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Aesthetic reconstruction with fiber-reinforced polymerceramic crowns: A case study
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INTRODUCTION

Adhesive dentistry is rapidly evolving. Two main incentives drive this evolution - advances made in adhesive techniques combined with a demand for aesthetic restorations by patients. Patients want their teeth restored not only anatomically, but also aesthetically. Adhesive materials and indirect restorations currently available allow for these needs to be met in most instances using the concept of "minimally invasive" and "minimal intervention" dentistry.⁷ Recent innovations in composite technology and the demand for more aesthetic (metal-free) restorations have resulted in the development of advanced tooth-coloured materials particularly suited for crowns, inlays and onlay restorations.³ These new generation materials or indirect composites are also known as polymerceramics, polyglass composites, ceramic optimized polymers, ceromers or fibre-reinforced composites. A case is presented for aesthetic enhancement making use of minimal intervention using such a material namely, belleGlass HP.

Case diagnosis and treatment plan A 22-year old lady completing her law studies, was referred by her Orthodontist for post-orthodontic aesthetic restorative work. She presented with retained deciduous molars and congenitally absent succedaneous permanent premolars. In addition, she also presented with peg shaped upper lateral incisors. The primary molars were partially submerged and in infra-occlusion resulting in an uneven and highly unaesthetic occlusal plane (Figures 1a-1e). Her main complaint was: "I am

starting to work soon and I want my smile improved". From an orthodontic perspective there was nothing further that could be done to improve her aesthetics. No symptoms were reported, and clinical findings other than the aesthetic problem were not pertinent. The periodontal condition was healthy. The occlusal relationship was Class I with canine guidance in lateral excursions. The retained deciduous teeth were firm and seemingly ankylosed. The lateral incisors were peg shaped resulting in unacceptable diastemas in the anterior aesthetic zone. Confronted with this unusual situation, various treatment options were considered.

1. Removable option

Retention of retained and submerged deciduous teeth with partial upper and lower overdentures, over the retained teeth, · extraction of retained and submerged primary molars and upper first premolars followed by conventional partial dentures.

2. Fixed partial denture

Extraction of deciduous teeth and construction of fixed conventional metal-ceramic bridgework in all four quadrants.

3. Fixed/ implant supported crowns

Extraction of deciduous teeth followed by immediate or delayed implant placement and loading with implant supported crowns.

4. Conservative aesthetic crowns

Minimally invasive bonded aesthetic indirect composite (polymerceramic) belleGlass crowns.

The removable options were regarded as not being viable for reasons of being too radical in sacrificing sound teeth. Also, it would still be an aesthetic compromise. The biologic price to pay for the fixed bridge option and the cost associated with the implant options ruled out these options and were declined by the patient.

The final option of conservative crowns was considered ideal under the circum-

stances. Very little would be sacrificed in terms of tooth removal. Bonded crowns in this type of situation can be expected to work very well for several reasons: · bonding would be to enamel essentially with minimal tooth preparation - limiting technique sensitivity · belleGlass crowns, apart from being aesthetic, are also strong in terms of wear and fracture resistance - being a triple cured composite · bonding materials available today can be used with confidence for predictable bonding to enamel · polymerceramics would wear more like natural teeth and do not abrade the opposing teeth · adequate space was available for the polymerceramic fibre-reinforced system · the occlusal scheme would allow for the canines to disclude the posterior teeth during lateral excursions and in so doing limit horizontal forces on the restorations ie a canine protected occlusion · this would be a minimally invasive procedure and afford an opportunity to assess the effectiveness of the material under clinical conditions.

PRETREATMENT CONDITION OF PATIENT

Case preparation

Preparation of the teeth involved the provision of a finishing line (chamfer) slightly supragingivally for all the teeth including the peg-shaped laterals (Figure 2a). Minimal extension into enamel was done to remove the highly prismatic surface layer for better bonding of the crowns to the sub-surface enamel.

Impressions of the upper and the lower arches were recorded with President® addition cured silicone. No temporization was provided, but a thermoformed plastic guard lined with Viscogel® was provided in case the patient experienced some sensitivity.

