COMMENTARY

FRACTURE STRENGTH OF ENDODONTICALLY TREATED TEETH WITH FLARED ROOT CANALS AND RESTORED WITH DIFFERENT POST SYSTEMS

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For a variety of reasons, information about the clinical performance of new endodontic post systems is relatively scarce. Long-term prospective clinical studies of post and core restorations can be very costly and of questionable value to sponsoring agencies (mostly manufacturers). By the time a prospective clinical study is completed and the results are reported, often the technology is no longer novel or relevant. Manufacturers are therefore reluctant to support such longitudinal studies. Short-term clinical studies are more feasible financially but may offer limited value. In the case of post and core restorations, most post failures may occur after a number of years in service, so short-term studies are unlikely to demonstrate a difference between the new technology and the known control.

This is why laboratory studies of new technologies are valuable: they are more feasible financially and within a shorter period may yield useful and predictive information on the performance, ease of use, optimal procedure, indications, etc. This is applicable to new endodontic post systems as well, where in vitro mechanical testing, adhesion testing, effect of cyclic loading, etc. can generate comparative predictive data.

Simulating clinical conditions in vitro is not a simple task. Several elaborate attempts at creating "artificial mouths" have generated expensive devices that would only allow testing one sample at a time. Most researchers therefore resort to simpler and less costly testing methods that are easier to accomplish but may hold less predictive value in regard to clinical performance.

The current article describes a study that utilized static mechanical stressing to assess the fracture resistance of teeth restored with three post systems. The authors confess that the use of cyclic loading would be of more predictive value because in the oral cavity, restorations are subjected to cyclic stresses and are likely to exhibit fatigue failure. But cyclic fatigue testing requires expensive equipment and longer testing, obviating the option for many investigators.

The results of this study demonstrated that the traditional cast post and core group had a higher (static) resistance to fracture than the groups restored with the two kinds of reinforced resin posts. Because all teeth were prepared internally to simulate the excessive loss of tooth structure, the study essentially compared the strength of oversized metallic cast posts with standard-size prefabricated fiber-reinforced resin posts, hence the differences in fracture resistance. A contributing factor in generating these results was the absence of a ferule in the crown preparation. Without a ferule, the lower modulus resin posts tend to bend, resulting in the failure of the thin remaining tooth structure (close to the crown margins). This failure pattern, located mostly in the cervical region of the tooth, allows remedial treatment with a new restoration. The oversized cast post with a substantially higher cross-sectional dimension in the coronal section does not yield to the bending forces, transferring the stresses into the root (where indeed most fractures occurred). The use of a ferule in the preparations would have enhanced the predictive value of this study.

Perhaps the most important lessons from this in vitro study are that fiber-reinforced resin posts may not offer sufficient stiffness and load resistance to highly compromised, structurally deficient pulpless teeth, but they significantly lower the likelihood of root fracture under aggressive loading.

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