Short Communication

Comparison of the Retention of 5 Core Materials Supported by a Dental Post

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Purpose: This study evaluated the retention of dental post heads (No. 2 Flexi-Post) embedded in 5 core materials (1 automix resin composite, 2 hand-mixed resin composites, and 2 glass ionomers). ***Materials and Methods:*** Samples were prepared by embedding post heads in 4.5-mm-thick disks of core material. ***Results:*** The resin composite materials provided significantly more retention than the glass-ionomer–based materials. The post head retention of the automix resin composite was comparable to that of the hand-mixed resin composites. ***Conclusion:*** Unlike the resin composite samples, all the glass-ionomer samples fractured during testing. This is an unacceptable condition for a clinically successful restoration. *Int J Prosthodont 2006;19:183–184.*

The ability of a post-and-core system to endure a range of occlusal loads and remain intact is critical for the survival of a restoration.[1,2] The purpose of this study was to investigate the post head retention threshold of 3 types of restorative materials (flowable automix resin composite, traditional hand-mixed resin composite, and glass ionomer) with a multitiered, threaded, split-shank post. The hypothesis is that because the automix resin composite is more flowable than the hand-mixed resin composites, the post head retention of the automix resin composite should be lower than that of the traditional resin composites and perhaps even lower than that of the glass ionomers.

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Some results from this investigation were presented at the 83rd General Session and Exhibition, International Association for Dental Research, Baltimore, March 9–12, 2005.

Materials and Methods

Five post-and-core groups of 10 specimens each were examined. The following core materials were used: 1 flowable automix dual-curing resin-based core material (Ti-Core Auto E, Essential Dental Systems); 2 self-curing resin-based core materials (Ti-Core and Ti-Core Natural, Essential Dental Systems); and 2 glass-ionomer–based core materials (Ketac-Silver GIC, 3M/ESPE and GC Miracle Mix GIC, GC Corp). All core materials were prepared according to their manufacturer's instructions. The size of the core material was standardized using a 4.5-mm-thick metal mold with an 8-mm-diameter hole. The Ti-Core Auto E was light cured (Optilux 400, Demetron Research Corp) for 40 seconds. A multitiered, split-shank threaded post (No. 2 Flexi-Post) was used. For all test groups, the heads of the posts were placed into the core material perpendicular to the surface.

The core material/post combinations were allowed to set for 1 hour and then placed into distilled water for 2 weeks. The resin composite–based core material specimens were air dried before testing. The glass-ionomer core material specimens were tested while wet. The specimens were placed into a special jig, and retention tests were performed on a universal testing

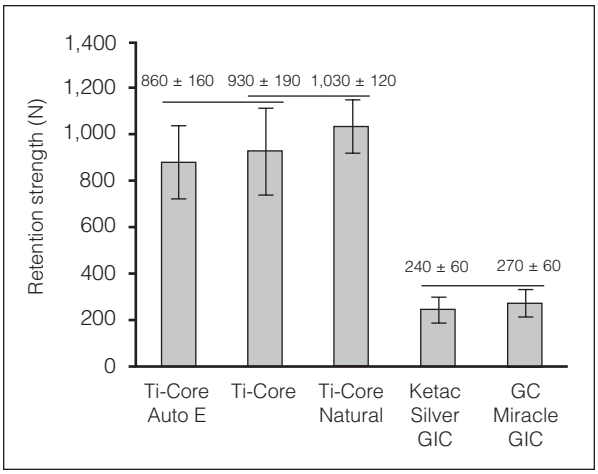

Fig 1 Post head retention strength of the core materials with No. 2 Flexi-Post design. Strength values connected by horizontal significance bars are not statistically different.

machine (810 MTS, Material Test System Corp). The posts were pulled out of the core materials using a crosshead speed of 0.635 cm/min until failure. Test specimens were considered to have failed when the cores separated from the post or post failures occurred.

One-way analysis of variance (ANOVA) was used to test the effect of the core material on the post head retention strength. A significant ANOVA result was followed by the Student-Neuman-Keuls multiple comparisons test. If $P < .05$, the results were considered statistically significant.

Results

Failure occurred when the core was displaced from its corresponding post head; no post failures were observed. None of the resin-based core material samples fractured during testing. However, all the glass-ionomer core material samples fractured during testing.

Figure 1 lists the mean post head retention. The post head retention of the resin-based core materials was significantly higher than that of the glass-ionomer–based core materials. Statistically, the post head retention of the Ti-Core Auto E was lower than that of Ti-Core Natural (85% of the Ti-Core Natural), but it was not statistically significantly different from that of Ti-Core.

Conclusions

Resin-based core materials, both traditional and automix, perform much better than glass-ionomer materials in terms of post head retention strength. The post head retention strength of the flowable automix core material was comparable to that of traditional resin-based core materials.

Clinical Relevance

The key to the clinically successful restoration of an endodontically treated tooth lies in the use of a selected core material that does not fracture away from the post. These findings in vitro suggest that all the reinforced composite core materials performed in a manner consistent with clinical success; however, all the glass-ionomer core materials fractured away from the post. This is an unacceptable condition for a clinically successful restoration.

References

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