The crowns were manufactured using the triple cured technique (light, heat and pressure) that is unique to the belleGlass indirect composite system. The finished crowns (Figure 2b) were sandblasted with



Figure 1(a): Close-up of smile



Figure 1b : Anterior view of occlusion



Figure 1c : Right lateral view of occlusion



Figure 1d : Left lateral view of occlusion

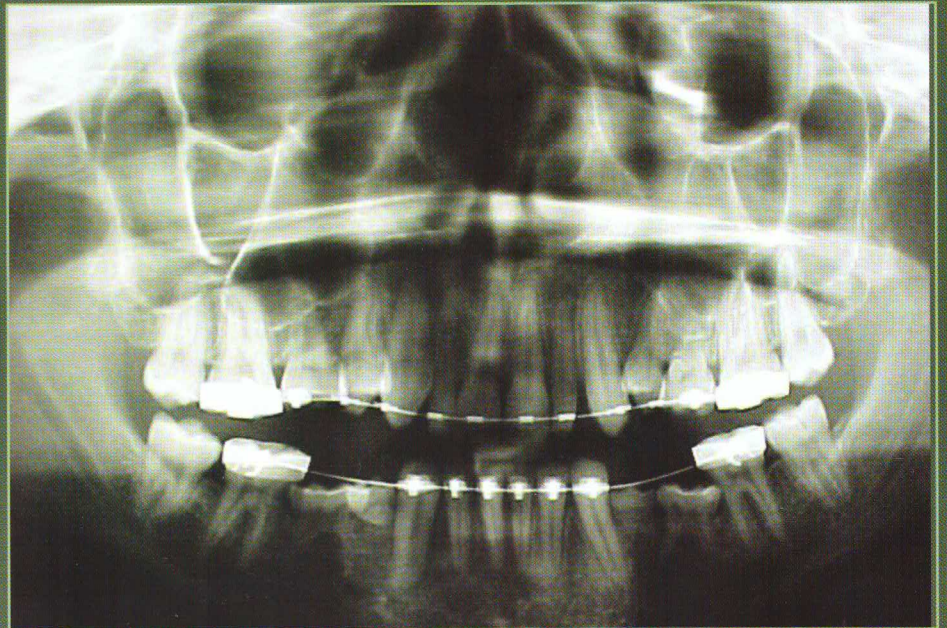


Figure 1e: Radiographic view of submerged teeth



Figure 2a: Minimal Preparation

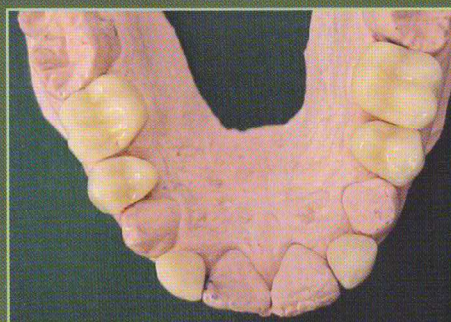


Figure 2b: Completed, polished, sandblasted and silanated crowns

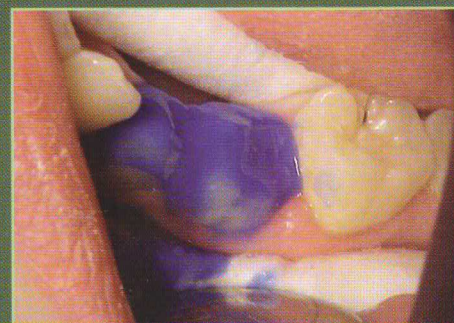
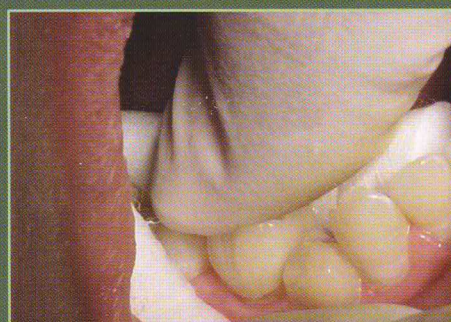


Figure 3a: Isolation and acid-etching of teeth



Figure 3b: Silane bond enhancer (air dried) followed by adhesive (light-cured)



