Alignment, bleaching and veneers to correct large and unsightly front teeth

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Having recently got engaged, this pleasant lady wanted to improve the appearance of her upper central incisors before her wedding in a year's time. She felt they were big and unsightly (*Figure 1, Figure 2*). She also wanted to have her teeth whitened.

Dental, medical and social history

The patient is a healthy 40+year old, non-smoking, non-drinking regular dental attender with a history of periodontal treatment at a London dental hospital. Her dentition is fairly heavily restored, with several crowns that are quite old (*Figure 3*). As a teenager she had fixed orthodontics with the removal of some of her premolars. The 45 was extracted due to a failed root canal treatment and the patient has chosen not to restore the space. She brushes her teeth twice a day and uses interdental brushes.

Comprehensive clinical examination

This revealed no evidence of pathology of the TMJ or associated muscles. Her soft tissues were all normal. There was evidence of parafunctional activity, with signs of wear on her anterior teeth and canine tips. She also exhibited some wear/ tooth structure breakdown at the cervical areas of her posterior teeth. All her teeth responded normally to vitality testing with an electric pulp tester, with no response only from the root filled 26 and 35, 36, 37.

The existing restorations appeared sound although she would like to replace some of the crowns in future, due to unsightly gingival recession and loss of cervical tooth structure. Her BPE score was 1/0/2 : 2/1/2.

She exhibited a number of larger interdental spaces, due to loss of

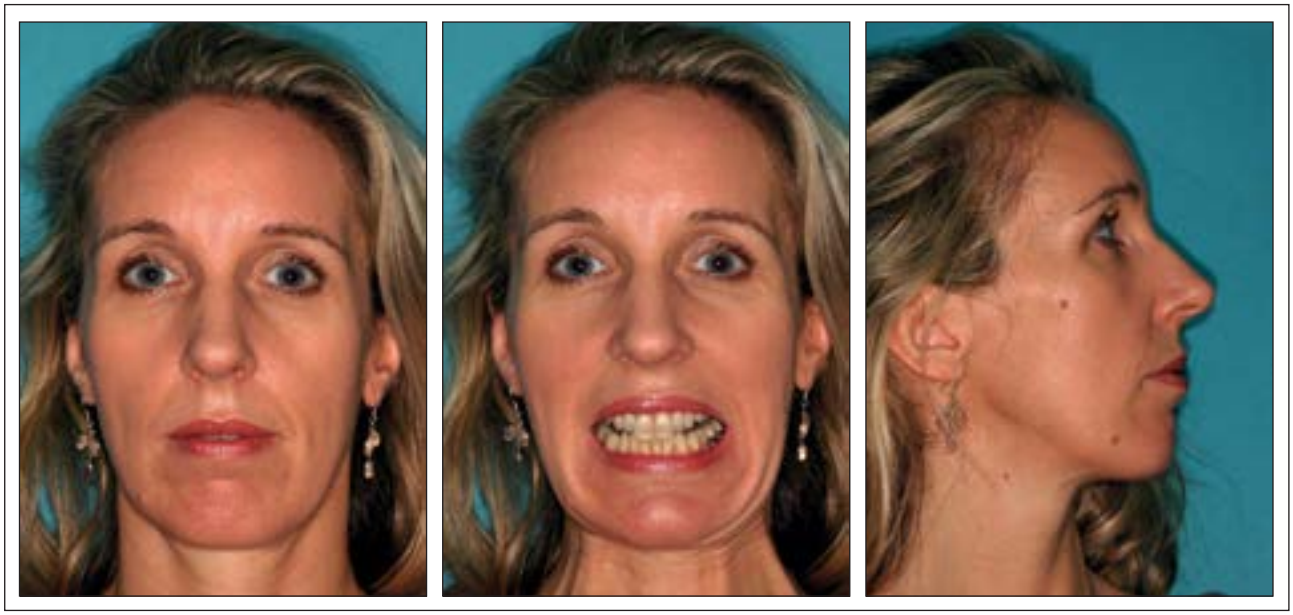
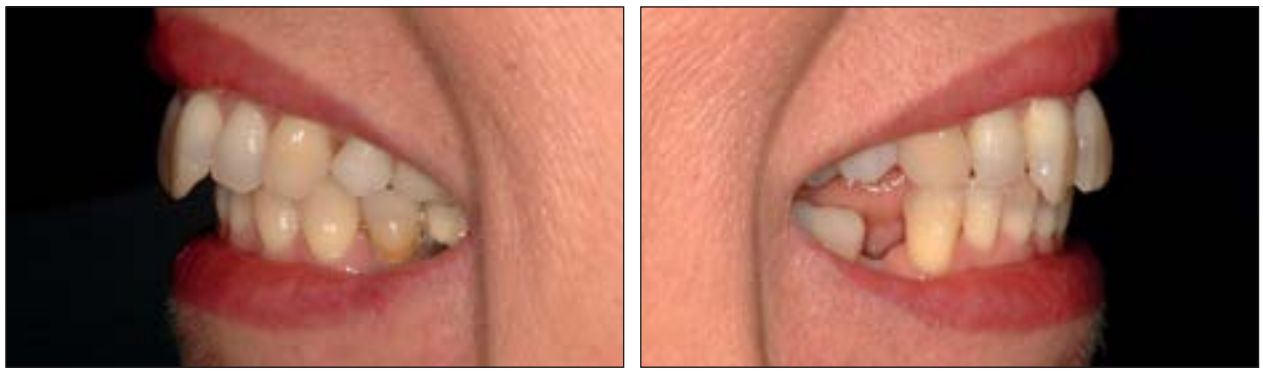


Figure 1: The patient at the initial consultation

Figure 2: The patient's dentition on presentation



papillae and generalised recession, associated no doubt with her history of periodontal disease and its treatment.

