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Frequency Assessment of  
One-Piece Implants”\*

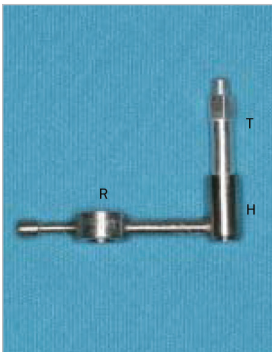
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## “A Novel Device for Resonance Frequency Assessment of One-Piece Implants”



The external fixation device is composed of an affixing ring (R) coupled to an internal-hex ring (H). The transducer (T) is mounted on the remote internal-hex ring.



The external fixation device is attached to a one-piece dental implant abutment via the affixing ring and screwed on tightly.

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### ABSTRACT.

#### Purpose

Immediate loading and/or restoration of dental implants requires the assessment of implant stability, which is best performed by resonance frequency analysis (RFA) prior to loading. One-piece dental implants are usually used for immediate loading, but there is currently no available reliable method to assess the primary stability of one-piece dental implants. Therefore, this study sought to validate a novel device designed for RFA measurements of one-piece implants.

#### Materials and Methods

Thirty (3.75 X 13mm) internal-hex implants (SEVEN, MIS) were divided into two groups; 15 were placed in the acrylic glass block and 15 were placed in fresh porcine jawbone using 30 N/cm<sup>2</sup> of insertion torque. Implant stability quotient (ISQ) values were measured using the Osstell mentor device; then, a new external fixation device was attached to the implant abutment with a 10-mm arm extending from the implant to an internal-hex ring at its proximal end. ISQ values were measured at the implant's internal hex and at the internal hex of the device, and the damping ratio was calculated. The measurements were repeated with 15 (3x13mm) one-piece implants (UNO, MIS) attached to the same device.

#### Results

The damping ratio between the implant and the proximal device was 23.6%± 4% in acrylic glass (50.1 ± 1.7 ISQ and 38.2 ± 1.8 ISQ, respectively) and 2.31% ± 3% in porcine bone (74.9 ± 2.8 ISQ and 57.5 ± 0.5 ISQ, respectively). ISQ values determined by the device on one-piece and two-piece implants were similar (57.4 ± 0.9 and 57.5±0.5, respectively).

#### Conclusion

With the present validation of this external fixation device for the measurements of implant stability using RFA, it is now possible to measure primary stability of any one-piece implant system, obviating the need for custom-made Osstell adaptors.