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Torque expression advantages in 0.020 inch slots' brackets: a theoretical model

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INTRODUCTION.

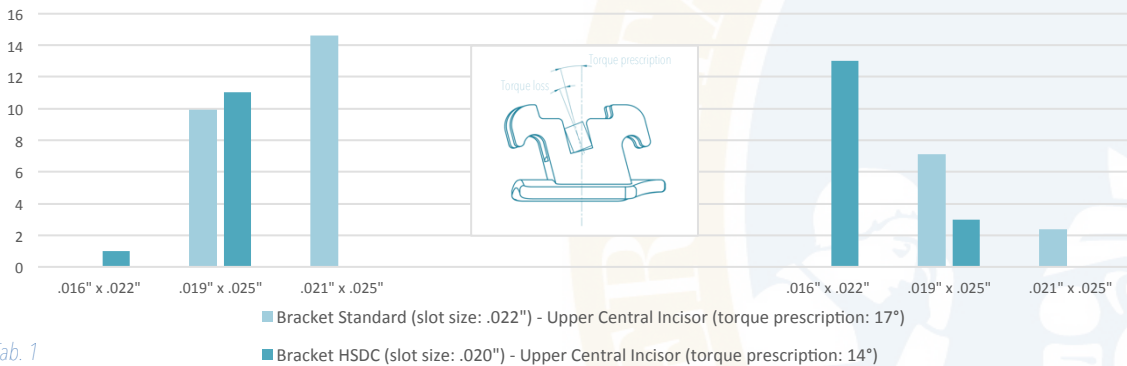
In the straight-wire technique, brackets are pre-programmed with informations, which are expressed thanks to interplay between the archwire and slot, a function of their respective geometries and sizes¹. For a complete transmission of information, from the appliance to the teeth, the archwire dimension must coincide as closely as possible with those of the bracket slot²: this is gradually achieved increasing the archwire dimensions during the treatment³.

AIM.

The purpose of this study is to predict the amount of torque expression using differently sized archwires in combination with different bracket slots (0.020"; 0.022").

MATERIALS AND METHODS.

The predictive torque expression or loss is determined using a CAD software (Inventor Professional Suite, Autodesk Inc., San Rafael, CA). The angle between the axis of the bracket slots and the axis of differently sized archwires was calculated: the resulting values represent the so-called "play".



Tab. 1

RESULTS.

Theoretical model shows a tangible advantage in torque expression using the 0.019" x 0.025" archwire paired with undersized slots' brackets (0.020"), if compared with conventional ones (0.022") (Tab. 1).

DISCUSSION.

The dimensions of the final working archwire never reach the whole dimensions of the bracket slot: a percentage of the torque built into the bracket is lost due to the "play"³, defined as the angle of freedom of the wire within the bracket slot. Literature has revealed that there is a considerable discrepancy between the theoretical and the measured bracket/archwire play⁴. Differences can be attributed to intrinsic variations in archwire cross-sectional diameters, bracket slot dimensions, archwire edge beveling, and bracket deformations. Other factors also have an impact on third-order moments, including bracket placement errors and irregularities in tooth morphology³.

CONCLUSIONS.

The use of undersized slots, especially in the frontal teeth, would provide a better expression of third order information. Further research should deepen the topic in experimental and clinical way.

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