Two veneers to restore worn central incisors

Accreditation Case Type 2

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Introduction

Few challenges are as great in aesthetic dentistry as the delivery of one or two indirect units at the front of the mouth. Communication is absolutely key if the dentist and technician are to produce a result that blends seamlessly with the surrounding natural dentition.

History

A 31-year-old female attended the surgery seeking an aesthetic improvement to her front teeth. She had become aware that they were becoming darker in colour and stained. She felt that she could no longer smile widely as this pulled her upper lip up revealing the dark teeth.

Medically, she was in excellent health. Dental examination revealed a minimally restored mouth, extensive non-carious tooth surface loss affecting the labial surface of her upper central incisors (11, 21) and superficial tooth fractures at 12 and 41. There was minor lower crowding present. Her periodontal condition was good with effective oral hygiene measures in place and her TMJs were healthy and classified as Piper stage 1.[1] Aesthetically, the overall colour of the teeth was relatively dark and the upper central incisors were severely worn with exposed dentine. The gingival heights of 11, 21 demonstrated asymmetry. Radiographically, all teeth were judged to be vital and the periradicular tissues intact.

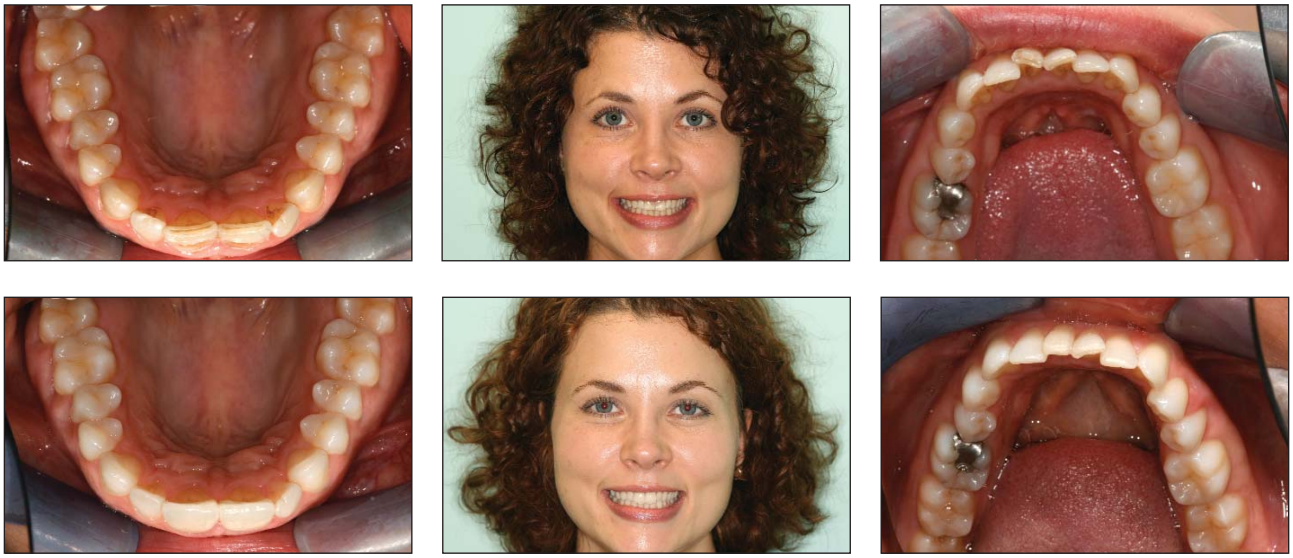
The non-carious tooth surface loss affecting 11 and 21 appeared to be primarily erosive in origin. The labial, localised position of the lesions indicated that the causative factor was most likely dietary. Questioning revealed that heavy consumption fizzy drinks from a wide bore bottle – the diameter of which was approximately the width of two central incisors – with the fluid being 'drawn through the front teeth' had occurred historically. The erosive nature of this carbonated cola drink had completely removed the labial enamel in the cervical third of the tooth; the exposed dentine was now becoming stained and noticeable to the patient.

The presence of some horizontal grooving across the central incisors would seem to indicate that there were some contributive abrasive habits present also. Advice and counselling regarding erosive and abrasive habits were given to the patient and the cause of her tooth surface loss explained.

A detailed discussion was held with the patient regarding her aesthetic expectations and the treatment options available. The treatment plan formulated in cooperation with the patient was to perform home whitening to lighten all of her teeth, gingival reshaping of 11 to equalise

Figure 1a: a-f – Retracted: *Before (above) and after (below) images of the case*

Figure 1b: a-f – Full face. upper occulsal and lower occulsal: *Before (above) and after (below) images of the case*



the gingival heights, porcelain veneers to restore 11 and 21 and composite bonding to repair the fractures to 21 and 41. Direct veneers were discussed with the patient but these were rejected in favour of the longevity and superior aesthetics of porcelain. Orthodontic treatment to reduce the amount of rotation of the lower central incisors was rejected by the patient.

Treatment

Probing depths around 11 showed an excess of gingival tissue and we were able to level the gingival zeniths using electrosurgey without the need for any osseous reshaping.[2] Impressions were taken along with a full set of clinical photos and these were sent to the laboratory to create our prescribed diagnostic wax-up, along with custom whitening trays.

