SHORT-TERM ORTHODONTICS

Debate based on an opinion article published in the *British Dental Journal* entitled 'Truth or consequences: the potential implications of short-term cosmetic orthodontics for general dental practitioners' by R. A. C. Chate (*BDJ* 2013; **215:** 551–553; www.nature.com/bdj/journal/v215/n11/full/sj.bdj.2013.1140.html).

DR ANOOP MAINI
General dentist and President of the European Society of Aesthetic Orthodontics

Dr Maini qualified from King's College in 1992 and has worked in private practice since 1993. He has a special interest in advanced cosmetic and implant dentistry. He is also Vice President of the Board of Directors – British Academy of Cosmetic Dentistry. Dr Maini was one of the first UK dentists to offer the latest 6 month braces orthodontic treatment.

I am writing in response to R. Chate's opinion article published in a recent edition of the *BDJ* on the potential implications of short-term orthodontics for general dentists. This article, in my opinion, only divides the orthodontic specialist community and general dentists.

Mr Chate, who is a specialist orthodontist, states that short-term orthodontic treatments *must* involve intercanine expansion and incisor proclination which I agree is an orthodontic movement that is inherently unstable due to non-axial loading and the encroachment of the soft tissues. A comment by Bjorn Zachrisson (one of the world's most renowned orthodontists) to this statement is 'this is true only if the treatment is done carelessly, with no re-contouring of teeth or necessary stripping of teeth with deviating morphology'. Using careful space and arch form analysis techniques (these days much of this can be done digitally), the arch form is maintained particularly in the inter canine width. In most cases proclination of teeth in the anterior zone is really limited to those teeth which are retroclined. In those situations where roots in the anterior zone are lingualised, we do torque roots for aesthetic reasons to improve gingival alignment if we are using fixed braces or repositioner aligners with specific attachments.

Mr Chate also in his opinion suggests that tipping movements are only confined to short-term orthodontics. In comprehensive orthodontics where there is a dentoalveolar malocclusion with an underlying skeletal discrepancy, this is often not corrected and is camouflaged dentally with either proclination or retroclination of the incisors to achieve a Class I incisal relationship. Functional appliances which are often used to treat skeletal discrepancies obtain most of their dentoalveolar compensation by just tooth tipping.[1] One could argue as to why more orthognathic surgery is not undertaken in the UK to the level seen in other European countries, such as Belgium, especially when Mr Chate states how unstable tipping movements are and that they should be avoided. I would suggest that this may fall down to finances and realism for patients, especially adults.

I agree whole heartedly that effective valid consent is important for any dental procedure. A patient must be aware of all the options, their limitations, their disadvantages and the risks associated with them.

'I hope that the orthodontic community do not consider general dentists as a threat...'

The gold standard of any orthodontics is a comprehensive resolution of a malocclusion and this should always be presented as the ideal. I also counter this by saying that it would not be fully valid consent unless a limited outcome aesthetic option, a restorative solution or non-treatment option were also presented with their relative advantages and disadvantages. I would also add that by not including short-term orthodontics as one possible treatment option would, in my opinion, be unethical. The analogy would be to offer implants only to restore a space and not offer fixed bridgework even though it would be the less ideal option with possible longer term implications. The decision is not mine or Mr Chate's but that of the patient to decide on the treatment that best suits their needs and outcomes after a discussion on the merits of each treatment choice. Short-term orthodontics is focused on the treatment of adult patients who desire an improvement in their anterior smile aesthetics. Their receptiveness to comprehensive orthodontics is not the same as a child patient and this has been borne out in my own clinic where we also offer comprehensive orthodontics but many adult patients choose not to pursue this option and are prepared to accept a limited compromised outcome as an alternative. As Vince Kokich is quoted as saying 'Treat kids idealistically and adults realistically'.[2] There are many adult patients who will *not* have comprehensive orthodontics to resolve all issues with their malocclusion. Would Mr Chate suggest that we revert to the days gone by of anterior alignment by camouflaging using a handpiece to reshape teeth and then restore with ceramics? I would say as a practitioner who has improved many smiles in this manner that the long-term implications of pulpal necrosis, periodontal issues, continual crowding and restoration failure are much higher in terms of cost and dental retreatment then the risk of possible relapse after short-term orthodontic treatment.[3] One also has to bear in mind that any orthodontic care, whether comprehensive or short-term, carries the risks of devitalisation, decalcification, white spot

lesions and root resorption.

