Aesthetic possibilities in removable prosthodontics. Part 1: the aesthetic spectrum from perfect to personal

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In brief

The predicament of the denture patient, emotional and practical.

The importance of good inter-personal relations between the patient and the dental team, with the patient as team leader.

Why should we make dentures look like natural teeth?

Patients requiring dentures are getting older and as a result can be difficult to treat owing to various co-morbidities. This series of papers presents an overview of the processes involved in making removable dentures which the patient considers to be functionally and aesthetically successful. We hope not only to provide technical suggestions but also to address the issue of the clinician's, technician's and dental nurse's relationships with the dentally depleted patient. It is increasingly clear from defence organisation reports that this has a decisive effect on the success of this fundamentally difficult enterprise ('The only branch of dentistry in which you are trying to attach something to nothing' [Hubert Aïche]). It seems best to conduct the planning and the treatment itself as a co-production – the patient assuming responsibility for choosing between the treatment options offered and playing the leading role in making aesthetic decisions. Distinctions are drawn between the idealised whiter-than-white, 'nobody-in-particular', attention-seeking denture at one extreme, and the highly personalised, discreet and naturalistic denture at the other. Reproducing nature in this way is time consuming and therefore expensive, but many 'denture sufferers' see it as good value. Methods for creating the latter, which through its very normality switches off the social observer's attention, are explained in detail in papers two and three of this series. These papers are designed to help clinicians and technicians involved in providing removable prosthodontics improve the appearance of their dentures and increase their patients' aesthetic satisfaction. They are not scientific articles in the Popperian sense of advancing theories which are capable of being falsified. Instead, they are an amalgamation of 72 years of combined experience in providing removable dental prostheses. We have found this branch of dentistry immensely interesting and have on many occasions had the satisfaction of seeing our patients' lives changed for the better.

Introduction

'Of course, dentures are essentially social appliances,' Per-Olof Glantz.[1]

The predicament of the denture patient

When approaching the subject of dental prostheses for patients for whom fixed restorations are not a practical or even a best first option, the authors believe that it is important to consider the life circumstances of people who have lost many or all of their natural teeth. This is not only because of conventional nostrums advocating holistic dentistry – 'treat the whole patient, not just the mouth' – but also because the day to day experiences of people who wear complete dentures (or nearly complete partial dentures) are radically different from those of our dentate patients. Although dentate patients may be concerned about the appearance of their natural teeth, some feeling that their teeth are too irregular, too dark, too worn down, have unwanted diastemas, etc, at least they still have their own teeth. In contrast, those obliged to wear dentures have often been subjected to more anxiety-producing, life-restricting and potentially humiliating experiences than dentate patients.

People deprived of all or most of their natural teeth, because of dentistry or the lack of it, often feel guilty.[2] They feel that they have lost one of life's battles and it was 'their own fault' (which is often not the case). To add to this symbolic loss and feeling of failure, denture wearers may live in constant fear of a variety of practical scenarios: that their denture could be seen to move in their mouth while speaking or eating, or worse still get knocked out of it by a collision in a public place; that it may fracture; that it may get mislaid while they are in hospital (especially when asked to remove it for an operation requiring a general anaesthetic), or lost while on holiday, swimming, etc. They often feel self-conscious if their speech is degraded by it, or they think it looks artificial. Many denture wearers also suffer chronic discomfort, loss of biting and chewing power, leading to restricted choices of food and the need to turn down invitations to restaurants and especially to meals at other people's homes, where they cannot choose 'safe' food.[3] These denture wearers can be called 'denture sufferers' to distinguish them from the many who manage to cope. Many complete denture sufferers feel inhibited with their sexual partners, their mouth becoming effectively a 'no go area'. Such common privations may be additional to any aesthetic shortcomings which they feel their artificial teeth and gums display.

