Abstract

The aim of this study was to examine the role of chemical compositional changes and iatrogenic dentin structural loss on the mechanical response of teeth to force and resistance to fracture. The experiments were divided into three phases. In phase 1, experimental studies were performed to evaluate the effect of chemicals used during treatment on ultrastructure, composition and resistance to fracture of dentin. In phase 2, experimental studies were used to evaluate the influence of dentin removal and remaining dentin volume on the resistance to fracture and microcrack formation in root dentin. In phase 3 finite element analysis was carried out to examine the influence of dentin loss on the stress distribution in root dentin. The combination of experimental and numerical analysis highlighted the role of remaining dentin volume and moment of inertia on root dentin biomechanics.