Restorative tips for primary care (part 2)

Byran Yip,[1] Ewen McColl[2] and Graeme Bryce[3] continue our series of top tips in dental specialties.

In this paper we continue our restorative top tips series by expanding on areas that we have experienced through trial and error in our own clinical practice, and questions that we have been frequently asked or observations of failing treatments.

1. Resin-bonded bridges

A resin-bonded bridge (RBB) is a predictable option for prosthetic replacement of missing teeth where there is sufficient enamel on abutment teeth to allow adequate and consistent bond strength. As with all restorative treatment, planning is core to optimal patient outcomes.

Design tips

a. Design and preparation

Maximum extension of the RBB wing on the abutment tooth, without affecting smile aesthetics,[1] is advocated. By employing vertical axial realignment principles (Dahl), and bonding the RBB high into the occlusion, abutment preparation can be avoided and enamel preserved.

For single abutment designs, mesial as opposed to distal cantilevering is preferred due to the increased occlusal forces realised by the fulcrum effects on distal pontics. For fixed-fixed RBBs replacing missing posterior teeth, metal coverage should extend onto the occlusal surface, finishing at the buccal cusp tip, and be bonded high in the occlusion. Minor preparation may be required for minimally tilted abutments with enameloplasty, using a long-tapered diamond bur, to create paralleled proximal guide planes. In restored abutments, dental amalgams should be replaced with resin-based composite (RBC) to enable bonding, and additional resistance form can also be achieved by preparing box seats within the RBC.

In patients with tooth surface loss (TSL), requiring re-organisation of the occlusion at an increased vertical dimension, the RBB can be accommodated within the new occlusal scheme and RBC, or further indirect fixed prostheses, applied to TSL affected teeth.

The pontic mucosal site can be developed, to provide a positive prosthetic emergence, by gingivoplasty or by using an Essix retainer with a provisional RBC pontic applying pressure to the mucosal tissue.[2] Further RBC can be added to the pontic fit surface, until the desired degree of indentation is achieved. The developed pontic site can then be captured within the definitive impression.

Within the aesthetic zone, abutment teeth with 'v'-shaped crown or displaying papillae loss can pose challenges with the prevention of 'black triangles'. In such cases, RBC can be added to the proximal emergence surfaces prior to the definitive impression, helping to reduce 'black triangle' appearance and metal show.

b. Laboratory prescription

The laboratory prescription should specify the desired extension of the metal coverage and minimal thickness of framework; a minimum of 0.7 mm on occlusal surfaces and a connector height of 4 mm, to ensure rigidity.[3]

The pontic design should be specified, with ovate advocated for the anterior tooth, and modified ridge lap for posterior tooth. An alternate approach to the clinical development of the pontic site is to prescribe adjustment of the pontic emergence on the master cast. This should include details of where the pontic should emerge from and how much stone/model material the technician should remove to achieve this. Localised soft tissue defects at the extraction site can be disguised by prescribing pink porcelain at the gingival aspect of the pontic. Photography can be used to help communicate the aesthetic requirements to the dental technician.

c. Fit tips

Trying-in the RBB prior to isolating the patient with rubber dam allows the clinician to check the fit and aesthetics of the restoration. Particle air abrasion of the RBB retainer's fit surface is also essential post try-in.

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In the anterior zone, an opaque resin cement, such as Panavia V5 opaque shade paste, Kuraray Noritake, Osaka, Japan, is generally recommended.[4] If not opaquing the metalwork, it is advisable to use try-in pastes to assess the effect of metal 'shine-through' prior to final bonding. The tooth surface should be prepared by ultrasonic scaling and pumicing with a bristle brush. If the tooth surface has previously supported a RBB retainer, or has been restored with RBC, then the surface should be particle air abraded with 50 micron alumina under rubber dam isolation prior to undertaking the bonding stages.

Whilst use of rubber dam is indicated for both safety and isolation of the chemical bonding process, it can create undesired pressures on the pontic site which can physically disrupt accurate seating. In this specific circumstance and in lower-risk areas of moisture contamination, such as the maxillary arch, rubber dam application may be avoidable and isolation could be achieved with cotton wool rolls or cheek retractors like Optragate, Ivorclar Vivadent AG,

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Schaan, Liechtenstein, whilst gauze can protect the airway. In the mandibular arch, with greater risk of moisture contamination, a split dam technique[5] helps to control saliva ingress to the site, without the risk of physical displacement of the RBB during bonding. Alternatively, conventional application of dam with floss ligatures to ensure inversion of the rubber can prevent some of the possible complications detailed previously.

Interproximal polytetrafluoroethylene (PTFE) tape between the abutment tooth and adjacent natural tooth, with glycerol added to reduce friction and ease placement, can aid the removal of excess cement post-bonding.

The pontic should be kept clear of excursive contacts.

d. Removal of RBBs

For the anterior RBB, a high-speed drill can be used to create an indent at the incisal/cuspal edge of the framework, sufficient to accommodate the tip of a straight enamel chisel. The chisel can be placed into the indentation, orientated to align with the palatal tooth/framework interface and either rotated or tapped, in a controlled fashion, using a surgical mallet (or similar) to dislodge the retainer. In the posterior RBB, a tungsten carbide bur (H4MCL bur, Komet, Lemgo, Germany) could be used to section the metalwork, and subsequent use of ultrasonic to remove sectioned portions of wing and cement layer.

