No preparation and Ultrathin veneers

Rahul Doshi discusses the extra-thin custom ceramic shells that produce a beautifully crafted result

In the last 15 years the advancement and evolution of chemical bonding and ceramic technology has proved to be the initial catalyst for the no preparation/minimal preparation revolution.

The basic concepts, which were first used in the 1980s, include hydrofluoric acid etching, silane coupling agent application, and the use of resin cements, all of which have paved the way for the production of extra-thin custom ceramic shells otherwise known as Ultrathin veneers.

Modern ceramic materials have transformed veneer techniques so that they can be made without over bulking teeth. The incredible diversity of pellets available allows the masking of the underlying colour of the tooth structure. These innovative techniques have allowed a far more conservative approach to laminate dentistry.

Treatment planning is critical and it goes without saying that the relationship between clinician and technique is vital to produce a predictable outcome using intraoral mock-ups and diagnostic wax-ups, so that a beautifully crafted and minimally invasive case is produced every time.

Treatment planning

The preparation-less veneer technique is the most conservative option. However, in many cases it is also the most aesthetically challenging. This technique can help to eliminate diastemas and spaces, change contours, widen buccal corridors, create better arch-forms, improve teeth alignment, alter incisal edge lengths, reposition canine tips and sometimes improve guidance and function.

When embarking on such techniques, it is important to understand that the lifespan of extra thin veneers is directly related to the amount of enamel substructure that is supporting it. By better understanding the final form and anatomical function, the dentist can reduce excessive removal of tooth structure, minimise postoperative sensitivity and prevent any clinical compromises. In years gone by, the traditional 'makeover' approach almost encourages a far too aggressive method of tooth preparation. A conservative plan, however, can also involve incorporating multi-disciplinary options to achieve minimum loss of tooth structure to preserve enamel.

Rahul Doshi BDS LDSRCS is the senior clinical director of The Perfect Smile Advanced Training Institute in Hertford and offers hands-on training courses in aesthetic dentistry. He lectures both in the UK and abroad. For more information please visit www.theperfectsmile.co.uk.

Education aims and objectives

To understand how advances in chemical bonding and ceramic technology have impacted no preparation/minimal preparations, in particular the preparation-less veneer technique.

Expected outcomes

To grasp the process of the no preparation and Ultrathin veneer protocol, including the laboratory process and cementation procedure, through the aid of a case study. Subscribers can answer the CPD questions on page 82.

Figure 1: Full face before treatment

A diagnostic wax-up or excellent mock-up of the teeth in the mouth is invaluable as a preparation guide. Reduction putties allow us to move away from the standard system of tooth reduction using depth-cutting burs. These burs do not take account of how much removal of tooth structure is actually needed to produce outstanding results according to the actual design of the smile, especially in areas where additive only techniques are required. Reduction putties, created from the diagnostic wax-ups and/or mock-ups, are a great resource and help overcome the need for excessive tooth removal.

Case study

The 21-year-old patient in general good health presented with a smile that she did not like and after consultation decided against orthodontic treatment due to time considerations. The patient's concerns included the shade, the symmetry, the small diastemas of her upper anterior teeth, the presence of a deciduous tooth, the rotated upper right lateral incisor, the asymmetric gingivae and the discrepancy in tooth proportions. Her bite was stable with no joint problems or excessive wear.

No preparation and Ultrathin veneer protocol

The conservative preparation was carried out without local anaesthesia, using predominantly course polishing burs and discs only.

The procedure undertaken involved the following steps:

- Prophylaxis of teeth
- The labial incisal line angles were smoothed

Figure 2: Pre-operative smile

Figure 3: Pre-operative retracted smile

Figure 4: Ultrathin veneers on the model

Figure 5: Wax up of final restorations

with course Soflex disc (3M)

• The shade of the natural teeth were taken

• Bite registration was taken with Luxabite (DMG)

A facebow record was taken with the Kois Facial Analyser (Optident)

• A 'stick bite' was taken using 'O' Bite (DMG)

• Two master impressions and the opposing arch impression were taken with Honigum (DMG)

• Transitional restorations created after spot etching the labial surface and using Luxaflow (DMG).

Review of the transitional restorations

The patient returned five days later to evaluate the occlusion and the appearance. Modifications were made to the shape and size of the transitional restorations, after listening to the patient's desired changes. The following records were taken:

• The measurements of length of the transitional restorations by a digital calliper

• Photographs of the approved transitionals

• Impressions of the approved transitionals

• The desired shade of the Ultrathin veneer restorations was confirmed

• A facebow record of the transitionals was taken with the Kois Facial Analyser (Optident).

