

Truth or consequences: the potential implications of short-term cosmetic orthodontics for general dental practitioners

R. A. C. Chate¹

IN BRIEF

- Provides a considered opinion from the Faculty of Dental Surgery of the Royal College of Surgeons of Edinburgh on the limitations and potential consequences of short-term orthodontics.
- Cosmetic practitioners, including general dental practitioners undertaking short-term cosmetic orthodontics, are recommended to follow recently published standards for cosmetic practice.

Until recently, cosmetic dentistry has focused on the use of traditional restorative techniques, bleaching and the so-called facial rejuvenators such as injectable dermal fillers and Botox. More latterly, the short-term use of aesthetic removable aligners and ceramic fixed appliance brackets have been promoted for use by general dental practitioners as a means of minimising the invasive amount of restorative dental treatment that would otherwise be required to achieve the desired degree of aesthetic improvement. Nevertheless, there are inherent risks and complications associated with short-term orthodontic treatments that are deliberately limited in their outcomes and these, together with the potential ramifications for the long-term dental health of patients, are discussed.

INTRODUCTION

Over the last few years, as a result of cosmetic makeover and 'ten-years younger' television programmes, both public interest and demand for cosmetic dentistry have risen and as a consequence, so has the insidious pressure on dental professionals to comply for fear that this could otherwise adversely affect their practices.

A recent publication entitled *Short-term cosmetic orthodontics for general dental practitioners*,¹ as well as the subsequent correspondence that this generated,^{2,3} together with a presentation made by Mr Maini, the Vice President of the British Academy of Cosmetic Dentistry, on this topic at the British Dental Association Annual Conference on 27 April 2013 has raised some important issues.

The main tenet that is being proposed is to offer adult patients who do not wish to have either full orthodontic treatment to comprehensively straighten their teeth or extensive porcelain ceramic restorations to camouflage their anterior misalignment a

third choice; namely a course of short-term orthodontic treatment to gain sufficient anterior alignment to allow less invasive restorative dentistry to achieve a pleasing smile. On first appearances, this would seem to be a laudable suggestion.

INFORMED CONSENT

As has been debated previously,³ such an approach is dependent on the patient having been given sufficient information about all of the available treatment options for them to be able to consent to such a procedure.

For the consent to be valid, it is critical that this must ensure there is a complete understanding of the probable long-term consequences that could be faced, should a 'quick-fix' option be followed.

COLLATERAL RAMIFICATIONS

In essence, short-term orthodontic treatments that reposition anterior teeth to facilitate their minimally invasive aesthetic restoration must involve inter-canine expansion and incisor proclination, both of which are inherently unstable orthodontic movements. To counter this, post-treatment permanent retention with either a removable clear 'essix' type of retainer or a lingual bonded retainer is correctly emphasised.¹

However, even though randomised trials have shown that nocturnal wear rather than full-time wear of clear overlay

retainers (COR) is sufficient to maintain orthodontic alignment,⁴⁻⁶ within the first year of retention another randomised controlled trial has shown that 27% and 22% of maxillary and mandibular CORs respectively, are usually lost by patients and that 31% and 49% respectively, often end-up broken.⁷

The situation is no better even if multi-strand bonded wire retainers are considered. Over the short-term, prospective studies have shown that 37.9% of lingual bonded mandibular retainers fail within the first six months of placement,⁸ as do 58.2% overall of palatal bonded maxillary retainers where operator inexperience correlates with higher failure rates.⁹

In addition, over the medium-term a randomised trial has shown that 22.2% of maxillary and 15.6% of mandibular multi-strand wire retainers detach, while 16.7% and 15.6% end-up breaking, respectively.¹⁰

Over the longer term, a similar 25% failure rate has also been found with rigid mandibular canine-to-canine bonded retainers and of those that survived 38% required repair, of which half were on more than one occasion.¹¹

The durability and longevity of different types of retainers is of importance for patients who have had a limited course of orthodontic treatment that without retention is immediately unstable, because the effect of a retainer that

¹Vice Dean, Faculty of Dental Surgery, The Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh, EH8 9DW
Correspondence to: Robert Chate
Email: robert.chate@rcsed.net

eventually fails is rapid relapse of the original misalignment.

