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A Randomised Controlled Trial of Postoperative Sensitivity after Class II Restoration with Bulk-Fill vs Conventional Composites

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ABSTRACT

Introduction: Bulk-fill composites may simplify posterior restorations, saving time and reducing technical complexity. Post-operative sensitivity is a risk of posterior composites; bulk-fill composites could mitigate this. This single centre, double-blinded, parallel groups randomised controlled trial compared postoperative sensitivity following restoration of class II carious lesions with bulk-fill or conventional, layered composite. Null hypothesis: there will be no difference in post-operative sensitivity between the two materials. Methods: Participants requiring class II restoration of posterior teeth were randomised to bulk-fill (FU) (Coltene Fill-UpTM) or conventional, layered (BE) (Coltene Brilliant Everglow) composite. Allocation was concealed during cavity preparation. Only the operating dentist knew allocation. The outcome was 24 h post-operative sensitivity. Results: 41 patients were randomised (20/group). Two patients from FU group were excluded from analysis (factors unrelated to intervention). There was no difference in post-operative sensitivity at 24 h nor any time point. Only participant age and baseline sensitivity scores significantly impacted post-operative sensitivity. One restoration debonded in FU group at 10 days, with no other adverse effects. No difference in time taken to place restorations was seen. Conclusions: Within the study's limitations, post-operative sensitivity after class II posterior restorations was no different in bulk-fill restorations compared with conventional, incrementally cured composite.

INTRODUCTION

Restoration of deep cavities in posterior teeth is a frequently encountered significant challenge in dentistry. Alongside clinical considerations and time limitations, the physicochemical properties of the restorative material to be used must be considered. With the phasing out of amalgam restorations following the Minimata convention,[1] adequate replacement materials are required. Moisture tolerance, a technique-forgiving nature and time-efficiency are important characteristics of any restorative material[2] to be used in time and resource limited services such as the UK National Health Service (NHS). At present, there is no material that meets these demands entirely. However, despite some limitations compared to amalgam, composite resin is increasingly used for posterior restorations.[3]

Conventional light-cured resin composites offer excellent aesthetics, good compressive and flexural strength and can be bonded to dentine and enamel, which may reduce the risk of cusp fractures and enables more conservative tooth preparations compared with amalgam restorations which are typically mechanically retained.[4] However, the drawbacks of this material include moisture-sensitivity[5] due to the hydrophobic nature of methacrylates; technique-sensitivity; and the time required for placement.[3] Due to limited depth of cure and the risk of polymerisation shrinkage which may result in marginal leakage of light-cured composite restorations, it is standard clinical practice to apply composite in layers of up to 2 mm, ensuring that the minimum possible number of cavity walls are contacted by each increment to reduce contraction stresses (also termed 'C-factor').[6] This can be time-consuming in deeper cavities. To overcome some of these limitations, bulk-fill composites were introduced.

Bulk-fill composites were first introduced to the market in 2003,[7] with a wide range of materials developed since this time. The primary advantage of bulk-fill composites is that they can be cured in increments larger than 2 mm at a time; typically 4-5 mm. They also are purported to not require the oblique layering techniques recommended for conventional light-cured composites due to reduced polymerisation shrinkage stress[8] and the absence of depth-of-cure concerns imparted by dual-cure polymerisation chemistry.[9] This may reduce both the time required to place a restoration and the technical demands of placement. While moisture tolerance is no better with these materials, reductions in working time and simplified restoration protocols may reduce the chance for moisture contamination to occur.[10] Bulk-fill materials tend to be more opaque and have reduced aesthetic properties compared to conventional composites[11] and so are most advantageous in restoring deep cavities in posterior teeth, where cavity depth and low aesthetic demands converge to maximise the benefits of bulk-fill composite restorations. A further potential limitation of many bulk-fill composites is reduced tensile strength and microhardness compared to conventional composites. One such material, Fill-Up™ (Coltene) was found to exhibit comparable flexural strength to a conventional composite at both 24 h and after 30 days of artificial aging in an *in vitro* experiment.[12] Similarly, a number of bulk-fill composite materials, including Fill-UpTM were found to have similar Vickers microhardness to a reference conventional composite material.[13]

