

# CURRENT CONCEPTS IN AESTHETIC RESTORATIVE DENTISTRY

Written by **Dominic Hassall**



In the first of two articles, Dominic Hassall reviews the current status of aesthetic restorative dentistry in private practice

Over the last decade there have been significant advances in the field of aesthetic restorative dentistry. This is combined with increased patient expectations and information (or misinformation), particularly from the internet.

A rising demand for aesthetic restorative and implant dentistry is anticipated to continue and so the private practitioner must continually evaluate materials and techniques in an attempt to improve the outcome and longevity of treatment in the most minimally invasive manner.

We are also continually challenged to provide evidence based solutions for our patients and risk assess so that the treatment provided reflects individual risk factors for the patient.

With an increasingly ageing population the nature of aesthetic restorative dentistry has also become more complex, with increasing incidence of tooth surface loss and partially dentate patients. A multidisciplinary approach is often required, involving treatments such as surgical crown lengthening, implant rehabilitation and more complex partial dentures, which are outside the scope of this article.

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The first article will consider developments in fixed prosthodontics.

## PORCELAIN VENEERS

There has been an overdue change in philosophy by some dentists that sacrificing large amounts of tooth tissue to satisfy 'cosmetic demands' is short sighted, particularly in unrestored/minimally restored dentitions.

This is particularly true of porcelain veneers which when used appropriately are a valuable restorative option. However, they are highly technique sensitive restorations and have numerous occlusal and tooth based risk factors which may prejudice outcome including:

- Occlusal
  - Lack of protective canine guidance
  - Deep overbites
  - Class III occlusions
  - Restricted envelopes of function
  - Cross bites
  - Parafunction
- Tooth based
  - Excessive over preparation into dentine
  - Bonding to restorations
  - Insufficient tooth tissue
  - Worn teeth
- Aesthetic failure
  - Loss of vitality if over prepared into dentine
  - Preparation or bonding errors
  - Biologic width violation.

With appropriate case and tooth selection, porcelain veneers can be highly successful restorations. However, used in situations when risk factors are present they can have unacceptable failure rates.

The following case attended for advice on her recently placed porcelain veneers (Figure 1, 2). There was biologic width violation and

developments in:

- Fixed prosthodontics
- Our understanding of the biologic width and its impact on aesthetic dentistry
- Composite dentistry
- Adhesion and tooth conditioning
- Post techniques
- Tooth whitening
- Developments in scanning and inhouse CAD/CAM restorations
- Attitudes and techniques in regard to more minimally invasive treatment options.



Figure 3



Figure 4



Figure 5

dentine preparation with loss of vitality UR2 (which required root canal treatment). Several of the veneers had debonded, the UR1 was discoloured and the patient was disappointed with the flat square appearance of the restorations.

The need for careful occlusal and tooth-based risk assessment is now more widely appreciated for veneers and fixed prosthodontics and the use of pre-restorative orthodontics to correct occlusal risk factors



Figure 9



Figure 10

more widely practised, improving the prognosis for restorations and reducing tooth preparation.

Prior to referral to me the following patient had four upper incisor veneers placed, which all debonded within a few months. The reason was a deep traumatic overbite and a lack of protective canine guidance (Figure 3, 4).

It was apparent that the occlusal risk factors required correction prior to replacement of the restorations and the occlusion was improved with lingual orthodontics and after whitening was restored with Emax crowns (Figure 5).

The orthodontics left a slight anterior open bite so full coverage restorations with an improved prognosis could be placed, but with no additional palatal tooth preparation required. The restorations have now been in place for over 10 years.

Over my career I have treated numerous restorative-orthodontic cases which can involve long term, lingual, aligner and short term orthodontics to improve functional and aesthetic outcome.

#### ALL CERAMIC CROWNS AND BRIDGES

All ceramic crowns and bridges have become a mainstay of aesthetic practice with the use of zirconia and Emax restorations becoming common place.

Zirconia is a high density and strength CAD/CAM ceramic, but rather 'opaque' in its monolithic form (Figure 6 shows a monolithic molar/premolar bridge on the LR5 and LR6) limiting anterior use but can be veneered with conventional porcelain providing excellent aesthetics (Figure 7 shows a central incisor cantilever bridge and crowns on the lateral incisors in a trauma case).

