size orthodontic models that only have dento-dental reference points (plane of occlusion and the last lower molars). Planas had already proposed a spatial orientation in order to better take into account the dento-maxillo-facial architecture. The Ditramax® is a method that connects these three entities by adhering to classic orthodontic models.

We should keep in mind that as soon as we choose a point of view, we become dependent on it and this view can bias our perception. The comprehensive investigation discussed here generated by the clinical examination and completed by additional assessments is the tried and true way for arriving at a diagnosis.

REFERENCES

1. Margossian P, Laborde G, Koubi S, Couderc G, Maille G, Botti S, Dinardo Y, Mariani P. Communication des données esthétiques faciales au laboratoire de prothése : le systéme Ditramax®. Real Clin 2010;21:149-155.
2. Margossian P. Les références esthétiques et fonctionnelles en prothése fixée. Clinic 2010 ; cahier 1, vol 31:633-684.
3. Margossian P, Laborde G, Koubi S, Couderc G, Mariani P. Use of the Ditramax system to communicate esthetic specifications to the laboratory. Eur J Estht Dent 2011;6: 188-196.
4. Margossian P, Koubi S, Maille G, Loyer E, Laborde G, Laurent M. La communication cabinet/laboratoire clé du succés prothétique. L info Dentaire vol 94 ñ32-26 septembre 2012.
5. Simonet P. Réhabilitation bimaxillaire par CFAO. 25 Cas complexes en Implantologie Stratégie Thérapeutique 4, Espace ID.