Bulk-fill materials can be categorised based on a number of different factors. Frequently, manufacturers divide these material by their physicochemical properties; into high viscosity light-cured (e.g. Voco X-tra fil); low viscosity light-cured (e.g. Dentsply Surefil SDR flow); dual-cure (e.g. Coltene Fill-Up™), and sonic-activated bulk fill composites (Kerr Sonic-Fill). More recently, alternative photoinitiators to camphorquinone have been developed that react to different light wavelengths, necessitating further classification into monowave and polywave curing materials (e.g. Tetric N-Ceram Bulk Fill). Alternatively, these materials can be categorised according to particle size or content of glass filler present. The majority of available composite materials on the market use a combination of different filler sizes to strike an optimal compromise between aesthetic and physicochemical properties. Contemporary composites comprise either 'microhybrid' fillers (filler particle sizes between 0.7 – 2 um) or 'nanohybrid' fillers (filler particle sizes up to 1 um, typically including a proportion of nanoparticles of approximately 0.02 – 0.05 um in diameter).[14] Increasing filler content can decrease polymerisation shrinkage and increase the elastic modulus of composites, reducing shrinkage stress.[15] Composites with higher filler content also demonstrate more favourable mechanical properties such as flexural strength.[16]

Fill-Up™ is a dual-curing bulk composite material created by Coltene-Whaledent. Fill-Up™ is a microhybrid two component composite made up of a base and catalyst paste. Its dual curing properties allow the restoration to be placed in one increment with unlimited thickness. Fill-Up™ was found to have Vickers microhardness[13] and flexural strength,[12] depth of cure that was similar to, or greater than, other bulk-fill materials and conventional composites,[13] but reduced microtensile bond strength to dentine compared with alternative bulk-fill materials.[17] Evaluation of bond strength may be influenced by delayed curing of deeper layers of the material relating to its dual cure nature however, as Monterubbianesi *et al.*[13] found that the degree of conversion (cure) of Fill-Up™ was lower than alternative bulk-fill composites measured immediately after curing, but highest among all materials evaluated 24 h later. The material also offers the advantage that no capping material is required, simplifying the restorative protocol and enabling a single product to be used for the entire restoration body. However, it suffers from relatively high surface roughness and reduced colour stability compared to some alternative bulk-fill composites,[18] so a capping material may still be desirable in areas of higher aesthetic concern.

The technique of incremental build up is used with conventional composites to minimise shrinkage stress[19] and therefore reduce the risk of post-operative sensitivity, alongside other operative factors such as avoiding moisture contamination and ensuring complete cure of materials. Nonetheless, this complication is still well recognised, alongside being time-consuming and technique sensitive. While light cured bulk-fill composite materials achieve improved depth of cure primarily through increased translucency, photo-initiator content and/or different photo-initiator chemistries, this typically comes at a trade-off of either reduced mechanical strength, increased polymerisation shrinkage stress or the risk incomplete polymerisation of deeper regions of the material due to attenuation of the curing light.[20] c suggested that dual-curing bulk composites may overcome these limitations by combining the rapid, command set of conventional light-cured composites with a slower, light-independent chemical cure, thus ensure complete polymerisation of the material while reducing

shrinkage stress which may reduce the risk of post-operative sensitivity.[21] However, upon review of the available literature, there is no clinical trial assessing post-operative sensitivity when restoring with dual-curing bulk composite material compared with conventional composite.

AIM

This randomised controlled trial aimed to compare post-operative sensitivity experienced by patients up to 1 month following class II posterior restorations with either a dual-cure bulk fill composite (Coltene Fill-Up™) or conventional layered composite (Coltene Brilliant Everglow).

The null hypothesis was that there would be no difference in post-operative sensitivity between restorations which used a dual curing bulk composite compared to restorations which used conventional composite resin to restore the tooth.