Her occlusion is Class 1 canine left, class 2 molar left, Class 2 canine right and Class 1 molar right. There is a small horizontal slide between RCP and ICP. In both right and left lateral excursion, she has group function (canines and lateral incisors) with non-working side interferences on the 37 and the 16.

Protrusive guidance is on the upper left central incisors.

Radiographic examination

Not unexpectedly, there was evidence of generalised bone loss due to a previous episode of periodontitis. There was no radiographic evidence of carious lesions. Radiographs of the upper central incisors showed normal root form and length.

Treatment Options

Having established the overall health of the patient's teeth and oral tissues, the following options to improve the aesthetics of 11 and 21 the following restorative and orthodontic options were discussed were discussed::

- Comprehensive orthodontics to align and level the arches, correct her malocclusion to class 1 and possibly recreate space at 45 for an implant. This would be followed by veneers on 11 and 21. The patient declined the treatment on the grounds of time.

- The patient did not like the characterisation or banding of her upper centrals and therefore recontouring was not an option and the proposal of veneers seemed the better solution. Due to the anterior upper incisor crowding, if we were to use veneers only, the preparations on 11 and 21 would be very aggressive as these teeth were significantly rotated and over erupted. The patient wanted to know if it was possible to do this with a reduced amount of preparation.

- We then discussed specific goal, fixed orthodontics to improve the alignment of the upper incisors and to intrude 11 and 21 in order to reduce the overeruption, followed by porcelain veneers on these teeth. Estimated treatment time for the braces was about 16 weeks. The patient found this option acceptable.

Treatment plan

1. Referral to hygienist for prophylaxis and OHI reinforcement
2. Placement of braces upper arch only
3. Diagnostic wax up of 11 and 21 veneers
4. Professional tooth whitening
5. Under local anaesthetic, veneer preparation and provisionalisation of 11 and 21

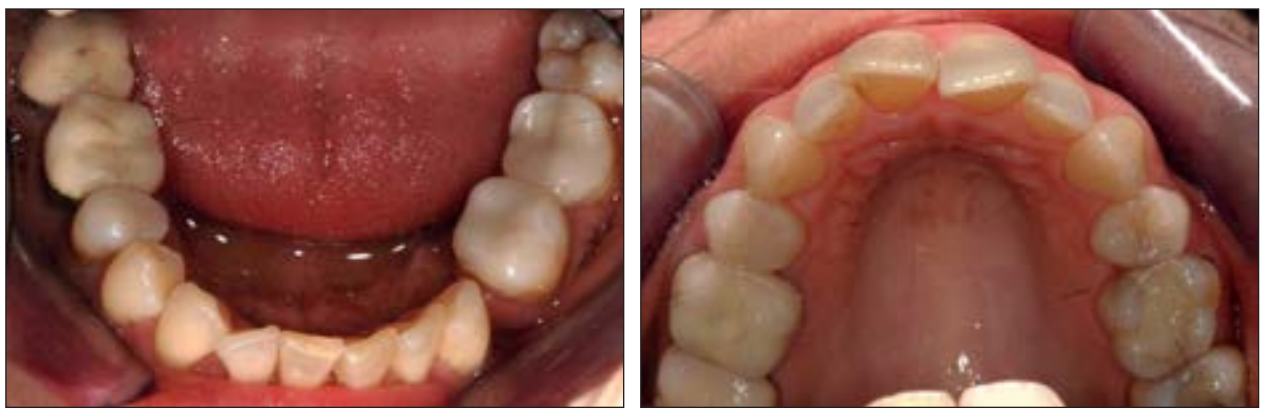


Figure 3: Dentition on presentation

Orthodontic Evaluation

Reason for attendance: Appearance upper incisors – look big
Medical History: Clear
Dental History: Regular attender

EXTRA ORAL EXAM
Skeletal pattern: Mild skeletal 2, increased FMPA, increased lower face height
Soft tissues: Lips competent, normal labio-nasal angle
TMJ: No problems

TEETH PRESENT

765321 | 123567
876321 | 1234567

INTRA ORAL EXAM
Oral hygiene: Fair
Periodontal state: Periodontally healthy
Teeth of poor prognosis: Nil

OCCLUSION

Lower arch
Labial segment: 3-4mm crowding
Buccal segment: R- 3mm spacing L – 0-aligned

Upper arch
Labial segment: 4mm crowding
Buccal segment: R- well aligned L- well aligned
Incisor relationship: Class 2 div 1 uppers & Lower incisors upright
Overjet: 6mm **Overbite:** 80%
Centre lines: Lower deviated to right by 4mm

Buccal relationship:
Canines Right: 3/4 Class II
Left: Class I
Molars Right: Class I
Left: Class II
Crossbite/displacements: No crossbites