The laboratory process

The following steps were undertaken by the ceramist:

Impressions of the temporaries were studied in detail for the extent of the buccal corridors, the proportions and alignment of teeth, the midline, the incisal plane and the arch form.

All bites were trimmed, models made, dies trimmed under magnification, mounted on an articulator and then die relief applied. All the restorations were pressed in e.max, cut back and than layered.

Each unit was waxed-up using a putty matrix, which was duplicated from the model of the temporaries in situ, so this maintained the exact form of the temporaries for every tooth.

The whole case was than waxed up to full contour. Exact measurements from the temporary model were verified with the waxed up model. This putty was also used to gauge the amount of room for the restorations. This, in conjunction with the preparation shade photograph supplied by the dentist, was useful in choosing the base colour pellet for pressing.

The wax was than cut back to a predetermined line dependent on the amount of translucency or effects required.

The units were sectioned, margins and contact points finished, removed from the dies, sprued, invested and pressed in the required shade as per lab ticket.

When pressed the units were de-vested, carefully cleaned, fit checked before replacing on the master cast to make the final adjustments before the ceramic process began.

Using the layering technique, the case was built, until the contour required is achieved, slightly oversized for firing (minimal shrinkage 6-12%).

It was then fired, refitted to the master cast, adjustments and subsequent firings

Figure 6: Luxatemp transitionals

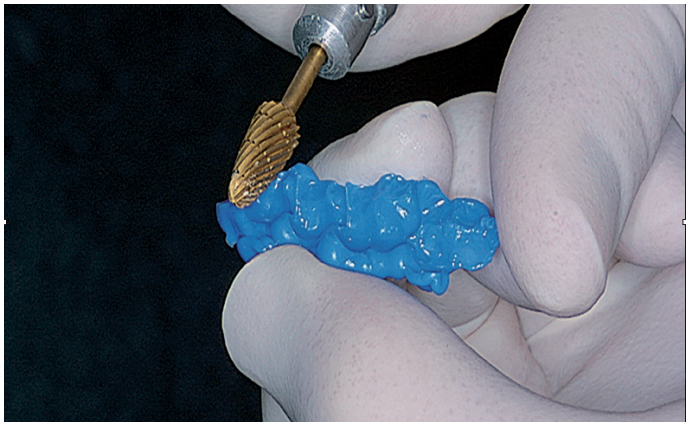

Figure 7: Adjustment of accurate Luxabite occlusal record

Figure 8: Post-operative smile

Figure 9: Post-operative retracted smile

made, shaped, surface texture adjusted and glazed.

Cementation

Due to the nature of the fragile Ultrathin veneers, care needs to be taken until they have been bonded to the teeth, a low-viscosity luting cement such as Vitique (DMG) should be used, and excessive pressure must be avoided when seating the restorations.

Cementation procedure

The restorations were assessed on the model carefully for accuracy of fit and the restorations were inspected for colour, translucency, texture and anatomy. The transitional restorations were removed and all surfaces were inspected for any residual temporary cement.

The tooth surfaces were cleaned with pumice and water, followed by chlorhexadine.

The restorations were tried in the mouth (after dipping them in water to increase the surface energy of the fitting surface for the tooth), one at a time, to check the accuracy of the fit, length, shape and contour. Vitique try-in gel was then used to select the shade of the Vitique luting cement.

All the veneers were then tried in together, with the try-in gel, to evaluate the smile and to ensure that the prescribed appearance has been achieved, as well as the contact points.

The veneers were then passed back to the assistant in readiness to clean and prepare the bonding surface of the veneer. The restorations were treated with:

- Hydrofluoric acid (Ultradent): etched for 10 seconds and then washed and dried really well
- Silane coupling agent (DMG) – one drop each from two separate bottles was mixed; a thin layer applied, one to two minutes later the surface gently blown dry
- A thin layer of bonding resin (eg, Prime and Bond) was placed, and than blown dry gently and covered up or placed in Luxatray (DMG) so the resin did not get activated with ambient light.

A rubber dam was placed to isolate the teeth. The teeth were etched with 38% phosphoric acid (DMG) for 60 seconds, as no preparation or minimal preparation has taken place and bonding is to enamel, and then washed and air dried.

