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E.	04001NOZN	NOZN NSK F/Optic Oil Nozzle NOZN/9797148
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Restoring discoloured composite

Joe Bansal[1]

Introduction

The patient, a 25-year-old aspiring actress teaching dance at a local studio, was referred to our clinic for composite bonding by a local cosmetic dentist.

She presented with discoloured composite bonding on her upper left central incisor. She became more aware of it when one of her young dance students mentioned it and has become progressively conscious of it since.

At the initial consultation, her main concerns were the colour match of her composite bonding, as well as her overall tooth colour.

History

The tooth was initially traumatised during a swimming incident in her childhood. The composite bonding was placed around a year ago following whitening. It discoloured soon after its placement and she was too nervous to return to the treating dentist to have it redone. She overcame this by guarding her teeth during smiling.

She is originally from Birmingham and on her move to London, she researched cosmetic dentists on Harley Street. After having been to see a few of them, the options she was given ranged from having one to 10 porcelain veneers. She wanted to have her bonding replaced, leading to one of the dentists she saw referring her to our clinic.

The patient was very open and honest about her dental anxiety. She was otherwise a confident young lady but the thought of actual dental treatment (as opposed to an examination and hygiene session) terrified her. In the past she had managed to have treatments such as Invisalign, tooth whitening and bonding done but it had taken a lot for her to undergo these procedures. She, to this point, had not had any pharmacological measures (such as sedation) to help her with her dental treatments.

Despite her previous anxiety, she gave enough encouraging signs that we could attempt to help her in a non-pharmacological manner. Medically, she was fit and well with no known allergies nor medications.

It would take time and patience from both her and myself to rebuild her confidence in the dentist but I felt she was motivated and ready to improve her smile.

Diagnosis and treatment plan

The main features from her assessment were:

- Discoloured composite bonding present on the upper left central incisor
- Due to previous trauma history, it was difficult to assess whether the discolouration came from the composite or underlying tooth
- The UL1 was asymptomatic, not tender to percussion, with no buccal tenderness, no mobility, a 'normal' response to cold ethyl chloride testing and the periapical was unremarkable
- She was wearing upper and lower retainers from previous Invisalign treatment
- Her teeth were well aligned bar a small degree of relapse in the upper arch
- There was a composite MOB inlay present on the upper left first molar, which had an open mesial margin and caries leading to gingival inflammation
- The posterior teeth (in general) showed signs of early carious lesions on radiographs

[1] Dr Amerjote (Joe) Bansal BDS
Private practice, London, UK

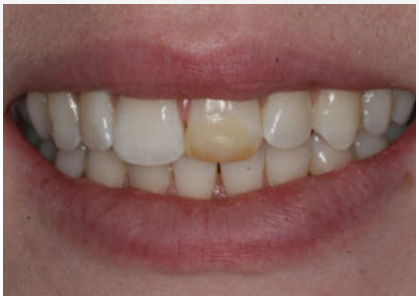

Figure 1a: Frontal smile

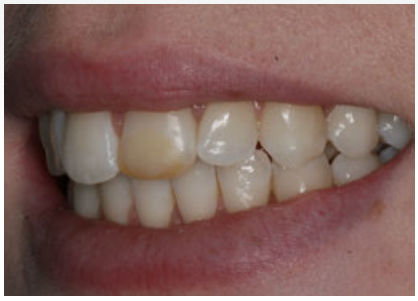

Figure 1b: Frontal lateral smile (left)

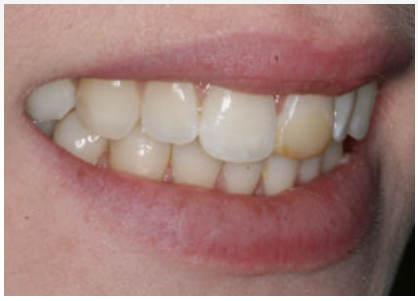

Figure 1c: Frontal lateral smile (right)