RADIOGRAPHIC FINDINGS: UR1 UL1 normal root form and length
SUMMARY: Class 2 div 2 patient with deep bite on a skeletal 2 base
IOTN: 3A AC- 5

PROBLEM LIST
- Unsightly poorly shaped central incisors
- Centre lines deviated
- Spacing distal LR3
- U/L labial segment crowding
- Left molar - Class 2 by ½ a unit
- Class 2 div 1 deep bite

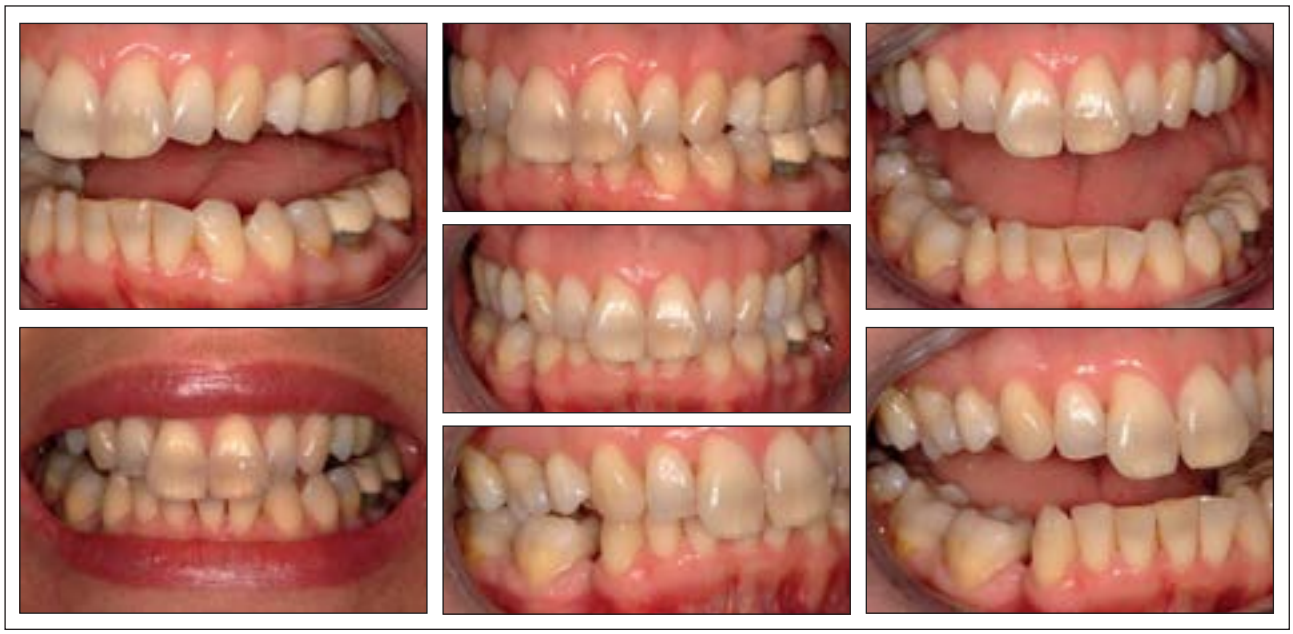
TREATMENT AIMS
- Improve appearance central incisors
- Resolve spacing LR3
- Correct incisors to class 1
- Resolve upper and lower crowding
- Correct molars and canines to class 1
- Correct centre lines

POSSIBLE TREATMENT PLAN/ OUTCOMES

Ideal:
1. U/ L Full Alignment
2. Extract 34
3. Intrude incisors to level upper arch and reduce OB
   Close upper and lower spaces
4. Veneers or recontouring 11,21
5. U/L bonded retainers and removable essix retainer

Compromise:
1. Upper Full Alignment
2. Intrude 11,21
3. Accept lower incisor crowding
4. Accept centre lines
5. Accept molar and canine relationships
6. Not correct incisors to class 1
7. Leave spacing distal 43
8. Veneers or recontouring 11,21
9. Upper bonded retainer and removable essix retainer

Figure 4: Pre-treatment photographs



6. Fitting of 11 and 21 veneers and placement of a bonded upper orthodontic retainer to prevent relapse
7. Review and fabrication of a full coverage hard occlusal splint for night-time wear, in order to protect her dentition and new restorations from her parafunctional habits
8. Regular dental examinations and hygienist recall.

Treatment progression

Orthodontic treatment
Impressions were taken for an indirect bracket bonding tray for the upper arch. Brackets were bonded and 012, 016 & 020x020 Niti wires were used sequentially to level and align the anterior incisors with a 'wire under bracket' technique to intrude 11 and 21. The posterior segments were ligated to avoid any changes to the posterior occlusion. Treatment time was three months (*Figures 5-7*).

