

Ceramic veneers in general dental practice.

Part one: Treatment planning

Dr Philip Newsome and Dr Siobhan Owen give us a detailed description of the treatment planning of ceramic veneers and discuss their advantages and disadvantages



Philip Newsome BChD PhD MBA FDS RCS (Ed) MRD RCS (Ed) is currently an Associate Professor at the Faculty of Dentistry of Hong Kong University and he is on the Specialist Prosthodontist Registers of both Hong Kong and the UK. He graduated from Leeds University Dental School in 1976. In 1986 he joined Hong Kong University where he is currently an Associate Professor. He holds the Fellowship in Dental Surgery and Membership in Restorative Dentistry from the Royal College of Surgeons of Edinburgh as well as an MBA, with Distinction, from the University of Warwick Business School and a PhD from The University of Bradford Management Centre. His main area of academic interest is in the factors that lay behind success in dental practice and he has published and lectured widely on this subject. He has written four dental textbooks and he maintains a thriving private practice focusing primarily on aesthetic dentistry and is particularly interested in the current ethical debate over the use of porcelain veneers to 'transform' smiles.

Dr Siobhan Owen graduated from Dundee Dental School in 1990. Since gaining her BDS she has worked in NHS and Private practices in different parts of the country and has a thorough understanding of the requirements of modern dental practice. She is currently practice principle of a very successful six surgery private practice in the SW of England. She is Managing Director of Southern Cross Dental Laboratories UK Ltd and has a particular interest in modern crown and bridge design, especially in relation to the new generation of aesthetic all porcelain restorative systems.

Introduction

Ceramic veneers were introduced in the late 1930s (Pinkus 1938) but only became widely accepted by the dental profession some 50 years later following the introduction of acid etching and porcelain silanisation. Although the literature contains a variety of recommendations with regard to tooth preparation, luting cement and ceramic material (Sadowsky 2006), the technique almost invariably comprises a thin ceramic laminate veneer bonded, ideally, to a predominantly enamel substrate by means of a composite resin luting cement aided by the application of silane to the etched porcelain fitting surface. The main advantages of veneers are as follows:

1) Minimally invasive

2) Aesthetically pleasing

3) Durable

4) The ability to elicit a good tissue response.

The above features mean that, when used appropriately, ceramic veneers can dramatically transform unaesthetic, damaged dentitions in ways once thought impossible. Indeed, their aesthetic and strength characteristics are closer to those of natural tooth structure than almost any other dental restoration. They are not, however, without limitations:

1) They are technique-sensitive and time-consuming to place

2) Some tooth preparation is usually necessary

3) Repair can be difficult

4) More than one appointment is required

5) Their colour cannot easily be modified once



Figure 1: This patient presented requesting veneers so that she could smile like 'Miss America'. Clearly a case exhibiting this degree of malocclusion is beyond the scope of ceramic veneers and the patient was persuaded to have orthodontic therapy to realign her teeth



Figure 2a, b and c: Veneers can be useful in treating anterior spacing. In this particular case, it was felt that direct composite restorations were unsuitable and the four incisor teeth were therefore restored using ceramic veneers. However, even with minimal tooth rotation dentine exposure can be quite marked – as in this case on the upper right lateral incisor – and this may adversely affect the retention of the veneer.

placed

- 6) Satisfactory provisional restorations can be difficult to make and retain
- 7) Prior to cementation they are fragile and difficult to manipulate
- 8) They are more costly than a number of possible alternatives.

Given their advantages and despite their limitations, ceramic veneers have been recommended for use in a wide variety of differing clinical situations:

- 1) For treatment of discoloured teeth that do not respond to tooth-whitening or micro-abrasion procedures
- 2) The closure of interdental spacing and restoration of malformed teeth where crowns are not indicated
- 3) Realignment of in-standing, rotated or protruded teeth
- 4) Discrepancies in the size and shape of teeth that are not correctable by orthodontics alone

The use of veneers to rectify malocclusions (Figure 1) has provoked considerable controversy and a number of authors have expressed grave concerns about what they view as a 'disturbing' even 'objectionable' trend (Friedman 2001, Christensen 2006). There are also concerns about the use of veneers in other clinical situations, for example:

- 1) Heavily restored teeth, worn teeth and any teeth with insufficient enamel available for bonding or teeth too weak to withstand functional forces.
- 2) Where the spaces requiring closure are too wide to be closed just by increasing tooth width alone.
- 3) Where any tooth discolouration is too severe to be masked by a thin porcelain veneer and where thickening of the veneer would require extensive preparation into dentine.
- 4) Non-vital teeth for reasons of tooth weakness and the possibility of subsequent, unfavourable, colour changes.

The treatment planning process

In general terms, an appropriate treatment plan comes about as the natural consequence of following a sequence of carefully considered steps (Newsome 2003). Whenever one is considering a cosmetic treatment option such as veneers, it is especially important to follow this logical sequence of events:

Step 1: Collect and collate information by means of history and examination.

As well as the obvious clinical history and examination and the collection of physical information such as radiographs, photographs and study casts (a duplicate of which is used to create a diagnostic wax-up) it is vital that



Figure 3a and b: Treatment planning must take into account the need to replace any old restorations prior to tooth preparation. Failure to do so will significantly reduced the strength of the adhesive bond retaining the definitive veneers

some insight is gained into the patient's expectations, in other words, the problem as he or she sees it together with an idea of what the patient sees as a satisfactory treatment outcome.

