

Indirect vs direct bonding of mandibular fixed retainers in orthodontic patients: Comparison of retainer failures and posttreatment stability. A 2-year follow-up of a single-center randomized controlled trial

Fabienne Egli,^a Efstathia Bovali,^b Stavros Kiliaridis,^a and Marie A. Cornelis^c
Geneva, Switzerland, Thiva, Greece, and Aarhus, Denmark

Introduction: The objectives of this 2-arm parallel trial were to compare the numbers of failures of mandibular fixed retainers bonded with indirect and direct methods and to investigate the posttreatment changes 2 years after placement. **Methods:** Sixty-four consecutive patients from the postgraduate orthodontic clinic of the University of Geneva in Switzerland were randomly allocated to either an indirect or a traditional direct bonding procedure of a mandibular fixed retainer at the end of their orthodontic treatment (T0). Eligibility criteria were the presence of the 4 mandibular incisors and the 2 mandibular canines, and no active caries, restorations, fractures, or periodontal disease of these teeth. The patients were randomized in blocks of 4 (using an online randomization service) with allocation concealment secured by contacting the sequence generator for assignment. The patients were recalled 12 months and 24 months (T3) after retainer bonding. The main outcome was any first-time failure of retainers (ie, at least 1 composite pad debonded or fractured); unexpected posttreatment changes of the mandibular incisors and canines were a secondary outcome. Impressions and lateral cephalograms were taken at T0 and T3; changes in mandibular intercanine and interpremolar distances and mandibular incisor inclination were assessed. Blinding was applicable for outcome assessment only. The chi-square test and Cox regression were used to compare the survival rates of the retainers bonded with direct and indirect methods. Paired *t* tests were used to assess differences in intercanine and interpremolar distances and mandibular incisor inclination at T0 and T3. Significance was set at $P < 0.05$. **Results:** Sixty-four patients were randomized in a 1:1 ratio. One patient dropped out at baseline, and 3 patients did not reach the T3 recall. In 24 of 60 (40%) patients, the fixed retainer failed within 2 years: 13 of 30 (43%) in the indirect bonding group and 11 of 30 (37%) in the direct bonding group (log-rank test, $P = 0.64$). The hazard ratio was 1.26 (95% confidence interval, 0.56-2.81; $P = 0.58$). Bond failures occurred mainly during the first year. There were no clinically significant changes in mandibular intercanine distance, interpremolar distance, and incisor inclination between T0 and T3, or between groups. In 5 patients (17%), all in the direct bonding group, unexpected posttreatment changes, systematically consisting in a lingual inclination of the mandibular left canine, were observed. In 1 patient (3%), the change was considered clinically severe. No other serious harm was observed. **Conclusions:** There was no difference in the risks of failure between mandibular retainers bonded with direct and indirect methods. Bonded retainers are effective in maintaining intercanine and interpremolar distances. There seem to be fewer unexpected posttreatment changes

^aDivision of Orthodontics, School of Dentistry, University of Geneva, Geneva, Switzerland.

^bPrivate practice, Thiva, Greece.

^cSection of Orthodontics, Department of Dentistry, Aarhus University, Aarhus, Denmark.

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

Address correspondence to: Marie A. Cornelis, Section of Orthodontics, Department of Dentistry, Aarhus University, Vennelyst Boulevard, 9, DK-8000 Aarhus C, Denmark; e-mail, marie.cornelis@dent.au.dk.