Tooth whitening

Once the teeth were better aligned the braces were removed and a removable Essix retainer was provided which acted as a whitening tray, with a conventional bleaching tray provided for the lower arch. The

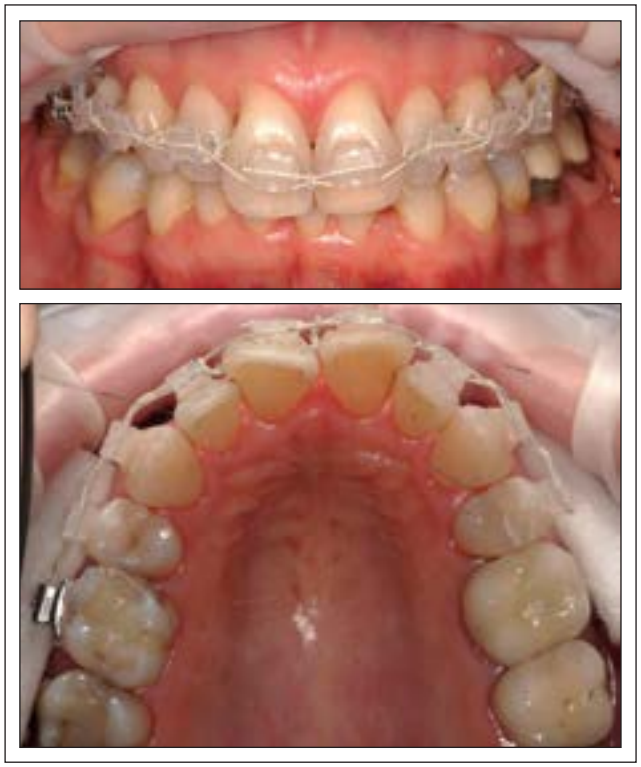


Figure 5: Orthodontic appliance *in situ*

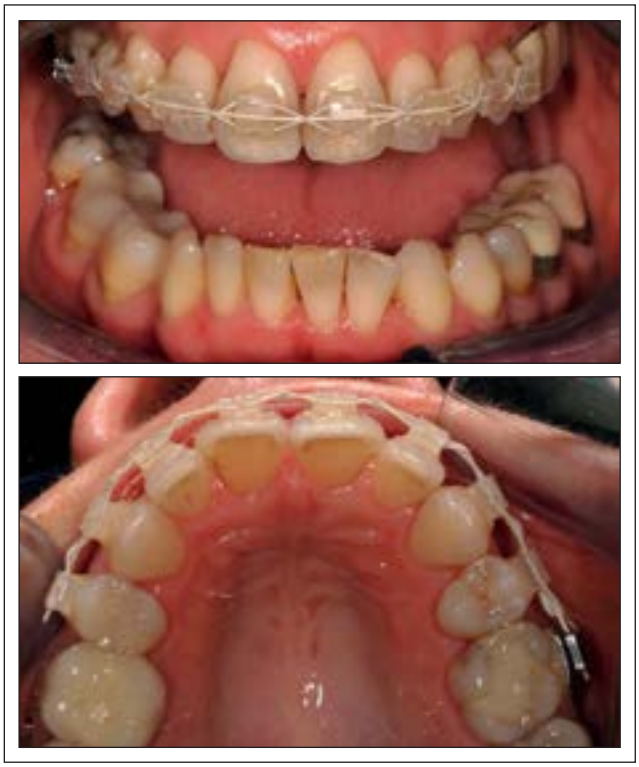


Figure 6: Orthodontic appliance in situ – anterior view

Figure 7: Orthodontic appliance *in situ* – anterior view during treatment

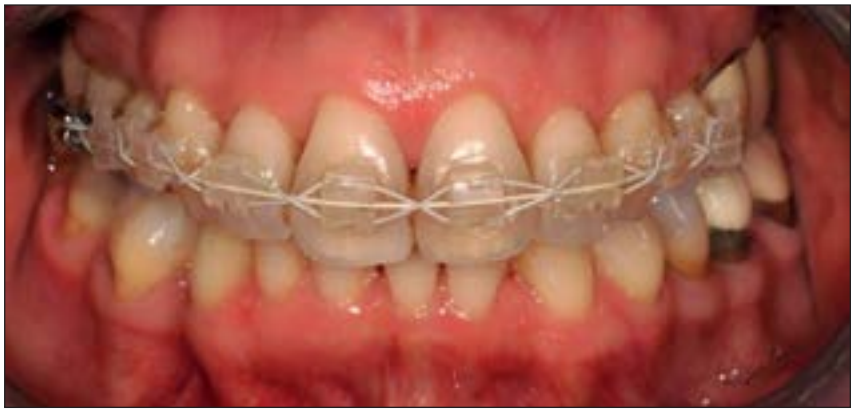
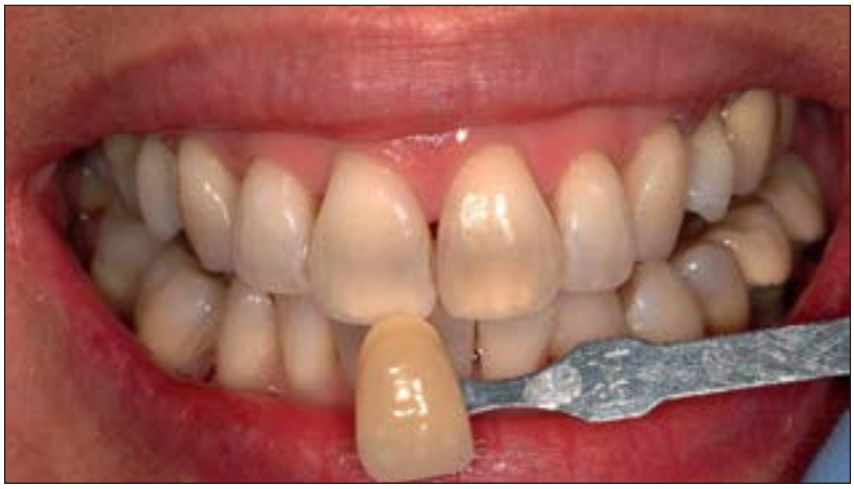


Figure 8: Shade comparison



patient then proceeded to use 10% Carbamide peroxide overnight for two weeks to whiten her teeth in the trays and her shade improved from B4 to A1 (*Figure 8*).

