

A tale of two veneers: a case report

Jason Smithson presents this challenging case study on a 15-year old patient

Presenting case

A 15-year-old student and aspiring model was referred to the practice by a friend and colleague for assessment and treatment of her upper central incisors. Clinical and radiographic analysis alongside evaluation of clinical photographs revealed the following issues:

- 1) Ellis Class II fractures involving dentin and enamel affecting both upper central incisors, the upper right central was the most severely affected with approximately 60% loss of coronal structure whereas the left had around 30% loss. This occurred as a result of a childhood accident at around 12 years of age. The teeth had been previously restored with composite resin, which although achieved an acceptable aesthetic result, was not optimal.
- 2) The upper right central incisor was non-vital with significant periapical radiolucency. However, the tooth was asymptomatic.
- 3) The non-vital right central was significantly

Education aims and objectives

The aim of this article is to explain to the reader the processes needed to treat the upper central incisors, outline the challenges presented and to formulate a treatment plan.

Expected outcomes

The reader will understand how the author performed the reconstructions and how the communication between dentist and technician is of utmost importance.



It was the worst of times, it was the best of times
Adapted from Charles Dickens.



Jason Smithson BDS, DipRestDentRCS (Eng) qualified at the Royal London Hospital in 1995 achieving a number of awards including The Constance Klein Memorial, The Stafford Millar, and The Malcolm Jenkins Scholarships, The American Association of Endodontics Prize and the Overall Award for Clinical Dentistry. After spending three years in oral surgery residency in London, he relocated to Cornwall in the extreme south-west of England and is in general practice with a special interest in Aesthetic and Restorative Dentistry. His specific interest is composite resin artistry and he has presented to dentists both locally, nationally and internationally (USA, Canada and Europe) on this topic. He is a clinical lecturer to final year students at The Peninsula Dental School, Cornwall, UK and is involved in postgraduate dental teaching in both the Cornwall and Isles of Scilly and Plymouth Foundation Dental Practitioners Schemes. Jason recently achieved Diplomat Status in Restorative Dentistry from the Royal College of Surgeons (England). Jason is a past Chairman of The Cornwall Independent Practitioner's Group: one of the largest independent study groups in the UK. In 2009, he was awarded the Pankey Scholarship.

discoloured: the decreased value is particularly obvious in the black and white images.

4) The patient had recently completed a course of fixed orthodontic therapy at another practice some 12 months previously, although the arches were well aligned and the functional result was acceptable, there was some flaring of the upper anterior segment.

The patient requested restorations, which were indiscernible from her natural dentition in both natural light and photographic images. In view of her age, both the patient and her mother viewed conservation of tooth structure as a priority.

The challenges

Although we elected to treat only two teeth (both central incisors), this case was more challenging than it may first appear for the following reasons:

- 1) Due to the iatrogenic flaring of the anterior segment, the available space was very difficult to manage within the confines of the two teeth: essentially, there was excess mesio-distal space meaning that the potential height: width ratio of the teeth was reduced and less than ideal.
- 2) At 15 years of age the gingival margin position is still immature and one can expect it

to move apically with growth. This means that any restoration margin will become obvious even if placed subgingivally if it is not completely invisible at the time of placement.

3) The large pulp chamber meant that the subsequent endodontic therapy removed a significant proportion of palatal enamel to gain access and facilitate adequate debridement.

4) The orthodontist requested fixed and removable retention.

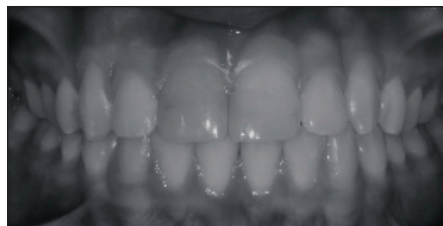
The treatment plan

Endodontic therapy was carried out by a Specialist Endodontist (Peter Davis BDS MClinDent MRD RCS (Edin), Riverside Specialist Practice, Truro, Cornwall). A decision was then made to bleach the upper right central incisor using an 'Inside-Outside' technique in order to render the upper right central incisor the same shade as the adjacent teeth. This allowed us to finish the margin of the restoration supragingivally using the 'Contact Lens' effect to result in an invisible final restoration. Since the margin was supragingival and invisible at the time of placement there were several advantages:

- 1) Any subsequent apical migration of the gingival margin would be inconsequential as far as



Figures 1-5: Pre-op smile



Figures 6-8: Black and white images show low value of UR1 in comparison with surrounding teeth



Figure 9: Retracted anterior segment

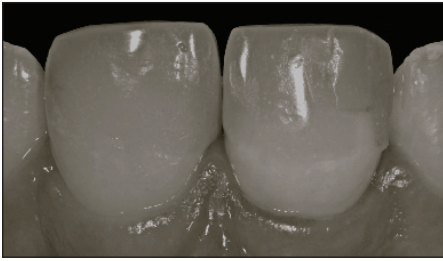
Figure 10: Black and white 'texturised' shot shows surface anatomy of existing restorations is incongruous with surrounding dentition

