Authors' response

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In the treatment plan, extracting the impacted canines that would be replaced by the first premolars was selected not only because of the severity of the position of the impacted canines, but also to eliminate the potential adverse effects associated with an orthodontic-surgical approach. Our case report was intended to be somewhat provocative, because a good-looking smile and a well-functioning occlusion (at least in the middle term) were obtained with an unusual extraction pattern.

The second question of Drs Feng and Zhao regards the clinical management of the maxillary first premolars. When preadjusted appliances are used, it is advisable to use the corresponding bracket for each tooth to maintain the correct values of in and out and torque. Accordingly, we used a $-7^\circ$ Tq/0 tip preadjusted maxillary premolar bracket (Victory series; 3M Unitek, Monrovia, Calif); as mentioned in the article, some slight negative torque was added in the finishing stage. The maxillary premolar crowns were long, and canine guidance was easy to achieve. Reduction of the maxillary premolar palatal cusps was not performed because a careful evaluation of the static and dynamic occlusion did not show a need for equilibration.

Davide Mirabella
Gabriella Giunta
Luca Lombardo
Ferrara and Verona, Italy

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Rate of orthodontically induced tooth movement

With interest, we read the recent study reported by Dudic et al in the May 2013 issue of the AJO-DO (Dudic A, Giannopoulou C, Kiliaridis S. Factors related to the rate of orthodontically induced tooth movement. Am J Orthod Dentofacial Orthop 2013;143:616-21). Above all, we sincerely congratulate the authors for their efforts and contribution. Nevertheless, we have concerns about the amount of tooth crowding of the patients involved in this study.

First, why were the patients required to have severe crowding in both jaws? Other malocclusions—eg, bimaxillary protrusion—might also need premolar extractions, but with no or mild crowding. What’s more, the crowding situation shown in Figure 1 was mild, but the inclusion criterion was for severe crowding.

Second, according to the study, the intra-arch obstacle, which is mainly from the adjacent teeth, significantly decreased the displacement of the teeth. That is, the crowding situations in the experimental and the control teeth influenced the movement velocity and the amount of displacement. However, the authors did not clearly interpret the region of crowding in these patients. Severe crowding in the anterior segment should have less of an obstacle effect on premolar displacement.

In addition, the authors evaluated the tooth displacements when intra-arch or interarch obstacles were present. However, both intra-arch and interarch obstacles could have been present; these would greatly impair the movement velocity and the displacement of teeth. Evaluation of this situation was absent in the study. It might be advisable to extract the premolars early in patients with severe crowding and interarch obstacles to tooth movement if they are scheduled for premolar extractions.

Yongwen Guo
Chengdu, Sichuan, China

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Authors’ response

We would like to thank Dr Yongwen Guo for his questions about our article, since this allows us to clarify certain points and prevents misunderstandings and wrong interpretations of the purpose and findings of the study.

Concerning the first point, we agree that the indications for premolar extractions are more than severe crowding. Therefore, situations with moderate crowding in patients with dental protrusion were considered to be severe crowding, since no option other than premolar extractions could be the treatment of choice. This was the case for the patient shown in Figure 1 for whom tooth crowding in the maxillary and mandibular arches demanded 4 premolar extractions.

Regarding the second point, an intra-arch obstacle to the movement of the experimental teeth was independent of the amount of the crowding in the arch. For example, patients with the same degree of crowding could have (1) nicely aligned premolars without an intra-arch...
obstacle with localized crowding in the anterior region and (2) premolars with irregular positions and intra-arch obstacles by the adjacent teeth. Therefore, we did not attempt to relate our experimental tooth movements with the general space conditions in the arch; rather, we preferred to indicate whether the experimental teeth could move freely during the experimental period. As far as we know, our study was the first to focus on this aspect, indicating the importance of intra-arch obstacles in this type of tooth movement. Therefore, our findings suggest that in future studies, the degree of severity of intra-arch obstacles that might be independent of the general space conditions of the arch could be useful information to further understand the importance of this factor.

We agree with Dr Guo that there might be an additive impeding effect on tooth movement when intra-arch and interarch obstacles are simultaneously present. However, in our study, as shown in the “Results,” both factors were not simultaneously present, so this did not allow this kind of evaluation.

Last but not least, we want to stress that our study focused on factors influencing this kind of experimental tooth movement and does not provide evidence to support Dr Guo’s suggestion that “It might be advisable to extract the premolars early in patients with severe crowding and interarch obstacles to tooth movement if they are scheduled for premolar extractions.”

Alexander Dudic
Catherine Giannopoulou
Stavros Kiliaridis
Geneva, Switzerland

Factors related to rate of tooth movement

It was fascinating to read the investigation about the factors related to the rate of tooth movement in the May 2013 issue of the AJO-DO (Dudic A, Giannopoulou C, Kiliaridis S. Factors related to the rate of orthodontically induced tooth movement. Am J Orthod Dentofacial Orthop 2013;143:616-21). We appreciate the authors for their great efforts in contributing to the theory of tooth movement.

The authors investigated the relationship between buccal tooth tipping and subject-related factors (age and sex) as well as tooth-related factors (location and interference). They reported that younger subjects showed greater tooth movement velocity than did older subjects, and interarch or intra-arch obstacles decreased the amount of tooth displacement. However, some additional considerations should have been mentioned in this study.

First, the authors stated that the subjects met the criterion of severe crowding in both jaws. However, the maxillary dental arches in Figures 1 and 2 do not seem to show severe crowding. Maybe the subjects’ eligibility should have been more carefully verified. In addition, the investigators moved premolars buccally. In such a model, the location of the crowding could affect tooth displacement more than the severity of crowding. Severe crowding on the contralateral control side might not influence tooth displacement in the experimental group, but mild crowding on the experimental side might decrease tooth displacement significantly and influence the result.

Second, the continuity of the force could play a crucial role in orthodontic tooth movement. In similar models, Lundgren et al. and Owman-Moll et al. reactivated the archwire weekly to prevent force decay. However, in this study, the investigators checked the force after 4 weeks. Because other factors, such as length of the archwire and the patient’s diet, could influence force decay, the variation of force was undoubtedly different among the subjects over such a long period, and, accordingly, could have led to different rates of tooth movement in this trial.

Last, it might be disputable to consider that younger subjects showed greater tooth movement velocity than did older subjects simply by comparing the different ages of the participants. The authors failed to exclude other confounding factors such as the patients’ growth patterns, tooth locations, and interferences of teeth in the study design. That is to say, the baseline characteristics of the patients were not comparable in the 2 groups.

Shanbao Fang
Juan Li
Chengdu, Sichuan, China

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