The reason for our mentioning these other problems here is that dentists who do not regularly treat partly or totally edentulous people may be unaware of the abject depths to which denture sufferers can sink or, correspondingly, the jubilant heights to which they can be raised again by being provided with teeth which are comfortable, stable, permit satisfactory speech and mastication,

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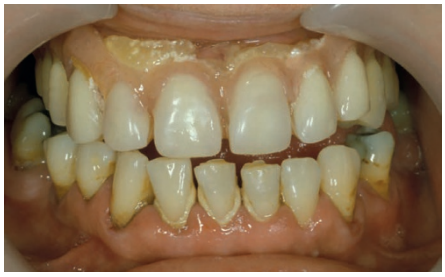

Fig. 1 Dentally phobic policewoman finally seeking dental help after years of avoidance

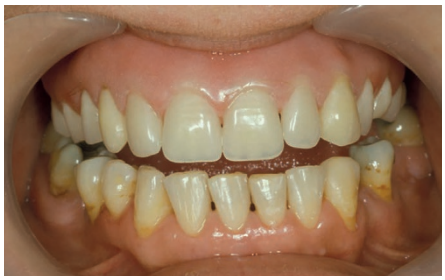

Fig. 2 The same policewoman, less phobic, after scaling, oral hygiene instruction, closing the gaps between the lower front teeth with composite additions and a new upper complete denture. No local anaesthetics were needed. On completion of treatment she said, *'God, don't take me now!'*

provide proper lip support and look attractive to the wearers and their circle of family and friends. Helping denture sufferers regain their lost or diminished social confidence, their self-esteem, natural beauty, and overall morale provides some of the greatest, most positive work experiences open to the clinical and technical members of the dental team (Figs 1 and 2).

Producing complete dentures with excellent aesthetics and function is challenging and requires much attention to detail. It seems obvious that dentures which are technically good – having good retention, support and stability – are necessary for successful treatment outcomes in removable prosthodontics. However, this is not fully supported by the dental literature, which reports that 'objective' denture quality is not significantly correlated with denture satisfaction.[4] There is, however, good evidence to show that having a good inter-personal relationship between the clinician and the patient is critical for the successful outcome of removable denture treatment.[5] Such relationships require mutual trust between the patient and the other members of the dental team. This in turn has the best chance of being developed if the clinician at the outset gives each patient time and space to fully explain the dental problems encountered and the hopes and aspirations currently entertained. In our experience, a numbered 'shopping list' of problems and wishes, agreed with the patient, is the simplest and best format for this.

It is not within the scope of these articles to provide a technical description of the processes of producing complete dentures, since there are many excellent guides and textbooks, which describe their production in detail.[6,7] The purpose of these papers is to highlight current state of the art and best practice in connection with the appearance of removable dentures, and it is important to emphasise that the aesthetic principles described in this paper apply equally well to fixed dental implant restorations.

The advantages of patients being actively involved in the creation of new complete dentures

One of the burdens with which clinicians unnecessarily saddle themselves is assuming responsibility for all or most of the clinical decisions in any particular case. Possibly, this attitude arises because of the authoritarian stance assumed by some clinical teachers during the years of training. However, it is both more effective and more trust-building to conduct treatment planning as a co-production between patient, clinician(s) and, in more complex cases, technical staff.[8] Once that co-operative relationship has been established at the planning stage, it is easy to expand it to involve the patient in giving opinions about many other aspects of treatment, from the extension of impression trays to the retention of trial bases and even the feel of different occluding dimensions with record rims and set-ups. All such opinions may be helpful to the clinician in refining treatment and moving it closer to maximum patient satisfaction. Key among these opinions, in the case of denture construction, are those affecting the patient's appearance and speech.

Responsibility for dental appearance

Who is responsible for deciding when the appearance of complete dentures is satisfactory (or better)? The old fashioned classic training of clinicians and technicians alike was that clinical decisions were the prime responsibility of the clinician, who was supposed to know what is best for the patient. This traditional view was reflected in the behaviour of many clinical teachers, who saw it as their role to tell patients what they needed and students what to do (Fig. 3).[9] Understandably these attitudes and behaviours tended to be absorbed by less empathetic students, replicated and passed on from one generation of teachers to the next.

