

Handling evaluation

Trevor Burke, Russell Crisp and Louis Mackenzie review Dentsply's SDR.

The volume of clinical material seen in general dental practice makes dental practice an ideal area for the assessment of new techniques and materials. While the physical performance of dental materials must be satisfactory to meet the demands placed upon them in the mouth, ease of use is also important, given that the clinician, when placing a material which handles easily, may be more likely to produce a better result than when using one which is technique sensitive. The assessment of the handling of a new dental material is therefore of importance.

When practitioners band together to form a group to assess the handling of new materials in dental practice the results are likely to be more objective. All of this becomes possible when practitioner-based research groups are teamed with the expertise available in academic institutions. A UK-based group of practice-based researchers is the PREP (Product Research and Evaluation by Practitioners) Panel. This group was established in 1993 with six general dental practitioners, and has grown to contain 32 dental practitioners located across the UK. It has completed over 60 projects, mainly 'handling' evaluations of materials and techniques, but also, currently, has six clinical trials of new materials and techniques (varying from two to five years) operating in UK dental practices.

Resin composite restorations and polymerisation contraction stress

The majority of conventional resin composite restorative materials shrink

up to three per cent on polymerisation, resulting in stresses at the (bonded) restoration margin, or within the restorative material itself. These stresses may result in internal microcracks within the material, separation of the restoration from the cavity wall with resultant post-operative leakage and sensitivity, and, deformation of tooth, also leading to pain post-operatively, generally when the patient bites on a cusp. For a more complete review of the subject, please consult *Dent Update* 2009; 36:401–409.

The magnitude of the stresses depends on a number of factors and a variety of clinical techniques have been suggested to reduce or overcome the effect of polymerisation contraction stresses, such as incremental placement, ramped curing, pulse activation and placement of a flowable composite base layer.

Regarding the material itself, factors employed to reduce the effect of polymerisation contraction stresses include:

- Increasing the filler loading of the material, with subsequent reduced volume of resin composite which may shrink, although this may increase the modulus (stiffness) of the material,
- Use of a resin with reduced polymerisation shrinkage, such as Filtek Silorane* (*Filtek Silorane is a registered trade mark of 3M ESPE,



• Fig 1: Dentsply's SDR Intro kit.

St. Paul, USA) and,

- The use of a bulk-fill, low modulus material designed to be curable to a depth of 4mm. A recently introduced product, designed to fulfil this objective is SDR from Dentsply, the product under evaluation in this handling assessment (fig 1). SDR is a bulk-fill flowable composite base material manufactured by Dentsply DeTrey GmbH, Konstanz, Germany. SDR is indicated for class I and II restorations and is applied in bulk fill of 4mm increments (cured for 20 seconds) to replace dentine and then capped with the dentist's existing standard composite. It is compatible with regular (methacrylate based) adhesives and composites.

The evaluation

Methods

Members of the PREP Panel were contacted in February 2010 to ascertain whether they would be prepared to participate in this evaluation. Of those who responded positively, 12 members were ☺

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selected at random. Two were female and their average time since graduation was 26 years, with a range of 17 to 42 years.

Explanatory letters, questionnaires and packs of Dentsply's SDR were distributed in March 2010. The practitioners were asked to use the materials as indicated in the manufacturer's instructions and return the questionnaire after 10 weeks.

Results

Background information: The number of posterior composite restorations placed by the evaluators in a typical week varied from <5 (one evaluator), five-10 (one evaluator), and >10 (10 evaluators). Of these, the mean proportion of occlusal restorations placed was 26 per cent, class II were

48 per cent and MOD restorations made up 26 per cent. A range of posterior composite materials were used by the respondents prior to the evaluation, with the principal reasons for the choice of these materials being good results, ease of use, and polishability. Other reasons reported were good aesthetics, low shrinkage, good wear resistance, sculptability, packability, long working time under ambient light, and previous Prep Panel evaluation. The evaluators currently used a variety of dentine/enamel bonding systems, with seven using a total-etch (etch and rinse) system and seven using a self-etch system.