With short-term orthodontics the risk of relapse exists and though there isn't a study to show the risk of relapse being higher than comprehensive orthodontics one would assume the risk is higher since no anterior-posterior corrections are made to the dental malocclusion in short-term orthodontics therefore the anterior teeth are likely to be placed in an unstable zone. One can say that the most stable position for the anterior teeth is where they currently reside prior to treatment. With short-term orthodontics the consent protocol includes advising the patient of the absolute need for lifelong retention which takes the form of a bonded fixed retainer *and* a removable Essix retainer. However, in the patient's eyes failure of any orthodontic treatment is any post treatment crowding that occurs which can be related to the original orthodontic movements or the denta-matural changes that occur in adults throughout life which result in shortened dental arch lengths and width leading to crowding. As Mr Chate cites Little's paper[3] of 1990 70% of orthodontic cases completed comprehensively will show crowding years, even decades, later. In fact, Little's paper of 1998 states that 90% of comprehensive orthodontic patients will relapse after 20 years.[4] One cannot predict who will relapse and therefore in comprehensive orthodontics lifelong retention is paramount to avoid a failure in the patient's eyes. In fact, a large volume of adult patients who consider short-term orthodontics have had comprehensive orthodontics as teenagers but have now relapsed. The issues of cost implications due to relapse in terms of orthodontic retreatment or an alternative restorative solution apply equally to both comprehensive and short-term orthodontic patients. It is unfortunate that Mr Chate singles out these concerns purely for short-term orthodontics when it also applies to comprehensive orthodontics. Like many general dentists I fully appreciate that any dentistry I offer is not lifelong. In providing crowns, bridges, root canals, fillings, etc the long term ramifications of failures and inherent risks of these treatments is always discussed from the outset and short-term or comprehensive orthodontics is no different. It is ultimately the patient's choice.

Mr Chate cites a paper by Schneider and Ruf (2011)[6] on a poor survival rate of bonded retainers in the maxilla of 37.9% survival at six months. The operators in this article were generally inexperienced clinicians (mostly students). Experienced general dentists tend to have a good understanding of bonding procedures from their everyday restorative dentistry and many can identify parafunction and canine wear faceting due to non-working side interferences which they can seek to remedy. In more skilled hands bonded retainers have a much higher survival rate of 94% as shown in Zachrisson's 2007 paper.[7]

On the subject of resorption I would like to directly quote Bjorn Zachrisson since he puts the risk into perspective: 'I would not consider root resorption to be a problem at all after treatment with Inman Aligners or similar short-term orthodontic cosmetic approaches. Even with comprehensive long-term fixed appliance therapy, root resorption is a concern in a very small (around 5%) percentage of patients (having abnormal root end configurations at the start or extreme individual predisposition). In practice, we detect such predisposition to root resorption by taking a radiograph of the upper incisor after six months of treatment.'

Histological studies in both animals and humans show that root resorption occurs in 90% of orthodontic cases. This is not radiographically evident for the majority of patients because the resorption is repaired by the cementoblasts, where this does not occur moderate to severe resorption will occur.[8] Eminent orthodontist Vince Kochich, in his 2008 paper,[9] states that there are three variables which show an association with increased root resorption, amount of linear root movement, length of treatment and premolar extraction cases. With short-term orthodontics these variables are less significant since we do not extract premolars, we have minimal linear movement and the treatment time is significantly shorter than comprehensive orthodontics. Root resorption is still a potential risk for susceptible patients undergoing short-term orthodontists and this needs to be discussed as a part of the consent process.

Mr Chate expresses a concern about resorption due to 'jiggling forces', that teeth are cyclically exposed to repetitive tipping forces especially in the retreatment of short-term orthodontic relapse cases. A couple of thoughts spring to my mind:

1. Jiggling intermittent forces in orthodontics are usually associated with the use of elastics
2. Round wire level and aligning treatment used in short-term orthodontic fixed appliance therapy is the same first phase protocol that is used in comprehensive orthodontics and therefore the teeth are subjected to similar movements
3. I am not familiar with any short-term orthodontic retreatment studies which highlight this postulation.
4. If jiggling forces are a concern for orthodontists do they fully equilibrate their cases post treatment to eliminate any interferences? As far as I am aware this is not common practice.

