

# Restorative Smile case study

Neil Gerrard presents his winning entry for the Restorative Smile (single arch) category at the 2012 Smile Awards

## History

The patient, a 40-year-old male in good health, attended the practice with the priority of improving the appearance of his smile. His aim, to replace an existing anterior bridge while creating a more symmetrical even smile more visible when smiling, i.e. increase the length of his upper anterior teeth, level the occlusal plane and eliminate shadows in the buccal corridors.

## Diagnosis and treatment plan

A comprehensive dental health examination was completed prior to commencement of treatment. An intra-oral assessment confirmed a Class I occlusion with compromised dental health due to multiple carious lesions and failing restorations. Oral hygiene was of a fair standard.

Examination of the TMJ's and muscles mastication found no abnormality. A minor discrepancy between centric relation and centric occlusion was noted (approximately 1mm), with an anterior slide to the left detectable following bi-manual manipulation of the mandible. With a risk assessment and clinical examination indicating no risk factors associated with the existing occlusal scheme



Figures 1-2: Full face views (before and after)



Figures 3-4: Smile views, anterior (before and after)



Dr Neil Gerrard is the principal of Clifton Dental Studio in Bristol. He is one of a select number of UK dentists to have achieved accreditation status with the British Academy of Cosmetic Dentistry (BACD).

Neil's interests are in advanced cosmetic dentistry, complex smile reconstruction with dental implants and smile rejuvenation. He completes over 100 hours of advanced training every year in the fields of cosmetic and implant dentistry, and is an examiner with the BACD, helping educate dentists, dental technicians and team members in the art and science of cosmetic dentistry. For further information please visit [www.cliftonsmiles.com](http://www.cliftonsmiles.com) and [www.bacd.com](http://www.bacd.com).

(the existing anterior bridge had been in situ for 20 years or more), a conformative approach was taken utilising the existing MIP.

Analysis of his smile indicated an occlusal plane which dropped posteriorly left and right following over eruption as a result of early loss of the first molars in the lower arch. A reverse smile line was also noted 13 to 23, the canines appearing longer than the central incisors when smiling. A ridge defect around the existing bridge was also evident in the 11/12 region, again from a result of long-term tooth loss following a traumatic injury as a child.

In accordance with the patient's requirements a number of treatment proposals were presented, including pre-restorative alignment to level the occlusal plane and gingival zeniths into the ideal position with orthodontic treatment, thus negating the need for crown lengthening in the posterior

sectants. Implant placement to support the 11, thus reducing the risks of abutment failure, and conventional crown and bridge restorations to restore those teeth compromised with primary and secondary carious lesions. Oral hygiene and dietary advice would also be offered to reduce future risk of caries in conjunction with caries management programme as appropriate.

With a complete understanding of the benefits and compromises associated with each treatment, the patient opted to replace the existing bridge with another fixed bridge (as this had functioned satisfactory for nearly 20 years), along with crowns and veneers in the upper arch to correct those undesirable features already noted.

Treatment would therefore consist of:

- Placement of indirect restorations to all teeth treated within the upper arch – a combination of a zirconia-supported bridge with layered

ceramic for 12 to 21 and E-max crowns/veneers/onlays as required.

- Crown lengthening to reduce the left and right posterior inclination of the gingival tissues, thus allowing levelling of the occlusal plane anterior-posteriorly without shortening of the visible crown heights. This would also offer the ability to widen the buccal corridors as required while maintaining the correct crown inclination of each tooth.

- Root treatments in the pre-molars and molars as required if exposure were to occur while creating adequate occlusal reduction to lift the occlusal plane.

- Enamel plasty of the lower incisor teeth as required to improve incisal edge relationship.

- Finally, a conformance occlusal scheme would be followed, as no evidence of dysfunction could be deduced from the intra-oral examination or patient history.

The patient was also aware that failure to restore 37 and replace 47 would increase the risk of compensatory eruption in the right posterior sextant and the need for further complex restorative care with 37. The patient requested that treatment be phased, concentrating on the upper arch at this point in time, followed by the lower arch in the near future.

