

## IN BRIEF

- Correct diagnosis and treatment planning is crucial for all cosmetic cases.
- A diagnostic wax up is essential to allow conservative preparation and prototype fabrication.
- Porcelain Laminate veneers are a conservative treatment modality.
- Through the conjunctive use of tooth whitening, bonding and orthodontics it is not always necessary to prepare a full smile (10 units) to make dramatic cosmetic changes.

# 1

# Aesthetic changes with four anterior units

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Cosmetic dentistry has evolved with the advent of more robust porcelain materials and ever-stronger bonding agents. This series of three articles aims to provide a practical overview of what is now possible both functionally and cosmetically from the preparation of a small number of teeth, through a whole smile, to full mouth rehabilitation. A complete diagnosis is the starting point to planning any cosmetic or functional changes. Guidance is given on the techniques used but adequate training must be considered essential before embarking upon modification in occlusal schemes or even minor adjustments in smile design. Conservative use of porcelain laminate veneers can result in significant aesthetic improvements to a patient's smile and it is not always necessary to prepare all the teeth visible in a smile.

## AESTHETICS AND COSMETICS

1. Aesthetic changes with four anterior units
2. Smile lifts – a functional and aesthetic perspective
3. Increasing occlusal vertical dimension – why, when and how

## INTRODUCTION

With the ever-increasing cosmetic demands of patients, it is essential to fully use all the tools available to dental care professionals. While often it is necessary to take control of the whole smile by restorative means, an ethical professional must be aware that major cosmetic changes can be achieved without having to prepare all of the teeth visible in a smile. Preparing all teeth in a visible smile has been referred to as a 'smile lift'. This is because other face features, including lips, can be enhanced with the use of supporting porcelain akin to a facial lift. Such changes can also be achieved with minimal intervention and still with good long term prognosis.<sup>1</sup> In this article the use of porcelain laminate veneers in conjunction with other techniques (bleaching, composite bonding for occlusion and orthodontics) is shown allowing for the preparation of only four anterior teeth.<sup>2</sup>

## Indications for four anterior veneer units

1. Presence of diastemas and/or poor incisal embrasure form.<sup>3</sup> Bleaching of the other teeth, though not the teeth to be prepared, can be carried out initially with a power whitening system and followed up by trays for home bleaching to maintain the colour of these teeth. New trays are then constructed following seating of the anterior units. The four prepared teeth are not bleached as the inevitable relapse post bleaching could affect the final shade of the veneered teeth and bleaching just from the palatal will not be as effective (Figs 1-3). However, if the patient accepts prolonged and possible repeated episodes of bleaching, this can be done.<sup>4</sup>

2. Chipping or wear limited to the front four teeth (Fig. 4).
3. Multiple black triangle disease (Fig. 4).
4. Tooth position, either in standing, protruded or rotated. Sometimes even orthodontics alone cannot completely correct an occlusion and/or aesthetics unless an osteotomy is carried out.
5. Size shape discrepancies that are not correctable via orthodontics alone (Fig. 5).
6. Poor colour or surface texture issues in an otherwise healthy dentition (Fig. 6).

## Contra-indications (to only four units)

1. Lack of buccal corridor ie negative buccal space.
2. Poor colour that cannot be overcome via bleaching ie grey form of tetracycline staining, or patient expectations of colour that cannot be matched through bleaching alone.
3. Inappropriate apical health of teeth being treated – this must be corrected before any aesthetic treatment is completed – see radiographs associated with case 6.

Even heavily filled teeth can be restored with veneers – these may be anywhere between 180 degree with incisal coverage and 360 degree coverage depending on the remaining tooth tissue and occlusal consideration. All margins should however be placed on sound tooth and not on pre-existing restorations.<sup>3</sup>

## Technique

Following a pre-examination discussion with a patient to find out their wishes, a full examination (which includes soft tissue, periodontal and occlusal screenings) together with radiographs

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and SLR photographs is undertaken. This enables a thorough diagnosis and a comprehensive treatment plan to be formulated and presented to the patient. All treatment plan options should be discussed with the patient to allow informed consent.

