Short Communication

Radiopacity of Nonmetallic Root Canal Posts

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Purpose: This study determined the radiopacity of a group of nonmetallic posts. ***Materials and Methods:*** Four specimens were cut from 7 posts, and tooth sections were cut from extracted teeth. Radiographic images of all specimens along with an aluminum step wedge were obtained on occlusal films. Optical density readings for each specimen image were determined with a transmission densitometer. Radiopacity values were subsequently calculated as equivalents of aluminum thickness. ***Results:*** Analysis of variance revealed significant differences in radiopacity values among the posts ($P < .001$). One nonmetallic post that was made of zirconium had a radiopacity value significantly greater than that of enamel. Another, made of glass fibers, acrylic resin, and fillers, had a radiopacity that was greater than that of dentin but smaller than that of enamel. The remaining 3 nonmetallic posts had radiopacity values lower than dentin. ***Conclusion:*** The 3 posts with radiopacity that was lower than dentin cannot be considered sufficiently radiopaque. *Int J Prosthodont 2006;19:101–102.*

The use of nonmetallic root canal posts has increased significantly. One of several reasons for this trend is that some nonmetallic posts can result in superior strength when used in combination with composite cores.[1] However, unlike with metallic posts, viewing these new posts on radiographs might be difficult. A previous study found that a nonmetallic restorative material had less-than-ideal radiographic value.[2] Ideally, restorative materials should have radiopacity values equivalent to or greater than that of enamel.[3,4] The aim of this investigation was to determine the radiopacity values of a group of nonmetallic posts, including glass-fiber, carbon-fiber, and zirconium posts, and to compare them to those of enamel and dentin.

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Materials and Methods

Four cylindric specimens 2 ± 0.05 mm thick were cut from each of 7 post systems (Table 1). Two longitudinal tooth sections 2 ± 0.05 mm thick were prepared from extracted permanent molar and premolar to determine the radiopacity of enamel and dentin using a microslicing machine. Following standard radiographic imaging techniques, images of all specimens along with an aluminum step wedge were obtained on occlusal films (Kodak Ultraspeed) exposed at 70 KVP, 15 MA, with impulse timer of 19. Optical density readings for each specimen image were determined with a transmission densitometer (Macbeth TD-504). Radiopacity values were subsequently calculated as equivalents of aluminum thickness. Data were analyzed statistically using one-way analysis of variance.

Results

Figure 1 shows a representative radiograph with post specimens along with teeth sections and the aluminum step wedge. Table 1 records aluminum thickness equivalency values for all 7 post systems. Analysis of variance revealed significant differences in radiopacity values among the different posts ($P < .001$). One nonmetallic post, made of zirconium (Cerapost), had a radiopacity value that was significantly greater than that of enamel.

Table 1 Posts, Manufacturers, Composition, and Mean Radiopacity Values (in Descending Order) of Materials Examined

Material	Manufacturer	Composition	Mean radiopacity (mm material/mm aluminum)
Cerapost	Brasseler	Zirconium	7.50
Parapost SS	Coltene	Stainless steel	7.00
Parapost Titanium	Coltene	Titanium	4.20
Enamel			1.29
Parapost Fiber White	Coltene	Glass fibers/ resin/fillers	1.12
Dentin			0.93
Cytec Blanco	Hahnenkratt	Glass fibers/resin	0.65
Logipost Quartz 2	Jeneric Pentron	High performance quartz fibers	0.28
Composipost	RDT	Carbon fibers/ epoxy resin	0.20

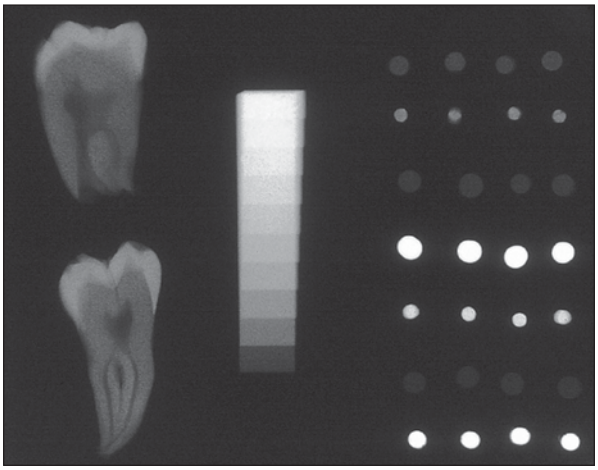

Fig 1 Representative radiographic images of post specimens, along with tooth sections and the aluminum step wedge. Post specimens *(top to bottom)*: Cytec Blanco, Parapost Fiber White, Logipost, Cerapost, Parapost Titanium, Composipost, Parapost Stainless Steel.

This value was also higher than values found for the 2 control metallic posts (Parapost SS and Parapost Titanium). Another nonmetallic post, which was made of glass fibers, acrylic resin, and fillers, had a radiopacity value that was greater than that of dentin but less than that of enamel (Parapost Fiber White), while the remaining 3 nonmetallic posts had radiopacity values that were lower than that of dentin.

Discussion

The method to determine the radiopacity of posts used in this study has been previously used to determine radiopacity values of restorative materials and cements.[2–4] Manufacturers of resin composites add either barium glass or strontium glass fillers to render their materials sufficiently radiopaque.[3,4] It is likely that Parapost White Fiber might have had such fillers incorporated into its formula. This explains why this product had greater radiopacity value than the other 3 fiber-based posts, which did not have fillers. While the use of a radiopaque cement might help to identify the boundaries of such poorly radiopaque posts on radiographs, it would be ideal if the posts were fabricated to be adequately radiopaque. Clinicians must consider other clinically relevant characteristics and merits of post systems when making their clinical choice.

Conclusion

One nonmetallic zirconium post, Cerapost, had a radiopacity value that was higher than that of enamel and is therefore considered to be sufficiently radiopaque. One glass-fiber post (Parapost Fiber White) had a radiopacity value that was between that of enamel and that of dentin, while the remaining 3 nonmetallic posts were less radiopaque than dentin and thus cannot be considered sufficiently radiopaque.

References

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