Diagnostic wax-up

To assist with the fabrication of the diagnostic wax up of the 11 and 21 proposed veneers, an addition cured silicone impression was taken for both arches. This together with a stick bite in her habitual bite, a facebow transfer and photographs were sent to the laboratory (Simplee Dental Ceramics). The laboratory also fabricated a Silteck putty matrix, special tray and labial preparation guide as well as a stiff transparent vacuum formed stent. The wax up was reviewed with the patient and she was happy to proceed with treatment.

The prep visit (*Figures 9-13*)

1ml articaine with 1:100,000 adrenaline was administered by buccal infiltration. Optragate was applied for retraction of the lips. The

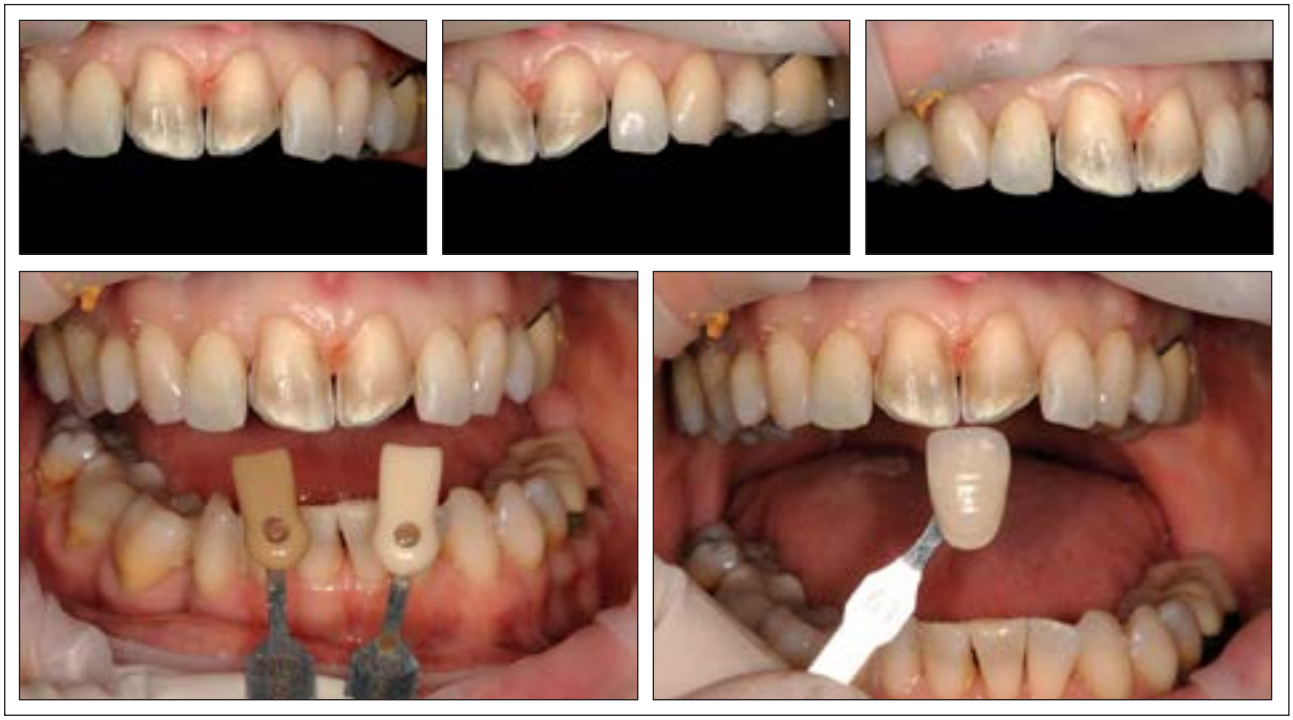


Figure 9: The prep visit

Figure 10: Stick bite

Figure 11: Temporisation of 11 and 21

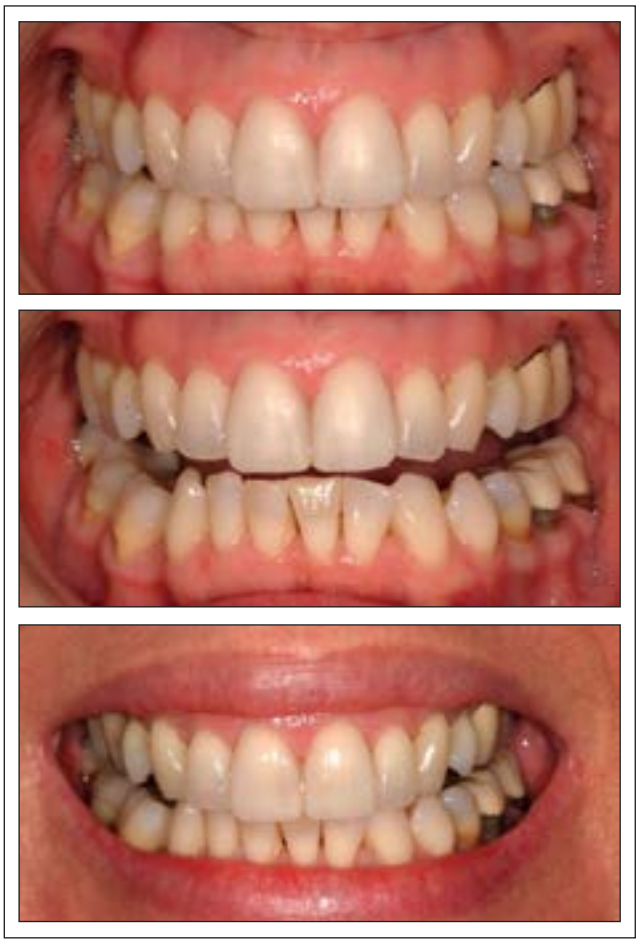


Figure 12: Final restorations 11 and 21

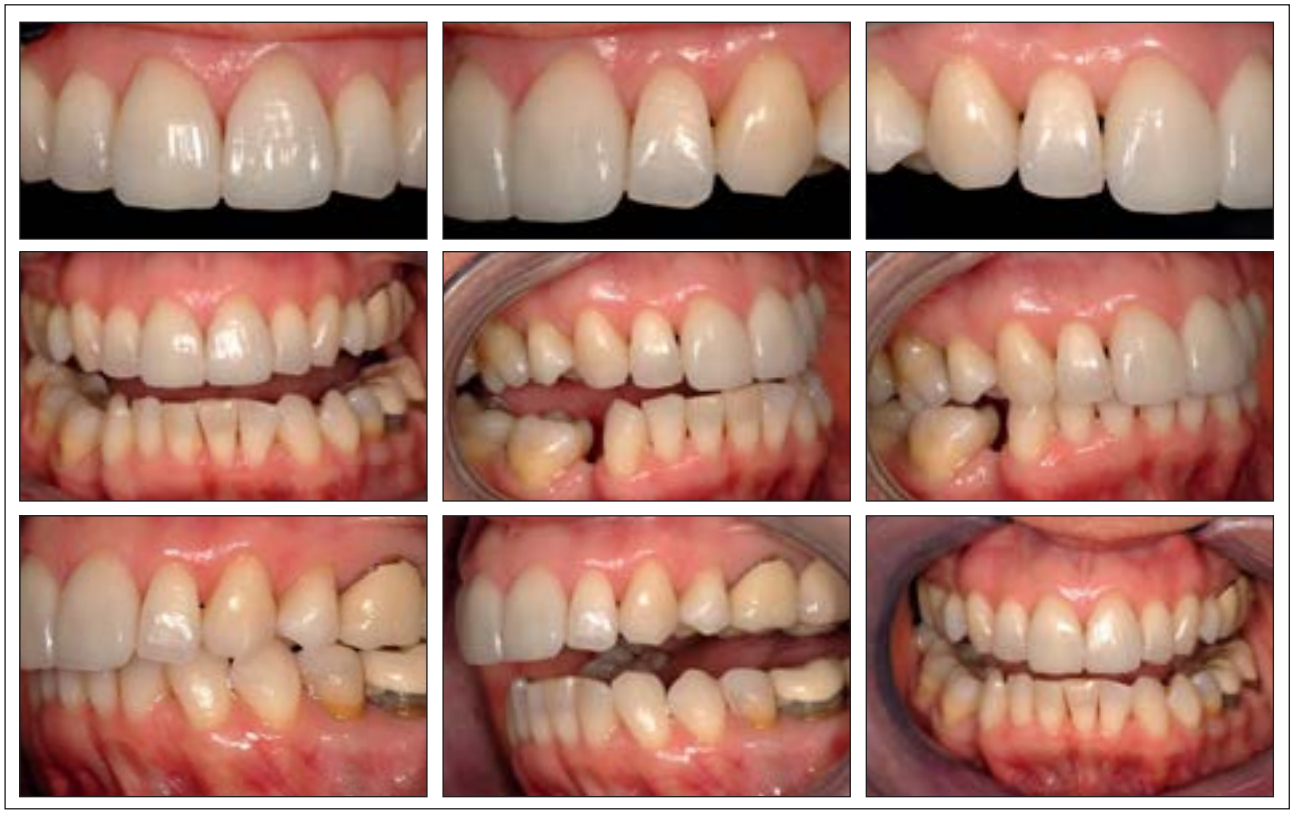
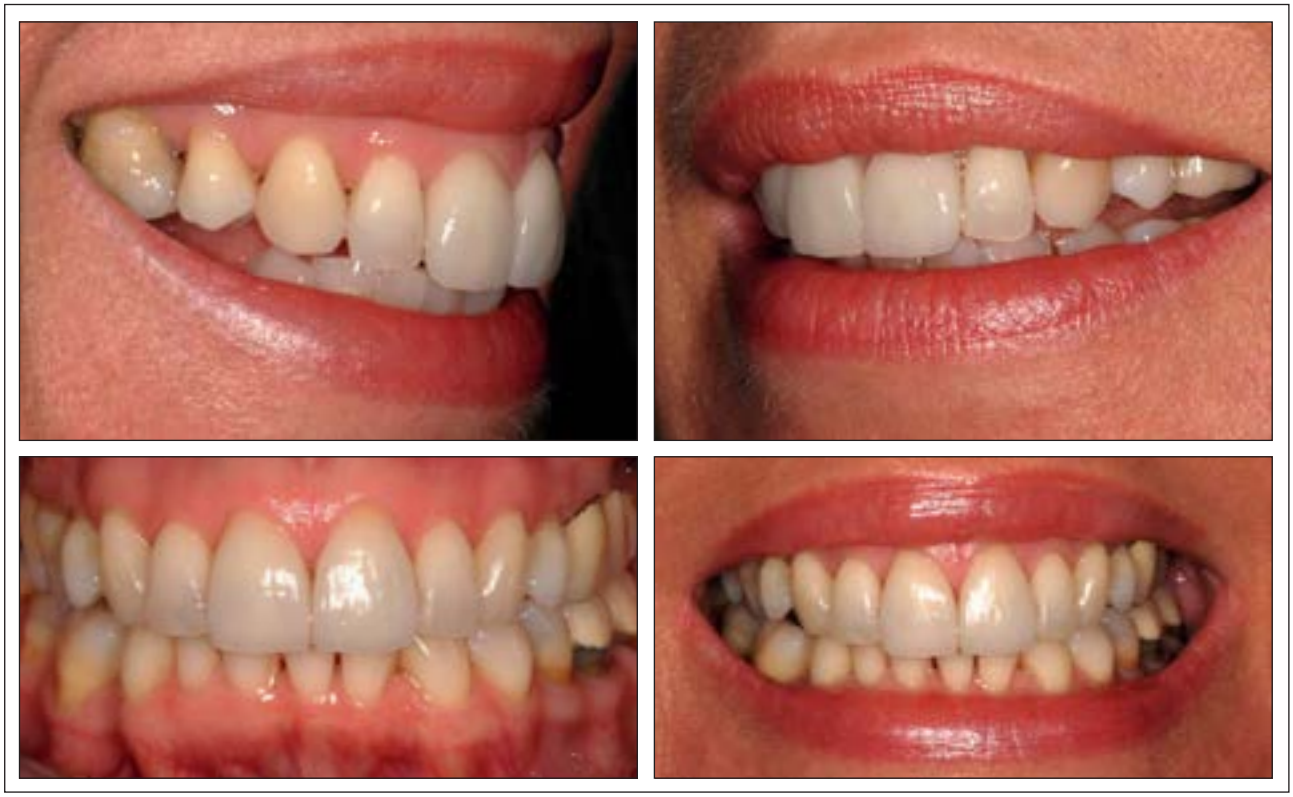