When the evaluators were asked what steps they took to prevent the adverse effect(s) of polymerisation

contraction stress, the results were as follows:

- Flowable base layer: nine evaluators (82 per cent)
- Incremental placement (only one wall touched per increment): 11 evaluators (92 per cent)
- Ramped curing: three evaluators (25 per cent)
- Use of a low-shrink composite: nine evaluators (82 per cent)
- Ten (83 per cent) of the evaluators agreed that a flowable, low stress material such as SDR, to bulk fill large cavities in posterior teeth prior to placement of a final layer of resin composite restorative would be useful.

Evaluation of Dentsply's SDR after clinical use

Evaluators rated the presentation of the kit as follows:☺

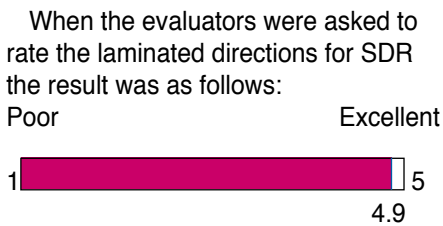
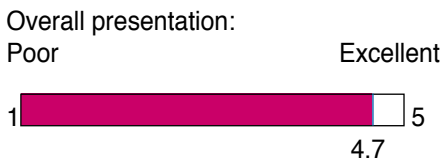
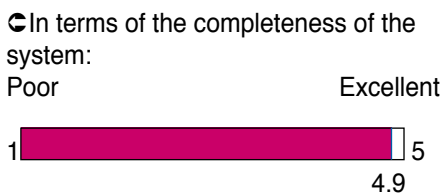
Procedure	No. of evaluators	Brands used (if named)	Replace with SDR?
Amalgam	6	Permite (1) SDI (1) Tytin (1) GS80 (1)	3 + 1 maybe
Glass Ionomer (Open sandwich)	3	Fuji 9 (2) Fuji II LC (1)	2
Glass Ionomer (Closed technique)	4	Fuji 9 (2) Fuji II (1) Vitrebond (1)	2
Bulk fill posterior composite	8	Z250 (2), Nayyar core (1) Herculite (1) Filtek Supreme XTE (1) Xtrafil (1) Silorane (2), EsthetX (1)	7
Layering of Universal composite	7	Herculite (1) Filtek Supreme XTE (1), Majesty (1) Spectrum (1)	3 + 1 maybe
Flowable as liner	7	Tetric Flow(1), Filtek Supreme Flow(1), Revolution (1), Kerr Point 4 (1), X Flow(1), Voco Grandio Flow (1), Henry Schein (2)	6
Flowable as bulk-fill base	5	Grandioflow (1) Henry Schein (1)	5

● Table 1.

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	Better	Same	Worse
Simplicity	8	4	
Cavity adaptation	9	3	
Ease of Placement	8		3
Creation of positive contact	1	6	4
Time saving	8	4	

Table 2.



The total number of restorations placed during the evaluation was 379, with 102 being class I and 277 class II.

The evaluators were asked to consider restorations in posterior teeth and indicate the procedures and the brands of materials used and also if they would consider using SDR in place of that material (Table 1).

All (100 per cent) of the evaluators considered that the compules worked satisfactorily and that the tip was a satisfactory size. Comments made included:

- ‘Metal tip was ideal size to insert into a root-canal orifice’.

- ‘Perfect dispensing tips – very good’

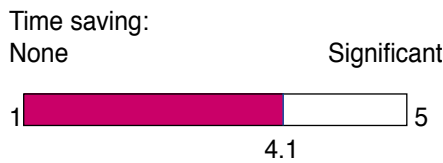
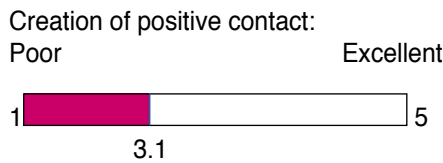
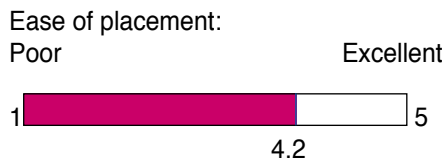
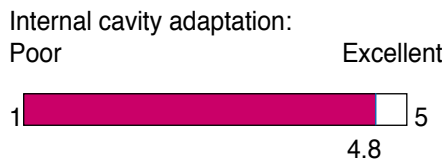
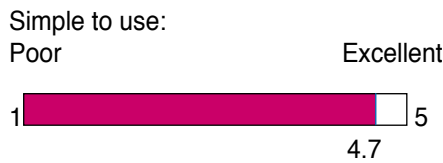
Eight (67 per cent) of the evaluators stated the viscosity of the material was satisfactory. The remaining four evaluators stated it

was not viscous enough.

