**Direct layered Transitional Resin Bonded Bridge and Composite Pontic used with Resin-impregnated Glass-Fibre Ribbon**

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**Treatment List (FDI classification)**
- Tooth 22MBD: direct acid-etched layered composite veneer
- Tooth 21MBD: direct layered composite crown pontic
- Tooth 11MBD: direct acid-etched layered composite veneer

**Restorative Material**
- Reverse layering system demonstration

**Adhesive System**

**Introduction**
Patient J.B. (24) presented to my service for an emergency reassessment after he complained of “looseness” followed by debonding of his tooth 21. As a matter of history, tooth 21 had previously been root canal treated by another dentist due to trauma when the patient was very young. Following a secondary instance of trauma, the tooth had received a fibre post/core and new crown just 3 years prior with virtually no ferrule. The patient was warned about the poor long-term prognosis of type of restoration, but wanted to see how long his natural tooth might last.

On dental examination, tooth 21 exhibited a complicated 5mm subgingival mid-root fracture on the buccal aspect, 3mm subgingival on the distal, 4mm subgingival on the mesial and 2mm subgingivally mid-palatally. Part of the post was fractured and remained within the root stump. Otherwise, the crown/post/root fragment unit emerged intact.

Radiographic examination revealed an area of localised moderate-to-severe horizontal bone loss in the 21 region, commonly seen in long-standing mid-root fracture cases. The fracture would have occurred in the distant past with plenty of time for the infection to propagate to bone.

The patient needed an immediate restorative solution and was not keen on an extraction, as he had a social event to attend the coming weekend. Understanding his immediate needs, but also the vision for bone grafting before long-term restoration with an implant-supported crown, the decision to leave the fractured root in situ and provide him with a transitory resin-bonded bridge was the ultimate solution. This solution respects the need to sustain soft tissue and particularly interdental papillae support in the face of massive horizontal bone loss. Hard tissue contour is maintained in this case by retaining the root tip, thus stabilizing the buccal cortex. The extraction is planned to be concomitant with implant placement and bone grafting.

**Medical History**
- Conditions: borderline Class I hypertension [140/80]
- Medications: none
- Allergies: codeine. Sensitivity to NSAIDs.
Treatment Plan for Mandibular Anterior Sextant

- Preparations for resin-impregnated glass fibre ribbon (GrandTEC, VOCO, or similar) to be made on the proximalpalatal surfaces of teeth 22 and 11 adjacent to the missing tooth space. Depth of preparations approximately 0.7mm.
- Preparations to be completed on facial aspects of teeth 22 and 11 to refine shapes and establish harmony with pontic. Note that 22 and 11 previously were restored with direct composite veneers.
- Mylar strip or similar isolation from adjacent teeth, micro-air abrasion (50µm aluminum oxide) to be completed on 11, 22 proximal, buccal and incisal surfaces.
- Etch, bond, GrandiosO Flow A1 to fix the shaped glass fibre ribbon to the palatal preparations.
- Palatal wall of pontic to extend to incisal aspect of root fragment subgingivally in order to ensure soft tissue support. Placed with A1 GrandiosO. Dentin bulk built from palatal to buccal aspect using GrandiosO A1. Enamel wall also built with A1 GrandiosO (time restrictions on Day 1).
- Single shade direct layered composite veneers placed on teeth 11 and 22 using GrandiosO A1 following bulk composite placement of pontic 21.
- Finishing and polishing completed for resin bonded bridge on Day 1.
- The desire for greater facial surface characterization required bringing the patient back for surface modifications. Following a mid-facial cutback from incisal to gingival aspect, the composite was micro air abraded (50 micron aluminum oxide), silanated, and added to. A2 was used cervically, A3.5 as a mid-facial patch, and Flow Incisal for the incisal 1/4th. This technique represents a reverse layering technique whereby the colour characterization is built into the enamel layer instead of the dentin.

Clinical Case Report

Patient J.B. is representative of the modern-day patient with high esthetic needs and limited financial means. The implant solution for his mid-root fractured tooth 21 is obvious, along with the need for bone grafting and possible connective tissue grafting to maintain a natural buccal soft tissue contour. In this case, untimely events, financial constraints and a common fear of dentists came together to inspire a non-extraction, provisional solution with superior esthetics.

