

Multiple veneers in a reorganised occlusion

Accreditation Case Type 1

(Six or more indirect restorations treating permanent upper anterior teeth)

David Bloom BDS

Treatment provided

- Tooth whitening
- Occlusal equilibration
- Multiple upper arch veneers and onlay veneers
- Porcelain onlay 36

Introduction

With the advent of porcelain laminate veneers we have the opportunity to make some dramatic and life changing improvements to people's smiles and so their self confidence. However, for these cases to be successful, the dentists must understand all the subtle implications of smile design as well as have all the technical skills and knowledge to successfully complete these cases, especially if this work is elective in nature. Careful planning of all the stages can give a predictable recipe for success. This new patient attended requesting changes to his smile, which he did not like and which was affecting his

self confidence. He wanted a straighter, broader, whiter smile, complained of getting food trapped, and wanted tooth coloured restorations to replace existing amalgam fillings and discoloured large direct posterior composite restorations.

Medical and dental history

There was no relevant medical history. His dental history was unremarkable in that he only had two, albeit large, posterior restorations. His periodontal condition was fair but there was some generalised gingivitis especially in the posterior interproximal regions. However, his smile and tooth arrangement were far from ideal. There was generalised upper crowding, with poor buccal corridor display and incorrect axial inclinations, most noticeably on the upper canines. The patient also desired a lighter, whiter shade in

general even though the initial colour of his teeth was not very dark. It was therefore particularly important to have listened carefully to his expectations. The patient was not getting any symptoms of temporomandibular dysfunction but there were signs of a wear facet on 12 due to the very slight canine lift in right lateral disclusion. There was also a centric relation contact on 14 with a small vertical slide into centric occlusion. The joints were healthy.

Diagnosis and treatment plan

1. Basic hygiene therapy for mild gingivitis
2. Bleaching the lower teeth
3. Direct equilibration to make centric relation and centric occlusion coincident with no slide between the two positions. Canine disclusion could then be incorporated into the final restorations. Achieving this essential part of an ideal



Figure 1: a-f – Full face, upper occlusal and lower occlusal: Before (above) and after (below) images of the case

Figure 2: a-f – Anterior: Before (above) and after (below) images of the case



occlusion is often the hardest part of an equilibration and the restorations planned would help in this process, giving the treatment functional and cosmetic elements – a functional smile lift!

4. A minimum of a 10 unit 'smile lift'. The aim was to correct the crowding and axial inclination of the canines and also widen the buccal corridor. It was also initially planned to increase the incisal display by 0.5mm, which could be corrected on the prototypes if this was not correct. Finally, the canine lift was to be improved by steepening the guidance with the restorations.
5. It was planned to replace the existing large amalgam restoration on 26 as was the patient's wish, but also because there was a fracture line and shadowing indicating probable secondary caries and demonstrating the lack of support and reinforcement for the remaining tooth tissue.
6. The position of 17 relative to 16 demonstrated the full potential of

the buccal corridor and it was decided to provide a veneer on 16 as the patient wanted a light shade and with a wide smile showing the region. This can be checked by asking the patient to say 'eeeh'. This would be additive as most of the restorations were from the first premolars posteriorly and so would be very conservative.

7. Replacement of the leaking restoration with very stained margins and a poor occlusal position in 36.
8. Possible removal of the non-functional upper third molars in the event that the patient was unable to keep them clean or if they over-erupted and caused a centric relation interference. This was to be kept under review.

