VITAL GUIDE SERIES

2 Aesthetics: The seven deadly sins of aesthetics and how to spot them.

- What are the culprits of a fake smile?
- How do you avoid the seven deadly sins of aesthetic dentistry?
- Are there cases when aesthetic dentistry can do more harm than good?

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VITAL GUIDE TO Aesthetic dentistry

Welcome to the second article in the Vital Guide Series. At the end of the article are some CPD questions, which are designed to get you thinking about the article and to help you remember some of the key points. Here, **Irfan Ahmad**[1] points out the seven deadly sins of aesthetic dentistry and how to spot them.

Introduction

Being in the dental profession, we have a voyeuristic tendency to look at other people's teeth. For example, in socially interactive situations while chatting at the bus stop, gym, restaurant or wine bar, and non-interactive circumstances while walking down the street or watching television. On many occasions, aesthetic dental problems are obvious, such as stained or grossly misaligned teeth. However, how many times have you thought that something isn't quite right, but you just can't quite put your finger on it? These less obvious anomalies, especially when maxillary anterior teeth have been restored, make you think that something is wrong. Aesthetic dental restorations (crowns, veneers or bridges), if correctly fabricated, should not stick out like a 'sore thumb' but integrate with surrounding teeth, or mimic a natural dentition (Fig 1). The following seven deadly sins of aesthetic dentistry are culprits of a fake smile, and should be avoided if inconspicuous and natural looking restorations are desired.

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First sin – Cervical black lines

During a relaxed smile, individuals with a high lip line reveal the cervical margins of their maxillary teeth, and if present, 'black lines' around artificial prostheses become blatantly visible (Fig 2).

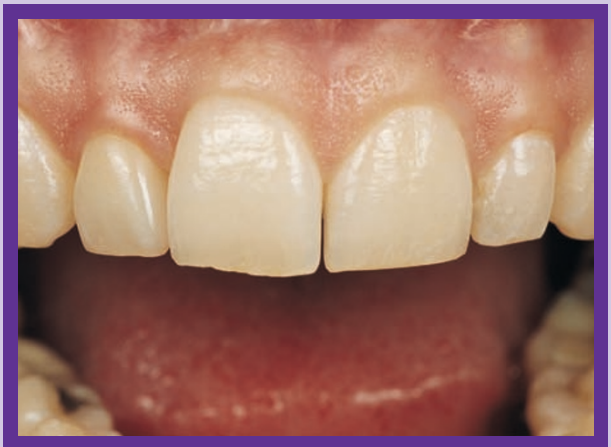


Fig 1 Aesthetic dental restorations should be undetectable compared with surrounding natural teeth. The porcelain laminate veneer on the right maxillary lateral incisor is virtually indistinguishable from its left contralateral incisor, and harmoniously blends with adjacent natural dentition.

Cut along the dotted line and keep!

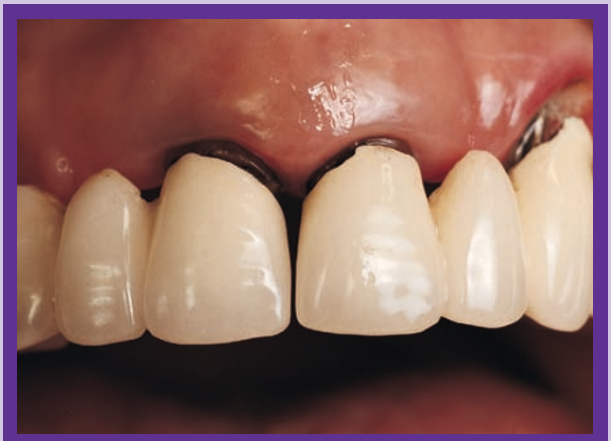


Fig 2 Cervical black lines, and interproximal black triangles, around defective metal-ceramic prostheses due to visibility of metal substructure and gingival recession.

These unsightly black lines around the cervical margins of restorations are attributed to numerous causes, including defective margins, exposure of the metallic substructure of metal-ceramic crowns, shine through of underlying tooth discolouration via thin gingival margins, gingival recession and shadowing by a pontic overlapping a deficient alveolar ridge. Elimination depends on the cause of the black lines.