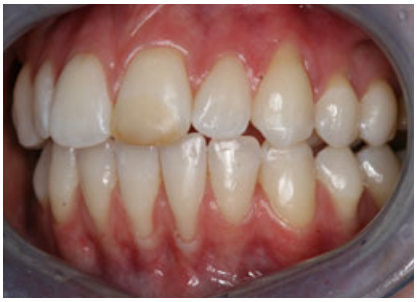

Figure 2a: Retracted (left)

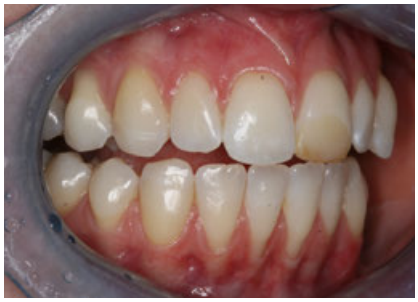

Figure 2b: Retracted (right)

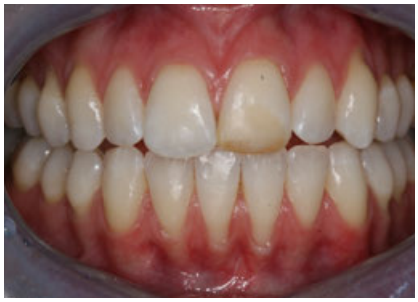

Figure 2c: Retracted frontal

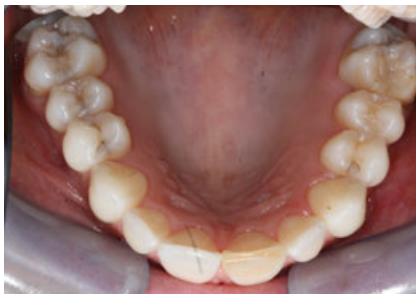

Figure 3a: Upper arch

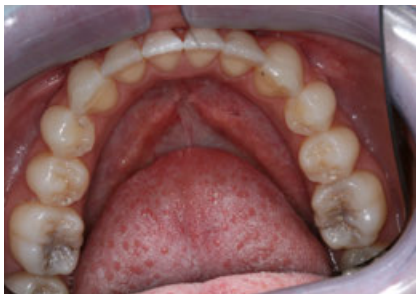

Figure 3b: Lower arch

and clinically

- BPE scores were 112/121
- The UR1 and UL1 were both 12mm in length
- The upper incisors and upper canines were Vita B1shade
- The UR1 has Intensive 2 and Opalescent 3 effects (Vanini Colour Chart)
- Thin soft tissue biotype
- Soft tissues clear of signs of oral pathology/cancer
- No soft tissue signs of parafunctional habits
- Load test negative using a leaf gauge
- TMJ joints and muscles were clear
- Tentative Piper class I
- Maximum opening 47mm.

The provisional diagnosis of the upper left central incisor was that of a discoloured composite restoration causing an aesthetic concern. There was a possibility that the discolouration may have also been caused by calcific metamorphosis due to the previous trauma.

The other concerns were of the early lesions present in her posterior teeth.

Her overall treatment plan was as follows:

1. Replace the composite bonding on the UL1 to improve confidence in herself and our clinical skillset. This would in turn provide a positive pathway to restoring the carious lesions present in her posterior teeth
2 Replace the UL6 inlay
3. Restore the early carious lesions present in her posterior teeth.

To help us diagnose the cause of her lesions, a diet analysis was carried out and there were no obvious issues with her diet. It did transpire that there was a period where her consumption of a high acid and sugar diet was present.

The patient was happy with this treatment plan and the approach that we had proposed.

