Title: Changes in cephalometric measurements in adult patients following orthodontic treatment with premolar extractions versus non-extraction

Authors: Byron Chou[1], David Dang[1], Adrienne Joy[2], Joorok Park[2], David Chambers[2], Heesoo Oh[2]

[1] Doctor of Dental Surgery Program, [2] Department of Orthodontics, University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco, CA

INTRODUCTION: Extraction of premolars is indicated as part of orthodontic treatment for patients who have severe crowding or protrusion of incisors. CBCT can be used to locate cephalometric landmarks in 3D. The purpose of this study was to determine whether there are differences in sagittal, transverse, and vertical skeletal and dental dimensions for adult patients who were treated with premolar extractions in conjunction with orthodontic treatment compared to those who received orthodontic treatment without extractions.

METHODS: Pre- (T1) and Post-treatment (T2) CBCTs were collected for adult patients who received comprehensive orthodontic treatment in the Orthodontics clinic at our program. There were 20 patients in the experimental (extraction) group and 17 patients in the control (non-extraction) group. All patients were at least 18 years old at the initiation of orthodontic treatment. 49 anatomic landmarks were located on each CBCT by three judges. A total of 5 judges participated in location of landmarks. 51 measurements between skeletal and dental landmarks were evaluated to analyze changes in sagittal, transverse, and vertical dimensions. Statistical analyses were performed using t-tests to determine differences in the means of measurements between the two groups. Significance was reported at $p \leq 0.05$.

RESULTS: There were significantly more male patients in the non-extraction group compared to the extraction group. When analyzing the differences that occurred during treatment (T2-T1), the extraction group had significantly reduced upper and lower incisor proclination, reduced arch depths and arch widths, and greater retraction of upper and lower incisors compared to the non-extraction group. Treatment duration of extraction cases was also significantly longer compared to non-extraction by an average of 1.4 years.

CONCLUSIONS: There were several significant dental changes but no significant skeletal changes after orthodontic treatment when comparing patients who had extractions versus non-extraction controls. Orthodontic treatment with extractions takes longer than non-extraction treatment.