Figure 11: close up of treated teeth



Figure 12: palatal view pre-treatment

Figure 13: palatal view after removal of temporary dressing

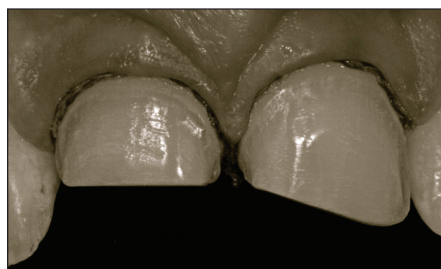


Figures 14-16: UR1 after internal 'Inside-Outside' bleaching



Figure 17: Central Incisors after removal of existing composite resin

Figures 18-19: Shade taking with Ivoclar shade tabs



Figures 20-22: Completed preparations with retraction cord in situ

cosmetics were concerned: resulting in a more predictable long-term aesthetic outcome.

- 2) The margins are accessible for inspection and maintenance.
- 3) There is no effect on gingival health.
- 4) Bonding is to enamel, which is more predictable in the long term.

We elected to restore both central incisors with minimal preparation ceramic veneers to achieve an ideal aesthetic result in combination with predictable durability. Placing a ve-

neer, rather than a more traditional post crown on the upper right central means that access to the pulp chamber is retained for potential endodontic retreatment or rebleaching. Palatal enamel was also available for the bonding of a fixed orthodontic wire retainer.

The treatment

The endodontic temporary dressing was removed from the upper right central incisor and under microscope enhanced vision (Ziess

OmniPico, NuView) all debris was excavated from the pulp chamber with a steel rosehead in a slow handpiece. The pulp chamber was washed with EDTA and then irrigated with ultrasonically energised sodium hypochlorite for 20 minutes in an attempt to remove as much debris from the dentinal tubules as possible. The Gutta Percha root canal sealer was removed from the canal orifice to a level some 3mm sub crestally (checked with a periodontal probe intra-orally in comparison with

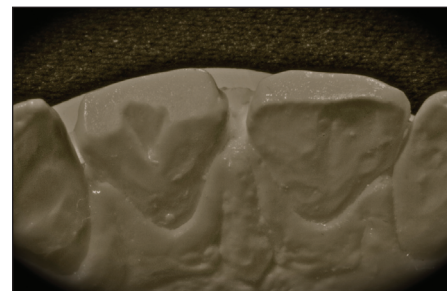
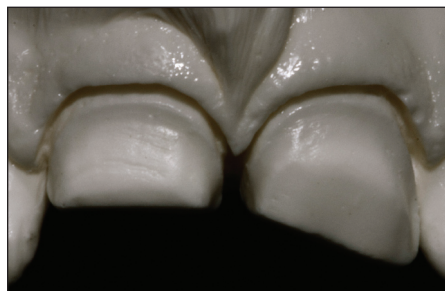


Figure 23: Pre-treatment radiograph

a peri-apical radiograph) and the orifice sealed with Fuji IX GIC (GC) placed in a 'Saddle' configuration. A bleaching tray was fabricated (Enlighten Smiles) which favoured bleaching of the central incisor in isolation and the access cavity left open. The patient was instructed in how to apply bleach to the tooth via the access cavity and the tray and was provided with 10% Evolution bleach (EnlightenSmiles). She was asked to apply the bleach to the tooth every two hours and return in two days for assessment.

After two days the patient returned for review and the bleaching result was seen to be satisfactory. The access cavity was sealed with Fuji IX Extra (GC) after dentin conditioning and the patient dismissed. Two weeks later, the patient returned. The old composite resin restorations were removed from both central incisors along with the majority of the Fuji IX access seal in the right central. The access chamber was resealed with Empress Direct Composite (Ivoclar-Vivadent) after bonding with a 3 step 4th Generation Bonding Agent (Optibond FL, Kerr). Ultrapack Cord (UltraDent, Optident) was placed to protect the gingivae during preparation.

Preparation depth guide grooves were cut to a depth of 0.2mm in the facial surfaces of both teeth and the teeth prepared for veneers with diamond burs in an electric handpiece



Figures 24-25: facial and palatal view of fixed working model

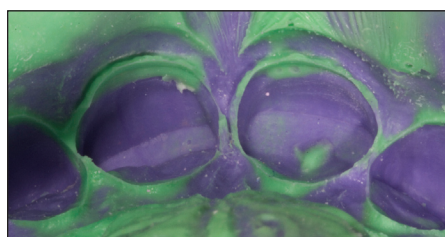


Figure 26: Impression after three die pours



Figure 27: Completed preparations showing supragingival margins

(Masseroni Kit, Komet, WestOne), the margins were refined using the Masseroni tip (Komet, WestOne) in an EMS MiniPiezon (Optident). Final margin refinement was carried out with KMIS 1 chisels (Hartzells, Chicago). The preparations were then polished and rounded with discs (Cosmedent). The palatal margin of the upper right central incisor was deliberately finished on the freshly placed composite resin access seal in order to preserve tooth structure. Both teeth were 'Immediate Dentine Sealed' with a fourth Generation bonding agent (Optibond FL, Kerr) and the oxygen-inhibited layer removed via final polymerisation beneath KY Jelly.

