Letters to the Editor

European Journal of Orthodontics 34 (2012) 788 *doi:10.1093/ejo/cjs030 Advance Access publication 9 May 2012*

Conundrum in vertical dimension changes

Dear Sir,

I have read with interest the article by Chhibber *et al.*, (2011) comparing the changes produced by the Begg appliance and the preadjusted edgewise appliance (PEA) on vertical dimension. The theory of the occlusal wedge hypothesis has been researched extensively in recent times for its appropriateness in the clinical treatment scenario and no firm evidence has been substantiated (Sivakumar and Valiathan, 2008; Gkantidis *et al.*, 2011). I have few concerns that I would like to raise.

The present study results could have been more valid if a control sample (non-extraction group) has been used in each group (Begg and PEA). This would have allowed the treatment changes from the extraction protocol to be assessed.

The authors reported that in cases (PEA) where the bite deepened, an intrusion arch was used. There was no explanation in the article as why there was closure of the bite (Figure 2(d) in the article). It is a little unusual to retract the canines in round wire in a straight wire mechanics (except the Alexander Discipline mechanics). Could this have been a possible reason or really the occlusal wedge hypothesis in action?

The authors discussed that the Begg technique was marginally better at conserving anchorage than the PEA. As part of the study protocol, the authors never considered any form of anchorage support in the PEA cases although the conventional Begg technique had inherent differential anchorage support. Hence, it is prudent to argue that there will be more anchorage slippage in the authors' PEA sample. I feel

European Journal of Orthodontics 34 (2012) 788–789 *doi:10.1093/ejo/cjs047 Advance Access publication 5 October 2012*

Reply

Dear Sir,

We would like to thank Dr Sivakumar for his interest in this article and for the comments.

We agree with Dr Sivakumar that there should have been a control sample to analyse the effect of extractions in both Begg and pre-adjusted edgewise appliance (PEA) so that that our treatment mechanics and protocols should dictate the treatment outcome and not the technique as such.

Even though the sample included subjects in cervical vertebral maturation (CVM) stage VI of skeletal maturity, the contribution of 'residual growth' to the treatment effects needs clarification. The increase in face height and the mesial movement of molars could be consequent to mechanotherapy or residual growth (Gardner *et al.*, 1998; West and McNamara, 1999).

Arunachalam Sivakumar Department of Orthodontics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India

References

- Chhibber A, Upadhyay M, Shetty V S, Mogra S 2011 Cephalometric comparison of vertical changes between Begg and preadjusted edgewise appliances. European Journal of Orthodontics 33: 712–720
- Gardner R Z, Harris E H, Vaden J L 1998 Postorthodontic dental changes: a longitudinal study. American Journal of Orthodontics and Dentofacial Orthopedics 114: 581–586
- Gkantidis N, Halazonetis D J, Alexandropoulos E, Haralabakis N B 2011 Treatment strategies for patients with hyperdivergent Class II Division 1 malocclusion: is vertical dimension affected? American Journal of Orthodontics and Dentofacial Orthopedics 140: 346–355
- Sivakumar A, Valiathan A 2008 Cephalometric assessment of dentofacial vertical changes in Class I subjects treated with and without extraction. American Journal of Orthodontics and Dentofacial Orthopedics 133: 869–875
- West K S, McNamara J A 1999 Changes in the craniofacial complex from adolescence to mid adulthood: a cephalometric study. American Journal of Orthodontics and Dentofacial Orthopedics 115: 521–532

the hypothesis of the 'wedge effect' could be verified to a greater accuracy. However, as Dr Sivakumar points out himself that the wedge hypothesis has been studied extensively, the objective of this study was to analyse this concept further by trying to understand if there would be a difference between the Begg and PEA treatment techniques in terms of their effect on the facial vertical dimension. The Begg technique relies heavily on the use of anchor bends in archwires with inherent use of Class II elastics for correction of the presenting malocclusion. Such mechanics can cause significant extrusion of the molars, resulting in the possible alteration of the facial vertical dimension.

