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Fracture Resistance of Endodontically Treated Tooth Restored with Fiber Reinforced Composite Core and Crown at Different Heights of Ferrule

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Abstract
Aims: The aim of this study was to compare the fracture resistance of endodontically treated teeth restored with fiber-reinforced composite core and crown using different postmaterials at different ferrule heights. Materials and methods: A total of 49 extracted single-rooted lower premolar teeth were grouped into control (sound teeth), prefabricated fiber posts—IA (no ferrule), IB (2 mm ferrule), IC (3 mm ferrule), and prefabricated metal posts—IIA (no ferrule), IIB (2 mm ferrule), IIC (3 mm ferrule), with seven teeth for each group. After root canal treatment, posts were cemented, fiber-reinforced composite cores were built-up, and then metal crowns were cemented. Teeth were subjected to thermal cycling and compressive load until fracture. Results: The control group exhibited the highest mean [standard deviation (SD)] fracture resistance [1041.31N (± 278.40)]. For comparison of the mean fracture resistance between fiber and metal posts at different heights of ferrule restored with fiber-reinforced composite cores, a significant difference was observed at 0 mm ferrule (p = 0.003). The association between fracture mode and types of prefabricated post was significant at 0 mm ferrule (p = 0.026). All teeth in fiber posts group had favorable fracture mode. Conclusion: In the presence of ferrule, the fracture resistance of endodontically restored teeth with fiber posts and fiber-reinforced composite cores was comparable to those restored with metal posts. The favorable fracture mode occurred in teeth restored with fiber posts and fiber-reinforced composite cores, either with or without the ferrule. Clinical significance: The fiber-reinforced composite cores increased the fracture resistance of tooth restored using fiber post with the presence of ferrule and resulted in favorable fracture mode in teeth with or without the ferrule. In the clinical situation, this material has the potential to be used for a core material in combination with the use of fiber posts for endodontically teeth with compromised coronal tooth structure.

Author Keywords
Ferrule; Fiber post; Fiber-reinforced composite; Fracture resistance; Metal post

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