

Can cone-beam computed tomography superimposition help orthodontists better understand relapse in surgical patients?

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This case report describes the interdisciplinary treatment of a 19-year-old Brazilian man with a Class I malocclusion, a hyperdivergent profile, an anterior open bite, and signs of temporomandibular joint internal derangement. The treatment plan included evaluation with a temporomandibular joint specialist and a rheumatologist, orthodontic appliances, and maxillomandibular surgical advancement with counterclockwise rotation. Cone-beam computed tomography images were taken before and after surgery at different times and superimposed at the cranial base to assess the changes after orthognathic surgery and to monitor quantitatively the internal derangement of the temporomandibular joints and surgical relapse. Our protocol can improve the orthodontist's understanding of surgical instability, demonstrate the clinical value of cone-beam computed tomography analysis beyond the multiplanar reconstruction, and guide patient management for the best outcome possible. (*Am J Orthod Dentofacial Orthop* 2014;146:641-54)

Maxillomandibular advancement has been associated with condylar changes particularly for patients with previous temporomandibular joint (TMJ) internal derangement.¹⁻³ Postsurgical condylar changes lead to skeletal and occlusal instability that can compromise surgical and orthodontic achievements.³ Orthodontists notice changes in occlusion progressively, and usually they are the professionals who will manage the instability after orthognathic surgery, at which time the surgical team is no longer seeing the patient frequently. The clinician must be able to identify any etiologic factors involved in the instability with the adequate knowledge and technology that each case requires to prevent or intercept

postsurgical complications. Orthodontic treatments that require surgical intervention should include cone-beam computed tomography (CBCT) to properly monitor bone segments and TMJ stability. Recent advances in 3-dimensional (3D) image assessments have allowed researchers and clinicians to see beyond cross-sectional images and switch from subjective conclusions to quantitative facts that can make significant differences for optimal patient care.⁴⁻⁷

This case report describes the relevance of a quantitative CBCT image analysis protocol (with freeware software only) and its clinical application used to minimize occlusal and skeletal disharmonies during postsurgical orthodontics and concomitant condylar osteoarthritic changes.

ETIOLOGY AND DIAGNOSIS

The patient was a 19-year-old Brazilian man. His medical history was noncontributory, and the extraoral examination showed a hyperdivergent facial profile, increased lower third of the face, labial incompetence, and increased nasolabial angle with the maxilla and mandible posteriorly positioned in the sagittal view. Intraorally, he had an anterior open bite, a deep curve of Spee in the maxillary arch, maxillary posterior teeth with excessive lingual crown inclinations, maxillary and mandibular midlines shifted 1 mm to the left, no significant transversal cant,

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All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

