

AAO Foundation Award Final Report

Principal Investigator	Tung Nguyen
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Secondary Investigators	Lucia Cevidanes
Award Type	Orthodontic Faculty Development Fellowship
Project Title	The use of Shape Correspondence Analysis to Quantify Skeletal changes Associated with Bone-Anchored Maxillary Protraction
Project Year	July 2011 to June 2012
Institution	University of North Carolina at Chapel Hill
Summary/Abstract (250 word maximum)	<p>Introduction: Conventional treatment for young Class III patients involves extra-oral devices designed to either protract the maxilla or restrain mandibular growth. The use of skeletal anchorage offers a promising alternative to obtain orthopaedic results with less dental compensations.</p> <p>Aims: To evaluate 3-D changes in the mandible and the glenoid fossa of Class III patients treated with bone-anchored maxillary protraction (BAMP).</p> <p>Methods: 25 consecutive skeletal Class III patients between the ages of 9 and 13 (mean age 11.10 +/- 1.1 years) were treated using Class III intermaxillary elastics and bilateral miniplates (2 in the infra-zygomatic crests of the maxilla and 2 in the anterior mandible). The patients had CBCTs taken before initial loading (T1), and at the end of active treatment (T2). 3-D models were generated from the CBCTs, registered on the anterior cranial base and analyzed using color-maps.</p> <p>Results: Posterior displacement of the mandible at T2 was observed for all subjects (mean 2.74mm, +/- 1.36mm for posterior ramus, 2.07mm, +/-1.16mm for the condyles and -0.13mm +/- 2.89mm for the chin). Remodeling of the glenoid fossa at the anterior eminence (mean 1.38mm, +/- 1.03mm), and bone resorption at the posterior wall (mean -1.34mm +/- 0.6mm) was observed in most patients.</p> <p>Conclusion: This new treatment approach offers a promising alternative to restrain mandibular growth for Class III patients with a component of mandibular prognathism or midface deficiencies. Future studies with long-term follow-up and comparisons to facemask and chin cup therapies are needed to better understand the treatment effects.</p>
Were the original, specific aims of the proposal realized?	It was a productive year for our group. We developed software to analyze and measure 3-D shape correspondence changes between pre-treatment and post-treatment CBCTs from our BAMP sample.

	<p>This technology is more accurate than closest point, manual point to point or region to region 3-D measurements. This technology allowed us to look at global as well as regional skeletal changes in the mandible and condyles. A manuscript detailing the research has been prepared and will be submitted soon.</p>
<p>Were the results published? If not, are there plans to publish? If not, why not?</p>	<p>A paper on “Mandibular and Glenoid Fossa Changes in 3D following Bone Anchored Class III Intermaxillary Traction” was accepted and will be published in the July issue of the AJODO. In addition, a manuscript on “Shape Correspondence Analysis of BAMP” has been prepared and will be submitted by the end of July. We are also working on another manuscript with “3-D Cephalometric Analysis of BAMP”.</p>
<p>Have the results of this proposal been presented? If so, when and where? If not, are there plans to do so? If not, why not?</p>	<p>The results from the AAOF Award were presented at the American Association of Orthodontist meeting (2011, Chicago), the 2011 International Association of Dental Research meeting (San Diego), Southern Association of Orthodontists Annual meeting (2011, Boca Raton) Biennial Burststone Symposium (2011, Indianapolis) and the 39th Annual Moyer’s presymposium (2012, Ann Arbor).</p>
<p>To what extent have you used, or how do you intend to use, AAOF funding to further your career?</p>	<p>AAOF funding allowed me to carry out pilot studies which will be used to submit a NIH R21 grant. 3-D image analysis is a time consuming task and AAOF funding has allowed me to hire assistants to carry out this work. This leaves me time to write manuscripts and focus on developing new teaching materials for residents and dental students. It has also provided the funding needed to present my research at national and international meetings to help establish my name as a clinical researcher. Without the support from the AAOF, I would not have the time or resources to conduct research and disseminate the findings to our colleagues.</p>