

## **Influence of post material and length on endodontically treated incisors with a considerably bone loss**

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### **Keywords**

Post length, post material, bone loss, FE

### **Objectives**

To analyse, using a finite element (FE) approach, the influence of post material and length on the mechanical response of endodontically treated teeth, which have suffered a considerably bone loss.

### **Materials and Methods**

A FE model of a maxillary central incisor, restored with a prefabricated post, was used. This model has been properly validated in previous works.

A loss of the maxillary bone till half of the root length was considered. Simulations were performed for two different post materials: stainless steel and glass fibre. Three intraradicular post lengths were studied: 3.3, 6.6 and 10mm. The tooth was loaded with a 300N oblique force (50° to the radicular axis).

## Results

Stresses in dentine and post cement were approximately three times higher in the case of the bone loss than those in the intact bone case. For both post materials, a stress concentration was observed in the vestibular side of the dentine, around its insertion into the bone. For the stainless steel post another stress concentration was observed around the apical post end, which increased with post length.

Maximal stresses in dentine were not influenced by post length while maximal stresses in post cement were affected, especially in the case of stainless steel post.

		Post length (mm)		
		3,3	6,6	10
Dentine stresses (MPa)	Stainless steel	223	231	245
	Glass Fibre	223	230	245
Post cement stresses (MPa)	Stainless steel	85	209	310
	Glass Fibre	54	105	138

## Conclusions

Comparable root fracture resistance was found for both post materials. Debonding of the post depended on both length and post material.

## Clinical relevance

For a long term restoration, when a maxillary bone loss may occur, fibre posts seem to be an interesting option.