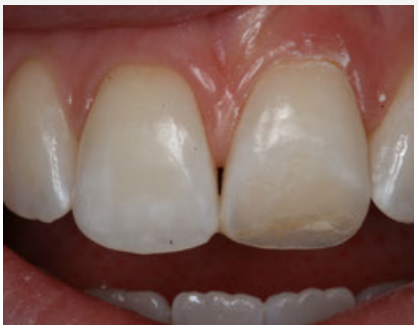

Figure 4a: Bonding removal

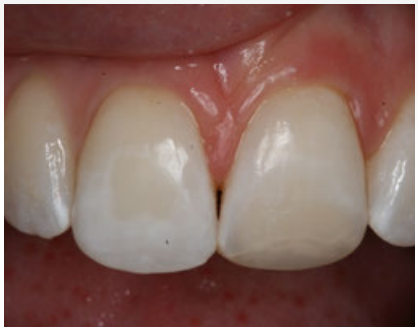

Figure 4b: Temporary bonding

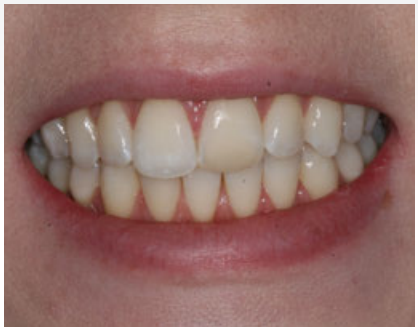

Figure 5: Post whitening frontal smile

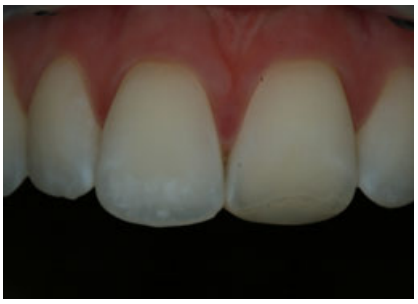

Figure 6a: Post whitening retracted close-up polarised

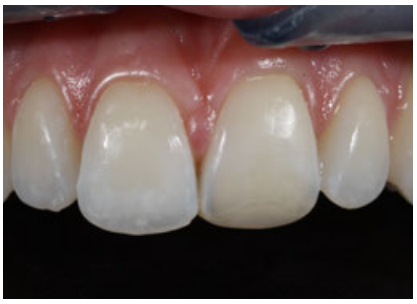

Figure 6b: Post whitening retracted close-up twin flash

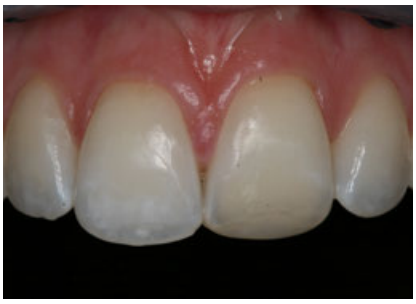

Figure 6c: Post whitening retracted close-up

Treatment Stage One: Tooth colour

Prior to replacing the bonding, we advised the patient to top up her tooth whitening if she wished as we would be shade matching her bonding to the tooth colour at the time of treatment.

She was happy overall with her colour but wanted to see if she could make her teeth any whiter. She came in with her tooth whitening trays, which fit well, and was given a three-syringe pack of Zoom! Daywhite 6% hydrogen peroxide gels to wear for a week or so. Day gels were given in preference over night time gels as she was wearing retainers overnight and there were possible issues with patient compliance.

As the patient was very concerned about the discoloured bonding, we took this opportunity to place a temporary restoration on the tooth during the whitening process. This would also give us the chance to see beneath the restoration.

The patient consented to treatment but was extremely nervous. She declined local anaesthetic.

Some of the strategies that we used to overcome the anxiety were based upon deep breathing and relaxation exercises prior to and during treatment, aromatherapy devices in the surgery and giving her the element of control during her procedures. We also used a pair of video goggles and a film to help to distract her during her treatment.

Using a slow handpiece and 3M Softflex discs, we were able to gently remove most of the bonding. The underlying tooth colour was coincidental with the exposed tooth colour so the possibility of calcific metamorphosis was ruled out. The tooth was then restored using Venus Pearl shade B1.

We had to work extremely slowly with regular breaks and patient reassurance. It was difficult and at times frustrating but we were able to manage the patient well.