However, when it comes to the appearance of dentures, the final arbiter in each case must be the sighted patient, preferably supported at a full try-in stage by friends or family members if the patient agrees. This is, after all, the social arena in which the dentures will operate. There is no reason to suppose that the clinical or technical staff will be any better than the patient at choosing the moulds of the denture teeth or deciding their exact positions, alignments and characterisations. Once the teeth have been placed approximately in the right locations and order, most patients – properly invited, instructed and assisted – will have detailed opinions about the appearance of their lips and face as well as the look of the artificial teeth and gums. The opinions of other members of the dental team will always be of secondary importance to those of the patient, who will be wearing the teeth, and the patient's family and friends, who will be likely to see them most.

Many long-term denture wearers have never been given the opportunity to play an active role in controlling the appearance of their dentures. Real or assumed time/cost constraints have operated to provide them with only a cursory view of set-ups already completed at some remote laboratory by a technician who has never met them, nor been provided with much in the way of dental evidence, nor in many cases even guidance as to tooth mould and tooth position.[10] Such patients will need to be convinced: first that they are seriously invited to participate in the visual design of the new dentures, and second to be as particular about it as they wish. They are afraid of 'being a nuisance' and end up with less than they had hoped for.

Fig. 3 Consultation' by Nick Wadley, from Man + Doctor.[9] Reproduced with permission from Jasia Reichardt, widow of Nick Wadley

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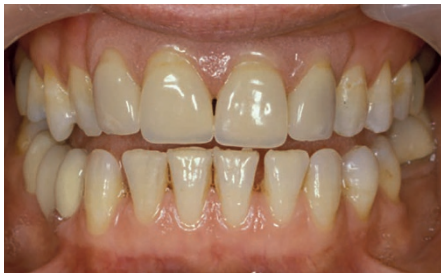

Fig. 4 The patient supervised the exact contours of her gingival margins for this rotational pathway partial denture replacing the upper incisors

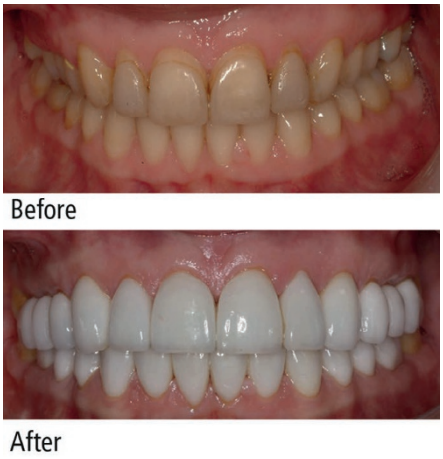

Fig. 5 Natural dentition before and after application of unrealistically white (and destructive) veneers (Courtesy of Tannlege Erik Svendsrud, Oslo)

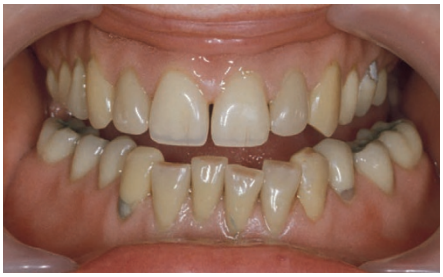

Fig. 6 Complete dentures fully characterised

Some patients will try to decline this offer of control and the responsibility that goes with it, saying: 'You're the expert, you know best, you decide.' In the authors' opinion it is extremely unwise to accept this shift of responsibility, for the reasons given above. If the patient or a member of her family later decides he/she doesn't like the appearance of the finished dentures, it will then be seen as the clinician's fault. This may give rise to disagreement, conflict, even litigation. At the very least it will sour the working relationship, cause disappointment, loss of job satisfaction, and bring stress rather than joy to the practice.

There are and always will be patients who are more aesthetically discriminating than the clinician. Indeed it may come as a surprise to discover, during the trial denture stage, or hopefully before, that some patients notice details not spotted by any member of the 'home team'. One of our patients picked up on an infinitesimal (0.02 mm) difference between the width of a left and right upper lateral incisor. These were from a set manufactured in the era before today's exact computer-controlled mirror-image milling, a time when denture tooth moulds were hand-finished. Another of our patients requested two one-hour appointments in order to supervise the exact contours of some upper anterior gumwork on a rotational pathway partial denture (Fig. 4). She was fully aware of the extra cost to her of this attention to detail and considered it worthwhile in getting exactly what she wanted.