It has been said that treatment cannot be considered truly successful unless the patient

is satisfied. Patients tend to grade the care we provide in terms of pain control (did the dentist hurt me?), aesthetics (am I happy with my new appearance?) and function (can I chew comfortably after treatment? are the restorations durable?). Problems arise in the small number of patients who hold what most peo-

ple might consider unrealistic expectations, most commonly with respect to the aesthetic outcome. Although we would dearly wish to fulfill all our patients' expectations, trying to do so in the patient with unrealistic demands usually courts disaster as common sense and fundamental principles end up being ignored.



Figure 4a and b: This young circus entertainer fractured both central incisors whilst juggling. There is precious little enamel remaining and so dentine-bonded all-ceramic crowns were placed as opposed to veneers, which were to be considered to have a less predictable prognosis

Better to err on the side of caution even to the extent of refusing to treat the patient. With this in mind, great care must be exercised in

using 'off-the-shelf' examples of treated cases to demonstrate to the patient the results of various clinical procedures as they may en-

gender unrealistic expectations; far better, if possible, to show patients examples of your own work.



Figure 5a and b: A combination of non-vital bleaching and direct composite to restore the appearance of the upper right central incisor combined with home whitening of the remaining teeth has produced an acceptable aesthetic outcome without the need to sacrifice healthy tooth tissue.

Step 2: Establish diagnosis

The best treatment plan is the one that represents the most appropriate treatment option given a) the diagnosis of the presenting condition and b) the patient's wishes and expectations. It is a basic principle that a definitive diagnosis must be established before the various treatment options can be fully explored.

Step 3: Consider the various treatment options.

In order to decide which option is the most appropriate one has to establish what it is that we are trying to change and improve and this, of course, is intimately linked to the clinical diagnosis, for example:

Tooth discolouration

Assuming this to be intrinsic then the cause of the discolouration must be established. For example, is it a consequence of ageing, habits, loss of vitality or is congenital in nature, perhaps the result of systemically-administered drugs during tooth formation, most notably tetracycline. Are one or several teeth affected? In many cases, tooth whitening would be the preferred option, while at the other extreme if the teeth are too heavily discoloured and are resistant to bleaching then masking by means of a thin layer of ceramic, even when using an opaque luting cement, may not be possible. Masking such dark discolouration often necessitates tooth reduction into dentine and yet the longevity of a bonded veneer is a direct function of the amount of enamel substrate supporting it (Friedman 1998). In such cases, extra-coronal restorations, for example den-

tine-bonded all-ceramic crowns, are likely to be more successful. They will allow for greater tooth reduction as they depend less on bonding for retention.

Tooth shape

In situations requiring an alteration of tooth morphology, a diagnostic wax-up is especially useful to confirm if veneers are capable of producing an aesthetically pleasing result with teeth in the correction proportions to one another. In some cases, a more conservative option may be applicable, such as directly bonded composite resin or cosmetic contouring.

Tooth position and/or spacing

Where the teeth are malaligned or there is spacing, the decision must be taken as to whether orthodontic treatment is the more preferred option and if so, is the patient willing to undergo such treatment. It is certainly possible to rectify some small rotations using veneers but in most cases orthodontic therapy is more appropriate. In the case of tooth spacing, directly bonded composite can be useful to close small spaces but the greater the spacing the greater the argument in favour of using indirect veneers (Figure 2). Once, however, the spacing becomes too severe then orthodontic therapy followed by prosthodontic tooth replacement is likely to be more effective.

Old restorations

Ceramic veneers are often placed to improve the aesthetics of previously-filled teeth. The larger the restorations the more likely it is, however, that full coverage restorations will be a better choice. Such teeth are likely to be weaker, perhaps as a result of a loss of vitality, and will certainly have less enamel available for bonding.

When the decision is taken to place veneers then the old restorations must be removed and the ensuing veneers placed within the two week period following composite replacement to ensure adequate bond strength (Figure 3). Water sorption, exposed un-silanated surfaces of filler particles and limited opportunities for further polymerisation of the resin component of the set material have all been used to explain the reduced bond strength to existing, long-standing composite restorations (Walls et al 2002).

Trauma

As in the case of old restorations, ceramic veneers can be an excellent means of restoring teeth damaged by trauma but once again consideration must be given to the amount of enamel available for bonding, pulp vitality as

well as the presence of crack lines.

Whenever there is any doubt about the degree or quality of remaining enamel then all-ceramic crowns once again are usually the preferred option (Figure 4).

Step 4: Formulate final treatment plan

From the discussion so far it is clear that veneers are not a 'one fit all' solution and there are a number of alternatives which ought to be considered and the most conservative option preferred before progressing to more invasive procedures (Dietschi 2005). Such conservative options include orthodontic treatment, tooth whitening, micro-abrasion, tooth re-contouring and conservative composite restorations. As has already been alluded to, it may even be that veneers are a less favourable option when compared with full coverage all-ceramic crowns for reasons such as available enamel and degree of tooth wear. It may be that a combination of techniques and therapies may best serve the patient's interests (Figure 5). Other factors must also be considered – the experience and skills of the dentist, the degree of ancillary support and the quality of laboratory support all must be taken into account

before embarking on complex treatment. Finally, there is the question of informed consent. Veneers are often proposed as a more conservative alternative to crowns. While this is undoubtedly true the patient must be informed of the fact that veneers do require some tooth reduction and are therefore usually considered to be irreversible in nature.

Summary

Ceramic veneers are an extremely useful form of cosmetic dental treatment but case selection and careful treatment planning is essential. When such preliminary care and attention is taken and allied with correct tooth preparation and bonding practices then the technique is extremely predictable yielding beautiful, aesthetic and functionally exceptional restorations that can be life-changing.

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