Submitted, May 2016; revised and accepted, September 2016.
0889-5406/\$36.00

© 2017 by the American Association of Orthodontists. All rights reserved.
<http://dx.doi.org/10.1016/j.ajodo.2016.09.009>

with retainers bonded with the indirect compared with the direct method. **Registration:** The trial was not registered. **Protocol:** The protocol was not published before trial commencement. **Funding:** No funding or conflict of interest to be declared. (*Am J Orthod Dentofacial Orthop* 2017;151:15-27)

The use of a lingual fixed retainer is crucial for maintaining stability in the mandibular anterior region of most patients after orthodontic treatment.^{1,2} To ensure this stability, orthodontists need fixed retainers with limited risks of bond failure and posttreatment changes related to distortion or residual activity of the wire. A mandibular fixed retainer from canine to canine is the most used and accepted method for long-term retention. The first direct bonded retainer was introduced by Knierim.³ In 1977, Zachrisson⁴ introduced the multistranded bonded lingual retainer, which, although varying in wire types, diameters, and bonding procedures, has become the gold standard.⁵

Although a rigid mandibular retainer bonded on the canines only is described as solid and easy to place,⁶ it does not prevent relapse of the incisors.² Renkema et al² found an increase in irregularity index with a mandibular fixed retainer bonded on the canines only within a 5-year posttreatment period.

Retainers can be bonded with a direct or an indirect bonding method. The direct bonding method requires the construction of a retainer on the patient's cast, subsequently bonded and light-cured in the mouth, after using a transfer key to keep the retainer wire in the right position. The indirect bonding method relies on the preparation of composite pads on the patient's cast to be bonded using a transfer tray covering the retainer and composite pads. Indirect bonding of a mandibular fixed retainer is a clinically faster procedure than direct bonding.⁷

A recent systematic review about fixed retainers reported a wide variety in protocols, differing in number of teeth bonded (all 6 anterior teeth vs canines only), bonding material, type and dimension of wires.⁸ The authors also reported wide variations in the risks of bond failure, varying from 3.5%⁶ to 53%⁹ for metallic retainers and from 11%¹⁰ to 51%¹¹ for glass fiber reinforced retainers. It was suggested that most fixed retainer failures occur during the first 3 to 6 months, whereas the probability of failure significantly drops after a year.¹²⁻¹⁴ Most studies evaluating the failure risk of mandibular fixed retainers are retrospective, without clinical information concerning wire preparation or bonding method, and with clinical procedures performed by different operators, resulting in wide variations in

so-called operator sensitivity.¹⁵ A few long-term prospective studies have compared the survival rates of different designs of mandibular fixed retainers with a direct bonding method.^{9,11,16-19} However, only 2 prospective studies have investigated the influence of direct vs indirect bonding methods on survival rates, with follow-ups limited to 6 months.^{7,20} Therefore, long-term prospective studies are needed to evaluate whether there is an influence of the bonding method (direct or indirect) on the failure rate and to identify the most effective mandibular fixed retainer in the long run.

Regarding posttreatment stability, unexpected movements of anterior teeth have been reported and are related to an active component of the wire or an operator-induced elastic deflection of the wire during bonding of a fixed retainer.^{12,19,21} It could be hypothesized that the indirect bonding method, where the wire is locked in a fixed position with the composite pads already prepared, could offer the advantage of bonding the wire absolutely passively, therefore preventing unexpected posttreatment movements. It has not been previously investigated whether direct vs indirect bonding procedures could induce different outcomes in terms of unexpected posttreatment changes.

In general, stability after orthodontic treatment is variable, but the highest posttreatment relapse within 10 years was found to occur during the first 2 years after debonding.¹ Therefore, a follow-up period of 2 years seems appropriate for a long-term assessment of mandibular fixed retainers.

Specific objectives and hypotheses

The aims of this study were (1) to assess the numbers of failures of direct and indirect bonded retainers at 2 years and to determine the time frame associated with the highest risk of debonding, and (2) to investigate the posttreatment changes (failure of stability) 2 years after bonding of mandibular fixed retainers, with either the indirect or direct bonding method.

Our hypotheses were the following: (1) the numbers of failures 2 years after bonding mandibular fixed retainers with indirect or direct bonding are similar, and most debondings occur within the first year; and (2)

Download English Version:

<https://daneshyari.com/en/article/5637516>

Download Persian Version:

<https://daneshyari.com/article/5637516>

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