### Treatment process

Following hygiene care and dietary advice, records were taken to produce a laboratory fabricated diagnostic wax up. These included upper and lower polyether impressions for accuracy, a Kois facial analyser to aid occlusal plane correction and pre-operative photos. Additionally, the laboratory was instructed to lengthen the incisors by 1.5mm as determined with a composite mock-up in the mouth to confirm ideal incisal edge position.

At the request of the patient treatment was to be expedited in as short a timeframe as possible. Following confirmation that the diagnostic wax-up fulfilled all aesthetic and functional requirements, treatment was initiated. To save time, crown lengthening would be completed at the same time as the preparation visit.

Utilising a technique described by Mangne<sup>1</sup>, bis-acrylic crown material was injected into a putty matrix taken from the pre-operative diagnostic wax model. This was positioned in to the mouth and allowed to cure for three minutes. The matrix was then removed, revealing a bis-acrylic template of the final result. Depth gauge cuts were then made through this template, utilising round diamond burs (Brassler) to aid a conservative



Figures 5-6: Smile views, right (before and after)



Figures 7-8: Smile views, left (before and after)



Figures 9-10: Retracted views, anterior (before and after)



Figures 11-12: Retracted views, right (before and after)

preparation design. The remaining template material was then removed to allow finalisation of the preparations.

It was felt that, due to the presence of interproximal carious lesions and dentine/cementum exposure following crown lengthening, a cohesive cementation protocol would offer greater long-term predictability, rather than rely on dentine bonding. This cementation protocol would therefore dictate the need for full coverage restorations. The depth gauge preparation technique is also beneficial when used in conjunction with full coverage restorations, enabling minimal preparation (buccal, palatal and occlusal reduction) of all tooth surfaces. In this instance the use of this technique resulted in no pulpal

exposures (even the occlusal surface of 16) with all full coverage restorations. To maintain the correct occlusal relationship, bite records were taken in sections following preparation of a few teeth at a time.

For those teeth requiring surgical crown lengthening, the gingival tissues were sculpted to the ideal form using a diode laser, followed by preparation of the restorative margins to the correct level. Probing to bone with a William's probe confirmed that the restorative margin was within a distance of less than 1mm to crestal bone. Leaving preparation margins in such close proximity would result in profound biological width invasion. Surgical crown lengthening would therefore be required to re-establish the correct crestal bone level in

relation to the restorative margin.

In accordance with papers published by Kois<sup>2</sup>, restorative margins positioned 2.5mm from the crestal bone would enable development of a healthy gingival complex (biologic width).

At this point it was decided to complete placement of a bis-acrylic trial smile and leave the crown lengthening for a future appointment. Short-term invasion of the biological width would cause no negative occurrences and the patient would be seen again within seven days to complete this part of the procedure.

## Trial smile

Prior to impression taking, a trial smile was produced utilising the putty matrix and bis-acrylic temporary crown material in an appropriate shade. As the majority of the teeth were of full coverage design the trial smile would be cemented with conventional eugonol Tempbond. The trial smile would be cemented in sections, with the veneers on the canines supported both mesially and distally from the full coverage restorations.

Prior to cementation and impressions the form of the pontic for 11 was modified to an ovate form followed my creation of an ovate pontic site in the gingival tissue with a diode laser for haemostatic control. This was designed in such a way as to push the tissues apically and buccally. Ideal care would normally dictate a connective tissue graft with such a defect, in this instance the patient refused this procedure as the pontic site was not visible when smiling. The technique of directional pressure application can result in a satisfactory tissue form, but is not always predictable with inadequate pre-operative soft tissues.

A polyether was used to complete the final working impression, followed by stump shade and additional photos as required. Once poured this would be cross-mounted with the new bite records against the previously articulated lower model. Assessment of the trial-smile confirmed the occlusal plane to be level, thus negating the need for intra-oral adjustment and new face-bow.

At this point the trial-smile was seated in situ with Tempbond and the patient was allowed to leave.

One week later the patient returned for surgical crown lengthening of 16, 15, 14 and 24, 25, 26.

Following LA, flaps were raised to allow clear access to the crestal bone. Using



Figures 13-14: Retracted views, left (before and after)



Figures 15-16: Views, anterior (before and after)



Figures 17-18: Views, right (before and after)



Figures 19-20: Views, left (before and after)



appropriate burs and periodontal instruments crestal bone was removed to a distance of 2.5mm of the restorative margins. Great care was taken to achieve this critical distance and remove adequate bone at the line angles to prevent a chronic inflammatory reaction. This was sutured with 5.0 Vicryl Rapid.