Figure 12: Final restorations 11 and 21 **(continued...)**



clear stent was used first to assist with some pre-preparation recontouring, especially on the distal aspects of the central incisors. The teeth were recontoured to allow the clear stent to fully seat. Following this, using the silicone matrix and A1 Luxatemp (DMG) an Aesthetic Pre-evaluation Temporary (APT) was fabricated over the unprepared teeth to assist with ensuring that an adequate yet minimal amount of enamel would be removed. Thicker veneers were required to mask the discoloured dentine so 0.5mm horizontal depth cuts and 1mm incisal depth cuts were made. The depth cuts were then marked with a pencil and the APT was removed.

The veneers were prepared using a tapered diamond bur, creating supragingival finishing margins and the facial was prepared to the depth of the depth cuts. The preparations were then smoothed with a blank carbide bur followed by a white stone. A yellow (fine) Vision IPR strip was used interproximally.

The preparation space was also evaluated using a labial putty preparation guide. An addition-cured silicone impression was taken using a special tray. Photographs with Vita A1 tab (to show intended shade) and ND8 & ND2 stump shades were taken to convey to the technician the underlying tooth shades and adjacent tooth characterisation.

A stick bite in the patient's habit bite (CO) was recorded and a Denar facebow transfer was taken. A silicone opposing impression was also taken.

The teeth were then spot etched for 15 seconds, Gluma desensitiser was applied followed by the adhesive from Optibond FL (Kerr) which was air thinned and then light cured. The