METHODS

STUDY DESIGN

This study was a single-centre, parallel groups, participant and investigator-masked, randomised controlled trial, evaluating patient reported post-operative sensitivity using a visual analogue scale (VAS). Groups were allocated on a 1:1 ratio. The trial was conducted within the DenTCRU (Dental Clinical Translational Research Unit) at Leeds Dental Institute. Ethical approval was obtained from the Research Ethics Committee (16/YH/0416). The trial was registered on the Mandatory Reporting of National Clinical Trial (NCT) database (NCT03513692). The study was conducted in accordance with the principles of the Declaration of Helsinki.

PARTICIPANTS

Adult (>18 y) dental patients requiring a class II restoration of a posterior permanent tooth (first premolar – third molar) were included if they were able to provide informed consent, the tooth to be restored gave a positive response to sensibility testing (patient reported short-lived sensation in the tooth after application of electric pulp test at a value of < 60 μA), the cavity was suitable for composite restoration, involved 2 or more tooth surfaces, and the patient was amenable to composite restoration.

Potential participants were excluded if they reported dental pain at the time of consent, were taking long term analgesics that might interfere with the reliability of sensitivity reporting, if the tooth to be restored was grade 2 or 3 mobile, an abutment tooth for a removable prosthesis, had undergone orthodontic treatment or periodontal surgery within the prior 3 months.

INTERVENTIONS

Preoperative VAS scores (0-100 mm scale) and electric pulp test were undertaken for the tooth to be restored, and the preoperative occlusal contacts in intercuspal position and excursive movements were determined. Moisture control was obtained by use of cotton wool rolls and high-volume aspiration throughout the procedure. Rubber dam was used where deemed clinically necessary by the dental operator. Cavity preparation and placement of an appropriate matrix band was undertaken by a single operator (NV) who was not aware of group allocation. Enamel was removed using an air-rotor handpiece at 200,000 RPM with copious coolant, using coarse grit, diamond coated burs appropriate to the cavity conformation. Subsequently carious dentine was removed using a slow-speed handpiece with stainless-steel rosehead burs at 10-20000 RPM, with the size of bur determined by the operator. Soft caries was removed until a point where hard but stained dentine was reached. Once cavity preparation was completed, allocation concealment was broken and the operator restored the cavity using either bulk fill or conventional layered composite, using the manufacturer's recommended etchant and dentine bonding systems for each material, and following the manufacturer's instructions. Light-curing units were assessed to ensure a minimum power output of 500 mW/cm^2 and a curing time of at least 40 seconds used to ensure complete cure of materials. Finishing and polishing of completed restorations was undertaken using a standardised protocol, ensuring that pre-operative occlusal contacts were re-established, and standard post-operative instructions provided to patients. Full details of materials used are presented in Supplementary Table 1.

Patients completed VAS score at 24 h, 7 days, 14 days and 1 month following restoration completion and returned these by post. Patients were followed up clinically at 1 month, where marginal integrity and occlusal contacts were re-evaluated, and pulp sensibility testing undertaken.

OUTCOMES

The primary outcome was patient-reported post-operative sensitivity at 24 h following treatment completion, determined by visual analogue scale (VAS). Secondary outcomes included post-operative sensitivity at 7 days, 14 days and 1 month, measured by VAS. Adverse events, including loss of vitality, restoration fracture, failure or loss of marginal integrity and unexpected adverse events were also evaluated.

SAMPLE SIZE CALCULATION

To achieve an 85% power of detecting a mean difference of 1 (S.D 0.9) in VAS score for the primary outcome (2 sample t-test, α = 5%), based on the findings of previous research,[22] a sample size of 17 per group was indicated. Assuming loss to follow up of at least 10%, a final sample size of 20 per group was selected.