2. Restoration of the root-filled tooth

a. Restoration of the anterior root-filled tooth

When a root-filled tooth has adequate dentine (>4 mm height and >2 mm thickness), an adhesive RBC core/restoration is normally sufficient and post placement should be avoided. Post placement neither reinforces the strength of the root, nor improves tooth survival.[6] Subsequently, a balance should be struck between preserving coronal dentine and providing a post with sufficient width/height to avoid fracture or debond, with the aim of providing a passively fitting and adhesively retained post restoration.[7] Due to the inherent flexure of fibre intraradicular posts, with the subsequent transmission of flexural forces onto the RBC core/dentine interface, these should only be prescribed to support core retention where there is adequate height (≥2 mm), thickness (>1 mm), circumferential distribution and good quality of remaining tooth tissue, providing ferrule effect, for resilience of subsequent restoration. A cast metal post and core, in type IV gold or similar, should be prescribed in the absence of these parameters, where the restored tooth is involved in guidance or for patients with parafunctional habits.

b. Restoration of the posterior root-filled tooth

Cuspal protection following pre-/molar root canal treatment (RCT) is crucial to tooth survival[6] and, to reduce the risk of catastrophic fracture, should be completed as soon as possible post-RCT.[8] Well-placed indirect restorations provide greater longevity, especially where a conservative tooth preparation has been undertaken and adhesive bonding used, such as when an endocrown approach is adopted.[9] Delayed definitive restoration may be indicated if RCT fails to resolve symptoms or doubts exist about the quality or success of the RCT. Whilst further management may include root canal re-treatment or specialist referral, the tooth should receive a provisional cuspal-coverage restoration in the meantime (eg by reducing the cusps by 2 mm and providing a RBC overlay). Cuspal coverage RBCs are cost efficient to place and may provide immediate protection from unfavourable cuspal loading, allowing the clinician/patient time to assess resolution of symptoms or radiographic review of apical healing at 12 months, prior to providing an indirect restoration.

In the uncommon situation where an unrestored, non-carious posterior tooth requires RCT, it is likely that a dentinal crack has led to devitalisation and, even though the access cavity may be conservative, the tooth should be restored with a cuspal-coverage restoration to reduce crack propagation.

3. Tooth surface loss – practical tips

a. Decision making: when do you move from monitoring to intervention?

The identification of tooth surface loss (TSL), with the raising of patient awareness and implementing risk factor management,[10,11] is crucial to successful management.

Restorative intervention for patients with TSL is advised following dentine exposure but should also be considered when there is evidence of progression, even when limited to the enamel. Early intervention can save the patient from extensive procedures in the future; for example, the restoration of worn canine cusp tips with RBC to regain canine guidance, accompanied with appropriate splint therapy, can help protect the posterior dentition from further TSL and coronal fractures.

Greater planning is required for generalised TSL, with multiple sextants involvement, or where the vertical dimension or smile aesthetics have been significantly affected. The application of unbonded RBC can be used to trial changes to both the anterior aesthetics and the vertical dimension. This allows the appreciation of approximate changes before committing to the expense of a formal wax-up. An impression can capture the RBC additions, *in situ*, and be used to guide the technician with any subsequent diagnostic work-up. Even within severe generalised TSL cases, RBC provides good aesthetics and functional strength, whilst conserving remaining tooth substance.[12] Placement can be aided using transparent stents, constructed from the diagnostic wax-up, and injection-moulding techniques.[13] Longer-term functional stability of RBC can be improved for bruxing patients using bonded gold veneers (for the palatal aspects of the anterior dentition) and onlays (for the occlusal aspects of molars).

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Achieving effective rubber dam isolation is a commonly reported challenge when placing RBC for generalised TSL, with the

dam often interfering with correct seating of the silicone stent or preventing RBC placement at the correct gingival margin extension. In addition to the previous advice for dam placement, the placement of small RBC stops at the gingival margin can hold the rubber dam at the desired level and be removed post-completion of RBC build-up. Inversion of the rubber dam around the teeth circumferences, by running a flat plastic instrument around the dam collar whilst simultaneously blowing compressed air from the 3:1 syringe, can further reduce saliva or gingival crevicular fluid (GCF) ingress. If bonding is required at the gingival margin level, retraction cord helps to expose further enamel, improving the extension of enamel bonding, and offering an additional means to control GCF ingress into the treatment area.

b. Splint therapy

Whilst hard acrylic splints are often seen as gold standard, they are expensive to manufacture and require considerable patient compliance with wear. An alternative, more cost-effective approach, is the dual laminate splint which offers better dentition protection for bruxists, than the simple soft silicone suck-down splint.[14] We normally find that if a patient wears through such splints within a short period, it gives both the patient and the dental team insight into the severity of the bruxing habit. Subsequently, patients are more likely to comply with the wearing of a hard acrylic splint, such as the Michigan or Tanner designs.

As stated previously, these top tips are based mainly from experience and may need some adaptation to an individual's circumstances and practice. We hope this series will be of benefit to clinicians in optimising outcomes for patients. ■

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