



CFAO GRADUATE STUDENT POSTERBOARD ABSTRACTS

Sponsored By: 

Western University

Diagnostic Ultrasound in the Measurement of Cortical Bone Thickness in Porcine Mandibular Specimens

Diego Diaz Guerrero
The University of Western Ontario
Supervisor
Tassi, A.
The University of Western Ontario

Introduction: Ultrasound (US) is a safe, non-invasive diagnostic method that has been used in various capacities in medicine and dentistry. Periodontal bone loss, bony dehiscence, and gingival recession have been reported as potential risks of orthodontic treatment in patients who have decreased buccal/labial bone thickness. US has the potential to aid in the diagnosis of patients at risk for these possible complications of orthodontic treatment.

Purpose: To validate the use of a novel US device in the measurement of buccal cortical bone (BCB) thickness over roots in porcine mandibles.

Materials and Methods: Jaw and cortical bone models were constructed and used for software and protocol refinement. Three porcine hemi-mandibles were scanned with Micro-CT (μ -CT). BCB thickness was measured with imaging software at 12 locations per specimen ($n=36$). BCB thickness at these locations was then assessed using a 19MHz pulse-echo US transducer. Bone thickness was determined by assessing US wave time of flight using a calibrated speed of sound (SOS) through porcine cortical bone. Statistical analysis was done with paired t-test, Pearson correlation, and Bland-Altman plots.

Results: SOS was calibrated to 3235m/s. Mean bone thickness (+/- SD) from μ -CT was 2.06 +/- 0.76mm and 1.61 +/- 0.46mm from US. μ -CT and US thickness measurements were significantly different.

Conclusion: A handheld US device showed promise in measuring BCB thickness, but some variability exists especially when measuring thicker bone. Further improvements in the device and the algorithms used are warranted to increase the accuracy and reliability of measuring cortical bone thickness overlying roots of teeth.

Keywords

Diagnostic Ultrasound, Intra-oral Ultrasound, Cortical Bone Thickness, Periodontal Assessment, Orthodontic Complications