Whitening

The patient performed home whitening for two weeks using 7.5% hydrogen peroxide, the shade was noted as increasing from B2 to B1 according to the Vita shade guide.

Following the home whitening, a break of two weeks occurred. Bleaching reduces the bond strength of resin-based materials to enamel and is probably related to the presence of residual oxygen in the teeth.[3] This short break allowed us to avoid any adhesive problems and allowed the colour to stabilise within the tooth.

Composite bonding

Following the whitening, teeth 12 and 41 were restored with composite resin. The system is based on the natural layering concept, which works with dentine and enamel masses whose optical properties are comparable with those of the original tissue. The dentine shade was selected by examining the tooth in the cervical area. This is where the enamel is thinnest and contributes least to the overall shade of the tooth. The enamel shade was selected by examining the incisal edge and interproximal region – again, this is where the enamel is at its most abundant and can be assessed without too much interference from the dentine body. These shade tabs can then be 'nested' into each other to give the overall shade and held next to the tooth to confirm the desired shade can be created.

Tooth 41 was isolated with rubber dam and a bevel was created to increase the amount of enamel available to bond to. Following etching, a dentine-bonding agent was applied. The selected dentine shade was used to replace the missing dentinal body portion of the tooth and light cured. The enamel shade was then applied in a thin layer to replace the missing enamel tissue. Care was taken to ensure that these two resins were applied in the correct three dimensional spatial arrangement so that heavy shaping or occlusal adjustment would not be required. If this were the case the

optical effect of the polychromatic layering technique might be lost.

Tooth 21 was had very little tooth structure missing and so, following etching and bonding, the enamel resin was used alone. The occlusion was checked and both teeth were finished and
polished using a combination of silicone points and diamond-polishing pastes.

Veneers

A large amount of tooth tissue had been lost from teeth 11 and 21 and so the restorations were to be mainly additive to restore the tooth volume.

A silicone index of the additive wax-up was made; this was to be used as a reference guide for subsequent tooth reduction. As we were planning to increase the tooth volume it was desirable for the patient to approve the planned changes before any tooth reduction took place. Magne[4] has advocated a technique whereby a diagnostic matrix is fabricated from the diagnostic wax up, allowing the patient and the clinician to visualise the end result in the mouth before any tooth reduction takes place.

This can then be used as a preparation platform to ensure the most conservative amount of tooth reduction is performed.

Prior to local anaesthetic being given the teeth were spot etched with 37% phosphoric acid for 20 seconds, a putty matrix fabricated from the diagnostic wax up was loaded with a self-cured bis-acryl composite provisional material and placed over the teeth and allowed to set, and the putty matrix removed. The new increased tooth volume could now be assessed for phonetics, function and aesthetics, as the tissues had not been anaesthetised full lip mobility was possible. Following approval by the patient local anaesthetic was administered and tooth preparation could begin.

Appropriate depth cuts were made incisally and facially through the diagnostic matrix and these were marked with pencil lines to allow easier identification. The diagnostic matrix and a minimal amount of underlying enamel were then cut back until the pencil lines were removed. This preparation technique allows the preservation of the maximum amount of enamel as well as facilitating accurate and swift tooth preparation. After the preparations had been refined the amount of tooth reduction was checked using putty matrices that had been manufactured from the approved diagnostic wax up. Although there was some pre-existing dentinal exposure due to the severity of the acid erosion the majority of the preparation remained in enamel.

Upper and lower impressions using an addition cured silicone were taken along with photos of the prepared teeth next to the appropriate shade tab. All of this,

Figure 1c: a-f – *Before (above) and after (below) images of the case*

along with an impression of the approved diagnostic matrix, was sent to the dental laboratory to begin fabrication of the restorations. The shade for the veneers had been selected and the characteristics mapped by the ceramist prior to tooth reduction and dessication. The veneers were returned one week later unglazed.

Following local anaesthetic administration the provisional restorations were removed and the tooth surfaces cleansed with pumice. The restorations were tried in to assess fit and overall colour. The ceramist at the same appointment then carried out final custom finishing and glazing. The teeth were isolated with rubber dam and the restorations bonded in place using a transparent veneer bonding cement. Care was taken to remove any excess resin from the margins and interproximally. The occlusion was checked and refined to provide equal multiple excursive pathways.

The patient returned one week later to have the occlusion checked and the final clinical photographs taken. She was delighted with the final result; a combination of minimally invasive veneers, composite bonding and whitening had transformed her appearance and allowed her to smile fully once again.

Acknowledgement

Ceramic work by Sally Dyer, Walton Dental Arts.

References

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3. Unlu N, Cobankara FK, Ozer F. Effect of elapsed time following bleaching on the shear bond strength of composite resin to enamel. *J Biomed Mater Res B Appl Biomater* 2008 **84**: 363-368.
4. Magne P, Belser U. Novel porcelain laminate preparation approach driven by a diagnostic mock-up. *J Esthet Restor Dent* 2004 **16**: 7-18.

Figure 1d: a-f – Smile: *Before (above) and after (below) images of the case*