ETHICAL DILEMMA

This therefore poses a dilemma; whether undertaking a course of short-term orthodontic treatment that is critically reliant on the indefinite integrity of a permanent retention regime is actually ethical, when fallibility is inherent in everything man-made or used. The answer is it is, so long as the patient is apprised of all the risks, benefits and consequences that are associated with the proposed treatment and they have the capacity to consent.

CLINICAL CONSEQUENCES

The consequences for a patient who experiences relapse after having had a course of short-term cosmetic orthodontics would be threefold. Firstly, they would need either to have a repeat course of orthodontic treatment to regain alignment of their minimally restored teeth, or secondly, have more destructive restorative treatment than originally intended in order to camouflage the misalignment relapse instead.

If neither of these two rescue remedies are accepted, either because of the patient's dissent or because of their financial circumstances, the third consequence would be a very disappointed, disillusioned and justifiably aggrieved patient.

However, should the patient consent to either of the two recovery treatments this would expose them to adverse biological effects and in relation to the option of having more extensive ceramic crown restorations, the risks and consequences associated with these are well documented.^{12,13}

In the case of orthodontics, it is commonly known that a small amount of apical resorption occurs following a conventional course of orthodontic treatment. However, there are a number of factors that can significantly increase both the risk and extent of root resorption.¹⁴ One of these is through the use of orthodontic 'jiggling' forces,¹⁵ where teeth are cyclically exposed to forward and backward tipping forces, as would be the case in a patient who had had initial short-term orthodontic anterior alignment, relapse and then subsequent realignment.

The resorptive process involves osteoclasts, large multinucleate giant cells¹⁶ and the biological response to tipping forces that jiggle the teeth is to produce a marked increase in alveolar bone marrow spaces that are lined by a multitude of osteoclasts, in particular within the coronal region.¹⁷

That tipping tooth movements predominate in short-term orthodontics is acknowledged¹ and this type of tooth movement results in maximum stresses and strains in the periodontal ligament (PDL) at the root apex and the alveolar crest of the teeth; so much so that in some instances the hydrostatic stresses exceed the body's systolic pressure, which can lead to the induction of PDL necrosis and a reactionary osteoclastic response.¹⁸

When orthodontic forces applied to teeth are not evenly spread over the root surface (as in the case of tipping), the forces can be focal and greater around certain regions.¹⁶ As such, orthodontic tooth movement has been highlighted as a possible factor in the development of external cervical resorption (ECR), where excessive forces in the cervical region (as may occur inadvertently in inexperienced hands) may induce necrosis and inflammation adjacent to dentine, stimulating odontoclastic differentiation followed by resorption. Surprisingly, the onset of ECR in these patients has been demonstrated to occur even after completion of the orthodontic treatment!¹⁶

IMPLICATIONS FOR PATIENT MANAGEMENT

For a patient considering restorative cosmetic dentistry to be able to give valid consent, they should be given evidence-based information, in a form and language they can understand, on all of the potential treatment's limitations,¹² such as the mean finite ten-year longevity of porcelain veneers as well as the potential one third to two thirds amount of sound anterior tooth substance that would need to be removed if either veneers or full coverage crowns were to be provided respectively.¹³

This should also be the case before a patient embarks upon a course of short-term orthodontics, on the basis that should their initial alignment ultimately be lost they may subsequently choose to have a restorative option to affect an aesthetic recovery.

For the same reason, they should also be advised about the root resorption risks associated with repetitive orthodontic tipping forces should further courses of simplistic orthodontic realignment treatment need to be chosen by them in the future instead.

Therefore, with the above in mind, from the outset such patients should be given evidence-based information on the longevity, durability and success of 'permanent' retainers so that they may estimate the potential likelihood of ever having to face making such crucial decisions.