It is sound practice not to process and finish a denture until the patient, unpressured and given sufficient time, has expressed total satisfaction with its appearance. '*Is there any detail, however small, in which you think the appearance might be improved? I want you to be fussy. Take your time.*' It may sometimes be a good idea for the very discriminating or the indecisive patient, to be sent away with the waxed-up try-in (on a non-warping base), safely packed in a box, for leisurely consideration at home. Note: apart from the warning about 'no hot drinks and no eating', it is only kind to add that it doesn't matter at all if some of the teeth break off the wax, so long as the patient doesn't lose them.

The 'aesthetic' dental landscape – perfection versus character

The words 'aesthetic' and 'aesthetics', as commonly used within the dental profession, mean different things to different people. At one extreme is the notion of a visual ideal, rarely found in nature but obtainable, often at some expense with natural teeth, by artificial means. These include imposing certain historic but irrelevant geometric proportions on the visible front teeth and rendering them free from all imperfections of colour and shape, using veneers and gingivoplasty. One effect of this visual idealism is to make all compliant dentitions – and thus every adherent's smile – look approximately the same and usually unreal (Fig. 5). It seems at first paradoxical that people who would be dismayed to find someone else at a party wearing the same dress as themselves, would yet be prepared to spend large amounts of cash to have their teeth altered to look exactly the same as other people's. But perhaps teeth come under the heading of 'bodily perfection' and the dress under the heading of 'adornment'.

At the other extreme, and much less common, is an aesthetic vision which embraces as many visual imperfections as can be crammed into a dental array, in the possibly exaggerated celebration of natural variation plus wear and tear (Fig. 6). Those who aim for this extreme, patient or professional, may be regarded by some as dental eccentrics, but their underlying ambition is to make their artificial teeth and gums look conclusively real by staying as far away from the idealised stereotype dentition as possible. Some such denture wearers have derived satisfaction from being asked by close acquaintances why they don't 'have those ugly teeth out and nice new dentures fitted'.

Aesthetic objectives between those two extremes are more common. Divergence still exists, however, between people who wish to have dental appearances more 'perfect' than nature had provided them with – for example, via dental veneereology and the Hollywood smile – and those who wish to retain or recreate the appearance of natural teeth.[11] For simplicity we shall call the first group 'idealists' and the second group 'realists'. The 'realists' will have resisted daily bombardment with unnatural appearances achieved by Photoshop editing in fashion magazines and whiter-than-white celebrity smiles on television. The less sophisticated 'idealists' may have succumbed to them. And they will be encouraged in this direction by dentists who subscribe to the perfectionist view, either for aesthetic reasons or for profit.

The authors believe that there is a higher proportion of realists among denture wearers than among dentate patients seeking aesthetic improvement. Partly, this is because people satisfied with the natural appearance of their own teeth don't seek treatment to have it changed, whereas the replacement of visibly missing teeth is for most people a social emergency. But once that is achieved, the matter of how real the prosthetic teeth look, while still remaining attractive, becomes of concern for all but the least discriminating patients who include many that have never been offered anything better. Partial denture wearers will be sensitive about any obvious mismatches between their natural teeth and the artificial ones used to fill the gaps. Some complete denture wearers become hypercritical of their own and other people's teeth and in effect

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Fig. 7 Complete denture set up of generalised teeth arrangement (British Standard Denture) with no reference to the patient's natural dentition

Fig. 8 The patient pictured in Fig. 7, with her natural dentition

Fig. 9 The patient with maxillary complete denture mimicking the natural dentition shown in Fig. 8

become 'dental obsessives'. When they walk into a room full of new people, it is their mouths not their eyes that they first focus on. And a smaller but increasing proportion of denture wearers hate the monochrome pink and unnatural contours of their conventional artificial gums. Our patients' aesthetic expectations seem to be rising. It is here that we hit a snag.