I would like to finish my response stating that Mr Chate highlights the Poly Implant Posthese breast implant scandal by medical practitioners and extrapolates this situation to general dentists offering short-term orthodontics. I do agree that for any elective procedure that is carried out for cosmetic (the better term is aesthetic) enhancement, the immediate and long-term risks, advantages and disadvantages, and all options of treatment must be discussed to achieve proper consent. This applies to any dental practitioner, general or specialist.

I hope that the orthodontic community do not consider general dentists as a threat because short-term orthodontists are only able to provide a very limited range of outcomes. Many orthodontic cases a general dentist will see will require specialist referral for correction of a patient's wider malocclusion. The greater acceptance of orthodontics, either comprehensive or in a limited form such as short-term, amongst adult patients to correct aesthetic issues with their dental malalignment can only be a good thing if it saves tooth enamel being mutilated irreversibly for ceramic restorations. William Profitt, in his book *Contemporary orthodontics*[10] describes limited outcome orthodontics for adult patients as a valid treatment approach. Therefore the concept is not new, the issue seems to be that general dentists are now offering this approach.

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MR ROB CHATE
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Mr Chate is a consultant orthodontist in Colchester and has been a Fellow of the Faculty since 1980. Between 2005-08 he served as a Regional Dental Adviser for the East of England and as Dental Council's Secretary between 2008-11. In addition to deputising for the Dean, he directs the Royal College's Regional Dental Adviser network.

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Thank you for giving me the opportunity to reply to Mr Maini's critique of my recent paper, 'Truth or consequences: the potential implications of short-term cosmetic orthodontics for general dental practitioners'.

Before I respond in detail to each of Mr Maini's comments, I would like to reiterate that while I was the originator of the article, the contents were endorsed by both the Orthodontic Specialty Advisory Board and the Dental Council of the Faculty of Dental Surgery of the Royal College of Surgeons of Edinburgh and so from the outset, they represent the views of the College's most senior dental representatives.

In addition, it is useful to note that throughout Mr Maini's submission, he has predominantly used a liberal sprinkling of 'expert opinion' anecdotal comments to qualify many of the points he has raised, where in hierarchical terms these are considered to be the very weakest forms of evidence.[1]

He first states that the article will 'only increase the divide between the orthodontic specialist community and general dentists' when the sole intention was to provide ethical and cautionary guidance on the conduct required by any level of practitioner when undertaking a course of orthodontic treatment with limited and potentially unstable objectives.

He claims that my statement of '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' is a fallacy. He quotes Zachrisson that 'this is true only if the treatment is done carelessly, with no re-contouring of teeth or necessary stripping of teeth with deviating morphology.' I contest that, especially if a case with more than minimal labial segment crowding is to be treated in this way.

Previous studies have published the mesial and distal proximal enamel thicknesses of the maxillary and mandibular permanent incisors and canine teeth[2-4] such that in general, only 0.5 mm of enamel may be stripped from each canine and maxillary incisor proximal surface and only 0.3 mm per mandibular incisor proximal aspect,[5] thereby restricting this process to the orthodontic relief of only mild irregularity, that is, not more than 4 or 5 mm of mandibular or maxillary crowding, respectively.

Adult cases with more crowding than this would either require a prolonged course of conventional orthodontic treatment with relieving extractions or alternatively, upper incisor proclination and inter-canine expansion into unstable positions with subsequent permanent retention. Even in mildly crowded cases, if insufficient interdental stripping were inadvertently undertaken at the start of the orthodontic correction, this would still unwittingly result in some degree of incisor proclination and inter-canine expansion that would similarly be inherently unstable.

Mr Maini claims that my article 'suggests that tipping movements are only confined to short-term orthodontics' and these are 'unstable movements and should be avoided.' If he reads my article more carefully, he will see that neither such claim has been made. Indeed, it was he who acknowledged that tipping movements predominate in short-term orthodontics[6] and my reference to them was in relation to the focusing of the periodontal ligament stresses and strains at the root apex and at the alveolar crest of the teeth, with regard to the potential induction of root resorption.

'...my intention was to provide guidance so that clinical standards and the safety of patients are maintained...'