DENTAL MATURATIONAL AGE CHANGES

On the subject of life-long orthodontic retention, it has been insinuated that without this even those patients that have had comprehensive, idealised treatment are otherwise as equally prone to experience mal-alignment relapse.¹⁹

This is untrue if the definition of the word 'relapse' is strictly applied because, unlike cases that have had short-term orthodontics, the teeth of malocclusions that have been comprehensively corrected do not immediately relapse upon withdrawal of the retainers at the end of a conventional period of retention.

Nevertheless, it is well documented that up to 70% of patients who have received previous fixed appliance orthodontic treatment re-experience dental irregularity many years, if not several decades later. This is irrespective of whether they were treated with dental extractions or not, or whether their arch widths were deliberately expanded, constricted or kept unchanged. However, exactly the same occurs with untreated normal occlusions, although to a much lesser extent.²⁰

In all, there is a measurable, life-long incessant reduction in dental arch widths and dental arch lengths that lead to late dental crowding.^{20,21}

Therefore, these changes are now regarded as normal, albeit undesirable maturational developments consequential to ageing.²²

As a result, many patients who have completed a course of conventional orthodontic treatment and subsequent retention are advised to continue wearing their retainers on a part-time indefinite

basis, not because their corrected malocclusions are inherently unstable, but to mitigate the unfavourable dental arch changes that are associated with getting older. Needless to say, should their retainers either detach, become lost or break, there is not the same remedial urgency as there would be in a retained case that is inherently unstable.

REGULATION AND PROFESSIONAL STANDARDS

Cosmetic interventions are a booming industry in the UK with a projected value of £3.6 billion by 2015 and in the light of the Poly Implant Prothese breast implant scandal, the Department of Health commissioned a group to review the regulation of this sector of clinical practice.

The chair of the group, Sir Bruce Keogh, has prefaced the group's report with the following statement 'Those having cosmetic interventions are often vulnerable. They take their safety as a given and assume regulation is already in place to protect them.'²³

The report's main recommendation is for the Royal College of Surgeons to establish an Inter-speciality Committee on cosmetic surgery in order to set standards for cosmetic practice and training and to make arrangements for formal certification.

The report acknowledges that people considering cosmetic procedures have a natural tendency to focus on outcome and in contrast to an apprehensive patient required to undergo a significant procedure, they may not pay enough attention to limitations and underplay the risks. In these instances, the report urges cosmetic practitioners to manage people as patients and not consumers when undertaking consent and to put the safety and health of individuals ahead of any commercial interests.²³

In addition, a separate document entitled *Professional standards for cosmetic practice* has been published recently and

this is aimed at all cosmetic healthcare professionals, including nurses and dentists who are involved in cosmetic treatments, irrespective of whether these are either reversible or irreversible.²⁴ Among other things, in relation to consent discussions with patients, the proposed standards expected of practitioners should be that they have provided sufficient information for patients to be able to know:

- What is involved in the proposed procedure
- What the likely outcome will be and whether this will meet their expectations
- The risks and what complications might occur in both the short- and long-term and how these will be managed and paid for
- What other alternative treatment options may offer
- What the consequences would be of doing nothing.

In relation to professional conduct, the same document advises practitioners to make clear to patients what their qualifications are and where appropriate, whether they are on a specialist list and what this entails. Creating the impression of specialist knowledge without specialist registration should be avoided and since cosmetic practices are not recognised specialties, the use of self-descriptive terms such as 'cosmetic dentist' is to be discouraged.²⁴

In the light of the nationwide reviews in cosmetic practices, the deans of the four UK dental faculties have recently written to Lord Howe, the Parliamentary Under Secretary of State for Quality, offering their expertise in progressing any further reviews on developing standards and regulations for cosmetic dentistry. Given time, these will no doubt come to pass. In the interim, it would behove all dentists involved in short-term cosmetic orthodontics to take note and to review their current practices accordingly.