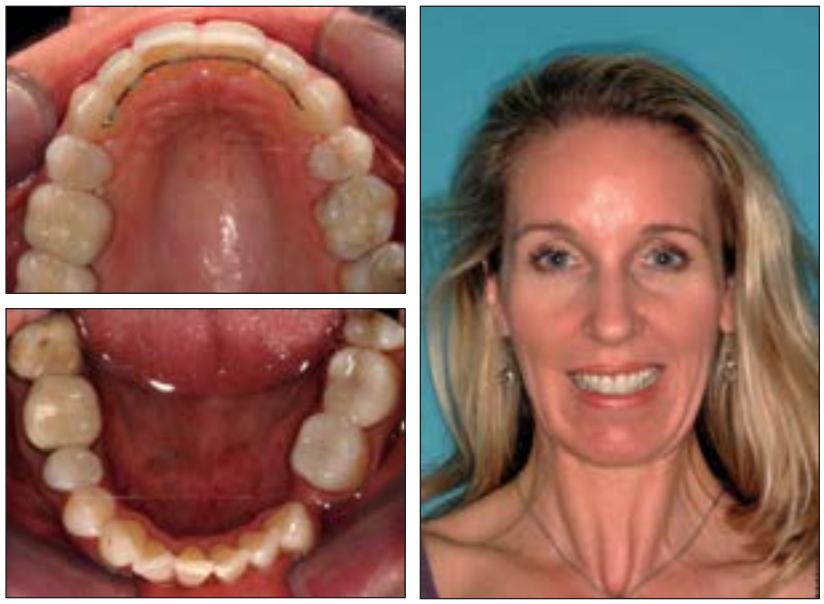


Figure 13: Final result with fixed retainer *in situ*

siltek provisional putty matrix loaded with Luxatemp A1 was then placed over the preparations and allowed to self cure. The matrix was removed and the provisionals were trimmed to remove excess materials beyond the margins using a fine fluted carbide bur. The gingival embrasures were opened to allow for interdental cleaning and the occlusion was checked.
The laboratory prescription was filled requesting Emax (Ivoclar) pressed veneers. A light texture, polished gloss and 1 mm incisal translucency was defined. The shade was detailed as Vita A1. Photographs of the stick bite and preparations were sent to the laboratory.

Review of provisionals

The patient was reviewed one week later to evaluate the provisionals. The gingival health was confirmed. Using a pencil the line angles were drawn to confirm symmetry. The incisal embrasures were further defined. Phonetics and occlusion was also checked.

The patient was happy with the aesthetic outcome and the shade was confirmed with the patient as Vita A1. Photographs were taken (*Figure 14*) and an addition-cured silicone impression was taken of the provisionals and sent to the laboratory to index and assist with the fabrication of the definitive veneers.

Porcelain veneer fit visit

1 ml articaine 1:100,000 adrenaline was given by buccal infiltration. An Optragate retractor was placed and the area was further isolated with cotton wool rolls, gauze and high volume suction.

The provisionals were removed by sectioning. The preparations were then cleaned with a white stone bur to remove any residual composite resin adhesive. The veneers were tried on the teeth one by one, dry, to check for accuracy of fit.

The veneers were then tried in with a translucent try in cement (Vitique, DMG) to assess the shade. A colour modification was deemed necessary to reduce the value so an A1 try in cement was assessed.

The Optragate was then removed and the patient was given the opportunity to review the veneers.

The patient was happy with the try in and so the veneers were then cleaned and prepared in the following way:

- The fit surface was etched with 10% hydrofluoric acid for 60 seconds
- The fit surface was washed copiously and dried
- The veneers were then placed in an ultrasonic bath with 95% alcohol for 4 minutes to remove any acid salt crystals that might have precipitated
- The veneers were then dried and freshly mixed silane applied and allowed to air dry
- Optibond FL adhesive was then applied to the fit surface and air thinned and the veneers placed under a light sensitive cover
- Rubber dam was then applied to the teeth using a split dam technique.

The teeth were then treated as follows:

- Teeth were etched with 37% phosphoric acid for 30 seconds and then washed copiously and lightly air dried. The 11 composite was sandblasted using silanised 50 micron particles
- Gluma desensitiser was then applied to the teeth and lightly air thinned
- Optibond FL Primer was then applied to the teeth for 20 seconds with agitation and then air thinned
- Optibond FL adhesive was then applied to the teeth and air thinned
- Vitique A1 light cure cement was then applied to the fit surface of the veneers and the veneers were applied to the teeth. Excess cement was removed using a brush
- The veneers were then light cured using a tacking tip mid facially to secure the veneers. The excess cement was then removed interdentally using floss. The veneers were then covered with glycerine (to prevent oxygen inhibition) and fully cured for 40 seconds each cervically, interproximally and incisally.

Where necessary, the interdental areas were opened with a serrated strip (Komet) and then final polished with the red and yellow Vision polishing strips (Komet).

The cervical and incisal margin areas were cleaned of excess resin with a curved No.12 scalpel blade and then with a fine fluted composite finishing carbide bur.

Fine composite polishing rubber points were then used at the

margins followed by diamond polishing paste with a bristle brush. The rubber dam was removed and the occlusion was checked and adjusted.

An upper bonded wire retainer (3-3) was then fitted to avoid any future orthodontic relapse.

Final review

The patient was reviewed a week later to check for any residual cement and to check occlusion, phonetics and the final aesthetics. Upper and lower addition-cured putty and wash 2 stage impressions were taken in metal trays and an open bite CR record taken after placing an anterior Lucia jig deprogrammer for 60 minutes. These impressions were sent to Hanham dental laboratory to construct a lower hard bit splint (Tanner appliance).

Delivery of hard bite splint

The Tanner appliance was fitted and equilibrated to ensure even posterior occlusal stops and the correct anterior guidance/disclusion. The patient was satisfied with the outcome and a suitable maintenance recall period was recommended and agreed.