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AN *IN-VITRO* INVESTIGATION OF MECHANICAL MEASURES USED TO ASSESS ORTHODONTIC MINI-IMPLANT STABILITY

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Stability of orthodontic mini-implants used for skeletal anchorage is achieved by mechanical retention that occurs at the implant-bone interface. Within the literature, numerous techniques for measurement of mini-implant mechanical stability have been utilized; however, few studies have compared these mechanical measures to determine their agreement in predicting mini-implant success. This study aims to investigate the various methods currently available to assess orthodontic mini-implant stability.

Self-drilling mini-implants from three different manufacturers (Aarhus, Medicon; Dual-Top, Jeil Medical Corporation; OrthoEasy, Forestadent) will be inserted into artificial bone blocks (Sawbones[®], Pacific Research Laboratories) using a custom-made device. A load sensor (6 DOF, Advanced Mechanical Technology Inc.) at the base of the bone block will measure insertion torques experienced during mini-implant insertion. Immediately following insertion, mini-implant mobility will be assessed using the Periotest[®] Stability Measurement System (Periotest[®], Medizintechnik Gulden). Subsequently, the inserted mini-implant will be placed in a materials testing machine (8874 Axial-Torsion System, Instron[®]) for pull-out testing. During pull-out testing, an optical measurement system will be used to track the displacement of the mini-implant relative to the surrounding bone block. Multiple Bland-Altman plots will be used to determine agreement between the various stability measures, and intraclass correlation coefficients (ICC) will be used to assess the reliability of the various measures, for each mini-implant group tested.

Statistical comparisons of the stability measures are expected to show varying degrees of agreement and reliability. Overall, it is anticipated that this study will provide useful information to researchers and clinicians when deciding on appropriate measures to be used in determining mini-implant stability