

Comparison of direct and indirect skeletal anchorage systems combined with 2 canine retraction techniques

Serkan Ozkan^a and Mehmet Bayram^b

Ordu and Trabzon, Turkey

Introduction: We compared the effectiveness of 2 canine retraction springs and anchorage systems (direct and indirect skeletal anchorage) in patients requiring first premolar extractions and maximum anchorage in the maxilla. **Methods:** Thirty-six patients were included (17 male, 19 female; mean age, 16.8 ± 2.4 years). A mini-implant-supported Nance appliance with indirect skeletal anchorage system was used in 18 patients and a mini-implant-supported direct skeletal anchorage system in the remaining patients. In each patient, a segmental retraction arch with a reverse closing loop was applied to a maxillary canine, and a Ladanyi spring (Dentaurum, Ispringen, Germany) was applied to the other canine randomly after extraction of the maxillary first premolars. The retraction process was continued until a Class I canine relationship was obtained. Lateral cephalometric films and orthodontic casts taken before and after retraction in the distalization process were used to evaluate changes during canine distalization. The measurements were statistically evaluated using paired and independent *t* tests with 95% confidence intervals. **Results:** The reverse closing loop and the Ladanyi spring were found to be effective in canine distalization ($P \leq 0.001$). There were no statistically significant differences between the reverse closing loop and the Ladanyi spring with regard to canine distalization rates ($P \geq 0.05$). Both systems were effective in providing maximum anchorage ($P \geq 0.05$); no statistically significant differences were detected in molar anchorage loss rates between the 2 methods ($P \geq 0.05$). **Conclusions:** These 2 systems can be used during segmental distalization of canines requiring maximum anchorage with no significant anchorage loss. (Am J Orthod Dentofacial Orthop 2016;150:763-70)

Loss of anchorage is a common problem faced during maximum anchorage orthodontic treatment, and prevention of this plays a significant role in the design of the orthodontic appliances.¹ For a patient with a Class II occlusion, if the treatment plan is the extraction of the premolars, the maxillary canines must be distalized completely to the extraction sites. Therefore, anchorage reinforcement of the posterior teeth must be ensured using intraoral or extraoral appliances.²

Previously, extraoral appliances were the only way to provide maximum anchorage, but their use was limited

because they required patient cooperation. As a result, intraoral appliances became increasingly popular among clinicians for obtaining anchorage. However, popular intraoral appliances, such as palatal and lingual bars, Nance appliances, and intermaxillary elastics, have undesired side effects: protrusion, extrusion, and tipping.³

Anchorage problems encountered during the use of intraoral mechanics led to increased use of implant-borne mechanics. However, these had several limitations, such as excessive waiting times for osseointegration. These limitations were prevented by the introduction of orthodontic mini-implants as intraoral anchorage units. These implants were developed as an alternative to conventional molar and other intraoral anchorage units.

Orthodontic mini-implants can be used either directly or indirectly. Direct anchorage refers to the movement of teeth using orthodontic mini-implants, whereas indirect anchorage refers to the stabilization of certain teeth in the dental arch and subsequent use of these stabilized anchors to move other teeth.⁴ Indirect skeletal anchorage systems are preferred by clinicians when the direct skeletal anchorage system is not applicable, such as in patients with proximity of the roots.

^aAssistant professor, Department of Orthodontics, Faculty of Dentistry, Ordu University, Ordu, Turkey.

^bAssociate professor, Department of Orthodontics, Faculty of Dentistry, Karadeniz Technical University, Trabzon, Turkey.

All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

Address correspondence to: Serkan Ozkan, Department of Orthodontics, Faculty of Dentistry, Ordu University, 52100, Ordu, Turkey; e-mail, dtserkanozkan@gmail.com.

Submitted, November 2015; revised and accepted, April 2016.

0889-5406/\$36.00

© 2016 by the American Association of Orthodontists. All rights reserved.

<http://dx.doi.org/10.1016/j.ajodo.2016.04.023>

In extraction patients, canine retraction can be carried out with fixed appliances using frictional or nonfrictional methods.⁵ The popularity of the nonfrictional method increased when Burstone⁶ reported its advantages. Thereafter, many canine retraction springs were introduced and tested for reliability and efficiency.⁷⁻¹⁰

The aim of this study was to compare the efficiency of direct and indirect skeletal anchorage systems combined with 2 canine retraction springs in patients requiring maximum anchorage for maxillary canine retraction.

MATERIAL AND METHODS

After receiving ethical approval from the ethics council of Karadeniz Technical University (protocol number, B302KTU0200000/637), we conducted a pilot study to calculate the total sample size. Twenty patients were recruited for the pilot study at the beginning of the treatment, and a number from 1 to 20 was assigned to each patient. Using a randomization Web site, 4 columns of the random array of numbers were created. According to the 4 randomized number strings, patients were assigned to the following groups: (1) direct skeletal anchorage, Ladanyi spring (LS) (Dentaurum, Ispringen, Germany) on the left side; (2) direct skeletal anchorage, LS on the right side; (3) indirect skeletal anchorage, LS on the left side; and (4) indirect skeletal anchorage, LS on the right side. After randomization, the canine distalization method was applied to every patient according to the patient's assigned group. As the distalization finished, all cephalometric and cast materials were measured, and the power of the study was determined. Meanwhile, we continued to recruit new patients for the study. According to our pilot study, power calculations with G*Power (version 3.1.3; Franz Faul, Christian-Albrechts-Universitat, Kiel, Germany), group sample sizes of 16 achieved 82% power to detect a difference of 1.5mm between the null hypothesis that both group means were 1.7mm and the alternative hypothesis that the mean of group 2 was 0.1mm, with estimated group standard deviations of 1.2mm and 1.7mm at a significance level (alpha) of 0.05 using a 2-sided, 2-sample *t* test. Thus, 16 additional patients were recruited to guarantee the exact power with a total of 36 patients (17 male, 19 female; mean age, 16.8 ± 2.4 years). The aforementioned randomization method was applied to these patients as well.

Patients receiving maximum anchorage with extraction of the maxillary first premolars were included in the study. The inclusion criteria were (1) permanent dentition, (2) good oral hygiene, (3) Class I or Class II skeletal pattern, (4) no anomaly in the transverse direction, (5) no maxillary canine with supraposition or excessive rotation, (6) no systemic disorder that contraindicated



Fig 1. The palatal region after mini-implant insertion in the indirect skeletal anchorage group.



Fig 2. Nance appliance built for the indirect skeletal anchorage group.

orthodontic treatment, and (7) no systemic or allergic disorder that contraindicated the application of skeletal anchorage units.

The maxillary first premolars were extracted to resolve the crowding in all patients. In the direct skeletal anchorage group, 2 mini-implants (Aarhus; American Orthodontics, Sheboygan, Wis; 1.5-mm diameter, 8-mm length) were inserted into the buccal aspect between the roots of the maxillary first molars and second premolars at an angle of 15° to 20° . In the indirect skeletal anchorage group, after determination of the insertion areas using cephalometric radiographs and dental casts, 2 of the same mini-implants were inserted into the paramedian section of the palatal area (Fig 1).

Appropriate molar bands (3M Unitek, Monrovia, Calif) were chosen and adapted to the maxillary molars.

Download English Version:

<https://daneshyari.com/en/article/5637756>

Download Persian Version:

<https://daneshyari.com/article/5637756>

[Daneshyari.com](https://daneshyari.com)