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Clinical performance of root surface restorations in older adults

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Background

In light of the projected increase in the number of older people, and the unique needs of this population, the need to develop an evidence based oral healthcare policy for older people is clear. Very few studies are available to provide an evidence base when selecting a restorative material for the operative treatment of root caries lesions. Studies to date have recommended glass ionomer cements as the best available option.

A new material has been developed combining tricalcium silicate powder and aqueous calcium chloride solution that, in theory, could offer important advantages over traditional restorative materials in the treatment of carious root lesions. It is commercially available as Biodentine™ and is manufactured by Septodont. *In vitro* studies have shown that this material may induce the secretion of reactionary dentin which would promote pulp healing after caries removal (Zhao, Chang *et al.* 2007; Laurent, Camps *et al.* 2008; Han and Okiji 2011). As root carious lesions are often confined to dentine, and this material produces mineral tags in dentinal tubules, Biodentine™ has the potential to offer high micro-leakage resistance.

Objective: To compare the success rates of restoring root caries lesions with glass ionomer cement (Fuji IX GP Extra, GC), resin modified glass ionomer cement (Fuji II LC, GC) and a tricalcium silicate based cement (Biodentine, Septodont).

Methods

A randomized clinical trial was conducted on independently-living older adults in Cork, Ireland. Active, cavitated lesions on root surfaces were identified. Following caries removal the lesions were restored randomly with one of three materials: (1) a packable glass ionomer (Fuji IX GP Extra, GC Corporation), (2) a resin modified glass ionomer (Fuji II LA, GC Corporation) and; (3) a tricalcium silicate based material (Biodentine, Septodont). Six months after placement the status of the restorations was assessed by a blinded independent examiner according to USPHS criteria.

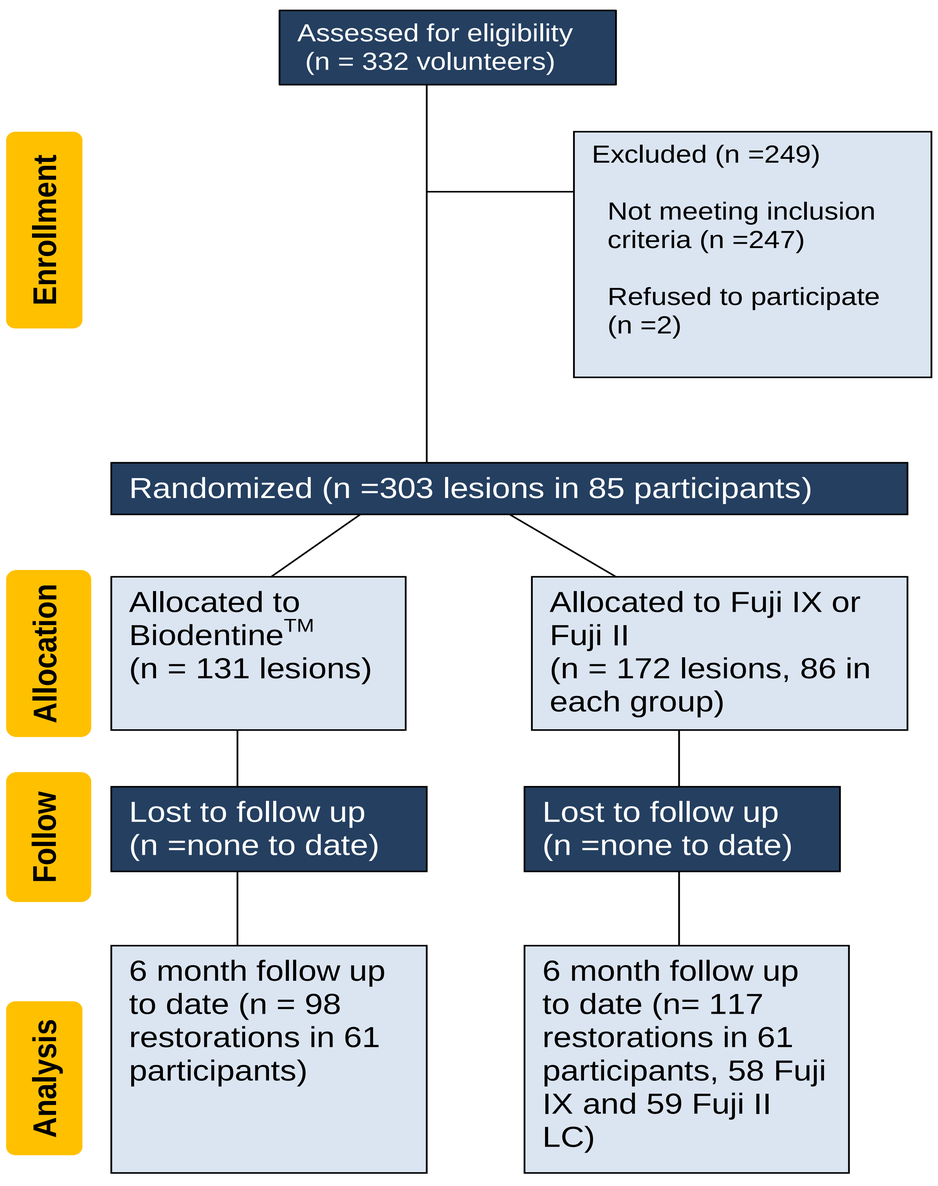
Figure 1. Root caries lesions



Figure 2. Immediately following restoration



Figure 3. CONSORT flow diagram (to date, trial not completed)



Results

Six month follow up data available to date

The summary in Table 1 below was based on the outcome of 215 restorations placed in 61 participants. 58 fillings failed and 44 of these had been Biodentine. The failure rate was 45% for Biodentine, 14% for Fuji II GP Extra and 10% for Fuji II LC. The failure rate for the combined glass ionomer materials was 12%

Table 1. Patient characteristics

Variable	n=61
Gender, no. (%)	
Male	41 (67)
Female	20 (33)
Race, no. (%)	
White	61 (100)
Other	0 (0)
Age, mean (standard deviation)	72.6 (4.6)
Root Caries Index, mean (standard deviation)	21.4 (18.2)
DMFT, mean (standard deviation)	23.4 (4.8)
Denture wearer, no. (%)	
Yes	32 (52.5)
No	29 (47.5)
Dry mouth, no. (%)	
Yes	10 (16)
No	51 (84)

Table 2. Success rates at 6 months

Filling material * Outcome Crosstabulation				
		Outcome		Total
		Success	Failure	
Biodentine	Count	54	44	98
	%	55.1	44.9	100.0
Fuji IX GP Extra	Count	50	8	58
	%	86.3	13.7	100.0
Fuji II LC	Count	53	6	59
	%	89.8	10.2	100.0
Total	Count	157	58	215
	%	73.0	27.0	100.0

There were statistically significant differences (Chi-square test, $p>0.05$) in restoration failure rates between restoration groups. There was no statistically significant difference between Fuji IX GP Extra and Fuji II LC but statistically significant differences ($p>0.05$) were shown between the Fuji II GP Extra group and the Biodentine group and also between the Fuji II LC group and the Biodentine group.

All failures to date have been due to complete loss of restoration except for two cases. In one of these the tooth has been extracted and was categorized as a failure, in the other there was unacceptable wear of the restoration requiring replacement.

Conclusions

Based on these results Biodentine cannot be recommended as a restorative material for the operative treatment of root caries.

Both of the glass ionomer materials had similar success rates and continue to be the best available option for the operative treatment of root caries lesions.

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