

Material evaluation

F.J Trevor Burke and Russell J Crisp review Dentsply ChemFil Rock glass ionomer restorative.

Since the majority of dental treatment, worldwide, is carried out in general dental practice, there is a strong argument to suggest that this is where clinical evaluations of the survival of restorations should be carried out. This has now been recognised by the International Association for Dental Research by the establishment of a Primary Dental Care research network.

The PREP (Product Research and Evaluation by Practitioners) Panel was founded in 1993, when it was realised that a group of dentists, rather than only one, would provide a more objective evaluation of the handling of a given dental material. Accordingly, the group was established with six general dental practitioners, and has grown to contain 32 dental practitioners located across the UK, with one in mainland Europe. It started life carrying out 'handling' evaluations of materials, devices and techniques, but it was soon realised that it would also be appropriate to carry out scientifically-based clinical evaluations of the survival of materials in the practice patient population, of which more than 10 have been completed.

Glass ionomer materials

Glass ionomer (GI) materials have become an integral part of restorative dentistry, especially in the UK and Europe, since their introduction in 1972. Their advantages include effective bonding to tooth structure, good compressive strength and fluoride release, at least during the first week following placement. Disadvantages such as poor fracture strength may be overcome by increasing the loading of the fluoro-alumina-silicate (FAS) glass, as has been achieved with the material

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Number of restorations	No of respondents
<10	4
11-25	6
>25	1

Table 1.

under test in the present study.

This study will therefore evaluate the in-practice handling of Dentsply's Chemfil Rock glass ionomer cement by the group of general dental practitioners who comprise the PREP Panel.

Materials and methods

The product under evaluation was the glass ionomer restorative material Dentsply ChemFil Rock.

As a result of a letter sent to all members of the PREP Panel, asking if they would be willing to evaluate a new glass ionomer restorative material, 11 general practitioner members of the PREP panel were selected at random to conduct the evaluation. Of the 11, two were female, with average time since graduation being 26 years (range 17 to 38 years).

Explanatory letters, questionnaires and packs of ChemFil Rock were distributed in late July 2011. The practitioners were asked to use the materials and return the questionnaire after 10 week's use.

Background information

The number of glass ionomer restorations placed by the evaluators in a typical week is shown in table 1.


The evaluators stated that, on average, 19 per cent were conventional glass ionomer materials (range 0-90

per cent), 77 per cent resin-modified glass ionomer materials (range 0-100 per cent), 0.5 per cent reinforced glass ionomer materials (range 0-5 per cent) and 3.5 per cent other types (range 0-25 per cent).

The glass ionomer materials used most frequently prior to this study by the respondents were stated to be Fuji materials in various forms by 91 per cent (n=10) of the evaluators. The reasons for the choice of these materials were ease of use, good handling, durability and speed. Also mentioned were cost, reputation from reported clinical and laboratory trials, group practice decision, reasonable aesthetics, previous Prep panel evaluation, and control over working time and volume of mix. When the evaluators were asked to rate the ease of use of the conventional glass ionomer material used most frequently, the result was as follows:



Seven (64 per cent) of the evaluators used their present conventional glass ionomer material in capsule delivery form and four (36 per cent) in powder liquid form. One evaluator used both forms and one evaluator did not use a conventional glass ionomer material.

Five (45 per cent) evaluators stated that they placed glass ionomer restorations in load bearing positions in the posterior teeth of adults. All the evaluators stated that they placed glass ionomer restorations in load bearing positions in the posterior primary 

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teeth and also all the evaluators used glass-ionomer materials in semi-permanent indications.

When the evaluators were asked about the number of shades in their current glass ionomer system 73 per cent (n=8) stated there were sufficient and the remainder stated there were not sufficient shades. The number of shades of the material currently rated as 'sufficient' had a mean number of three shades.

Typical comments regarding shades of glass ionomer materials included: "Only use where aesthetics not prime concern" (three evaluators), "Only use one shade" (three evaluators), and, "Only use two shades"

Evaluation

Evaluators rated the presentation of the kit as follows:

a) in terms of the completeness of the system:



b) in terms of the arrangement of the components:



c) in terms of ability to place on work surface:



d) overall presentation:



Comments:

"I keep the capsules in a drawer" (four similar), and "Liked sturdy box".

The instructions were rated by the evaluators as follows:



The total number of restorations placed during the evaluation was 275, comprised as follows: Anterior Class V five per cent, Posterior Class V 10 per cent, Class I/II & other 31 per cent, Core/dentine replacement 34 per cent, and, 'Other' 20 per cent. 'Other' included semi-permanent restorations

Attribute	Better	Same	Worse
Capsule activation in general	1 (9%)	6 (55%)	4 (36%)
Force required to extrude the material	2 (18%)	5 (45%)	4 (36%)
Consistency	5 (45%)	3 (27%)	3 (27%)
Packability	5 (45%)	4 (36%)	2 (18%)
Sculpting	3 (27%)	5 (45%)	3 (27%)
Stickiness	5 (45%)	5 (45%)	1 (9%)
Working time	3 (27%)	2 (18%)	6 (55%)
Setting time	7 (64%)	2 (18%)	2 (18%)

Table 2.

for use on fractured teeth/cusps, cores and large restorations in the elderly or patients with a high caries rate, and temporary or semi-permanent seals during and after endodontic treatment.

When the evaluators were asked to give their and their dental nurses' assessment of the dispensing and placement of ChemFil Rock, the result was as follows:

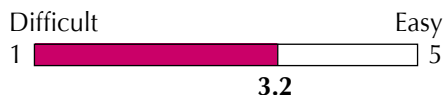


Four (36 per cent) of the evaluators stated that they experienced difficulty with the material sticking to instruments. This was overcome by using composite primer, separator or a quick wipe.