Mr Maini states that he 'agrees wholeheartedly that effective valid consent is important for any dental procedure' and 'A patient must be aware of all the options, their limitations, their disadvantages and the risks associated with them.' At length, he then justifies why a course of short-term orthodontic treatment is a potentially suitable option for either a previously untreated adult who declines a comprehensive course of orthodontic treatment or for one who has experienced a recurrence of misalignment many years after successfully being treated with conventional fixed appliance therapy. In either situation, my article does not denigrate this perspective.

Instead, it emphasises that information on the risks, benefits and costs of any remedial treatment that patients may have to undergo subsequent to any potential relapse of a short-term course of cosmetic orthodontic treatment must be given, in order for them to be sufficiently appraised before making a start with a limited option. This would include data on the published failure rates of whichever type of retainer they would be supplied with, so they may estimate the likely occurrence of requiring either an orthodontic or a restorative recovery sometime thereafter in the future.

Mr Maini then incorrectly quotes the data of 37.9% failure rates for bonded maxillary anterior retainers, attributing this to Schneider and Ruf's article,[7] when in fact the figure relates to the failures seen in a prospective two-year study involving 66 consecutive patients with mandibular retainers instead.[8]

Nevertheless, regardless of the correct, higher maxillary bonded retainer failure rate of 58.2%,[7] he criticises this as being skewed due to the operators in this article being 'generally inexperienced clinicians (mostly students).' He continues to say, 'Experienced general dentists, especially aesthetic and restorative minded practitioners, tend to have a very good understanding of bonding procedures,' implying that such practitioners would have lower failure rates than indicated by this study.

In the original article that I quoted,[7] it clearly acknowledged that operator inexperience correlated with higher failure rates, but the 'inexperienced clinicians' were actually postgraduate students and not undergraduates as Mr Maini has surmised. Therefore, they would have been working in general dental practice before enrolment on to the specialty training course. As such, their level of bonding expertise would have been no different from any other young graduate embarking upon treating patients with a course of short-term orthodontics, as promulgated by Mr Maini.[6]

Even if the smaller bonded retainer failure rates in the region of 15%-22% as derived from a six-year randomised study are taken,[9] they are still large enough to be of clinical significance when obtaining consent for an inherently unstable course of orthodontic treatment.

Elsewhere, Mr Maini states 'The issues of cost implications due to relapse in terms of orthodontic retreatment or an alternative restorative solution apply equally to both comprehensive and short-term orthodontic patients' and that 'it is unfortunate that Mr Chate singles out these concerns purely for short-term orthodontics when it also applies to comprehensive orthodontics.'

As already outlined in my article, the issue is not to do with comprehensive orthodontic cases that are successfully treated still needing indefinite part-time retention to mitigate the maturational age-related dental changes that can occur, but that unlike inherently unstable short-term orthodontic cases, replacing a retainer for these patients that is either lost or broken does not have the same remedial urgency nor the potential for rapid relapse that otherwise would commit a patient to some form of recovery treatment with all the associated adverse biological consequences.

In relation to the 'jiggling forces' with short-term orthodontic retreatments and the increased risk of root resorption, Mr Maini is mistaken in his belief that I asserted jiggling forces occur during 'round wire level *(sic)* and aligning treatment that is used in short-term fixed appliance therapy' this being 'the same first phase protocol that is used in comprehensive orthodontics.'

Instead, the association between an increased risk of root resorption and teeth that have experienced a cyclical reversal of forces placed upon them was emphasised, as might occur in the recovery treatment of a short-term cosmetic orthodontic case that initially had the anterior teeth tipped one way into alignment, relapsed and then had the teeth tipped back again.

Finally, I refute Mr Maini's assertion that 'Mr Chate highlights the Poly Implant Prosthese breast implant scandal by medical practitioners and extrapolates this situation to general dentists offering short-term orthodontics.'

Instead, the reference was made to illustrate why the Department of Health had initiated a group to review the regulation of the cosmetic industry in medicine, leading to the involvement of the Surgical Royal Colleges in providing guidance to all cosmetic practitioners, including dentists.

Mr Maini concludes his critique by quoting Profitt who apparently 'describes limited outcome orthodontics for adult patients as a valid treatment approach,' so that 'the concept is therefore not new, the issue seems to be that general dentists are now offering this approach.'

This is entirely true and encapsulates the whole reason behind the original publication; namely, to provide non-specialists with educational guidance on the ethical conduct of short-term cosmetic orthodontic treatments so that clinical standards and the safety of patients are maintained, if not enhanced.

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