

Letter to the Editor

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An in vitro investigation of peak insertion torque values of six commercially available mini-implants

Dear Sir

The paper in the *European Journal of Orthodontics* by Whang *et al.* (2011) investigates the torque values at which a range of selected mini-implants fracture. While it provides an overview of fracture issues, it is unfortunate that the consistency and density of the test materials are not described, there are multiple discrepancies between the torque values stated in Table 2 and parts of the text, and the diameter of the Infinitas® mini-implant version tested is incorrectly stated in the discussion section as 1.6 mm. More importantly, while the discussion section mentions that the Spider® and Infinitas mini-implants ‘have a more tapered shape’, the authors do not explain the relevance of this detail in terms of their observations that these mini-implants fractured at the lower (apical) third of the body at relatively low torque measurements. Mini-implant body design is a balance between mini-implant size and strength and both the ease of insertion and the achievement of optimum insertion torque. Unfortunately, the discussion section of this paper provides an unbalanced analysis of one of these factors: fixture strength.

The observation of tapered mini-implants fracturing at less than 20 Ncm is at odds with clinical experience and other experimental results, and ideally, the authors should have discussed this disparity. Maximum insertion torque occurs, during insertions into both artificial and human bone, when the relatively wide cervical portion of the tapered mini-implant body engages the cortical plate. It is this insertion measurement, which specifically relates to the 5–15 Ncm range described as optimum for mini-implant stability (Motoyoshi *et al.*, 2006; Wilmes and Drescher, 2009).

However, substantially less torque is encountered as the apical part of a tapered body is inserted through human or artificial cortex. This explains why, in contrast to this *in vitro* study, tapered mini-implant fractures are an unusual clinical occurrence. The exceptions to this occur when the cortex is very dense, in which case most protocols advise cortical pre-drilling/perforation as reported by Whang *et al.* (2011) or a mini-implant contacts a tooth root resulting in a noticeable torque increase. Therefore, it is misleading to directly relate optimum (maximum) insertion torque with the torque at which fractures occur in non-cervical regions of tapered mini-implant bodies. Perhaps, the authors would consider a follow-on study to specifically test fracture torque during insertion of the cervical region of mini-implant bodies since this could be more directly related to both the clinical situation and the current literature on maximum insertion torque values.

Richard R. J. Cousley

*Orthodontic Department, Peterborough and Stamford
Hospitals NHS Foundation Trust, Peterborough, UK*

References

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