The patient was advised to use and finish the whitening gels and to return after a 10- to 14-day period (to allow the tooth colour to settle and the surface to recover to maximise bond strength) for her bonding.

Treatment Stage Two: Composite Bonding

My protocol for shade matching composite restorations is to assess the colour at the very start of the session to minimise the effects of dehydration on the tooth colour. Using a Vita 3D shade guide, her approximate shade was between 1M1 and OM3.

This is done prior to any local anaesthetic, retraction or photographs. Anterior teeth are known to dehydrate within a few minutes of being dry.

Taking into account the colours I would need, I felt that the best suited system I had at my disposal would be Empress Direct. The composite shades were tested against the teeth by using a small amounts of the material in a ball shape and placed on the buccal surface of the two central incisors. The material was placed with no etch nor adhesive and fully light-cured for 20-30 seconds to assess their colour.

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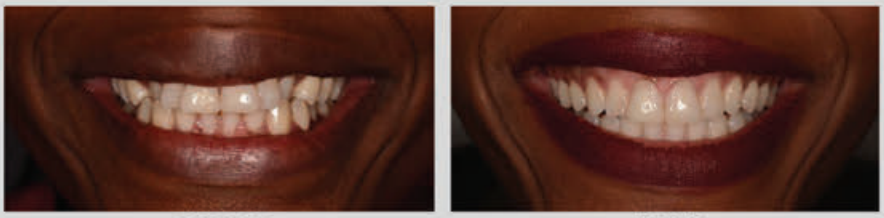

BEFORE AFTER

Before and after photos by Dr Hannes Scheepers (Dainfern Dental Studio)

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~ Dr Hannes Scheepers - Dainfern

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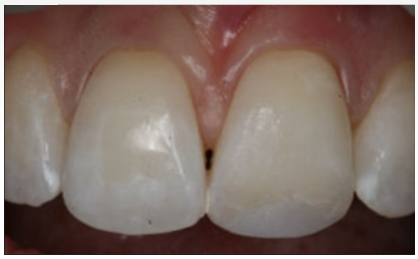