If the cause is visibility of a metallic substructure, the latter can be concealed either by placing the crown margins subgingivally, or if occlusion permits, using an all-ceramic restoration with superior light transmission properties. Recession, on the other hand, is much more difficult to resolve. Often, when crowns are cemented the cervical margins appear to be subgingival. However, if the biologic width was violated during crown preparation or other clinical procedures during the provision of the crown (gingival retraction, iatrogenic insult by rotary instrumentation, impression making or traumatic luting techniques), upon healing the resultant apical location of the free gingival margin reveals the restoration/tooth interface. This post-operative recession is detrimental to aesthetic appraisal by creating cervical black lines. Differential diagnosis of gingival recession also requires consideration, e.g. passive and altered passive eruption, which leads to similar aesthetic problems, but necessitates a different approach for resolution.

A particularly difficult scenario is recession around a discoloured non-vital or root filled tooth. In these cases, the options are internal bleaching, cementing with a highly opaque luting agent or choosing a definitive restoration capable of obscuring the intrinsic discolouration. The optical and masking properties of porcelains vary enormously, and if translucent ceramics are chosen, the underlying tooth discolouration may not be masked. The ideal is using either a metal-ceramic unit, or an all-ceramic restoration incorporating an optically dense core such as alumina or zirconia.

Lastly, shadowing by a pontic due to resorbed bone necessitates ridge augmentation by guided bone regeneration and/or soft tissue grafts. These surgical options are protracted but should be offered, even though the patient may reject them and opt for an aesthetic compromise of the definitive prosthesis.

Second sin – Colour mismatch

An artificial crown, which fails to blend with adjacent or antagonist teeth can be detected with relative ease (Fig 3). Colour is a complex subject, which is often perplexing for both the clinician and ceramicist. A good starting point is matching shades using illumination with the correct colour temperature (e.g. Trueshade, Optident). Since colour is highly subjective, it is worthwhile involving both the patient and ceramicist during the shade taking process, thereby avoiding disappointment at the delivery stage of the restoration.

Another factor contributing to shade mismatch is characterisations. Even though the basic colour of the crown may be satisfactory, if nuances such as incisal translucency or surface texture and lustre are incorrect, the effect is similar to a total colour mismatch, resulting in a conspicuous restoration compared to the surrounding natural teeth.

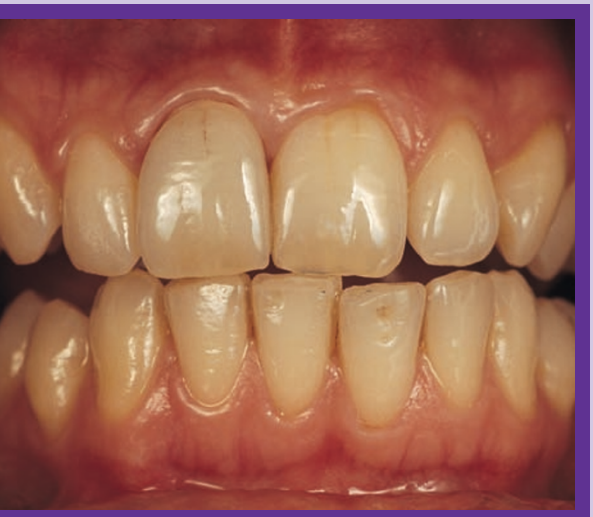


Fig 3 The crown on the right maxillary central incisor is of a lower value and fails to integrate with surrounding natural teeth.

Third sin – Incorrect tooth proportions

Maxillary anterior teeth have distinct proportions, which convey aesthetic appraisal. In addition, the relationship between the incisors and canines is also important for ensuring harmony and balance. The method employed to determine the correct tooth size is measuring the mesio-distal width and dividing by the inciso-gingival length. This width/length (w/l) ratio of the incisors and canines ranges from 0.6 to 0.8, averaging at 0.75. Translated into actual dimensions, a 0.75 w/l ratio creates a central incisor which is 12 mm long and 9 mm wide (9/12 = 0.75). For example, the colloquially used phase 'long in the tooth' is often used to describe an aged person. This is associated with periodontal disease with subsequent gingival recession creating the appearance of unusually long teeth. Conversely, excessive incisal tooth wear has the opposite effect of creating short, fat teeth, which are equally unappealing (Fig 4).

