

Evaluation of facial harmony after orthognathic surgery using Delaire craniofacial cephalometry. Part 1: skeletal balance

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Introduction: in orthognathic surgery, most of surgeons are used to plan the jaws' movements according to clinical parameters such as esthetic and dental relationships. This method, relying on personal experience, is thus subjective, and can hardly be taught to less experienced surgeons or be integrated to surgical planning software. In 1978, Delaire described a lateral cephalometry in which it was possible to figure out the optimal position of jaws, related to the skull base and vault, spine, and facial skeletal sub-units. A so called customized craniofacial drawing (CCFD) was defined to help orthodontist and surgeon to better characterize dentofacial deformities, and to predict skeletal and dental movements to perform. Few data asserting this method exist. The objective of this study was to validate a posteriori the use of CCFD in patients displaying a sound functional and aesthetic facial balance after orthognathic surgery. Materials and methods: fifty patients were selected by 12 surgeons among their best results in term of facial balance and dental relationships stability. Then CCFD was determined pre- and post-operatively on lateral cephalometries and compared to the real position of jaws. Differences in sagittal and vertical directions, and skeletal angulations were assessed by two examiners, and then relied to clinical results. Results: there were 33 females and 17 males, presenting pre-operatively bimaxillary retrusion, but no vertical anomaly such as long- or short face syndromes. Twenty-one bimaxillary surgeries (BIMAX), 19 bilateral sagittal split osteotomies (BSSO), 2 Le Fort I osteotomies (LFI), and 29 genioplasties were performed. Pre-operatively maxilla was located 6.23° posteriorly compared to the CCFD and 4.29° post-operatively ($p=0.0072$). Mandible was located 6.34° posteriorly preoperatively and 3.24° post-operatively ($p=0.0011$). Angle between maxilla and mandible was 4.91° pre-operatively, and 2.63° post-operatively ($p=0.0215$). Mandibular angle was 24.29° more than the CCFD pre-operatively and decreased to 12.12° post-operatively ($p=0.0191$). There was no significant difference regarding vertical parameters pre- and post-operatively. Genioplasty was significantly associated with skeletal balance's improvement. Discussion: Despite numbers of biases, this study tented to a posteriori validate the Delaire CCFD on a panel of patients operated by various surgeons, displaying personal decision making criteria, and using or not the

craniofacial cephalometric analysis for surgical planning. We assume that CCFD could help surgeons as well as engineers for orthognathic surgery planning.