Figures 3c: Seating of Crowns



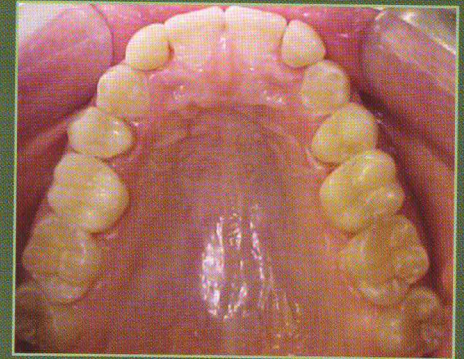
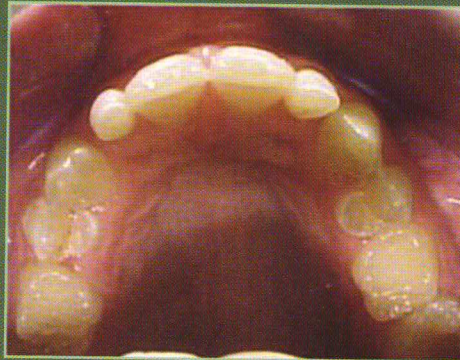
Figures 3d : Finishing and polishing procedure



POST TREATMENT PHOTOGRAPHS OF PATIENT

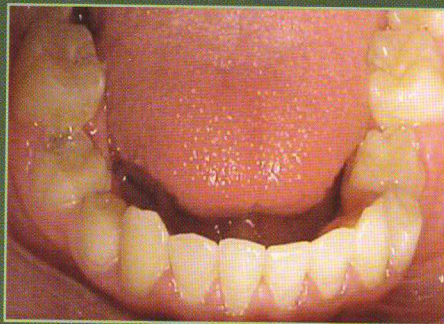
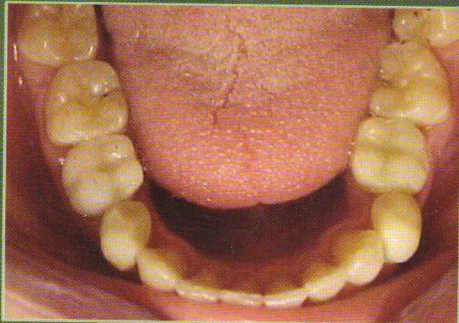


POST TREATMENT PHOTOGRAPHS OF PATIENT



SATISFACTORY AESTHETIC RESULTS

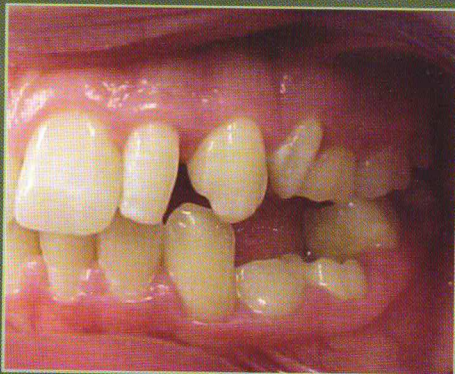
Upper and lower arches: before and after



Figures 3e : Finishing and polishing procedure



Anterior views before and after



Lateral before and after

aluminium oxide powder (50µ grit) on their fitting surfaces and then treated with silane bond enhancer.

Case delivery

The patient was prepared for the bonding procedure after a thorough prophylaxis. The teeth were carefully isolated with cotton wool rolls and Dri angles® for good moisture control. The crowns were tried in with water to assess accuracy of fit, shade and general aesthetics. Thereafter they were rinsed, dried and silanated again, leaving the silane to air dry. The teeth were then etched for 30 seconds with 37% Phosphoric acid (Ultra etch®) (Figure 3a) and rinsed for 10 seconds. The resin cement used for luting the crowns was Mirage® aesthetic resin cement. Equal amounts of base and catalyst were mixed for a dual cure bonding procedure. After application of the bonding adhesive, which was light cured for 20 seconds (Figure 3b), the mixed cement was placed in the fitting surfaces of the crowns and the crowns were seated into position and held under finger pressure (Figure 3c) while the cement was light cured. Excess cement was removed after an initial tack-cure, with superfloss (Figures 3d) and a brush moistened with bonding resin.

Following the bonding protocol the margins were finished using a fine diamond bur and Enhance® polishing and finishing discs (Figures 3e, 3f). The occlusion was checked to allow for clearance of the lateral incisors in all excursive movements. An alginate impression was taken to make a protective occlusal guard for the patient. The crowns have been in place for four years.

REFERENCES

1. Dickerson, WG. Rinaldi, P. The Fibre-Reinforced Inlay-Supported Indirect Composite Bridge. *Pract Periodont Aesthet Dent* 1996; 7:1-4.

The rest of this article's references (2-9) will be published in the online SADJ. www.sada.co.za