Another important factor is the amount of tooth display at 'rest' and during a relaxed smile. The term 'rest' loosely describes a state of lip tranquillity and distinguishes this position from a relaxed smile. During the rest position, the degree of tooth display is assessed by the LARS factor (**L**ip length, **A**ge, **R**ace

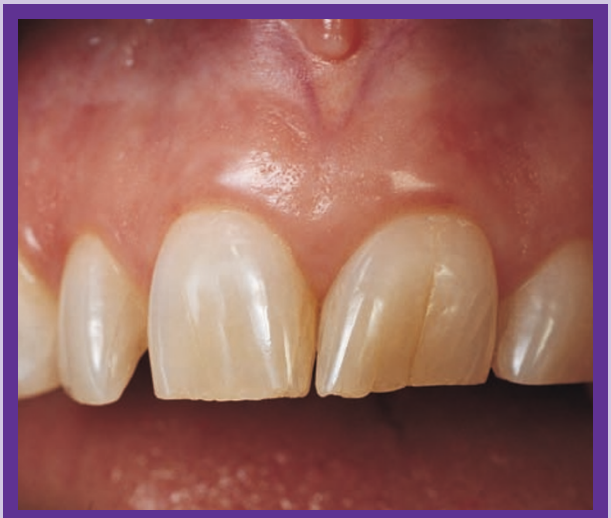


Fig 4 Tooth wear on left maxillary incisors resulting in incorrect tooth proportions.

and **S**ex). As a generality, females show more maxillary teeth than men. Furthermore, youthfulness is associated with grater maxillary, rather than mandibular tooth display. Therefore, if youthfulness or femininity is desired, greater maxillary incisor display is indicated.

The degree of tooth display during a relaxed smile is correlated to gingival exposure and the relationship of the teeth to the lips, which are discussed below.

Fourth sin – Bulbousity

Bulbousity can be isolated to a single tooth or encompass numerous teeth. A 'goofy' appearance is attributed to extreme bulbousity, with protrusive and prominent teeth. Factors contributing to this anomaly include facial or buccal inclination of a single or multiple unit(s) e.g. Angle's Class II occlusion, or incorrect angulation of artificial units. One of the most frequent causes of bulbous crowns is insufficient tooth reduction, leaving the ceramist insufficient space for the prosthetic materials (substructure and/or veneering porcelain), with resulting over-contouring. In other instances, a smile may appear full or 'toothy'. The latter is excessive bulbousity of many teeth, closing the lateral negative spaces (buccal corridors), and creating a smile dominated by excessive tooth display (Fig 5).

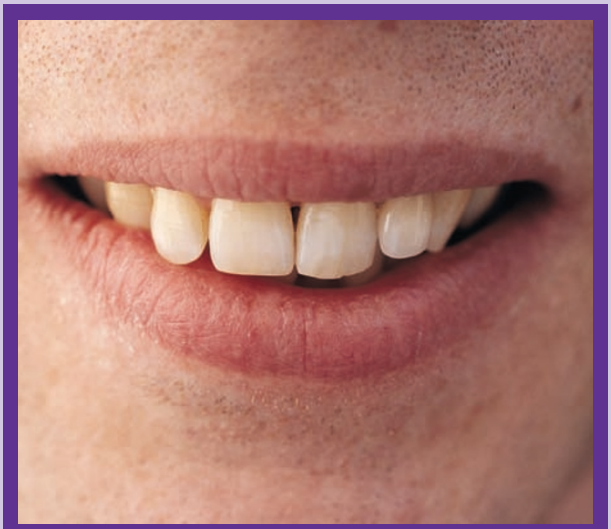


Fig 5 Maintaining bilateral negative spaces is essential for pleasing aesthetics (as shown in image), and preventing excessive tooth display or a 'toothy' smile.

Fifth sin – Monotony

The two constituents of monotony in dental aesthetics are tooth-to-tooth relationship, and tooth colour. An ideal tooth-to-tooth relationship incorporates incisal embrasures with increasing angles traversing anterior-posteriorly. If incisal embrasures are flat, due to tooth wear or incorrect shape/form of dental prostheses, the effect is uniformity and monotony (Fig 6). In addition, the maxillary central incisors should dominate the dental composition, and be wider and longer than the adjacent laterals.