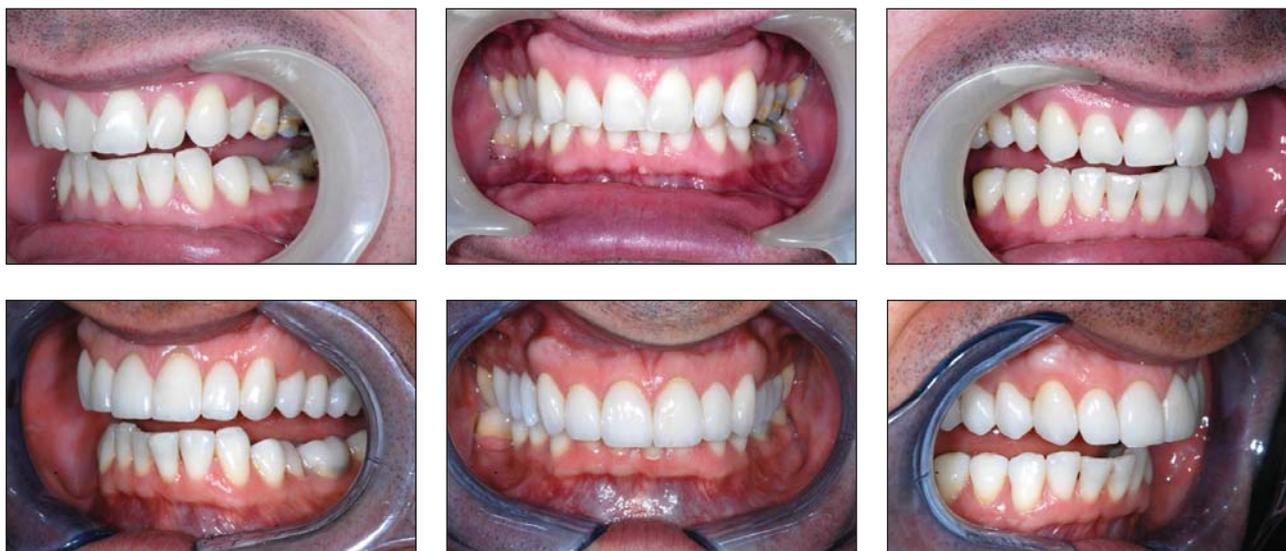
Clinical stages of treatment

After the initial consultation and presentation to the patient the above treatment plan was agreed. The

patient underwent Zoom power bleaching of the lower teeth, followed by home tray whitening in the bleach tray previously manufactured using 22% Day White from Discus Dental. Tooth 36 was not whitened but in any case no adhesive restorations were planned on bleached teeth within two weeks of the end of the whitening programme.

Upper and lower diagnostic impressions were taken in addition - cured vinyl polysiloxane impression material to allow multiple re-pours. This ensures full pre-operative models can be re-poured for construction of diagnostic wax up and for bleaching tray manufacture. A facebow record was taken for the diagnostic wax up. This is generally good practice but essential in this case as changes were planned to the patient's occlusal scheme. This allows confirmation of the new occlusal scheme in the prototype restorations. A pre-operative stick bite and photographs were also taken to aid incisal plane placement.

Figure 3: a-f – Retracted: *Before (above) and after (below) images of the case*



The laboratory was given full diagnostic instructions as above for construction of the 13 unit diagnostic wax up (including 36 due to its poor occlusal form). They were also asked to provide full putty matrices for prototype manufacture and preparatory guide putties.

On the tooth preparation appointment, after applying some topical anaesthetic (Ultradent, 20% benzocaine) further local anaesthetic was given, initially 3 x 2.2ml articaine in the upper arch. Care must be taken to note the number of cartridges given to the patient over what can be a long appointment, to avoid anaesthetic toxicity. Top-ups are acceptable as long as attention to the toxic dosages is adhered to. Initially the centric relation to centric slide was removed via careful tooth surface equilibrium. The guides from the wax up were then used to help visualise the final desired tooth position and so to only prepare tooth tissue for the porcelain as required. All teeth

except 26 were prepared for porcelain laminate veneers. The margins of choice are a gingival chamfer, interproximal finish line with 'elbowing' of the margins to ensure no underlying tooth shines through and an incisal overlay to a palatal bevel. In this case, as some teeth were crowded, slice preparations were required. Also, particular attention was paid in preparing the canine to allow the guidance to be improved and 'picked up' in the porcelain. The occlusal contact with the lowers can be on tooth or porcelain but should never be on the junction. Therefore, in this case, the palatal margin of the canines was a palatal chamfer placed in a position to pick up this guidance via appropriate contact with the lower canines.

In hindsight, it might have been more beneficial to have used the putty matrix to preview the final smile by placing the temporary material in this putty matrix and placing it on the teeth before tooth

preparation. If additional retention is required then the teeth can be initially spot etched. This would allow preparation through these final tooth position temporaries and ensure the most minimal tooth preparation required. In this case, this would have been 0.5mm depth cuts as the plan was to use feldspathic porcelain. It would also have the added benefit of confirming incisal length before the patient was numb. To ensure adequate tooth reduction, a trial set of temporaries was prepared before the final impressions to ensure adequate tooth reduction and assess final incisal length. However, as the initial diagnosis and smile design assessment had been accurate, all was correct as planned.

The old restoration in 26 was removed and the tooth prepared for a veneer only. At this point local anaesthetic was given to the lower left quadrant as an inferior dental nerve block with xylocaine to minimise the risk of a neuropraxic

Figure 4: a-b – Retracted: Before (above) and after (below) images of the case



episode which some studies have claimed can be associated with articaine. The 36 was prepared for a porcelain onlay. Porcelain was chosen as the opposing tooth was also in porcelain.

All preparations were recorded with addition cured vinyl polysiloxane impressions a facebow record; a stick bite, bite record and stump shade photographs were also recorded.

Finally, the prototypes were made with a one-stage lock on technique using Luxatemp BL. It is important to use the closest shade to the final restorations to allow the patient to assess and approve the final result. This temporisation process involves spot etching each tooth to be temporised, washing and drying after 10-15 seconds, applying gluma desensitiser (which is antibacterial and reduces microleakage), followed by the 2 FL filled resin component of the Optibond FL bonding system

from Kerr. Some authors prefer no spot etch and to use the primer agent, but on no account should primer be used if etch is also used unless an immediate dentine sealing technique is employed.

The occlusal scheme was checked and adjusted as required as were the final aesthetics. This can involve the addition of flowable composite material as well as removal via a bur to correctly contour and shape teeth. Final photographs and alginate impressions are taken for lab communications and for assessment by the dentist prior to a review appointment, when the patient is no longer numb, to assess and adjust the temporaries as required. If changes are made at this subsequent appointment, new photos and impressions should be taken.

