

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.

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CPD PAPER

Smile lifts – A functional and aesthetic perspective

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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. Porcelain laminate veneers have a role in the restoration and rehabilitation of a wearing and functionally compromised dentition.

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

Porcelain laminate veneers have been commonly assumed to be of purely cosmetic value. However, they can have a significant role in the restoration and rehabilitation of a wearing and functionally compromised dentition. Optimal aesthetics require the understanding of the fundamentals of smile design,¹ and without considering the functional aspects of the smile, the results long-term cannot be assured; at best, studies show a 90% success rate of porcelain laminate veneers over a 10-year period. Without consideration of the correct occlusal scheme, de-bonds and fractures can only result in a reduction in this figure.^{2,3}

Occlusal diagnosis and treatment planning

Whatever the aesthetic concerns of our patients, a full diagnostic protocol can highlight other issues or concerns. Following a pre-examination discussion with the patient to find out their wishes, a full examination (which includes soft tissue, periodontal and occlusal screenings) together with radiographs and SLR photographs⁴ is undertaken.

Posterior simultaneous contacts and canine guidance with posterior disclusion and no anterior posterior discrepancy (centric relation = centric occlusion, CR = CO) should be considered the gold standard for any reorganised approach to the occlusion be it aesthetically or functionally driven.⁵

CR can be defined as 'when the heads of the condyles are in their most superior position within their sockets, with the discs properly aligned and full neuromuscular release'. CO can be defined as maximum intercuspation of the teeth.

Any tension or tenderness when the patient is in CR indicates masticatory muscle hyperactivity or internal derangement of the joint. A deprogramming device (for example a Lucia jig or NTi appliance) will help if it is a muscle problem but worsen the situation if the disc is out of place.

In an occlusal screening the aim is to discover signs and symptoms of occlusal disease. This will generally manifest in any of four ways:

1. Extracapsular or intracapsular temporomandibular joint problems.⁶
2. Muscle pain. It is out of the scope of this article to fully discuss the function of the muscles of mastication. However while all the other muscles of mastication can act as elevators, inferior lateral pterygoid muscle, which pulls the disc down and forward, will always be contracting if the condyles are not in centric relation. This muscle cannot be palpated.
3. Wear facets as a result of pathological tooth-to-tooth surface loss. Parafunctional activity or bruxism can cause such faceting. However, the two need to be distinguished from each other as bruxism is a central nervous system mediated event and for such patients a night guard must be provided to ensure long-term success as even an idealised occlusion may not stop this activity. When considering wear, one must also look at other aetiologies, especially erosion. Erosion will be due to gastro-intestinal reflux, bulimia (see case 1), carbonated beverages or citrus fruits. Its relative location will provide clues to the aetiology.
4. Bone loss. Radiographic examination can show loss of lamina dura and both vertical and horizontal bone loss as well as caries. Angular bony defects may be particularly indicative of jiggling forces in the presence of plaque.⁷

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Fig. 1 Pre-op smile (left)
Fig. 2 Pre-op retracted (right)



Fig. 3 Pre-op occlusal view showing erosion (left)
Fig. 4 Occ view preparations (right)



Fig. 5 Post-op smile (left)
Fig. 6 Post-op retracted (right)



Fig. 7 Right hand excursion (left)
Fig. 8 Left hand excursion (right)



For all these reasons the dynamic situation has to be assessed and will involve centric relation and centric occlusion assessment as well as excursive movements.

From balanced articulation (dentures) to group function, and canine guidance many excursive schemes exist. Cr/co discrepancies as well as the presence of posterior working and non working interferences should be evaluated as occlusal slides invariably result in destructive interferences and these can cause many of the symptoms outlined above.

The goal of occlusal therapy is not to stop parafunctional activity. It is to put the patient at a mechanical disadvantage during the parafunction thus minimizing the stress to the masticatory system.

All the above, together with a full set of clinical photographs (invaluable documentation for medico legal considerations), enables a thorough diagnosis and a comprehensive treat-

ment plan to be formulated before it is presented to the patient. All treatment plan options should be discussed with the patient to allow informed consent.

Articulated study models mounted in centric relation should be used to perform a trial equilibration to assess the amount of enamel adjustment required to achieve cr/co coincidence. The advent of modern bonding additive procedures such as canine bonding can allow such posterior disclusion if the patient does not have aesthetic concerns.

Patient discussions can involve composite mock-ups and digital imaging (see case 2). These may address the aesthetic concerns but not the functional issues. A diagnostic wax up allows not only confirmation of the proposed functional aesthetic scheme on a semi-adjustable articulator and then intra-oral refinement but also prototypes to allow the patient to visualise the changes to meet their requirements.