RANDOMISATION

Written, informed consent was obtained for all participants. Computer generated simple randomisation (1:1 group allocation) was undertaken by a member of the DenTCRU team not directly involved in the study, and group allocation concealed in an opaque envelope, to be opened by the study dentist on completion of cavity preparation. Patients remained blind to allocation, and assessment of post-operative outcomes was undertaken by an independent assessor blinded to group allocation. Due to the nature of the intervention, it was not possible to blind the operator.

STATISTICAL ANALYSIS

Data was collated in Microsoft Excel (Microsoft Excel v16.67, Microsoft, WA, USA) and analysed using SPSS (SPSS v27.0.1.0, IBM, NY, USA). The analysis follows that previously reported by our group.[22] The primary outcome was assessed for normality using the Shapiro-Wilk test and visual inspection of Q-Q plots. The Mann-Whitney U-test was undertaken to assess between-group VAS scores at each time interval and time taken to place restorations.

Simple linear regression analysis was undertaken to assess the effect size of composite material on 24 h sensitivity VAS scores. Additional variables were then added sequentially and any variable that resulted in a >10% change in the effect size from the univariate model was included in the final analysis. To assess the impact of time on sensitivity VAS scores, repeat measures ANOVA was undertaken on the combined VAS scores for both groups, with pairwise comparisons between 24 h scores and each other timepoint. A Bonferroni post-hoc correction was applied to adjust for multiple comparisons. The level for statistical significance for all outcomes assessed was set at $P < 0.05$.

RESULTS

A total of 41 participants were enrolled on the study between 21/03/2017 and 04/06/2019, until the prespecified sample size was met. One participant was withdrawn due to pulp exposure during cavity preparation. All remaining patients completed the study and all study assessments. Details of participant flow through the study are summarised in the CONSORT flow diagram *(Figure 1)*.

Two participants were excluded from the study – 1 prior to randomisation and 1 after randomisation due to intra-operative pulp exposure. These participants were not included in analysis.

All teeth included required a 2-surface restoration including a proximal and occlusal surface. Cavity size was subjectively assessed as small/medium/large, and the distribution of cavity sizes was similar between the two groups.

