

Resin-bonded all-ceramic crowns: are you up to it?

Variations in tooth preparations for resin-bonded all-ceramic crowns in general dental practice by A. F. Sutton and J. F. McCord *Br Dent J* 191; 12: 677-681

Objective

To investigate variations in tooth preparations for resin-bonded all-ceramic crowns (RBCs) in general dental practice (GDP).

Design

Laboratory-based retrospective analysis of dies for RBCs.

Setting

General dental practice in the UK and Ireland (2000).

Methods

A sample ($n = 132$) of laboratory models containing 180 tooth preparations for RBCs, featuring work from different general dental practitioners was obtained from four commercial dental laboratories. Aspects of the preparations were quantified and compared with accepted criteria defined following a review of the literature.

Results

The teeth found to be most frequently prepared for RBCs were maxillary incisors (41%). Margin positions were variably positioned with 29% of the preparations on the buccal aspect having subgingival margins. There were many tooth preparation dies for low fusing RBCs (47%) and Chameleon Fortress RBCs (62%) demonstrating overpreparation in the mesiodistal plane. The majority of the margins (84% buccally and 79% lingually) of the dies examined, exhibited appropriate shoulder or chamfer finishes. Of the Chameleon Fortress preparations analysed, 86% had been underprepared occlusally. 42% of the teeth had been

prepared with no regard to tooth morphology and demonstrated just one plane of reduction. The majority (93%) of the clinicians failed to provide any information regarding the shade of the prepared tooth stump.

Conclusions

On the evidence of this survey of this sample of general dental practitioner's work, it was found that relevant guidelines for the preparations of RBCs are not being fully adhered to.

In brief

- The resin-bonded all-ceramic crown (RBC) has been in use for the past 10 years. The majority are placed in general practice.
- A variety of guidelines have been advocated for the design of preparations — these are essentially from the manufacturers of the ceramics.
- This study examined 180 dies for RBCs on 132 working models sent to four large dental laboratories.
- It was found that there was a tendency that the guidelines are not being fully adhered to.
- Postgraduate training of clinicians in general dental practice is probably necessary to improve the knowledge of the required preparation designs.

Comment

Resin-bonded all-ceramic crowns have many advantages, which include biocompatibility, potentially excellent aesthetics and minimal tooth preparation when compared with more traditional techniques. Consequently there is a trend toward increased use of these restorations by practitioners in modern day practice.

As with all restorations however a successful outcome is dependent on tooth preparation appropriate to the material prescribed for the final restoration. Too often newer techniques and materials are introduced and little thought is given to the modifications in tooth preparation required to ensure a successful outcome. Existing preparation techniques are often used for newer materials, for example, gold inlay preparations for ceramic or resin composite inlays and porcelain jacket crown preparations for resin-bonded all ceramic crowns.

This study focused on variations in preparations for resin-bonded all-ceramic crowns in general dental practice and high-

lighted that practitioners frequently prepare teeth inappropriately for all-ceramic crowns. The lack of clear preparation margins (6%) and subgingival preparation margins (22%) will compromise the long term success of any restoration.

This is particularly the case with resin-bonded restorations given the difficulties in moisture control during cementation and the possibility of subsequent interfacial leakage, particularly if the margins are placed in dentine and cementum. A combination of under and over preparation and inappropriate margin design will similarly reduce the prognosis for these restorations.

Adhesive techniques coupled with surface treatments of ceramics, which enhance the retention of restorations, have revolutionised operative dentistry. Whilst the bonding of ceramic materials to tooth tissue is tested and proven it does not obviate the need for adequate retention and resistance form within preparations. A significant proportion (42%) of the prepara-

tions in this study had been prepared with no regard for tooth morphology needlessly sacrificing advantageous resistance form.

The veneer of ceramic in these restorations is only 0.5–1.0 mm thick and as a consequence the shade of the underlying dentine will have some influence on the final shade of the restoration. It is important therefore that practitioners provide the laboratory with a shade of the preparation, which many of the practitioners in this study had not appreciated.

The authors have highlighted in this paper the common pitfalls that practitioners can encounter when preparing teeth for resin-bonded all-ceramic crowns. Successful management of these difficulties will improve the long-term outcome for restorations of this type.

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