Fig. 9 Pre-op smile (left)
Fig. 10 Retracted pre-op smile (right)



Fig. 11 Close up pre-op smile (left)
Fig. 12 Mock up 3s into 2s (right)



Fig. 13 Mock up 4 antrs (left)
Fig. 14 Imaged face (right)



Fig. 15 Prototypes(left)
Fig. 16 Prototypes close up (right)



Fig. 17 Occlusal scheme of prototypes (left)
Fig. 18 Post-op smile (right)



Fig. 19 Retracted post-op (left)
Fig. 20 Final occlusal scheme matches prototypes (right)

Table 1 Treatment choices

1. Equilibrate
2. Reposition (orthodontics)
3. Restore or reposition and restore
4. Surgical osteotomy
5. Orthognathic surgery

Indications for a functional smile lift

1. Lack of canine guidance with associated wear – not correctable via equilibration and bonding
2. Muscular symptoms – not correctable via splint therapy and/or equilibration
3. Posterior angular bone loss from an occlusal origin – not correctable via equilibration and bonding
4. Extracapsular TMJ issues – not correctable via splint therapy and/or equilibration

Indications for an aesthetic smile lift

1. Colour, not correctable by bleaching alone, for example tetracycline staining
2. Shape and/or proportions of the teeth
3. Tooth size to arch size discrepancy
4. Arrangement of the teeth, not correctable by orthodontic re-alignment

Contra-indications to smile lifts

1. Patient unsure of what they really want
2. Patient expectations cannot be met
3. Surgical intervention required
4. Inadequate operator training
5. Poor patient compliance re: oral hygiene and/or diet

Conjunctive orthodontic therapy can often achieve many of the functional requirements outlined above and thus minimise the extent of tooth preparation. However, if the patient is unwilling to accept this, a restorative solution is one of five choices (see Table 1).

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 remaining tooth tissue – all margins should however be placed on sound tooth enamel and not pre-existing restorations.⁸

TECHNIQUE

See part one in this series – Aesthetic changes with four anterior units (*BDJ* 2006; **200**: 135-138).

Case descriptions

For all the cases illustrated in this article, the dentistry was performed to satisfy the patient's desires for aesthetic changes to their teeth and not primarily to change their occlusal scheme. If the aesthetic changes are to be made then these changes need to be completed in a logical, repeatable and organised manner. This can best be achieved by using a recognised occlusal scheme⁵ and corrections to their occlusal scheme should be incorporated. Without this the likelihood of de-bonds and fractures will only increase.

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.

Fig. 21 Pre-op smile (left)
Fig. 22 Pre-op retracted note cross bite 113 (right)



Fig. 23 Angular bony defect (right)
Fig. 24 Preps (right)



Fig. 25 Post-op smile (right)
Fig. 26 Retracted post-op (right)



CASE 1

This patient requested options for her wearing anterior, discoloured teeth following a history of bulimia. She had the associated characteristic palatal erosion which was through the enamel and into the dentine, as well as loss of canine guidance. The patient wanted to smile with confidence again and upon discussion of her available options she decided upon 10 upper porcelain laminate veneers with 360 degree coverage where required and bleaching of her lower teeth. As well as restoring the loss of incisal length canine protected occlusion was achieved. All the exposed dentine was protected with virtually no preparation of the palatal aspects of the anterior teeth and only very minimal preparation of the occlusal surfaces of the premolars. No increase in the occlusal vertical dimension was required (Figs 1-8).

CASE 2

Despite previous bleaching the patient wanted to improve her smile. She was unaware of her congenitally missing lateral incisors and believed further bleaching could improve the appearance of her teeth. Imaging and mock-ups allow the patient to see her aesthetic options.⁹ Completion of a comprehensive examination including co-diagnosis allowed the association between the abfraction, incisal notching (which she had always believed was present from a historical accident and subsequent dental adjustment) to be discussed with the patient. The patient elected a 10 unit upper smile lift with bleaching of her lower teeth (Figs 9-20).

CASE 3

Having had a previous history of a high sugar diet, this patient presented requesting a complete smile make-over. As well as disliking the colour he disliked the multiple diastemas.¹⁰ He was unaware of the cross bite of LL2,3 and the non working interference on UR 6 and the associated angular bony defect.¹¹ Via

appropriate conservative preparations his cosmetic and our functional concerns could be resolved (Figs 21-26).

DISCUSSION

Immediate value for the patient is determined by the aesthetics of the case, the comfort of the reconstruction and the care in which the dentistry was delivered. Long-term value is determined by longevity.

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Further reading

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Author pls provide full ref for 1.