

## Letters to the editor

### Mini-implant anchorage: Much is still unknown

**M**ini-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,<sup>1</sup> 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.

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### 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

**W**e 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.<sup>1-3</sup>

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,<sup>4</sup> it was reported that failed mini-implants with 1.4-mm diameter had significantly higher insertion torque values ( $10.7 \pm 1.9$  Ncm) than successful ones ( $8.5 \pm 2.1$  Ncm). Suzuki et al<sup>5</sup> 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

McManus et al.<sup>2</sup> Actually, the aforementioned study revealed significant correlation between insertion torque and anchorage force values when miniscrews placed in the maxilla ( $1.62 \pm 0.57$  mm cortical bone thickness) were considered. However, the authors reported that no significant relationship was present for mandibular ( $2.13 \pm 0.66$  mm cortical bone thickness) miniscrews.<sup>2</sup> It is known that cortical bone thickness is one of the parameters determining bone quality.<sup>6</sup> The bone quantity and quality for mini-implant insertion were determined by investigating the cortical bone thickness and bone dimensions in recent literature.<sup>7,8</sup> Thus, it can be possible to argue that significant correlations between insertion torque and anchorage force values are present in all angle, diameter, and length variables but not in all bone quality variables.

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## Dentoskeletal morphology in Class I and Class II malocclusion with increased overbite

It was a great pleasure to read the article titled, "Dentoskeletal morphology in adults with Class I, Class II Division 1, or Class II Division 2 malocclusion with increased overbite" (Uzuner FD, Aslan BI, Dinçer M. *Am J Orthod Dentofacial Orthop* 2019;156:248-56). The authors have mentioned that overbite was measured as the distance between the incisal tips of the mandibular and maxillary central incisors perpendicular to the occlusal plane. The authors have nowhere mentioned about the use of casts in this study. If the overbite was measured using only lateral cephalograms, as it seems to be, the accuracy of the measured values becomes questionable. If casts were available, the authors could have evaluated the effect of tooth size-arch length discrepancies, Bolton discrepancies, macrodontia, and microdontia on the overbite as part of the dental morphology.

The study was carried out using lateral cephalograms, which are 2-dimensional images, and the authors have concluded that an increased overbite may occur in different craniofacial patterns and fail to demonstrate a characteristic craniofacial morphology. However, with lateral cephalograms, transverse dimension cannot be ascertained. It is possible that discrepancies in the transverse dimensions may be the root cause of an increased overbite. For example, narrow arches may lead to crowding in the maxillary or mandibular arches or both and a possible increase in overbite as a consequence. Their conclusion, in which the authors have mentioned that the sagittal position of both jaws did not have any influence on the amount of overbite, seems to be inappropriate.

The authors evaluated adult patients who were in cervical stage 6, which means the outcome of sagittal discrepancies between the jaws has already occurred. When there is sagittal discrepancy between the maxilla and mandible, as in case of Class II Division 1, a lack of stable incisor contact causes extrusion of the incisors, which contributes to an increase in overbite gradually during the growth period. It would have been appropriate to mention that irrespective of the sagittal position of both jaws, overbites of various extent were observed.

The authors' conclusions that lower incisor intrusion seems to be the main treatment concept in Class II Division 1 malocclusion should be clinically decided only after overall evaluation of the patient, particularly, the maxillary incisor visibility in rest position and smile, upper lip length, and presence or absence of gummy smile.