

Reply

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Dear Sir,

Thank you for your comments on our article. The diameter of 1.5 mm for ‘Infinitas’ mini-implants is correctly

stated throughout our paper apart from one instance, which you kindly pointed out. We also confirm that there is a discrepancy between the torque values in Table 2 and the

written part of the Discussion. This is due to rounding of the numbers from two digits to one after the decimal place. This should however not cause any confusion to the reader as it should not detract from the overall message of the article.

The density of our testing material was not further investigated as it fulfilled the criteria we proposed for our study: 'soft enough to allow for insertion of the implant and at the same time sufficiently resistant to allow the mini-implants to fracture'. It has been widely acknowledged that bone density is an inconsistent parameter and that it varies significantly within the same patient depending on the location (e.g. mandible versus maxilla) and that it is not homogeneous even within one anatomical area, let alone between individuals or patients from different ethnic backgrounds (Ono *et al.*, 2008).

The outcome of our study is that more tapered shaped mini-implants such as the 'Spider' and the 'Infinitas' screws fractured in the apical part and at lower torque values was not surprising because the diameter in that area is smaller than the diameter stated by the manufacturers. However, the material properties of an implant may have had a greater impact on its torque resistance than its shape and this is why we set out to investigate it. A direct relationship between fracture resistance and the diameter was also discussed by Carano *et al.* (2005) and the authors proposed a minimum diameter of 1.6 mm for clinical use.

Although results of *in vitro* investigations may have implications for clinical applications our study design was not intended to replicate a clinical scenario and aspects such as fixture strength were of no significant relevance to us. Our study aimed at illuminating possible correlations between the design of mini-implants and their predisposition to fracture at particular torque values during insertion. Although it may be interesting to look at torque resistance of mini-implants in the cervical area as torque tends to increase during insertion, I am not aware of any clinical investigation analysing the exact location of the fracture location.

References

- Carano A, Leonardo P, Velo S, Incorvati C 2005 Mechanical properties of three different commercially available miniscrews for skeletal anchorage. *Progress in Orthodontics* 6: 82–97
- Ono A, Motoyoshi M, Shimizu N 2008 Cortical bone thickness in the buccal posterior region for orthodontic mini-implants. *International Journal of Oral and Maxillofacial Surgery* 37: 334–340

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