Figure 7: Initial shape

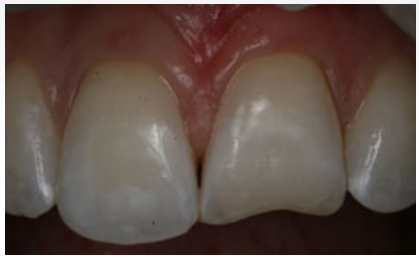

Figure 8: Bonding removed

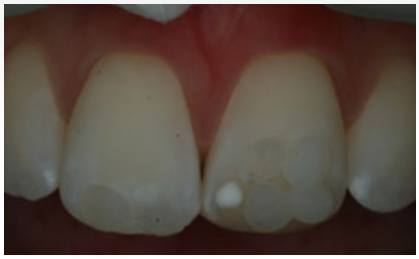

Figure 9a: Shade tabs cross polarised

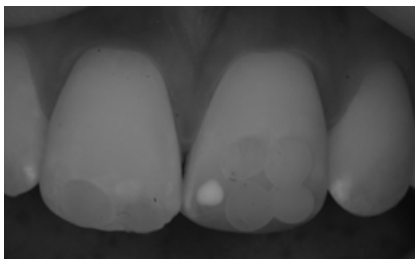

Figure 9b: Shade tabs cross polarised monochrome

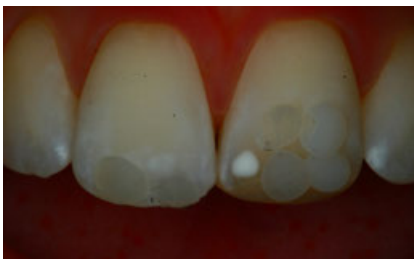

Figure 9c: Shade tabs cross polarised high contrast

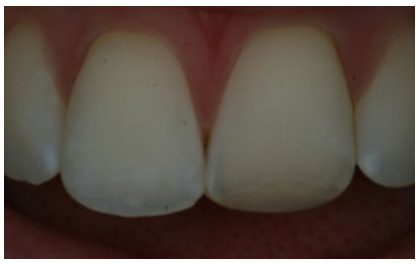

Figure 10a: Colour check cross polarised

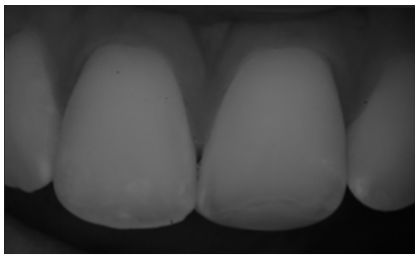

Figure 10b: Colour check cross polarised monochrome

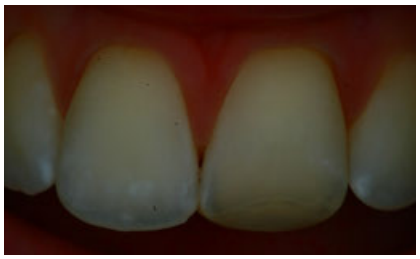

Figure 10c: Colour check cross polarised high contrast

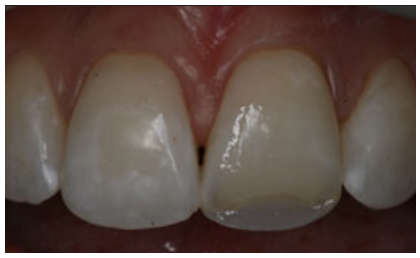

Figure 11: Cut back

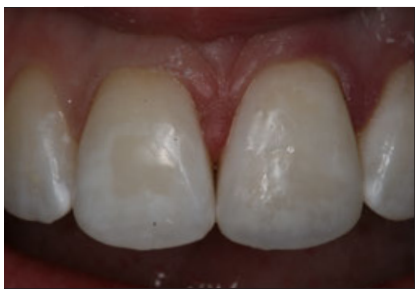

Figure 12a: Final result – initial polish

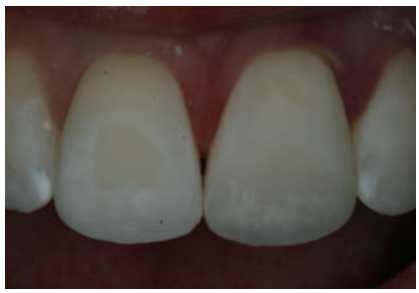

Figure 12b: Final result – initial polish cross polarised

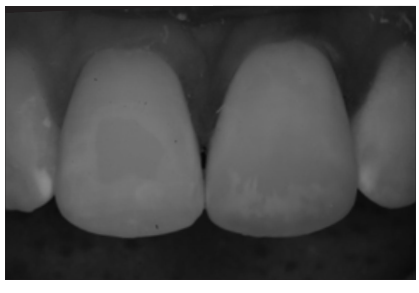

Figure 12c: Final result – initial polish cross polarised monochrome

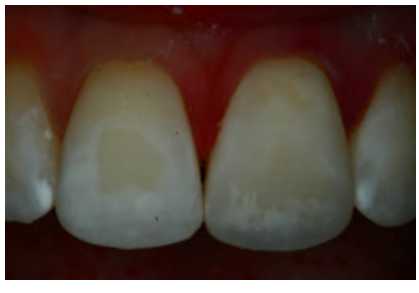

Figure 12d: Final result – initial polish cross polarised high contrast

The dentine shades were placed in the mid body of the tooth to assess the chroma and the enamel shades were placed towards the incisal third to assess translucency. I also tested the white coloured effect shade at the same time. No retraction was used and the patient was actively encouraged to keep her lips together and teeth moist during this phase to minimise dehydration.

The shades tested were a selection of the enamel and dentine shades for Empress BL and B1.

