Orthodontic Faculty Development Fellowship Award

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Biography

I received my BDS from Mahatma Gandhi Postgraduate Institute of Dental Sciences and MDS in Orthodontics from SDM College of Dental Sciences in India. I moved to the United States in 2012 and completed two fellowships in Orthodontics from UT Health San Antonio and the University of Connecticut Health. I then went on to complete my Master's degree in Dental Sciences and Certificate in Orthodontics from the University of Connecticut. I am currently a full-time Assistant Professor in the Division of Orthodontics at the University of Nebraska Medical Center - College of Dentistry. My time is divided between didactic teaching for both undergraduate and graduate students (orthodontic and pediatric residents) as well as clinical teaching, research and service activities.

As a researcher, I perform clinical and translational research mainly in the area of orthodontic biomechanics. It combines my interest in physics and orthodontics and has direct clinical implications where I am able to apply the results of my research in the residency clinic and my private practice at the college, in order to get more predictable tooth movement.

Project Synopsis

In order to understand the complex -*statically indeterminate force systems* that are commonly used in everyday orthodontic clinical practice, we need to understand the biomechanics produced in the two-bracket force system first. It is analogous to understanding of the role of a single cell of the body in order to understand the more complex organ systems.

My Master's research focused on 3D evaluation of the two-bracket force system when a V-bend was placed between brackets which were in different planes of space using an orthodontic testing apparatus. The methodology and results of my previous study form the foundation of the proposed project which aims to assess the biomechanics of a commonly used V-bend in clinical orthodontics called the tip-back bend. Our current understanding of the biomechanical principles of the tip-back bend are derived from a one-dimensional analysis of the appliance and concepts of statically determinate (one-couple) force systems. Although, it explains most of the tooth movements due to tip-back mechanics, it assumes a simplistic understanding of the force system involved. Historically, it has been impossible to measure the force system created by the brackets and archwires 'in vivo', primarily due to technological constraints. Conversely, it has also not been possible to measure clinical outcomes (i.e. tooth movement) 'in vitro' as it would involve recreation of the biological apparatus (tooth, periodontal ligament, bone etc.). Hence, there does not exist any clinical evidence to either support/refute the assumption that the type of tooth movement predicted by a force system actually occurs at the clinical level. This research would

be the first of its kind to bridge this gap in our analysis of how a force system results in a particular type of tooth movement. In the current project, we will analyze the force system of tip-back mechanics, create a prediction model based on the measured force system and verify this model with clinical data. The primary goal is to compare the theoretical deductions based on carefully measured force systems and the outcomes measured from clinical data.

Importance of AAOF Funding

It has been a dream realized for me, both as a resident, and now as a junior faculty to be able to perform biomechanics-based research. At the same time however, it has been extremely challenging due to the esoteric nature of this research. I am extremely thankful to AAOF for supporting the project through the Orthodontic Faculty Development Fellowship Award as it will help me pursue my research goals. The funding is crucial for junior faculty like me as it will help me not only carve a path as an independent investigator in the area of my interest, but also enable my overall development as an academic educator and I am truly grateful to be a recipient of this award.