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[\[Image PDF \(1325K\)\]](#) [\[References\]](#)**Non-linear Viscoelastic Finite Element Analysis of the Effect of the Length of Glass Fiber Posts on the Biomechanical Behaviour of Directly Restored Incisors and Surrounding Alveolar Bone**[Marco FERRARI](#)¹⁾, [Roberto SORRENTINO](#)¹⁾²⁾, [Fernando ZARONE](#)²⁾, [Davide APICELLA](#)³⁾, [Raffaella AVERSA](#)⁴⁾ and [Antonio APICELLA](#)⁵⁾

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Abstract:

The study aimed at estimating the effect of insertion length of posts with composite restorations on stress and strain distributions in central incisors and surrounding bone. The typical, average geometries were generated in a FEA environment. Dentin was considered as an elastic orthotropic material, and periodontal ligament was coupled with nonlinear viscoelastic mechanical properties. The model was then validated with experimental data on displacement of incisors from published literature. Three post lengths were investigated in this study: root insertion of 5, 7, and 9 mm. For control, a sound incisor model was generated. Then, a tearing load of 50 N was applied to both sound tooth and simulation models.

Post restorations did not seem to affect the strain distribution in bone when compared to the control. All simulated post restorations affected incisor biomechanics and reduced the root's deforming capability, while the composite crowns underwent a higher degree of deformation than the sound crown. No differences could be noticed in incisor stress and strain. As for

the influence of post length, it was not shown to affect the biomechanics of restored teeth.

Key words:

[Periodontal ligament viscoelasticity](#), [Post length](#), [Finite element analysis](#)



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