Retraction cord was packed (Ultrapak, Ultradent) and an impression taken of the upper arch with PVS putty/wash as a single step procedure. A lower impression was also obtained in alginate alongside a facebow and occlusal records.

Shade tabs were photographed in situ to facilitate shade taking and communication with the laboratory. The ingot selection was closest to BL4, but with lower value. Some incisal maverick effects were noted (a small amount of whitish hypocalcification at the incisal edge alongside a little ochre). The teeth were temporised and the patient dismissed.

All laboratory work was carried out by Rob Lynock, Ivoclar-Vivadent UK. An EMax



Figure 28: Final veneer under transmitted light

HT (High Translucency) restoration was selected for this case because of its high flexural strength (c 400MPa), wear compatibility and aesthetics. We were able to utilise an HT ingot because the underlying stump shade of the prepared teeth was identical to the adjacent teeth i.e. we were not attempting to block out discoloured preparations (the prebleaching of the case conferred this huge advantage). The veneers were waxed and initially pressed using an HT BL1 ingot: the value of this restoration proved to be too high and ingot selection was revised to HT BL2 and the veneers remade.

At the 'fit visit' the temporary veneers were removed and the preparations lightly abraded



Figure 29: Try in of final veneers. UR1 with medium value try in paste, UL1 with -3 (Low value) try in paste



Figure 30: Image as above. Black and white to assess value



Figure 31: Image as above. Increased contrast to assess incisal edge maverick effects



Figures 32-34: Veneers on fixed stone model



with 27-micron alumina oxide. The teeth were isolated with retraction cord, cotton rolls and PTFE tape (Plumbers Tape, Homebase) and the veneers tried in with Variolink Veneer Try-In paste (Ivoclar). Photographs were taken and manipulated chairside in 'Aperture' (Apple Mackintosh): a black and white image was used to assess value, whereas an image with significantly increased contrast was utilised to assess the maverick effects in the incisal edge build up. Clear cement was chosen as being most ideal after comparing both increased and reduced value cement.

The veneers were air abraded with 27-micron alumina under low pressure and etched with Hydrofluoric acid (Ultradent). After ultrasonic cleaning in an alcohol bath they were dried with a hairdryer and silanated with a two-bottle silane (GC Ceramic Primer, GC). The veneers were placed with Variolink Veneer (Ivoclar) after bonding with Optibond FL (Kerr). After a gross clean up with micro-brushes the veneers were 'tacked' in place with a three second cure from a halogen lamp (Optilux 501, Kerr). Excess cement was removed with a 12-scalpel blade and interproximal finishing strips (Cosmedent). The veneer margins were coated in KY Jelly and polymerised for a further 40 seconds per surface.

The veneers were finally polished with 1 micron Porcelize and 1-micron Enamelize polishing pastes (Cosmedent) on felt wheels. An orthodontic wire fixed retainer was bonded to the palatal surface of the upper anterior sex-



Figure 35: Veneers after sandblasting and HF etching

tant with Optibond FL and Empress Direct composite resin. Impressions were taken in alginate for an Essix orthodontic retainer, fitted later that day. The patient remains on six monthly recall and review.

Conclusions

Although at first glance a relatively simple and straightforward case, the case report hopes to show that attention to detail in a number of small areas will allow the clinician to be more conservative of tooth structure and produce a more aesthetic outcome with long term predictability and retrievability. Assuming favourable occlusal schemes and adequate remaining enamel, veneers (with or without composite core build ups) may often be considered as a less invasive approach to endodontically treat-



Figure 36: Final veneers after two weeks showing invisible supragingival margins and good overall integration with surrounding natural dentition

ed anterior teeth over the more traditional post and core foundation/ full veneer crown.

In the author's opinion, supragingival margins hidden using the 'Contact Lens' effect are the treatment of choice for the majority of cases. When approaching reconstructions with all ceramic restorations it is prudent to consider prebleaching any discoloured tooth units in order to reduce the amount of reduction and preparation required and facilitate the placement of supragingival margins. Uniform stump shades make ingot selection and shade matching an easier exercise for the dental technician. The use of photography to allow communication between dentist and technician is mandatory, particularly when the technician is working remotely from the dentist and he/she is unable to meet and assess the patient. The



Figures 37-39: Final smile

use of software such as 'Aperture', 'Photoshop' or 'LightRoom' chairside will allow the clinician to easily manipulate images and quickly assess the value and maverick effects chairside: this reduces the risk of post-cementation patient dissatisfaction and subsequent expensive remakes.

Acknowledgements

I am indebted to Laura Dellamuro, RDN for chairside assistance and Rob Lynock RDT for his superb technical skills, support and advice.

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Figures 40-41: Happy patient

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