

Letters to the editor

Mini-implant anchorage: Much is still unknown

Mini-implant anchorage is widely used in our daily clinical practice, however, because of its popularity, basic and clinical research are obviously not enough. This is why we read the article by Talti et al with great interest (Talti U, Alraawi M, Toroglu MS. Effects of size and insertion angle of orthodontic mini-implants on skeletal anchorage. *Am J Orthod Dentofacial Orthop* 2019;156:220-8). We learned much from this article about selecting the insertion degree and anchorage size. We would like to ask the following questions.

First, in this manuscript, the insertion angle is a fixed angle, which is different from our clinical insertion protocol; hence, it cannot mimic the in-vivo implanting situation very well. Clinically, a mini-implant is first inserted vertical to the cortical bone, then, after the sharp end penetrates the cancellous bone, the insertion angle is changed once more to achieve greater bone contact.

Second, the authors chose a 1.6-mm diameter mini-implant rather than a 1.4 mm because of ease in comparing with literature. As the authors mentioned, 1.4 mm is the smallest diameter for commonly used mini-implants, but it is less researched. A discussion of 1.4-mm implants would be valuable.

Third, the authors demonstrated that the cortical bone thickness of the bovine iliac bone used in this experiment is similar to that of human jawbones; however, the authors discussed in detail the effect of bone quality on the correlation between insertion torque and anchorage force values by citing the study of McManus et al,¹ which was not confirmed in this study. In other words, if the study could be experimentally verified by taking into account differences in bone quality in different regions of the maxilla and mandible of humans, it might have made a more convincing addition to the orthodontic literature.

*Wen Liao
Xue Jiang
Chengdu, China*

Am J Orthod Dentofacial Orthop 2019;156:709
0889-5406/\$36.00

© 2019 by the American Association of Orthodontists. All rights reserved.
<http://dx.doi.org/10.1016/j.ajodo.2019.09.005>

REFERENCE

1. McManus MM, Qian F, Grosland NM, Marshall SD, Southard TE. Effect of miniscrew placement torque on resistance to miniscrew movement under load. *Am J Orthod Dentofacial Orthop* 2011; 140:e93-8.

Author response

We thank Dr Liao and Dr Jiang for their interest and comments on our article. They underlined that the fixed-insertion angle we used is a bit different from their clinical protocol. Actually, in our clinical practice, when we insert mini-implants into maxillae, we change the angle as described by the authors. However, in the mandible, we use a fixed-angle protocol to prevent excessive bone compression and implant failure or fracture. Thus, the first reason for choosing a fixed-angle protocol in our study was to provide standardization of exact angles (90° and 70°). As is known, the insertion angle is set by rule of thumb in the clinical setting. The second reason was to compare our results with literature. The fixed-insertion angle protocol is mostly used in the relevant literature.¹⁻³

Second, the authors asked for a comparison of literature with 1.4-mm diameter mini-implants. Decreased insertion torque and anchorage force values might be expected for small diameter implants compared with large diameter ones. On the other hand, small diameter implants are more prone to breaking during insertion in subjects with excessive bone compression. In a previous clinical study,⁴ it was reported that failed mini-implants with 1.4-mm diameter had significantly higher insertion torque values (10.7 ± 1.9 Ncm) than successful ones (8.5 ± 2.1 Ncm). Suzuki et al⁵ reported that miniscrews with diameters of 1.3 mm should be placed with insertion torques <10 Ncm for safe orthodontic anchorage without failure. Thus, the combined effects of the corresponding parameters (increments in length and oblique insertion angle) that increase insertion torque values should be considered more carefully when using small diameter mini-implants, such as 1.4 mm, especially in regions with thick cortical bone and high bone density.

Third, the authors underlined our discussion about the effect of bone quality on the correlation between insertion torque and anchorage force values. The authors argued that this topic was not confirmed by