



Figure 5. A pie chart summarizing the results of *in vitro* studies (those satisfying both criteria in Table 2) that examine whether the use of methacrylate resin-based sealers and bondable root filling materials is able to improve the fracture resistance of root-filled teeth.

TABLE 2. *In Vitro* Fracture Resistance Studies Associated with the Use of Methacrylate Resin–based Sealers and Bondable Root Filling Materials

Results claimed by authors	Studies	Parameters examined	Compaction methods	First criterion: appropriate positive control (unfilled instrumented roots) included	Second criterion: results were not significantly lower than those derived from the positive control	Additional negative control (noninstrumented roots)?	Range of standard deviations	Comments	Studies that satisfy both first and second criteria (ie, two “Yes”)
Improved fracture resistance	Teixeira et al, 2004 (6)	Vertical root fracture	Cold lateral, warm vertical	Yes	Yes	No	16.5%–38.9%	NA	Yes
	Hammad et al, 2007 (148)	Vertical root fracture	Cold lateral, single cone	No	No	Yes	15.4%–38.8%	No positive control	No
	Schäfer et al, 2007 (149)	Vertical root fracture	Cold lateral	Yes	Yes	Yes	11.3%–23.2%	NA	Yes
No difference between methacrylate resin–based sealers and conventional sealers	Stuart et al, 2006 (150)	Horizontal root fracture	Warm vertical	Yes	Yes	Yes	19.4%–29.4%	NA	Yes
	Grande et al., 2007 (151)	Flexural stress	Warm vertical	Yes	Yes	No	25.2%–40.0%	NA	Yes
	Wilkinson et al., 2007 (152)	Horizontal root fracture	Warm vertical	Yes	Yes	Yes	—	No numeric data available	Yes
	Sagsen et al., 2007 (153)	Vertical root fracture	Cold lateral	Yes	Yes	No	6.2%–24.3%	NA	Yes
	Ribeiro et al., 2008 (154)	Horizontal root fracture	Cold lateral	Yes	Yes	No	12.0%–25.5%	NA	Yes
	Hemalatha et al., 2009 (155)	Horizontal root fracture	Warm vertical, single cone	Yes	Yes	No	7.3%–12.5%	Student <i>t</i> test for analyzing 4 data groups	Yes
	Karapinar et al., 2009 (156)	Vertical root fracture	Cold lateral	Yes	Yes	Yes	—	No standard deviation	Yes
Jainaen et al., 2009 (157)	Vertical root fracture, work of fracture, micro-punch shear strength	Single cone	Yes	Yes	Yes	16.4%–42.2%, 39.8%–54.3%, 18.8%–36.5%	NA	Yes	
Lower fracture resistance	Ulusoy et al., 2007 (158)	Vertical root fracture	Cold lateral	Yes	Yes	No	19.6%–23.7%	NA	Yes
	Jainaen et al., 2009 (159)	Work of fracture	Single cone	Yes	No	Yes	Inner to outer direction: 7.2%–55.5% Coronal to apical direction: 39.8%–54.6%	Roots filled with resin-based sealer had lower work of fracture than positive control in an inner to outer direction.	No

NA, not applicable.

Studies satisfying the 2 criteria described in the table were used for preparing the pie chart in Fig. 5.