The cost of attention to detail

A characteristic of nature is variation. Different people have different looking natural teeth in different arrangements. Forensic odontology depends on it. But natural variation is difficult to simulate convincingly with prosthodontic materials. It requires concentrated observation, attention to detail, even to minute detail, and lots of time. Not everyone working in the prosthodontic field, clinician or technician, has either the skill or the patience to achieve this, and not every patient can afford it. In the absence of any remaining natural teeth, it is much easier to provide stereotypical denture tooth arrangements with teeth of a standard shade and unvarying mould, working from a preconceived image already stored in the head, than to work from a photograph of a patient's actual dentition and try to match that. What most complete denture wearers get instead – and some are told these are the best available – are the standard 'nobody in particular' set-ups of generalised teeth (sometimes called the BSD or British Standard Denture, though it is by no means limited to these islands) (Fig. 7). Monochrome flat pink gumwork is usually also a feature of these dentures, as required by their speed of construction.

Fortunately, these 'nobody in particular', rapidly made, low cost complete dentures are accepted by millions of wearers, including those who could not afford the cost of convincingly natural-looking dentures. But among people with low disposable incomes there are many who are aesthetically sensitive and can only be satisfied with a natural dental appearance. It is surprising how many of these people, knowing what they want from previous aesthetic failures and reasonably confident that with a particular clinician they will get it, somehow find the funds for the extra attention to detail. We hope also to present some simple, inexpensive methods to make dentures look more real.

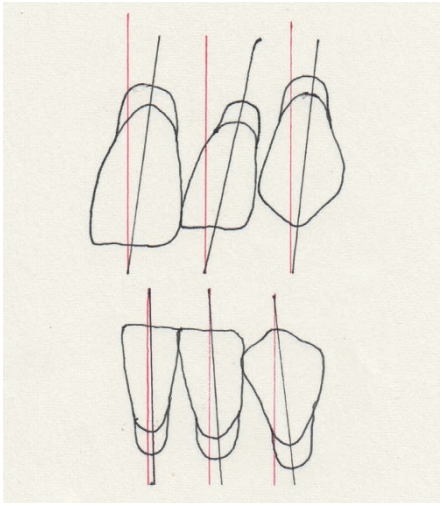

Fig. 10 Schematic drawing typical in textbooks, showing 'ideal' mesio-distal alignments of anterior denture teeth relative to vertical lines (red)

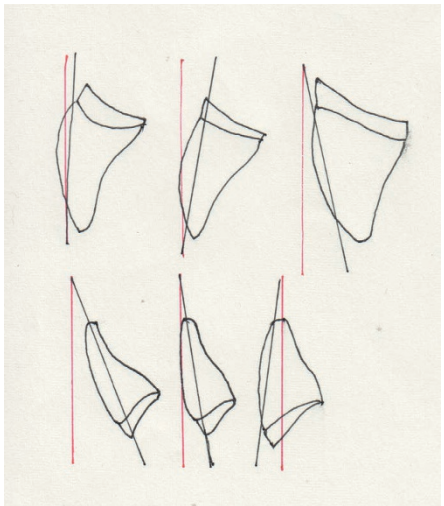

Fig. 11 Schematic drawing typical in textbooks, showing 'ideal' labio-lingual alignments of anterior denture teeth relative to vertical lines (red)

Three levels of denture aesthetics: a classification

Within the aesthetic boundaries mentioned so far, three concepts of denture aesthetics may be identified.

PERFECT: unvarying tooth moulds/ stereotype positions/'textbook'/exhibiting no wear, etc

When denture tooth set-ups are taught, a frequent method is to show clinical and technical students drawings of a single 'ideal' tooth arrangement, often one taken from a textbook of removable prosthodontics (Figs 10 and 11). A consequence of this seems to be that these images become implanted in the minds of the students and form the basis for what many later regard as the correct way to set up teeth for every patient's mouth. This is what they tend to produce ever after.

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Such stereotyping is understandable among dental laboratory technicians, who are often not provided with any evidence at all of an edentulous patient's lost natural dentition, nor even with record rims trimmed to provide suitable lip support and thus an indication of front tooth position and arch shape. What else can they do with no guidance from the clinician but reproduce what they were taught as correct during their training?