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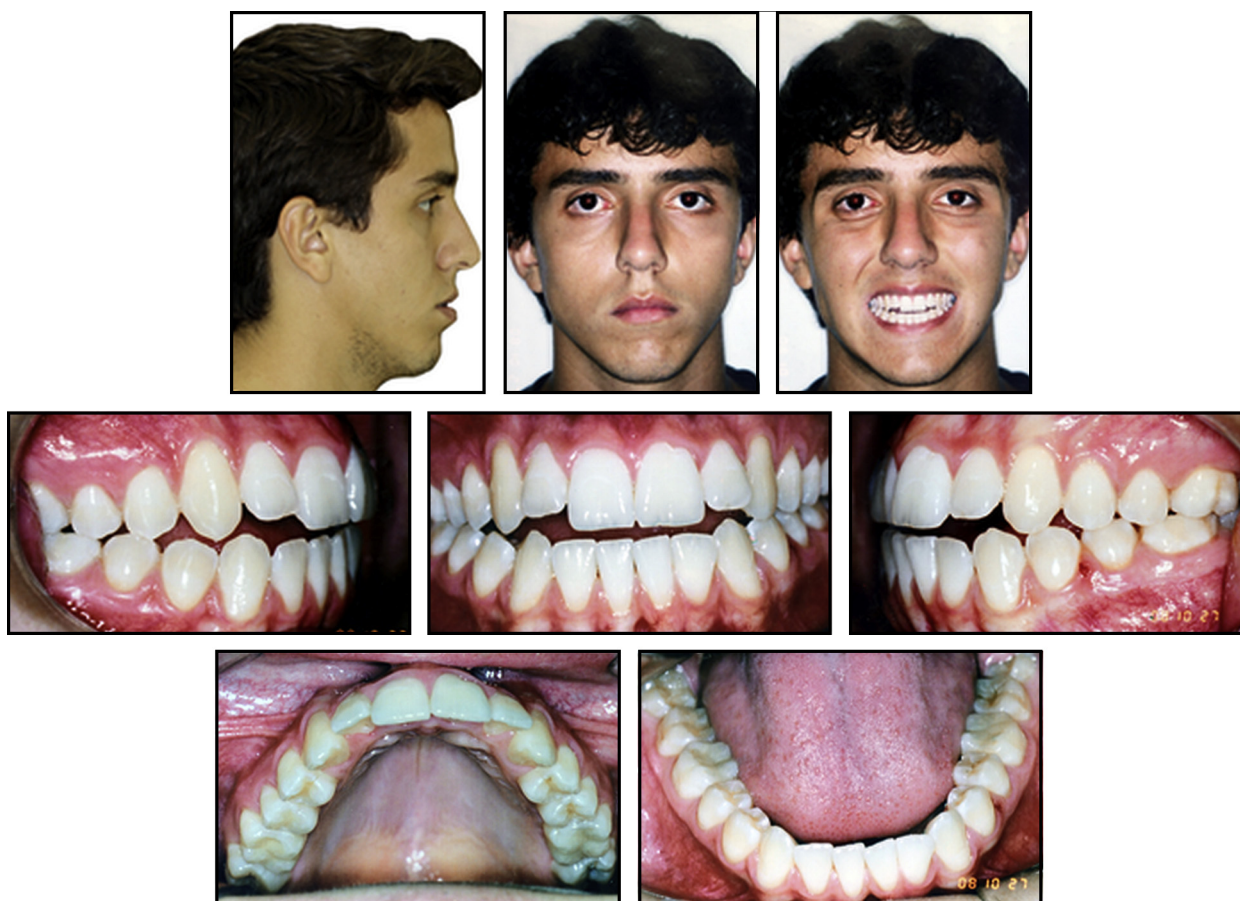


Fig 1. Pretreatment photographs: hyperdivergent facial profile, anterior open bite, no significant transversal cant, proclined maxillary and mandibular incisors, and Class I malocclusion.

proclined maxillary and mandibular incisors, and a Class I malocclusion (Figs 1 and 2).

The panoramic radiograph showed signs of left condylar remodeling, vertically positioned maxillary and mandibular third molars, and a mandibular arch fixed retainer (canine to canine) from previous treatment (Fig 3). The lateral cephalometric radiograph showed a narrow symphysis, proclined and protrusive maxillary and mandibular incisors, a long soft palate, decreased retroglossal and retropalatal airway spaces, and an increased mandibular occlusal plane angle (Fig 4). Previous treatment relapses causing open bite and poor facial esthetics were the main concerns for a new orthodontic treatment.

The physical examination of the patient showed signs of TMJ internal derangement that suggested further investigation with a magnetic resonance imaging (MRI) evaluation. Slight articular disc displacements with reduction were observed on the right and left TMJs with both discs' morphology preserved (Fig 5). The

left fast spin echo weighted MRI immediately after surgery showed a level 1 hypersignal on the upper and lower TMJ compartments (Fig 5, C).⁸⁻¹⁰

TREATMENT OBJECTIVES

The treatment objectives were to (1) improve facial appearance, (2) achieve normal overbite and overjet, (3) improve chin projection, (4) obtain lip competence, and (5) reduce the proclination of the maxillary and mandibular incisors.

TREATMENT ALTERNATIVES

Intrusion of the maxillary and mandibular posterior teeth with temporary anchorage devices is an alternative for the treatment of anterior open bite in adults. Although the technique is not new, the immediate results are not predictable, and long-term results have yet to be published. Additionally, facial improvement would be restricted to mandibular counterclockwise rotation with

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