Two layers of Prime and Bond NT (Dentsply) were placed on each tooth, and light cured for 20 seconds with LED light. Here, each layer was applied, dispersed using clean dry air, then a second layer applied and dispersed with air again and then only, light cured.

The Ultrathin veneers were loaded with Vitique (light cure), placed on the each tooth, the excess cement was then removed with Benda Brushes, prior to seating the next veneer.

Once all the veneers were in position, further clean up was carried out with cotton rolls and brushes. A final inspection was carried out of the new smile before setting the cement with light cure.

The veneers were tacked into place, using a 'two-step tack process', with a 4mm turbo tip on the Kerr LED Demetron light, to ensure that the veneers were fully seated on each tooth.

Tack No 1: Each veneer was tacked for five seconds with a 4mm turbo light cure

Figure 10: Final makeover picture with Ultrathin veneers

tip at the mid cervical margin. The veneer was fully seated via incisal pressure with finger and labially across with periodontal. Care was taken that the LED light from 4mm tip didn't reach and inadvertently tack the adjacent veneer.

Tack No 2: A Brasseler saw was placed interproximally, and tacked incisally, between the two teeth for 10 seconds each, to ensure the an easier interproximal clean up. All contacts were flossed gently to clean any unset resin.

A fine sickle scaler/sharp probe/fine rubber-tipped oral hygiene aid was used to remove unset cement resins at margins, labially and palatally. It was ensured that by then 95% of excess cement clean up was complete. The cement was light cured on each veneer for 40 seconds on the buccal, gingival and incisal surface after the veneers were tacked in place. The margins were finished with a fine diamond moquito bur (Komet). The lingual edge was polished with a fine diamond rugby shaped bur (Komet).

Occlusion was checked and adjusted using 100-micron articulating paper (Bausch) in in centric occlusion, lateral excursion and protrusive excursion. Finesse artistic recontouring in the incisal third area was carried out using a coarse Soflex disc (3M). The restorations were polished with a Shofu porcelain polishing kit. A final polish was achieved with a felt wheel and a fine diamond paste (Luminessence).

Case study summary

The nervous patient was extremely pleased with the transformation of her new smile created without using local anaesthesia and without preparing her teeth. Although additive-only technique, such as that described in this article, cannot be used for every case, it is a technique that every cosmetic dentist should present as a treatment option to their patients where applicable.

Conclusion

The combined advancement of superior bonding agents, innovative ceramic materials and well thought-through treatment planning of smile designs between dentist, ceramist and the patient have produced minimally invasive techniques that have superior bonding strengths and ultimate aesthetic results. Here comes the new age of Ultrathin veneers

Acknowledgement

I would like to acknowledge the contribution, dedication and the artistry of Rob Storrar of Amdecc Laboratories in fabricating the veneers to create an exceptional result, and for the supply of the digital photographs of the laboratory process.

Care to comment? @AesDenToday

References

1. Friedman MJ; Oral Health, April 2005. A disturbing transition of the of the bonded porcelain veneer restoration.
2. Barghi N, Overton JD, Johnie D; Contemporary Esthetics, Jan 2007: 48 – 51. Preserving principles of successful porcelain veneers.
3. Swift EJ, Friedman MJ, Journal of Esthetic and Restorative Dentistry. Critical Appraisal: Porcelain Veneer Outcomes Part 1,2.
4. Magne P, Douglas W; Journal of Adhesive Dentistry, Vol1, 1999: 81-92. Additive Contour of Porcelain Veneers: A key element in enamel preservation, adhesion, and esthetics for aging dentition.
5. Smales RJ, Etemadi S; Int. Journal Prosthodontics, Vol17, 2004: 323–326. Long term survival of porcelain laminate veneers using two preparation designs: A retrospective study.
6. Heymann HO; J Am Dent Assoc, Dec 1987, Spec No 14E-23E. The artistry of conservative esthetic dentistry.
7. Calamia JR, NY J Dent, 1983, 53(6): 255-9. Etched porcelain facial veneers: a new treatment modality based on scientific and clinical evidence.
8. Weston JE, J Cosmetic Dent, 2011; 27(3): 50-60. Conservative, simple, efficient: no prep smile design using a single shade, modern direct material.
9. Horowitz JC 2011, 30(10): 114 -118. Lithium Disilicate: masking discoloured teeth.
10. Culp L, McLaren E, Compend Contin Educ Dent 2010, 31(9): 716-5. Lithium Disilicate: the restorative material of multiple options.