This early imprinting is more insidious than that: it seems to block the reception of alternative arrangements, even when they are forthcoming from the clinician. It is easier, quicker and cheaper to set up denture teeth in a traditional way. This unvarying dental appearance seems highly contagious. John Kois calls it 'identity freeze', a commitment to a single idea, brand, etc.[12] Indeed even some American 'denture gurus' prefer it, or so we have been told by their gifted dental technicians: use the same mould, same shade, and same anterior set-up for everyone.

Many patients, too, are sold on the idea of dental perfection after repeated exposure to artificially perfect smiles in the media. They choose to have standard, unblemished artificial teeth of extraordinary whiteness, regardless of how unnatural they look and how inappropriate for their age. In some circles the underlying desire may be to display perfect teeth as a status symbol, wishing them to be noticed as expensive cosmetic dentistry, or it may be simply to look like their whitened and veneered friends, a new 'norm' having been created. This seeking for perfection, which Earnest Matthews teaching in the 1960s called 'latent idealism', is entirely the patient's prerogative, provided more realistic alternatives have been explained and offered. It is every patient's right to have artificial teeth of exaggerated perfection and unreality.

IMPERFECT ANONYMOUS: irregular/ individually characterised teeth showing signs of wear/age-appropriate shades/ variegated pink gumwork.

At this second level, conscientious and well-trained technicians, working for aspirational clinicians and discriminating patients, make serious attempts to avoid the 'denture look'. They do this by incorporating various imperfections, taking care to make the teeth and gums plausible for the age of the patient so as to preserve the wearer's prosthodontic privacy. Darker teeth, stained embrasures, crack lines and worn incisal edges may be created, fillings inserted and even, with the patient who aims for extreme naturalism, an upper second premolar missing as if following an extraction. This only shows during a smile and, since everyone knows that dentures don't have missing teeth, the observer's subconscious is likely to conclude 'it can't be a denture, can it?' The patient must be given time to consider and agree to the imperfect appearance (preferably with the support of a family member or close friend). The characterisations and irregularities are likely to provide a convincing simulation of normality. But something may still be missing. These creative imitations of natural teeth are still not those of anyone in particular. The imperfections have been applied without reference to an individual original – the patient in the chair.

IMPERFECT AND PERSONAL: any of the above imperfections approved by the patient and friends, plus one extra transforming element – the teeth are made to resemble the patient's own missing natural teeth, based on evidence provided by photographs and other pre-extraction records.

The emotional impact upon many of the dentally deprived of being returned to their own pre-extraction appearance is hard to exaggerate. Those who have been privileged to be able to work in this personalised way with needy patients will almost certainly have witnessed, from time to time, the shedding of tears of joy and relief at the final try-in stage or when the dentures were fitted and the patient can see him/herself returned to their own unique dental identity.

The degree of personalisation must be varied according to the patient's wishes. Some people's natural teeth were very irregular and a source of embarrassment to them, to the point that they rarely smiled and would hang back when group photographs were taken (as do many wearers of unattractive dentures). But even if the natural tooth positions are not reproduced exactly, at least photographs of the natural teeth will allow their sizes to be calculated and their shapes to be imitated in selecting denture teeth. Smiling photographs may also give more than a hint of degree of overbite and overjet, so that faces that need Class II/div 2 incisors can have them again to provide proper lip support and tooth visibility, and Class II/div 1 likewise. Try to imagine Freddie Mercury (Fig. 12) 'corrected' to a Class I incisor relationship. What a loss of individuality and charisma that would have caused.

Perhaps the most succinct and beautiful statement on the value of personal dental identity was penned by John Craig in a 2003

Fig. 12 Freddie Mercury. Image credit: Paul Natkin/Archive Photos/Getty Images

Editorial in *BDA News* attacking the eagerness of some dental practitioners to provide characterless porcelain 'makeovers' (as in Figure 5):

'*My view is that this type of cosmetic dentistry results in an anonymised, characterless smile and makes the more mature individual, paradoxically, look older rather than younger. In short, it looks as fake as a bad toupée…*

It is the confusion of regularity with perfection and perfection with beauty. There is no "perfect smile", no Platonic ideal of a smile out there in the philosophical ether. There are potentially as many perfect smiles as there are people.'[13]

Acknowledgments
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