A series of photographs were taken using a cross polarising filter (Polar eyes) to assess the colour match. My own protocol is to take photos of the central incisors at a 1:1 ratio with different (in-camera) colour profiles

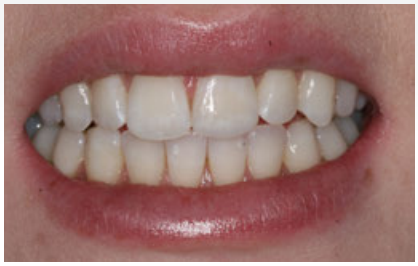

Figure 13a: Postoperative frontal smile

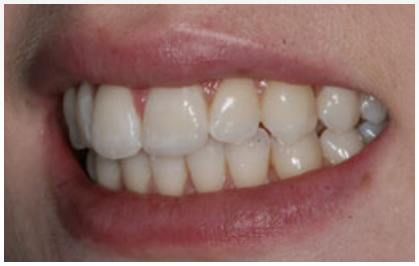

Figure 13b: Postoperative frontal smile left

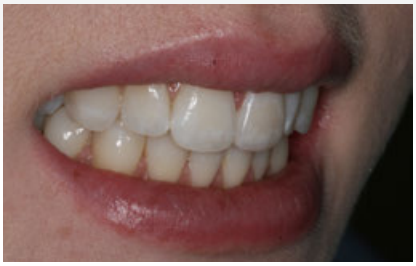

Figure 13c: Postoperative frontal smile right

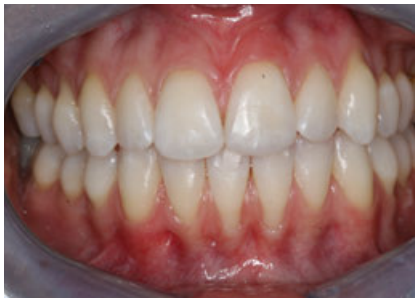

Figure 14a: Postoperative retracted frontal

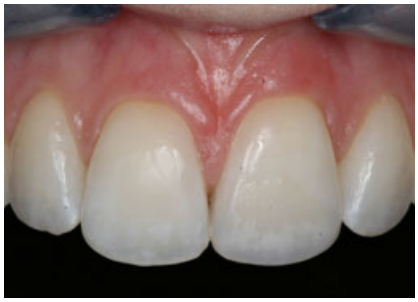

Figure 14b: Postoperative retracted close-up frontal

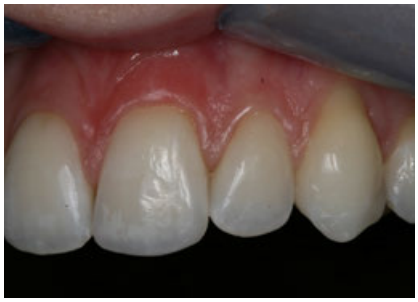

Figure 14c: Postoperative retracted close-up left

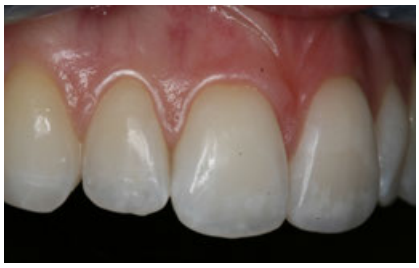

Figure 14d: Postoperative retracted close-up right

and with/without the polarising filter. The camera used was a Canon 30D with a 100mm macro lens. A crop body sensor is especially useful in this scenario due to the additional magnification the crop factor gives when at 1:1 ratio.

The photos taken were:

1. With polarising filter at 'normal' intraoral setting with standard colour profile
2. With polarising filter at 'normal' intraoral setting with monochrome colour profile
3. With polarising filter at 'normal' intraoral setting with high contrast colour profile.

The standard profile allows a baseline photograph to be taken of the composite in relation to the tooth colour.

The monochrome profile allows the verification of the value of the composite in relation to the tooth colour.

The high contrast profile allows the verification of the chroma of the composite in relation to the tooth colour.