Another point of contention when fabricating veneers or crowns is conformity to the Golden proportion, a frequently used excuse to justify 'extreme dental makeovers'. Firstly, only 17% of the population have natural teeth conforming to the Golden proportion. Secondly, humans are not clones, but individuals with unique facial and dental features. Thirdly, tooth preparation involving destruction of virgin enamel and dentine solely for fabricating prostheses that conform to the Golden proportion is at best spurious, and at worst unethical. Instant gratification cannot justify possible long-term spiralling dismay such as post-operative sensitivity, dislodgement of restorations, endodondtic complications, extractions and implant placement. The adage 'short term gain, long term pain' should be borne in mind before embarking on this type of elective therapy.

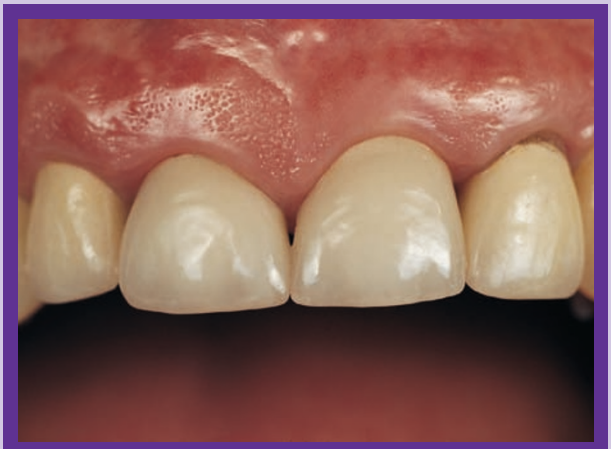


Fig 6 Lack of incisal embrasures and dominance of the maxillary centrals of these crowns creates monotony.

Similar to distinct form, teeth also exhibit distinct colour. Each tooth in a given arch has a unique shade, and it is rare for all teeth to be of an identical colour. Moving from the maxillary incisors to canines, the shade changes, e.g. on a Vita Classic shade guide, the centrals may be an A2, the laterals A3 and the canines A3.5. Furthermore, each tooth has specific characterisations such as deep chroma cervical regions, incisal and interproximal translucent areas, as well as mamelons, cracks and distinctive surface roughness.

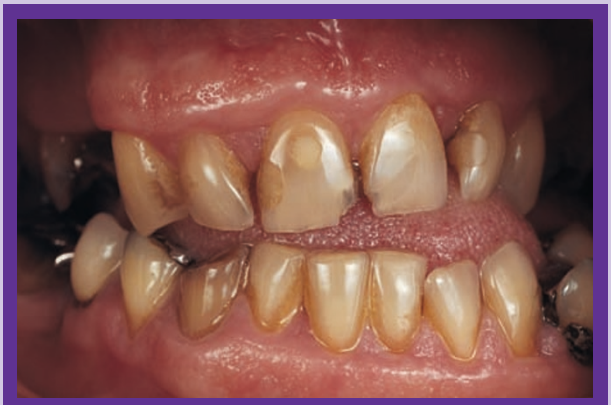


Fig 7 Slanted maxillary incisal plane.

Therefore, fabricating teeth that are monochromatic and characterless conveys artificiality, rarely observed in the natural dentition, and is contradicted for truly aesthetic restorations. Uniformity of shade monotony is also incorporated with 'extreme dental makeovers' resulting in a 'Barbie doll' unnatural façade. While this type of cover-up may be satisfactory for ephemeral cosmetic make-up, an irreversible dental makeover cannot be wiped away the following day with a cleansing cloth!

Sixth sin – Slanted smile

Psychologically, a concave shape signifies welcome and receptiveness, while a convex form may signify aggressiveness and belligerence. For example, holding out your hand for a handshake is a welcoming gesture with the hand forming a concave shape, but a fist with a convex shape implies confrontation and wrath. Similarly, a smile should be concave, with the incisal or occlusal plane of the maxillary teeth parallel to the concave curvature of the lower lip. This incisal inclination may be absent due to unilateral or isolated tooth wear, erratic eruption patterns, periodontal disease, tooth malpositions, slanted maxilla or incorrect occlusal plane of anterior restorations (Fig 7). The methods to ensure correct angulations of the incisal plane are using a face bow, bite-stick registration and photographs. Two key points to note are that the incisal plane should coincide with the interpupillary line, and the curvature of the lower lip during a relaxed smile.