Canine retraction is frequently performed (Shpack *et al.*, 2007; Burrow, 2010) on a 0.018 inch steel archwire and it does not seem unusual to us to do the same. However, during canine retraction an iatrogenic deep bite is created due to deflection of the wire under the influence of a retraction force (Gjessing, 1994; Upadhyay and Nanda, 2010). This may have been the cause for bite deepening and therefore the intrusion arches were used wherever it was deemed necessary.

Dr Sivakumar brings out an interesting point that the Begg technique has an inherent differential anchor support as it pits bodily movement of the anchor unit against tipping and uprighting movements of the anterior teeth. However, despite this, we observed no difference between the two groups indicating that probably the uprighting phase had a significant strain on the anchor unit during torqueing, resulting in posterior anchor loss. However, this is just a theoretical assumption which makes perfect mechanical sense. In order to generate evidence for such an effect, lateral cephalograms taken before and after the uprighting phase of the incisors will have to be analysed.

European Journal of Orthodontics 34 (2012) 789–790 *doi:10.1093/ejo/cjs039 Advance Access publication 5 September 2012*

Cautious use of thread shape factor

Sir,

Recently, Migliorati *et al.* (2012) evaluated the correlation between thread depth, thread pitch and thread shape factor (TSF), and maximum insertion torque (MIT) and found the strongest correlation between TSF and MIT (r = 0.902, P = 0.001) with a 2.2-mm cortical thickness of experimental bone. The article is interesting and among few studies in Orthodontics evaluating the prediction power of TSF for clinical decisions. I have some comments on the way they applied the Chapman equation.

Originally, Chapman *et al.* (1996) introduced an equation to correlate various characteristics to predict pull out strength of cancellous screw for orthopaedics application. The equation was as follows:

pull out = shear
$$\times \pi LD_0 \times \left(\frac{1}{2} + \frac{1}{\sqrt{3}}\right)$$

'Residual growth' is often used to describe any changes occurring in the skeletofacial characteristics of the face after majority of the intended growth is completed. These changes might occur even after the removal of orthodontic appliances. Growth of the face in the vertical dimension is generally considered to finish the last amongst the three spatial planes. Therefore, we mentioned that it might be interesting and worthy to observe the long-term changes that occur with these two different techniques.

> Aditya Chhibber and Madhur Upadhyay Division of Orthodontics University of Connecticut Health Center Farmington, CT, USA

References

- Burrow S J 2010 Canine retraction rate with self-ligating brackets vs conventional edgewise brackets. Angle Orthodontist 80: 626–633
- Gjessing P 1994 A universal retraction spring. Journal of Clinical Orthodontics 28: 222–242
- Shpack N, Davidovitch M, Sarne O, Panayi N, Vardimonc A D 2007 Duration and anchorage management of canine retraction with bodily versus tipping mechanics. Angle Orthodontist 78: 95–100
- Upadhyay M, Nanda R 2010 Etiology, diagnosis and treatment of deep overbite. In: Nanda R, Kapila S (eds). Current therapy in orthodontics. Mosby Elsevier, St Louis, pp. 186–198

where *F*, S_{shear} , *L*, D_0 , *d*, and *p* was pull out strength (N), shear strength of the bone (MPa), length of engaged intraosseous part (mm), external diameter of miniscrew (mm), thread depth (mm), and thread pitch, respectively. They introduced $\left(\frac{1}{2} + \frac{1}{\sqrt{3}}d/p\right)$ as the thread shape factor. It is noteworthy that this formula was designated for cylindrical screws, in which cross-sectional area of osseointegrated part is equal through the length of engaged part. More recently, Tsai *et al.* (2009) modified the original formula to be applicable in conical and tapered forms that are used with growing interest in routine practice of various disciplines of medicine and dentistry.

The modified Chapman formula is

$$dF_{\text{pull out}} = S_{\text{shear}}^* \times \left[\pi D_{_0}(x) dx \right] \times \left[\frac{1}{2} + \frac{1}{\sqrt{3}} \frac{D_{_0}(x) - D_i(x)}{2p} \right]$$

Copyright of European Journal of Orthodontics is the property of Oxford University Press / USA and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.