When SDR was compared with the evaluators’ most commonly used material for class I and II restorations the results were as seen in Table 2.

Overall, 10 (83 per cent) of the evaluators were satisfied with SDR and nine (75 per cent) would purchase the material and recommend it to colleagues.

The evaluators were asked to rate SDR for the following attributes:



Comments on the concept of bulk filling under resin composite restorations with SDR included:

- ‘Liked application tip, ease of placement.’
- ‘No post-operative sensitivity noted.’
- ‘Easy to use, good compule, time saving.’

- ‘Good idea but would like evidence of deep cavity polymerisation conversion and also the polymerisation shrinkage.’

- ‘Great concept. Makes placing posterior composites easier. Quicker and reproducible.’

- ‘For large supragingival cavities if SDR performs long-term then it will be a predictable acceptable technique.’

- ‘Excellent – simple, effective and time saving.’

- ‘Surprisingly good – initial concerns of negative effect of polymerisation shrinkage not realised clinically. Use of SDR in certain cavity configurations has revolutionised my posterior composite placement technique.’

Final comments included:

- ‘Needs to be more viscous.’

- ‘I particularly liked the metal tipped compules.’

- ‘I believe SDR may have a role to play in resurrecting tunnel preparation technique and may be of benefit in placement of direct restorations in primary teeth.’

- ‘Packaging and ease of use excellent. The compule tip is very good and allows precise placement.’

Figs 2 to 5 illustrate Dentsply’s SDR in clinical use.

Discussion and conclusions

The bulk-fill flowable composite base material, Dentsply’s SDR, has been subjected to an extensive evaluation in clinical practice by members of the PREP panel in which 379 restorations were placed. Based on this, the following conclusions may be made:

- The kit scored highly in terms of the completeness of the system and for overall presentation.

- The laminated directions and the paper instruction leaflet for SDR

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● Fig 2: Occlusal caries, maxillary second molar.



● Fig 3: Occlusal cavity maxillary second molar.



● Fig 4a: Dentsply SDR placed in cavity.



● Fig 4b: Dentsply SDR compule tip.



● Fig 5: Restoration completed by placement of hybrid composite surface layer.

● achieved high ratings with no suggestions made for improvement.

● After the clinical use of SDR, all the evaluators who used a bulk-fill posterior composite technique and a flowable as a bulk-fill base would consider replacing their current material with SDR. Also, 86 per cent of those evaluators who used a flowable as a liner would consider changing their current flowable material to SDR.

● All the evaluators stated the compules worked satisfactorily and the dispensing tips received praise for size and facilitating the precise placement of the material.

● Over two thirds of the evaluators rated SDR as better than their pre-trial material for class I and II restorations for simplicity, cavity adaptation, ease of placement and time-saving.

● Though some of the evaluators would like more information on

the physical characteristics of SDR and the 'self-levelling' nature of the material caused some comment, the positive reception of this novel material is demonstrated by 83 per cent of evaluators who were satisfied with the material and 75 per cent of the evaluators who would both buy the material and recommend it to colleagues. ■

Reference

1. Burke FJT, Palin WM, James A, MacKenzie L, Sands P. The current status of materials for posterior composite restorations: The advent of low shrink. *Dent Update*. 2009; 36: 401–409.

Acknowledgments

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Manufacturer's comments

Dentsply wish to thank the PREP Panel for their evaluation and the positive comments.

SDR is a unique, bulk-fill, flowable composite base indicated for posterior (class I and II) restorations. SDR has low shrinkage stress, and a less cumbersome placement procedure. It is anticipated that this should result in enhanced longevity of restorations. Most importantly, the excellent cavity adaptation with the flowable SDR reduces the incidence of voids/bubbles, leading to a significantly reduced risk of post-operative sensitivity.

SDR aims to make life in everyday practice for the high street dentist easier, by offering a quicker procedure for direct-placement restorations in posterior teeth, with no compromise in quality.

To request more information on SDR, you can visit www.dentsply.co.uk. To request a free sample, email enquiry.uk@dentsply.com, giving your full name and practice address and quoting FREE SDR Sample-Prep Panel, or contact Dentsply on 01932 837303.