Seventh sin – Gingival abnormalities

Generally, a low upper lip line conceals a multitude of sins, while a high lip line exposes them. In many instances, all the above sins may be absent, black cervical lines, colour mismatch, incorrect tooth proportions, bulbousity, monotony and slanted smile, but something is still missing. If this is the case, the cause is probably gingival abnormalities or lack of 'pink aesthetics'.

Pink aesthetics encompasses a myriad of soft tissue ideals. When attending a lecture on dental aesthetics, an easy way to pick out an artificial restoration is to move your eyes apically and view the soft tissues. An obvious give away is inflammation of the free gingival margins (FGM) – Fig 8, or open gingival embrasures creating 'black triangles' around artificial restorations. The reasons for the latter could be defective crown margins, violation of the biologic width, incorrect emergence profile or simply poor oral hygiene. Whatever the reason, a swollen FGM is not only detrimental to pink aesthetics, but also negatively impacts on the longevity of a restoration. Another less palpable aberration is the peaks or zeniths of the FGM around the incisors and canines, classified as the gingival aesthetic line or GAL. There are four classes of GAL, e.g. in GAL Class I the zeniths of the FGM of the maxillary central incisor and canine lie on the same tangent, while the lateral incisor is 1 to 2 mm below this imaginary line.

Finally, a 'gummy' smile is associated with excessive gingival tissue display apical to the cervical margins of the maxillary teeth. Up to 3 mm of gingival exposure apical to the FGM is acceptable. However, beyond this arbitrary limit, aesthetics are severely compromised. Correction of excessive gingival display is cause related, and methods include surgical crown lengthening, orthodontic intrusion or osseous resection.

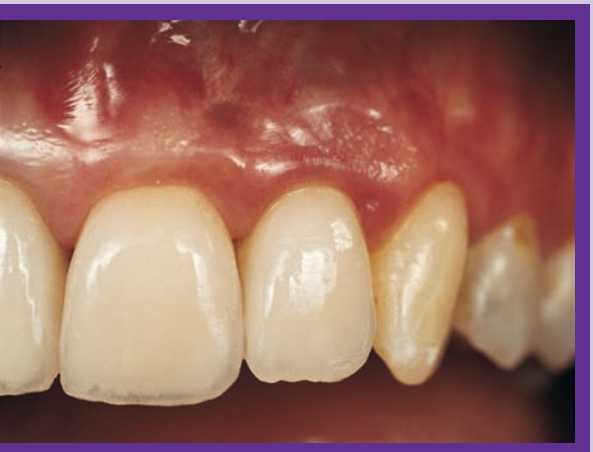


Fig 8 Inflammation of the free gingival margin (FGM) around the all-ceramic crown on the left lateral incisor detracts from 'pink aesthetics'.

Conclusion

Without doubt, dental aesthetic treatment has the capability of enhancing an individual's appearance and persona. However, accurate treatment planning is crucial for ensuring that therapy achieves health, function and finally aesthetics. Creating aesthetic restorations but omitting, or ignoring health and function, is a recipe for disaster, and one that mitigates durability and long-term success. Furthermore, if aesthetic treatment is deemed necessary, it is essential that the above seven deadly sins are avoided for achieving truly aesthetic and endearing outcomes. If present, any of these sins compromises dental aesthetics, which defeats the initial purpose of improving appearance and self-confidence.

Further reading

1. *Ahmad I. A Clinical Guide to Anterior Dental Aesthetics. London; BDJ Books, 2005.*
2. *Ahmad I. Protocols for Predictable Aesthetic Dental Restorations. Blackwell Munksgaard, 2006*
3. *Ahmad I. Digital and Conventional Dental Photography: A Practical Clinical Manual. Quintessence Publishing Co., 2004*
4. *Chu SJ. Fundamentals of Color: Shade Matching and Communication in Esthetic Dentistry. Quintessence Publishing Co., 2004*
5. *Romano R. Art of the Smile. Quintessence Publishing Co., 2005*

CPD Answers

Our first set of questions was a huge success with many of you sending in your responses. Here are the answers to last issue's CPD questions on endodontics.