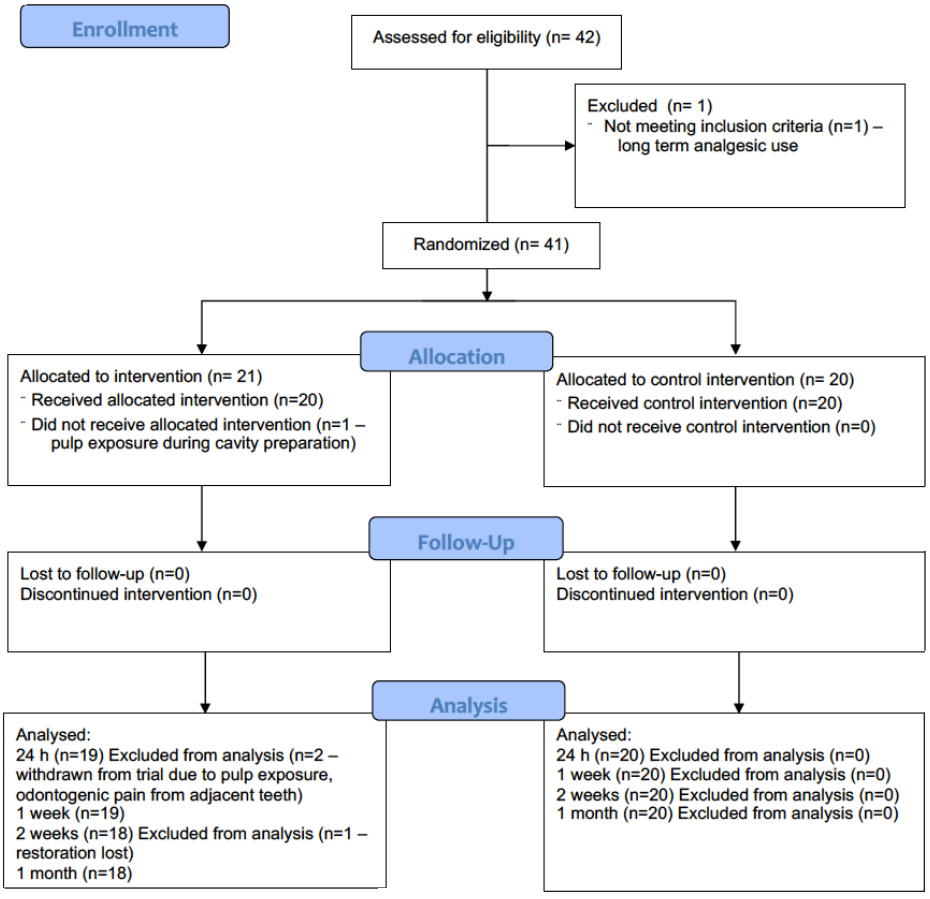

Figure 1: CONSORT 2010 Flow Diagram.

Participants were clinically similar in terms of baseline characteristics and status of teeth restored *(Table 1)*. A total of 8 participants reported any sensitivity from the tooth to be restored at baseline (VAS > 0; 5 conventional composite group, 3 bulk-fill composite group).

Table 1. Baseline characteristics of participants and teeth restored.

Variable		Bulk-fill composite (n=20)	Conventional composite (n=20)
Age, mean (S.D.), y		42 (15.4)	36 (12.2)
Sex, n (%)	Female	8 (40)	8 (40)
	Male	12 (60)	12 (60)
Tooth Restored, n (%)	Premolar	15 (75)	15 (75)
	Molar	5 (25)	5 (25)
Restorative status, n (%)	Previously restored	8 (40)	9 (45)
	Previously unrestored	12 (60)	11 (55)
Occlusal status, n (%)	In occlusion	19 (95)	19 (95)
	Not in occlusion	1 (5)	1 (5)
Baseline VAS, median (Range)		0 (0-50)	0 (0-19)

Relative isolation using a combination of cotton wool rolls, high volume aspiration and tongue guards/cheek guards was used for all but one case *(Table 2)*. There was no significant difference between groups for time required to complete the restoration after cavity preparation was completed *(Table 2)*.

Table 2. Intra-operative factors.

Variable		Bulk-fill composite (n=20)	Conventional composite (n=20)
Time to restore, mean, (S.D.), min		9.9 (4.5)	10.1 (3.5)
Isolation, n (%)	Relative isolation*	19 (95)	20 (100)
	Rubber dam	1 (5)	0 (0)

*Relative isolation included use of cotton wool rolls, high volume aspiration and a tongue guard, as required.

Sensitivity VAS scores were non-normally distributed (Shapiro-Wilk test p<0.001) for all timepoints assessed; therefore, the primary outcome was assessed using the Mann-Whitney U-test. There was no statistically significant difference in sensitivity between groups at 24 h post-restoration (Mann-Whitney U-test, p = 0.445, Table 3), thus we retained our null hypothesis (that there would be no difference between materials). There was also no statistically significant difference in post-operative sensitivity between groups at any of the other time points evaluated *(Table 3)*. Approximately half (n=18, 45%) of all patients reported any sensitivity after restoration placement at 24 h (8 conventional composite, 10 bulk-fill composite). Two participants were excluded from analysis at 1 month (1 failed to complete the VAS score and 1 participant had pain from an adjacent tooth that could not be distinguished from post-operative sensitivity in the tooth restored), leaving 38 participants analysed at this time-point (conventional composite n=20; bulk-fill composite n=18). The overall frequency of any sensitivity reduced to 26% at 1-month (4 conventional composite, 6 bulk-fill composite).

Linear regression analysis was undertaken to assess the impact of potential confounders on the impact of composite material used on 24 h sensitivity VAS scores. Only factors which caused a >10% change in the effect size for the univariate model were included in the final model (Supplementary Table 2). The final model included age and baseline sensitivity as significant confounders. Only baseline sensitivity VAS score was a statistically significant predictor of post-operative sensitivity (effect size 0.400, p=0.01).