After buccal infiltration anaesthesia with 1 carpule of 4% Articaine with 1:100,000 epinephrine [3M Espe], a long bevel was applied to the facial aspects of the composite veneers on 11 and 22 [Figure 1]. This cutback will allow control of symmetry of form and colour in this resin-bonded bridge, especially with a chameleon-opacious material such as GrandiosO, where colour characterizations are best built into the enamel layer.

Simultaneously, measurements are made 3-4mm past the linguoproximal line angle onto the linguoalveolar surfaces of both 11 and 22. This area is marked with a pencil or Sharpie, and reduced by 0.5-0.7mm with a high-speed diamond bur. A corresponding length of resin-impregnated glass fibre (GrandTEC, VOCO) is cut and fitted to the preparations. The teeth are isolated with Mylar strip matrices and micro air abraded (50 micron aluminum oxide) before 33% phosphoric acid is applied for 30 seconds. A 5th generation bonding agent (Kerr Optibond Solo Plus) was used in this case. After confirming fit and interdental contour, GrandioSO Flow A1 is added first to the preparation indents before the ribbon is gently manoeuvred into place. More flowable composite is added to the exposed surface of the ribbon, shaped, and...
each tooth cured from the palatal aspect for 30 seconds before a 20 second cure on the ribbon portion only (Figure 2). The pliable nature of this ribbon allows the formation of any shape or curve before setting, making it truly a versatile and strength-adding addition to any dentist’s restorative armamentarium.

Following this, the formation of the palatal wall is crucial. If you have had the luxury of completing a diagnostic wax-up prior to your case, a palatal silicone matrix or key would be invaluable for efficient and accurate placement of your palatal wall. In this case, we only had a few hours to make this patient’s teeth beautiful again, so freehand addition was our only option. The palatal wall measures approximately 0.3mm, and in this case extends subgingivally by 2mm to touch the subgingival root fragment. Sequential addition of layers progressed in a buccal fashion, carefully manipulating the material subgingivally to prevent material voids (Figure 3). In actuality, the entire buccolingual thickness of the pontic was completed with a single shade of GrandioSO A1 on Day 1. The composite veneers replaced on 11 and 22 also featured a single shade of GrandioSO A1 in a multi-layer technique (Figure 4).

After checking and adjusting the occlusion, finishing and polishing was completed on the 11-22 resin-bonded bridge (Figure 5).

GrandioSO acts as a chameleon, seemingly able to blend itself into natural tooth structure, opaque enough to block out stain where you need it and transmitting just enough colour to maintain optical depth where you want it.

On review, emergence profile and pontic form was pleasing (Figure 6). Post-operative radiographs showed good adaptation or proximity to the root fragment. However, symmetry with tooth 11 was not perfect, and the value of the pontic was higher than the adjacent teeth. Both teeth 11 and 21 exhibited a mid-labial area of higher chroma (Figure 7). It was decided that the pontic enamel layer could be enhanced for a more symmetrical final result.

Day 2 was 3 months later and required no anaesthesia, as the pontic was the only tooth being prepared. The patient had managed to fracture off part of the 22 composite veneer. Colour in direct layered composite veneers is routinely performed, approximately 1.0mm in depth, running from incisal edge to cervical extent (Figure 8). Following micro air abrasion with 50 micron aluminium oxide powder, a pre-hydrolyzed silane coupling agent was applied (3M ESPE Ceramic Primer) and allowed to air dry before unfilled resin was applied and cured (Cosmedent Complete). The mid-labial “patch” of higher chroma was recreated using GrandioSO A3.5 (Figure 9). The cervical area was slightly toned down using GrandioSO A2, and the incisal area was defined using GrandioSO A1 shade was

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**Fig. 09:** Application of GrandioSO A3.5 to mid-labial region to simulate feature seen in adjacent teeth.

**Fig. 10:** View after application of GrandioSO Flow Incisal to incisal aspect of restoration. Reverse layering concept – color is all built into the enamel layer instead of dentin.

**Fig. 11:** Maxillary occlusal view of completed resin-bonded bridge. Note buccal embrasure form is developed.

**Fig. 12:** Restoration finished and polished (Dimanto single-stage polishing system, VOCO). Final result after Day 2.

**Fig. 13:** Post-operative radiograph showing degree of horizontal bone loss in 21 region along with subgingival shaping and adaptation of pontic to region to maximize tissue support. Pontic and root tip to be removed simultaneously at time of bone grafting and/or implant placement.

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