1. Which of the following would not be a reason for carrying out a root filling?
   - **A** Reversible pulpitis
   - **B** Irreversible pulpitis
   - **C** Periapical periodontitis
   - **D** Periapical abscess

   Answer A

2. Although all the following are important reasons for using rubber dam, which is the most important?
   - **A** To stop the patient swallowing instruments
   - **B** To make treatment easier and more comfortable
   - **C** To stop saliva and other infections entering the root canal
   - **D** To stop the patient talking and having to rinse out

   Answer C

3. What prognosis for successful treatment after 5 years would you give to a patient having a root treatment for a case of irreversible pulpitis?
   - **A** Over 90%
   - **B** Between 80% and 90%
   - **C** Between 70% and 80%
   - **D** Less than 70%

   Answer A

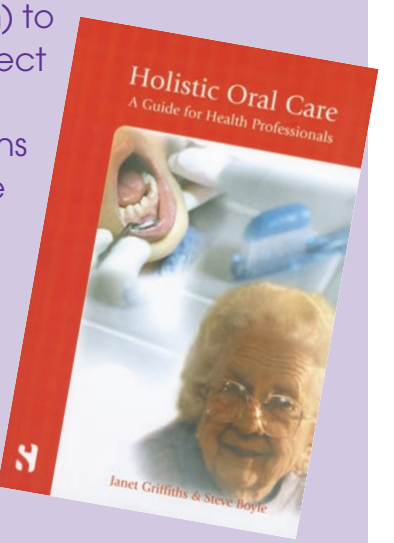
4. Although all the following are important in the obturation phase of the root treatment, which has been shown to be the most important?
   - **A** A good apical seal
   - **B** Three dimensional filling of the root canal system
   - **C** A filling that is within 1mm of the radiographic apex of the tooth
   - **D** A good coronal seal.

   Answer D

Congratulations to the first five correct entries to be drawn from our Spring issue. They were: Mrs Sharon Millar from the Isle of Man, Miss Kirstie Allen from St Albans, Miss Lauren Davies from Swansea, Mrs Jo-Anne Bowes from Exmouth and Miss Samantha Smith from Suffolk. They all win a copy of the book *'Communication and the dental team'*.

CPD Questions

In future, *Vital* will be offering verifiable CPD when it becomes mandatory for DCPs in 2008. In the meantime we have provided some CPD style questions for our new 'Vital Guide to…' series to encourage you to anticipate future CPD requirements. By way of extra encouragement we are pleased to offer a copy of the book *Holistic Oral Care* kindly provided by Stephen Hancocks Limited (**www.shancocksltd.com**) to the senders of the first three correct entries to be drawn on 1 August 2006. The answers to the questions will be published in the next issue of *Vital*.



After reading the article have a go at the following questions and send in your completed form to us. In the context of this article, only one of the answers to each of the following questions is correct.

1. Which of the following protocols is a method for avoiding cervical black lines?

- **A** Subgingival margin placement
- **B** Reinforcing oral hygiene procedures
- **C** Providing metal-ceramic restorations
- **D** Making maxillary teeth longer

2. Youthful teeth are characterised by…?

- **A** Greater mandibular incisor display
- **B** Longer maxillary lip
- **C** Greater maxillary incisor display
- **D** Shorter mandibular lip

3. Which of the following contributes to an artificial smile?

- **A** Bulbous teeth
- **B** Teeth with identical colour
- **C** Flat incisal embrasures
- **D** All of the above

4. Which of the following is a culprit of a 'gummy' smile?

- **A** Maxillary gingival display less than 3 mm
- **B** Maxillary gingival display greater than 3 mm
- **C** A low maxillary lip line
- **D** Inflamed free gingival margins (FGM)

CPD Answer form

Please **PRINT** your details below:

Title

First Name

Last Name

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Your Work

What is the name of your practice/ CDS/hospital?

What is your job title?

Please **TICK** (✔) the answer to each question

	A	B	C	D
Q.1	☐	☐	☐	☐
Q.2	☐	☐	☐	☐
Q.3	☐	☐	☐	☐
Q.4	☐	☐	☐	☐

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