Repeat measured ANOVA demonstrates a significant effect of time on overall VAS scores (Wilk's l test, p=0.04). Pairwise comparisons between specific timepoints demonstrated no significant changes at 24 h from baseline or to any subsequent timepoints (P>0.05). The change in VAS scores between groups is displayed in Figure 2.

One patient reported loss of a restoration in the bulk-fill group. This was the only adverse effect of treatment observed. There were no adverse events.

DISCUSSION

This double-blinded, parallel groups, randomised controlled-trial is the first to report post-operative sensitivity following restoration of class II posterior restorations using Coltene Fill-Up™; a dual cure, bulk-fill composite. No significant difference in post-operative sensitivity between conventional, incrementally placed composite and bulk-fill composite restorations was detected, and thus the null hypothesis was retained. Based on our short-term findings, it appears that either material may be clinically acceptable. However, in this study, there was also no significant difference in the time required to place either restorative material.

Table 3. Post-operative sensitivity (VAS).

Post-operative sensitivity (VAS scores), median (IQR, range)		Bulk-fill composite	Conventional composite	Mann-Whitney U test for between group differences	P value
Time since restoration	24 h	1 (0-24, 57) n=19	0 (0-10.25, 36) n=20	171.00 (SE 33.75)	0.445
	1 week	0 (0-18.25, 48) n=19	0 (0-0, 20) n=20	138.00 (SE 29.94)	0.096
	2 weeks	0 (0-15, 49) n=18	0 (0-2.25, 20) n=20	137.50 (SE 30.55)	0.141
	1 month	0 (0-15, 90) n=18	0 (0-0, 57) n=20	148.00 (SE 29.09)	0.247

There is surprisingly little evidence from clinical trials on the time taken to complete restorations with bulk-fill compared with conventional layered composites, despite reduced time being argued as one of the main advantages of this material. One clinical trial[23] reported volume-standardised time for restoration of class I and II restorations in posterior teeth using a high viscosity, non-capped bulk-fill composite material (3M Filtek One Bulk Fill). The authors found that the restoration time per mm^3 of cavity volume was reduced by almost 60% compared to conventional incrementally cured composites. This corroborates the findings of *in vitro* studies; a recent systematic review of laboratory studies[24] demonstrated that bulk-fill composites save a mean placement time of 2.08 min (95% CI -3.28 - -0.87), although the clinical significance of this time difference is questionable. It may be that lack of operator familiarity with the bulk-fill material influenced placement time in this study.

