

AAO Foundation Award Final Report

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Award Type	Orthodontic Faculty Development Fellowship
Project Title	Airway Changes Associated with Bone-Anchored Maxillary Protraction
Project Year	July 2012 to June 2013
Institution	University of North Carolina at Chapel Hill
Summary/Abstract (250 word maximum)	<p>Objective: To evaluate skeletal changes in the mandible of Class III patients treated with bone-anchored maxillary protraction using 3-D shape correspondence analysis.</p> <p>Material & Method: 25 consecutive skeletal Class III patients between the ages of 9 and 13 (mean age 11.10 +/- 1.1years) 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 one year out (T2). 3-D models were generated from the CBCTs, registered on the anterior cranial base and analyzed using SPHARM-PDM shape correspondence.</p> <p>Results: Bone-Anchored traction produced sagittal and vertical skeletal changes in the mandible. The posterior ramus was displaced distally and 3.6mm (SD+/-1.4) while the chin was restrained distally 0.5mm (SD+/- 3.92). The lower border of the mandible at Menton was displaced inferiorly by 2.6mm (SD +/-1.2) while the lower border by Gonion move downward by 3.6mm (SD+/-1.4) suggesting a closure of the mandibular plane angle. The condyles were displaced distally by an average 2.6mm (SD+/- 1.5mm) with 3 distinct patterns for displacement (44% posteriorly, 40% downward and backwards and 16% superior and posterior displacement). Vector SPHARM-PDM analysis showed a downward and backward displacement around Gonion producing a 2.1 degrees closure of the gonial angle.</p> <p>Conclusion: This treatment approach induces a favorable control of the growth of the mandible and can be used to treat patients with components of mandibular prognathism.</p>
Were the original, specific aims of the proposal realized?	We were fortunate to have another productive year and accomplished the primary aims for this proposal. We published a paper on the development of Shape Correspondence tools to evaluate 3-D growth

	and treatment changes. We developed new software for image segmentation and visualization and released it to the public as a free open-source software. Two manuscripts detailing airway research have been prepare and will be submitted soon.
Were the results published? If not, are there plans to publish? If not, why not?	A paper on “Mandibular and Glenoid Fossa Changes in 3D following Bone Anchored Class III Intermaxillary Traction” was published in the July issue of the AJODO. In addition, a manuscript titled “The Use of Shape Correspondence Analysis to Quantify Skeletal Changes Associated with Bone-Anchored Class III Correction” was submitted to the Angle Orthodontist in April. We are also preparing 2 manuscripts on Airway volume changes with growth and BAMP treatment.
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?	The results from the AAOF Award were presented at the 2012 International Association of Dental Research meeting (Brazil), 2013 IADR meeting (Seattle), the 2012 Joint Cephalometric Group meeting (Cleveland) and the upcoming 2013 Burstone Symposium (Indianapolis).
To what extent have you used, or how do you intend to use, AAOF funding to further your career?	AAOF funding allowed me to carry out pilot studies and published manuscripts with the eventual goal of apply for an R21 funding and an STTR grant. AAOF funds made it possible to disseminate our findings to orthodontists at national and international meetings. We used a portion of the funds to hire a computer scientist to help us develop segmentation and registration software to be used in 3-D orthodontic research and possibly daily clinical orthodontics. Without the support from the AAOF, I would not have the time or resources to conduct research and disseminate the findings to our colleagues.