One-week post-op sutures were removed and confirmation of uneventful healing was noted. The patient confirmed that he was delighted with the aesthetic result and reported no post-operative complications apart from some soreness of the gingival tissues to touch (as to be expected).

## Cementation of restorations

Cementation of the final restorations was completed three weeks post-preparation appointment. At this time complete resolution of the soft tissues in the pre-molar/molar regions had not occurred following the crown lengthening procedure. However, this was of no concern as the literature confirms a 100% predictable outcome in relation to gingival margin position to crestal bone position when the restorative margin is placed 2-2.5mm from the crestal bone, Kois.<sup>2</sup>

All teeth were isolated with retraction cord to prevent crevicular fluid contaminating the

cementation surface and to control haemostasis following particulate air abrasion. Air abrasion with 27um alumina oxide was used to prepare the bond surface, removing all contaminants which could compromise the tooth cement interface, including blood, saliva and eugonol.

The veneers on 13 and 23 were cemented first following an adhesive protocol, total etch, bond and light cure cementation. Following clean-up, all remaining full coverage restorations were seated using a self-etch dual-cure composite cement. Care was taken with both techniques not to desiccate any exposed dentine, thus reducing the incidence of post-operative sensitivity.

Following cementation the usual refinements were completed, the occlusion was checked and adjusted as required. Refinement of restorative margins was performed with fine rubber points together with confirmation that excessive blanching of the ovate pontic site had abated.

• I would like to thank my brother, Paul Gerrard of Bremadent Dental Laboratory, who provided the ceramic work, which he used as an accreditation case for the BACD. He is one of only two technicians to be accredited and together we are the only practice in the country to have both an accredited dentist and technician working under the same roof.

Care to comment? @AesDenToday



Figures 21-22: Upper occlusal views (before and after)



Figures 23-24: Lower occlusal views (before and after)



**Why this case won...**

*From Chris Orr, chairman of the judging panel*

In the restorative category, entrants often must address function as well as aesthetics. This was a highly challenging case, where the patient's presenting condition included worn teeth, failing restorations and caries in multiple locations, as well as the improvements the patient had requested in his smile. Previous restorations had not addressed obvious issues of tooth colour and bridge soft tissue adequately.

What really caught the judges' eye was the improvement in the overall appearance of the patient's smile and the fact that all dental disease was addressed as part of the comprehensive solution. A slightly more flattened, male smile line was very appropriately used, and the width of the smile was improved whilst addressing the essential aspects of the treatment plan.

The case is a good example of the synergy that can be achieved between dentist and ceramist. Neil Gerrard is to be congratulated on developing an all-encompassing treatment plan, then working in partnership with his brother Paul, who as technician produced a beautiful set of restorations. All technicians will recognise that there are great difficulties in addressing a mixed case of bridges, crowns and veneers, as the different preparations frequently make value and opacity control a challenge.

In spite of the fact that Neil's name is on the Award, both are to be congratulated for an excellent result, both aesthetically and restoratively.

# Aesthetic Dentistry Awards 2013

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**References**

1. Magne P, Magne M (2006). Use of additive wax up and direct intra-oral mock-up for enamel preservation with porcelain laminate veneers. *The European Journal of Esthetic Dentistry* 1(1): 10-19.
2. Kois, John C (1994). Altering Gingival Levels: The restorative connection Part1: BiologicalVariables *Journal of Esthetic Dentistry* 6 (1): 3-9

**Summary of products used**

Biolase - Diode Laser	Air-abrasion (Prep-Start - Danville products) 27um alumina oxide
Vicryl Rapid 5.0 suture	Bisco luting cement - Choice 2 (trans)
Luxatemp Bis-Acrylic temporary crown material	Rely-X dual cure self etching composite cement (trans)
Impregum Penta - Polyether impression material	IPS e.max layered and monolithic full coverage restorations
Ultradent retraction cord and haemostatic agent	Cercon Zirconia with layered IPS e.max Ceram