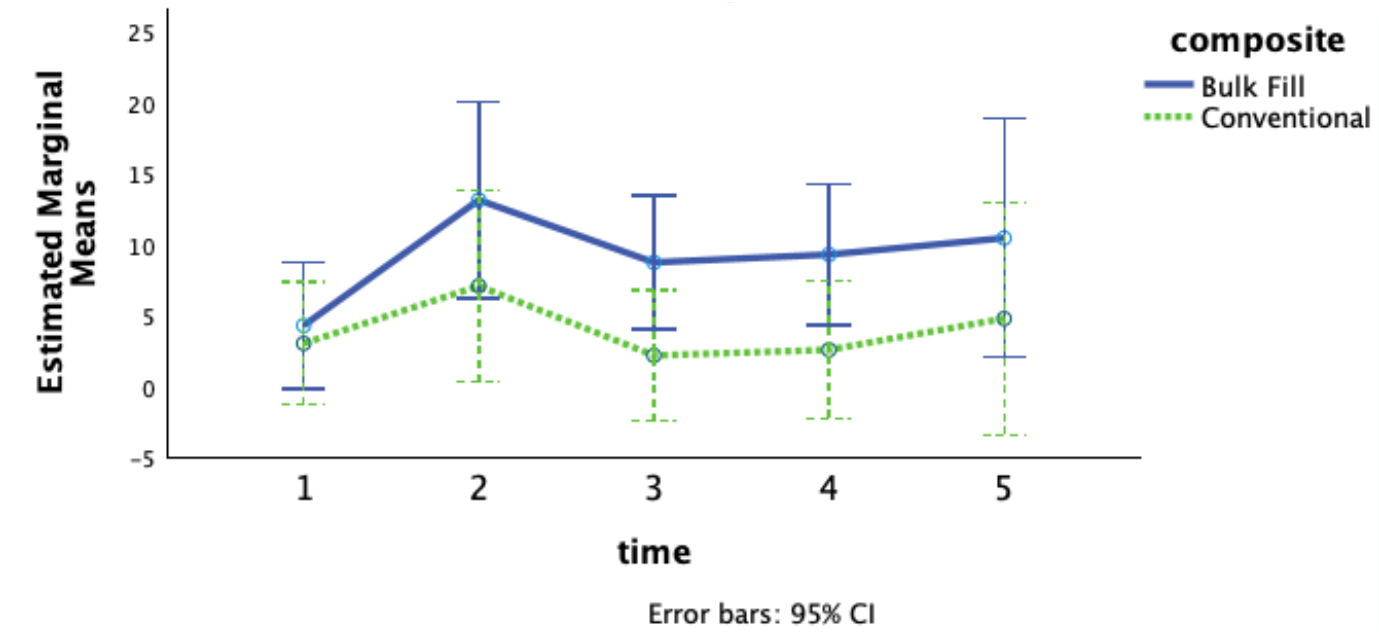

Figure 2: Change in self-reported VAS scores over time.

In this pragmatic trial design, the use of rubber dam was decided by the operator based on perceived clinical need. While there is a trend towards routine use of rubber dam by many practitioners for posterior composite restorations, there is conflicting evidence regarding the effectiveness of rubber dam use on restoration survival and success. A Cochrane review[25] found weak evidence to suggest that rubber dam use may improve restoration longevity for non-carious cervical lesions and primary molars but found no direct evidence to support these findings in posterior restorations in adult patients. Heintze and Rousson[26] found that there was a higher incidence of material fractures requiring replacement when rubber dam was used, while Brunthaler *et al.*[27] found no significant difference between use of rubber dam or cotton wool rolls and aspirators. In a large, national survey, only one third of UK general dental practitioners reported routinely using rubber dam for operative dentistry procedures,[28] which supports that isolation methods used in this study reflect those used by a majority of dentists in a general practice setting. One possible explanation

for the surprising event of early failure of one restoration in the bulk-fill composite group may be explained by potential moisture contamination leading to suboptimal bonding of the restoration, in the absence of any other obvious contributory factor.

The cavity conformation for all teeth in this study was similar, with an occlusal and proximal surface involved. However, cavity size varied among participants, and it was not possible to determine if cavity size influenced postoperative sensitivity as this was not measured objectively, which is a limitation of this study. All restorations were undertaken by a single operator (NV) who was an experienced general dental practitioner, thus operator-induced variability should be minimised. However, the operator had no prior experience with the Fill-Up™ restorative material used in the study. This is unlikely to have influenced the success of restorations, as the skills and principles underlying placement of bulk-fill composites are no different to conventional composite, and in some aspects are simplified. However, it may have influenced the time taken to place the restorations.

Notably, post-operative sensitivity rates were low in both groups after restoration placement, but appeared to remain largely stable over time *(Figure 2*), rather than decreasing as might be expected. The reason for this finding is unclear, but may relate to participants recalling previous scores, other sources of discomfort being misreported or may indeed reflect a small proportion of participants experiencing persistent post-operative sensitivity. It should be noted that the severity of sensitivity was low (VAS score ≤25 mm) for all but three participants. The lack of a defined clinically important threshold for sensitivity makes interpretation of these VAS scores challenging however.