All cases require a diagnostic wax up.<sup>5</sup> This is used to prepare putty indices as a preparation guides and a putty matrix for prototype fabrication.

After adequate anaesthesia, correct arch form is first achieved via appropriate buccal and lingual preparation. This will allow for the correct incisal anatomy for buccally or lingually placed teeth ensuring a natural thickness of the incisal tip. Depth cuts for the material of choice are made,<sup>6</sup> and the preparation margins finalised with gingival chamfers and incisal overlay with a palatal bevel.<sup>7</sup> Contacts between the teeth are not broken unnecessarily (Tables 1 and 2). Master impressions are taken and stick bite recorded along with face bow records if required. A stick bite is a horizontal plane reference taken with a full face photograph as a check record for the incisal plane recorded using the face bow. A stump shade of the prepared tooth is recorded and photographed with the shade tab visible for the ceramist to facilitate the masking out of any undesirable, underlying tooth colour. The prototypes are now fabricated and tacked in place. This involves spot etching a small 1-2 mm square area of enamel on the mid-facial surface and using a filled resin as a luting cement for the prototype restorations. Final recontouring of these prototypes is achieved on a separate visit when the patient is no longer anaesthetised to assess all aspects of smile design (phonetics, incisal length, contour, embrasure form, colour<sup>8</sup>). Once both the practitioner and the patient are happy with these prototypes (this may take several visits), impressions of them are recorded and photographs taken to allow the ceramist to accurately reproduce these details in the final restorations.

The restorations are fabricated by the ceramic specialist and returned etched with hydrofluoric acid but un-silanated.<sup>9</sup>

At the seat appointment the patient is again anaesthetised, the prototypes removed and the preparations checked for the presence of any resin tags which may prevent the accurate seating of the veneers. The restorations are tried in with water for fit and with try in paste if there are any colour considerations involving value. The preparations are then isolated with rubber dam. The veneers are silanated at the same time as rubber dam isolation, as it is paramount that the teeth are not dehydrated as this will result in increased post operative sensitivity. They are then cemented using a rapid cementation technique and a dentine-bonding agent of choice. It is recommended that since enamel bond strength with self-etching systems are still in doubt that conventional total etch technique with phosphoric acid is used.<sup>10</sup>

After final cure the dam is removed and the occlusion checked and refined. Final photographs can be taken but it is recommended that

the patient return for a re-care appointment to ensure absence of all excess cement, further refinement of occlusion and final photographs.

**CASE DESCRIPTIONS**

In all cases all options available were discussed. These included no treatment, bleaching only, direct resin bonding or porcelain veneers to correct size shape discrepancy and orthodontics. All necessary hygiene treatment was completed for these patients and active caries or leaking restorations addressed prior to cosmetic treatment.

**Case 1 (Figs 1a and 1b)**

This patient was unhappy with the colour of her teeth and requested bleaching. Once shown the poor incisal embrasure and associated apparent diastemas she wanted to know the other options available. Her examination revealed very shallow canine guidance. It was agreed to bleach her teeth with a combination of power and home whitening, provide four porcelain laminate veneers and direct resin bonding on her canines to protect the restorations in lateral excursions.



Fig. 1a Case 1 pre-op



Fig. 1b Case 1 post-op

**Cases 2 and 3 (Figs 2, 3a and 3b)**

As case 1 except adequate canine guidance was present.

