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READER'S FORUM

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Orthodontic treatment of gummy smile by maxillary total intrusion with a midpalatal absolute anchorage system.

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Q1. Common complications of intrusion include root resorption and relapse. The optimal force for intrusive movement is quite smaller than that for other types of orthodontic tooth movement. Given that the amount of force applied for intrusion of whole maxillary dentition was 800 to 1,000 g in this study, what is the scientific base for the selection of this specific force magnitude?

Q2. To reduce the possibility of relapse, maintaining the altered tooth position by fixed appliances was required for a few months in certain cases. Could you explain why the fixed appliances were removed right after 9 months of intrusion?

Q3. Using only one screw implant could be vulnerable to rotational force. Have you experienced any problem from rotation of the safe-multifunctional-solid (SMS) screws during installation of the power arms and elastomeric chains?

Q4. How did you manage the loosened SMS screws during active treatment?

Q5. In Figure 6B the modified lingual arch is bonded closely to the palatal gingival surface. It seems that it could disturb intrusion or raise periodontal problems such as inflammation and deepening of periodontal pockets. Were there any complications related with the vertical position of the modified lingual arch?

Questioned by
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A1. In the past 80 years, the concept of optimal force has changed considerably. Schwarz[1] proposed the classic concept of the optimal force as "the force leading to a change in tissue pressure that approximated the capillary vessels' blood pressure, thus preventing their occlusion in the compressed periodontal ligament." Schwarz's definition was slightly modified by Oppenheim[2], who advocated the use of the lightest force capable of bringing about tooth movement, and by Reitan[3], who demonstrated cell-free compressed areas within the pressure site even in cases where light forces were applied and also advocated the use of very light forces.

The current concept of optimal force is based on the hypothesis that a force of a certain magnitude would be capable of producing a maximum rate of tooth movement without tissue damage and with maximum patient comfort. The optimal force for tooth movement may differ for each tooth and for each individual patient. The majority of the articles concerning the optimal force or range of forces for orthodontic tooth movement are on animal experiments. Furthermore, hardly any experiments were reported to provide information on the relation between the velocity of tooth movement and the magnitude of the applied force. At this point in time, it appears that no evidence-based force level can be recommended for the

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optimal efficiency in clinical orthodontics. In this case, we purposed to move the maxillary dentition from second molar to second molar as a unit and a heavy orthodontic force of 800 to 1,000 g was applied.

A2. To improve stability, strategies such as slow tooth movement, overcorrection, longer retention periods, and active retention methods should be considered. Maintaining the altered tooth position for a few months before debonding should be also considered. Because there is no effective way to retain an intruded tooth, a tooth displaced intrusively is much less stable than one displaced either mesiodistally or rotationally. In this case, slow intrusive movement (9 months) of the maxilla and overcorrection were used strategically to reduce possibility of relapse.

A3. In our experience, the SMS screw is not stable against rotational movements when the power arm is loaded with a force system generating a moment, such as when force is applied anteroposteriorly to only one of the power arms during placement of the appliance. A solution is to fix one of the arms in place with a ligature wire, activate the second arm, and then activate the first arm.

A4. The posterior region of the midpalate is suitable for micro-implant placement. The midpalatal area within 3 mm of the suture actually has the densest bone in the entire palate. The midpalatal mucosa remains a uniform thickness of 1 mm posterior to the incisive papilla. The median and paramedian areas of the palate (except for the incisive canal region) have another obvious advantage: they contain no nerves, blood vessels, or roots. These anatomical factors ensure biomechanical stability for SMS micro-implant placed in the posterior region of the midpalate. Because the posterior region of the midpalate is wide, SMS micro-implant is relocated immediately or later when loosened.

A5. In this case, there were no periodontal complications related to vertical position of the modified lingual arch during treatment. When gingival remodeling is slow during intrusion, however, periodontal problems such as swelling and/or inflammation of the gingiva can occur due to orthodontic appliance. In this situation, therefore, the position of the appliance should be considered and located far from the gingiva as much as possible.

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