The results of this trial indicate that restoration success and post-operative sensitivity are equivalent between Coltene Fill-Up™ bulk fill composite and conventional, incrementally cured composite restorations. However, the reported time-saving benefit of bulk fill composite was not seen in this study. These findings need verifying by additional centres. In future studies, measurement / evaluation of cavity size, depth and conformation is important to remove this potential source of confounding. This may be easily achieved using intra-oral optical scanners. Future trials evaluating clinical outcomes of bulk-fill composites should report the time taken to complete both the placement of the composite material and the entire restoration, including finishing / polishing procedures. Longer term success / survival data is required to establish equivalent longevity for bulk-fill and conventional composite restorations in posterior teeth.

CONCLUSIONS

Within the limitations of this study, post-operative sensitivity in class II posterior carious lesions was no different in dual-cure bulk-fill restorations compared with conventional, incrementally cured composite. This suggests that reduction in sensitivity may not be an advantage for such bulk-fill materials, in line with the null hypothesis for this study. Furthermore, use of bulk-fill composite may not reduce the time spent on posterior restorations.

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AUTHOR CONTRIBUTIONS

J. Twigg contributed to data analysis and drafted the manuscript. N. Vaid contributed to data collection, provision of all clinical work as part of a MSc studentship. A. Chavda contributed to data collection, coordination of research activities, critical revision of the manuscript. D. Seymour contributed to data analysis, critical revision of the manuscript. T.P. Hyde contributed to study design, supervision, critical revision of the manuscript . P. Nixon contributed to study design, supervision, securing funding, critical revision of the manuscript

All authors gave final approval and agree to be accountable for all aspects of the work.

COMPETING INTERESTS

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

REGISTRATION

The trial was registered on the Mandatory Reporting of National Clinical Trial (NCT) database (NCT03513692).

PROTOCOL

The full protocol is available on request. No changes from the planned protocol were made.

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Supplementary Table 1. Materials and products used during this study.

Material used	Product name	Manufacturer details
Electric pulp tester	Vitality Scanner, Model 2006	SybronEndo
Timer	Single channel timer with big display	Brannan
Occlusal indicating paper	Detex Super Articulating Paper	Kemdent
Acid etchant	Bulk Fill – Ultimate Etchant Gel S Conventional –Super Etch	Coltene Whaledent SDI
Dentine bonding system	Bulk Fill –Parabond Conventional – One Coat 7 Universal	Coltene Whaledent Coltene Whaledent
Matrix system	Omnimatrix (clear Mylar)	Ultradent
Light curing unit	Satelec Mini L.E.D	Acteon
Composite finishing products	Diamond Burs Flame FG 562 Ultra Fine Composite Finishing Diamond Burs Flame FG 652 Ultra Fine Ash Hi-Di Diamond Burs Friction Grip Flame 675-Extra Fine Grit	Unodent Unodent J&S Davis

Supplementary Table 2. Regression models of univariate (bulk-fill or conventional composite group) and models including a potential confounder as an explanatory variable.

Variable	Coefficient (S.D.)	P Value
Model 0		
Bulk fill vs. conventional	0.183 (0.160)	0.257
Model 1		
Bulk fill vs. conventional	0.226 (Over 23% change from model 0, 0.158)	0.175
Age	0.180 (0.160)	0.280
Model 2		
Bulk fill vs. conventional	0.183 (0.160)	0.263
Sex	0.049 (0.162)	0.765
Model 3		
Bulk fill vs. conventional	0.183 (0.160)	0.263
Tooth Restored	0.065 (0.162)	0.690
Model 4		
Bulk fill vs. conventional	0.178 (0.160)	0.276
Restorative status	0.11 (0.161)	0.497
Model 5		
Bulk fill vs. conventional	0.183 (0.160)	0.258
Occlusal status	0.152 (0.160)	0.347
Model 6		
Bulk fill vs. conventional	0.16 (0.160)	0.284
Baseline Sensitivity (VAS)	0.41 (over 12% change from model 0, 0.148)	0.008
Model 7		
Bulk fill vs. conventional	0.197 (0.159)	0.203
Age	0.152 (0.160)	0.324
Baseline Sensitivity (VAS)	0.400 (0.149)	0.010