**Case 4 (Figs 4a and 4b)**

This patient requested a cosmetic improvement to his smile as he was aware of the black triangles and continued wear of incisal edges – this wear had been ongoing for some time and even prior to lower anterior bridgework which was provided to improve his masticatory efficiency and reduce the indigestion he was suffering from a result of wearing/not wearing his lower denture. His treatment plan not only included four anterior units but also involved providing implants to replace

**Table 1 Reasons to break contacts**

1. presence of pre-existing restorations
2. diastema closure
3. colour considerations
4. idealise anatomical contour

**Table 2 Reasons not to break contacts**

1. improve prototype retention
2. laboratory convenience
3. ease of cementation



Fig. 2a Case 2 pre-op



Fig. 2b Case 2 post-op



Fig. 3a Case 3 pre-op



Fig. 3b Case 3 post-op

Ir4, 5 to ensure as many posterior contacts within to concept of a reduced dental arch.<sup>11</sup>

#### Case 5 (Figs 5a–5c)

The patient presented complaining of chipping of his upper incisors. He also did not like the lower anterior crowding.

He had an old porcelain bonded crown ul2 some 4 mm thick and old veneer ur2 some 2 mm thick at the incisal edge. His incisor relationship was class three with mild crowding. see pre-op

After fully discussing the options available to the patient, he chose the orthodontic route as it meant having to prepare fewer teeth. After



Fig. 4a Case 4 pre-op – wear was present prior to lower bridge placement



Fig. 4b Case 4 post-op

orthodontic realignment it was planned to place one porcelain laminate crown ul2 and three porcelain laminate veneers.

The patient saw Dr Asif Chatoo of Apex Orthodontics in Watford. He completed fixed orthodontic therapy which included the extraction of Ir1 (Fig. 5). The upper lateral incisors were brought forward. This resulted in an edge-to-edge anterior incisal relationship (Fig 6). Since it was planned to treat all four incisors due to the wear, this was deemed acceptable as it would be possible to 'jump' the upper incisors into a positive over jet with our final restorations. Total time for orthodontic treatment was 12 months. Permanent retention was provided for the lowers along with an Essex type retainer.

Immediately following the removal of the upper brackets, the patient had impressions taken for a wax up and temporary splinting was achieved with acid etch retained flowable composite

After an occlusal equilibration to ensure even posterior bilateral contacts and canine protected guidance with no CR/CO slide the old class five composite restorations on the upper canines were replaced. The four upper incisors were prepared and prototypes fabricated.

Once in place it became apparent that they needed to be lengthened. Adding flowable composite and adjusting the proportions of all the incisors (Fig. 12) achieved this. The average length of the upper central incisors is 10.5 to 11.5 mm, however in this case the final length was 12.5 mm which resulted in 4 mm unsupported porcelain; this was not considered a problem as his protrusive guidance was not steepened. Final Feldspathic porcelain restorations were cemented and impressions taken for an upper Essex retainer.

#### Case 6 (Figs 6 a–d)

This patient presented complaining of the appearance of his front teeth and in particular the darkness of his lateral incisors and pitting of his central incisors. One lateral incisor

Fig. 5a Case 5 pre-ortho cl 3 incisors



Fig. 5b Case 5 pre-prep, post-ortho



Fig. 5c Case 5 immed post-op - shows bonding agent on ging



Fig. 6a Case 6 pre-op

Fig. 6b Case 6 ul2 pre-op apical status



Fig. 6c Case 6 ul2 post-op re rct



Fig. 6d Case 6 post-op

required endodontic re-treatment.<sup>12</sup> When it came to fit the veneers the shade was assessed with water soluble try in pastes and the lateral incisors were still slightly too dark. Accordingly it was necessary to further reduce the lateral incisors in the mid buccal region (not at the margins) allowing a greater cement thickness to mask this underlying darkness. After cementation, the patient was supplied with a bleaching tray to maintain the results of the whitening particularly since porcelain and natural teeth were present in the same arch.

**DISCUSSION**

These cases demonstrate that stunning cosmetic results can be achieved with minimal tooth preparation provided that appropriate diagnosis, treatment planning and patient consent are completed, along with an adequate knowledge of the techniques available to our profession in the twenty-first century.

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