My own understanding of composite colouring leads me to believe that the most important parameter when shade matching a single tooth restoration is the value of the composite, rather than the chroma. The relative brightness of the restoration (when incorrect) is far more visible than when the chroma is not so correct.

The other important factors are the tooth form and shape and relative surface finish, which can also make a restoration appear more obvious when not well integrated.

We chose Empress Direct Dentine (B1 and BL), Empress Direct Enamel (BL), Venus Color White for the characterisation effects, and Empress Direct Trans 30 for the translucent effects.

Final Result

As I was unable to fabricate a stent prior to the appointment, my plan was to use the first layer to help create the tooth form and outline. I would then cut this back to allow space for the internal colours and effects.

A selection of preoperative photographs of the UR1 were left on the surgery computer screen to refer back to when layering. The cross-polarised images are especially useful for this.

My own bonding protocol is to treat these cases over two visits. The first visit (as explained to the patient) will take them to around 80% of the final result.

A refinement visit a week or two later allows me to reassess the colour integration following rehydration, the patient's thoughts, any functional issues with the occlusion and finalise the surface finish and polish.

I will also take impressions for replacement whitening trays and retainers at this visit to help maintain the colour and alignment long term.

Treatment steps – visit one

- Local anaesthetic (lignocaine) and optragate retraction
- Bonding carefully removed using 3M Softflex discs and tungsten carbide composite finishing burs
- The tooth was prepared using a coarse disc to smooth the surface and create a bevel
- Air abrasion of the surface using 27micron alumina oxide powder
- Total etch, prime and bond using Optibond FL
- The instruments used are a selection of my favourites from American Eagle, LM Arte Style Italiano, Firm Rubber clay brushes and Sable hair art brushes
- Empress Direct Trans 30 was used to create the initial tooth form and outline with the help of a Garrison Blueview Varistrip
- The translucency of this shade will allow good optical effects in the incisal third
- Softflex discs were used to reshape the composite
- A diamond bur was used to cut back the composite for the internal colours
- Once happy, the composite dust was carefully removed with dry air and the surface was cleaned using Optibond adhesive
- Empress Direct B1 dentine was used in the deepest parts of the internal space and bevel to help mask the join
- Empress Direct BL dentine was used over this and over the bevel to help with colour integration
- The dentine shades were shaped in the lower incisal third to mimic the flat comb effect in the UR1
- Empress Trans 30 was used to fill in the incisal third to allow a translucent effect
- Venus Color white was used via a brush and diluted with Optibond FL Adhesive to copy the white characterisation
- This characterisation layer helped in masking the join of the restoration
- It was also used to recreate the halo effect on the incisal edge
- The final layer of Empress Direct BL enamel was used to cover the final surface
- This layer often takes time to shape well and right, which helps in simplifying the finishing stages
- This was cured under a layer of glycerine to minimise the oxygen inhibition layer
- The outline form and primary anatomy was created using Softflex discs
- The bonding was polished with 3M Softflex discs, Contours points (Optident) and a Groovy Diamond (Optident) to give a good level of initial finish.

Treatment steps – visit two

- The patient was seen a week later for refinement of the shape and polish
- The secondary anatomy (line angles) was defined to match the UR1
- We finalised the finish with 3M Softflex discs, 3M rubber soft flex high polish wheels
- She was happy with the overall result and look.

Case Discussion

I was very happy with the outcome of the result overall.

It is often very easy to over-use the stain effect shades and to place more than is necessary. The effect in this case has helped in not only the shade matching but also in helping mask the join to create a seamless blend between natural tooth and restoration.

This is all the more rewarding taking into account the additional difficulty in trying to manage the patient's anxiety towards the treatment.

I would not have done anything vastly different to how the case planned out. My only regret is that I wish I was able to take more photographs of the various stages but due to patient anxiety this was not possible.

At present, the patient has had three quadrants of her posterior restorations completed and is waiting to finish off the last quadrant at some point in the near future.

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