As is good practice, close communication with the laboratory was maintained during the manufacturing stages and all restorations were checked on the models well in advance of the fit appointment to ensure that everything was correct for placement. At this appointment, a local anaesthetic was given as before and small slices were made in the prototypes down to tooth tissue, but not into it, to allow an instrument to torque off the temporaries. A Brassler crown remover may be used. All veneers were tried in with water to confirm fit, colour and all aspects of smile design, i.e. to check they fitted and matched the prototypes. This also provided the patient the opportunity to see them and confirm approval.

This is best done very carefully with the patient still supine and advising the patient to be very careful. If colour changes are required, try-in pastes can be used to assess these, and can also be used to help choose final veneer cement colour.

The veneers, which had been etched with hydrofluoric acid in the laboratory, were then washed and etched with phosphoric acid to reacidulate the surface to permit better sialination. They were then treated with a silane coupling agent; the ideal is a two-part system to ensure fresh, active silane. Finally a thin layer of unfilled resin was placed on the veneers as a wetting agent that helps reduce air entrapment during seating and they were placed in a light impermeable protective light box.

The teeth were then isolated with a split dam technique but not allowed to dehydrate, then etched with 37% phosphoric acid for 15 seconds,



Figure 5: a-b – Lips at rest: Before (above) and after (below) images of the case

followed by gluma desensitiser and the two bottle Optibond FL system. The veneers were all cemented simultaneously using the rapid cementation technique with spot tacking, cement clean up and final curing. The cement used was Vitique B1 from DMG. The 26 and 36 were cemented using the same technique but with a dual cure cement.

All cement was removed and the final occlusion checked and adjusted as required. Final fit photographs were taken. The patient was scheduled for a review appointment, which was uneventful.

Conclusion

The case demonstrates that with careful attention to detail and thorough treatment planning applying the principles of occlusion and smile design, stunning and life changing improvements can be made to a person's smile whilst also improving the functional status.

Acknowledgement

I am grateful to my technician Luke Barnett, of Luke Barnett Ceramics for carrying out the ceramic work for this case.

Armamentarium

- Nikon D100 digital camera with macro capability
- Retractors and mirrors (Photomed Industries)
- Schick CDR Digital radiography system (Schick Industries)
- Dental loupes x 2.2 magnification (Orasoptic)
- Denar Slidematic Facebow (Teledyne, Prestige)
- Blu mousse bite registration material (Prestige)
- Topical surface anaesthetic (Optident)
- Local anaesthetic; articaine and xylocaine
- Cooper 8 seminars preparation and polishing kits (Brasseler Komet)
- Front surface reflecting dental mirror (Claudius Ash)
- Silicone impression material (Honigum, DNG)
- Alginate (Henry Schein)
- Rimlock metal impression trays (Prestige Dental)
- Eezitray stock impression trays (Henry Schein)
- Triple trays (Prestige)
- Optibond FL (Kerr)
- Gingival retraction cord (Ultradent)
- Astringent tissue management system (Ultradent)
- Expasyl (Kerrhawe)
- Superoxyl hydrogen peroxide (Henry Schein USA)
- Bis-acryl Provisional Crown material (Luxatemp, DMG)
- Luxaglaze (DMG)
- KY jelly – glycerine jelly
- Zoom power whitening system and light and day white 22% carbamide peroxide (Discuss Dental)
- Benda Brushes (Centrix)
- Disposable plastic dappens dishes
- Gluma Desensitiser



Figure 6: a-f – Smile: Before (above) and after (below) images of the case

- (Heraeus Kulzer)
 - Flowable composite resin (Revolution, Kerr)
 - Halogen curing light (Bisco VIP light)
 - 11mm diameter curved curing light tip (Kerr)
 - 3mm diameter curved curing light tip (Kerr)
 - Soflex ET contouring and polishing discs (SM Espe)
 - Ultrafine rotary diamond burs (Brasseler Komet)
 - Silicone porcelain polishing kit (Ceramiste, Shofu)
 - Aluminium oxide impregnated rubber polishers (Flexpoints and Flexicups, Blue and Pink; Cosmodent)
 - Diamond polishing paste (Luminescence, Premier)
 - Rubber polishing cups for contra angle handpiece
 - Dental floss
 - Interdental brushes (Tepe)
 - Accu film II articulating foil,
- Black and Red (Parkell)
 - Miller's forceps
 - Shimstock foil
 - Straight probe and Williams probe
 - Tweezers, flat plastic and excavator
 - Cotton wool rolls and gauze 2x2 squares

Further reading

- Dason P. *Functional occlusion from TMJ to smile design*. Mosby, 2007.
- Dumfahrt H. Porcelain laminate veneers – a retrospective evaluation after 1-10 years of service: part 2 clinical results. *Int J Prosthodont* 2000 **13**: 9-18.
- Magne P, Belser U. *Bonded porcelain restorations in the anterior dentition – a biometric approach*. Chicago: Quintessence, 2002.