18 per cent (n=2) of the evaluators experienced a problem with the material slumping when placing restorations freehand.

When the evaluators were asked if the material's viscosity was satisfactory, 91 per cent (n=10) stated that it was. The remaining evaluator thought it was too viscous.

The ease of polishing of restorations of ChemFil Rock was rated to be as follows:



The number of shades was stated to be adequate by 55 per cent (n=6) of the evaluators.

Comments:

"All shades too bright!" (five evaluators), "All shades too opaque for

aesthetic use", "One shade – A4 would do".

It was suggested that darker shades such as A4, C4, B4, C5 or a 'brown' shade should be added. The shade most used was stated to be A3 (9 evaluators).

The overall surface finish achieved with restorations of ChemFil Rock was assessed as follows:



The principal use of ChemFil Rock was seen to be as a posterior restorative by the majority of evaluators (n=9: 82 per cent).

When the evaluators were asked to compare their current GI material with ChemFil Rock for various attributes, the result is shown in table 2.

When the evaluators were asked what they liked most about ChemFil Rock, compared to their commonly used GI, the results indicated that the most liked attributes were the setting time (six evaluators) and its packability (four evaluators). Comments made included "Better surface finish & sets quickly without the shrinkage of a light cure" and "Speed essential for difficult core build-ups and with 'bright' colour easy to see tooth and core material".

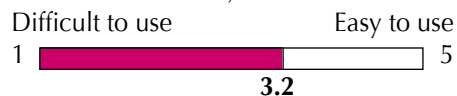
When the evaluators were asked what they liked least about ChemFil Rock, compared to their commonly used GI, the responses were as follows: "Poor shades" (five similar comments), and, "A bit too fast set" (three similar).

When the evaluators were asked what changes were considered essential for the acceptability of ChemFil Rock, the following

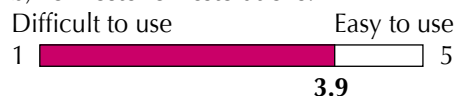
Comments were made: "Alter shades" (four evaluators), "Change set time to give longer placement time" (two similar) and "Redesign capsules" (two similar).

The evaluators rated the ease of use of ChemFil Rock as follows:

a) For anterior restorations (Note: five evaluators did not use ChemFil Rock for anterior restorations).



b) For Posterior restorations:



Seventy-three per cent (n=8) of the evaluators stated they were satisfied with ChemFil Rock. Eight (73 per cent) evaluators also stated they would purchase the material if available at an average price and the same number would recommend ChemFil Rock to colleagues.

Final comments:

"Good material but needs to be easier to use" (two similar), "Too fast set", "Capsules did not retain in two different mixers", "A good material for quick stabilisation of fractured teeth or as an intermediate restoration.", "Love it – a definite advantage" (two similar) and "Great to use as a core build-up material or semi-permanent restoration but poor for anterior restoration".

Discussion

The Dentsply ChemFil Rock glass ionomer restorative system has been subjected to an extensive evaluation in clinical practice by members of the PREP panel, in which 275 restorations were placed. Based on this the following conclusions may be made:

Presentation

The kit scored well in all the criteria rated, with scores ranging from 4.2 (on a visual analogue scale (VAS) where 5 = excellent and 1 = poor) for ability to position on the work surface to 4.3, on the same VAS scale, for completeness of the system, arrangement of the components and for overall presentation. The instructions also achieved a very high rating of 4.8 (on the visual analogue scale where 5 = excellent and 1 = poor).

Dispensing and handling

ChemFil Rock scored better than average for dispensing and placement (3.9 on a VAS where 1 = inconvenient and 5 = convenient), and while the scores for ease of use were lower than the previously used conventional glass ionomer system for use in both anterior restorations and posterior restorations (3.2 & 3.9 compared with 4.2, on a VAS where 1- difficult to use and 5 = easy to use) the majority (73 per cent) of the evaluators would both purchase the material and recommend it to colleagues. It was noted that five of the evaluators (45 per cent) would not consider using a glass ionomer material for an anterior restoration or where aesthetics were important.

In the table comparing characteristics of ChemFil Rock with the evaluators current GI material it is interesting to note that the highest score for 'Worse' was the short working time and the highest 'Better' score was for the short setting time. Comment was made by some evaluators on the difficulties of using the capsules, both in activation, mixing and dispensing. The brightness and opacity of the shades of ChemFil Rock were also mentioned as areas for change considered essential to the acceptability of the material.

Conclusions

Despite some criticism of some of the characteristics of ChemFil Rock overall 73 per cent of evaluators were satisfied with the system and the same number would both purchase the material and recommend it to colleagues. Changes to set time, capsule redesign and shade

alteration were suggested to further improve the acceptability of the material.

Manufacturer's comments

Dentsply wishes to thank the PREP Panel for its evaluation and useful feedback. ChemFil Rock is a big step forward in glass ionomer technology. Its new and unique formulation contains zinc-modified reactive fillers which make it up to 25 per cent stronger than other GIs. This leads to an earlier build-up to fracture toughness, superior wear resistance and longer lasting restorations. Unlike other GIs, cavity conditioning and surface coating are not recommended, which saves time, effort and material cost. The non-sticky, packable material can be sculpted straight away which increases confidence in the restoration.

ChemFil Rock offers a simple and reliable semi-permanent restorative solution in compromised clinical situations.

References

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