Unfortunately studies demonstrate layered zirconia to be prone to chipping/delamination of the veneering porcelain when used posteriorly. In a study involving posterior feldspathic layered zirconia bridges a success rate of only 57.9% over seven years was achieved, with the majority of failures due to chipping. Consequently, layered zirconia can only currently be routinely recommended for anterior use where bite forces are lower.

This has led to developments in monolithic zirconia with ultraconservative preparations. With monolithic zirconia we have the opportunity to undertake an ultraconservative preparation with only 1.25mm occlusal reduction and 0.5mm axially (Figure 8). However, zirconia can be difficult to adjust or drill through for endodontics and can be abrasive if not highly polished. The opaque aesthetics have improved from early systems.

Monolithic zirconia demonstrates excellent success. Over a five-year period, there was only 2.6% fracture for bridges and 0.71% for



Figure 6



Figure 7



Figure 8

crowns in anterior/posterior regions.

When there is a dark core shade or metal post, zirconia can offer the advantage of improved masking compared with Emax. However, zirconia does not roughen or silane bond so is not routinely indicated for adhesive restorations.

Emax (lithium disilicate) ceramics are pressed improving strength. Aesthetics can be superb when layered with Emax Ceram veneering porcelain (Figures 9 and 10 demonstrate layered Emax crowns on the maxillary lateral incisors supported by implants). It can also be used in press-only form, lacking only detailed characterisation ▶



Figure 11



Figure 12





Figure 13



Figure 14



Figure 15



Figure 16

and translucency (Figures 11 and 12 shows press-only Emax crowns on the upper incisor teeth in a toothwear case). These restorations allow to opportunity to undertake ultraconservative anterior restorations with high strength and very good aesthetics. More recently Emax has become available in CAD/CAM blocks, although strength is lower than in the press form.

Single pressed Emax restorations demonstrate good success. A nine-year evaluation of Emax crowns demonstrated 94.8% survival in anterior/posterior positions.

Emax is also suitable as highly aesthetic onlay material, demonstrating acceptable failure rates of 10% over a 10-year period. Posterior Emax onlays or crowns require 1.5mm of occlusal reduction posteriorly.

Bridge performance is variable, for example only 71% survival has been recorded over 10 years in respect to three-unit anterior bridges, the majority of failures being connector fracture (the flexural strength of Emax is up to three times lower than zirconia). Although Emax has lower strength than zirconia, it is

possible to bond the restoration improving strength for single units.

Press-only Emax provides the opportunity to offer highly aesthetic and ultra-conservative anterior crowns which can be taken as thin as 0.3mm axially (0.6 is more realistic) with only 1.0mm to 1.5mm incisal reduction required (Figure 13, 14). These minimal anterior restorations are better regarded as full-coverage/360-degree veneers rather than crowns and offer very good aesthetics as long as the tooth's core shade is similar to that of the final crown. They also offer lower risk to the pulp and tooth structure than conventional preparations (Figure 15 and 16 demonstrate the minimal nature of these preparations and the good aesthetics).

### AESTHETIC ONLAYS OR CROWNS?

Over the last decade there has been considerable debate of the merits of crowns versus aesthetic onlays.

Aesthetic onlays demonstrate satisfactory clinical performance with failure rates are in the region of 10% at 10 years. The failure of aesthetic onlays is approximately double that of conventional metal-ceramic crowns at approximately 5% over 15 years.

Onlays are often perceived as more preservative of tooth tissue than crowns. This is true when compared with destructive conventional metal-ceramic crowns. However, with monolithic zirconia crowns we are at a stage where tooth-coloured posterior crowns can be provided with ultraconservative preparations. However, it is generally considered that when a crown fails it is more likely that the tooth will be unrestorable compared to when an onlay fails, when there may be a chance of salvaging the tooth.

The decision as to whether a crown or onlay would be more appropriate needs to be decided on an individual tooth basis. For example, when treating restored molars and increasing the vertical dimension in wear cases, an onlay (Figures 17-20) would generally be more preservative than a crown. ●

**A full list of references is available. Please email [andy.myal@fmc.co.uk](mailto:andy.myal@fmc.co.uk)**



Figure 17



Figure 18



Figure 19



Figure 20

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