- 1 Maini A. Short-term cosmetic orthodontics for general dental practitioners. *Br Dent J* 2013; **214**: 83–84.
- 2 Kirschen R. Short-lived benefits. *Br Dent J* 2013; **214**: 325.
- 3 Slater R, Hunt N. Providing a choice. *Br Dent J* 2013; **214**: 325–326.
- 4 Gill D S, Naini F B, Jones A, Tredwin C J. Part-time versus full-time retainer wear following fixed appliance therapy: a randomized prospective controlled trial. *World J Orthod* 2007; **8**: 300–306.
- 5 Thickett E, Power S. A randomized clinical trial of thermoplastic retainer wear. *Eur J Orthod* 2010; **32**: 1–5.
- 6 Jaderberg S, Feldman I, Engstrom C. Removable thermoplastic appliances as orthodontic retainers - a prospective study of different wear regimes. *Eur J Orthod* 2012; **34**: 475–479.
- 7 Sun J, Yu Y C, Chen L *et al*. Survival time comparison between Hawley and clear overlay retainers: a randomized trial. *J Dent Res* 2011; **90**: 1197–1201.
- 8 Taner T, Aksu M. A prospective clinical evaluation of mandibular lingual retainer survival. *Eur J Orthod* 2012; **34**: 470–474.
- 9 Schneider E, Ruf S. Upper bonded retainers. *Angle Orthod* 2011; **81**: 1050–1056.
- 10 Bolla E, Cozzani M, Doldo T, Fontana M. Failure evaluation after a 6-year retention period: a comparison between glass fibre-reinforced (GFR) and multistranded bonded retainers. *Int Orthod* 2012; **10**: 16–28.
- 11 Booth F A, Edelman J M, Proffit W R. Twenty-year follow-up of patients with permanently bonded mandibular canine-to-canine retainers. *Am J Orthod Dentofacial Orthop* 2008; **133**: 70–76.
- 12 Merivale J. Cosmetic dentistry: a risky business? *Faculty Dental Journal* 2011; **2**: 73–78.
- 13 Kelleher M. Ethical issues, dilemmas and controversies in 'cosmetic' or aesthetic dentistry. A personal opinion. *Br Dent J* 2012; **212**: 365–367.
- 14 Weltman B, Vig K W L, Fields H W, Shanker S, Kaizar E E. Root resorption associated with orthodontic tooth movement: A systematic review. *Am J Orthod Dentofac Orthop* 2010; **137**: 462–476.
- 15 Brezniak N, Wasserstein A. Root resorption after orthodontic treatment: Part 2. Literature review. *Am J Orthod Dentofac Orthop* 1993; **103**: 138–146.
- 16 Darcey J, Qualtrough A. Resorption: part 1. Pathology, classification and aetiology. *Br Dent J* 2013; **214**: 439–451.
- 17 Polson A M, Meitner S W, Zander H A. Trauma and progression of marginal periodontitis in squirrel monkeys III. Adaption of interproximal alveolar bone to repetitive injury. *J Periodontal Res* 1976; **11**: 279–289.
- 18 Field C, Ichim I, Swain M *et al*. Mechanical responses to orthodontic loading: A 3-dimensional finite element multi-tooth model. *Am J Orthod Dentofac Orthop* 2009; **135**: 174–181.
- 19 Maini A. Response to 'Providing a choice'. *Br Dent J* 2013; **214**: 326.
- 20 Little R M. Stability and relapse of dental arch alignment. *Br J Orthod* 1990; **17**: 235–241.
- 21 Tsiopas N, Nilner M, Bondemark L, Bjerklin K. A 40 years follow-up of dental arch dimensions and incisor irregularity in adults. *Eur J Orthod* 2013; **35**: 230–235.
- 22 Sinclair P M, Little R M. Maturation of untreated normal occlusions. *Am J Orthod* 1983; **83**: 114–123.
- 23 Keogh B. *Review of the regulation of cosmetic interventions*. London: Department of Health, 2013.
- 24 Cannon S. *Professional standards for cosmetic practice*. London: The Royal College of Surgeons of England, 2013.