Unexpected complications of bonded mandibular lingual retainers

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Introduction: The flexible spiral wire (FSW) retainer is the most frequently used type of fixed retainer bonded on all 6 anterior teeth. Our aim in this article was to demonstrate unexpected posttreatment changes in the labiolingual position of the mandibular anterior teeth associated with the use of FSW retainers. Methods: During a 3-year period, patients attending the postgraduate orthodontic clinic of the Department of Orthodontics and Oral Biology, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands, for regular, posttreatment follow-up appointments were screened for unexpected posttreatment changes in the mandibular anterior region. Results: Twenty-one patients with FSW retainers bonded on all 6 mandibular anterior teeth presented unexpected posttreatment changes in that region. Almost half of these patients were assessed as needing retreatment. Two patients are presented to illustrate the 2 distinct patterns of posttreatment changes: torque difference between 2 adjacent mandibular incisors and increased buccal inclination and movement of one mandibular canine. Conclusions: FSW retainers bonded on the 6 mandibular anterior teeth might cause unexpected movements of anterior teeth to such an extent that retreatment is necessary. Clinicians should consider this possibility when planning the retention strategy. (Am J Orthod Dentofacial Orthop 2007;132:838-41)

The stability of the treatment result is an important issue in orthodontics. Studies evaluating longitudinal posttreatment records have shown remarkable relapses in several occlusal traits, especially the alignment of the mandibular anterior teeth.1-9 To avoid relapse in the mandibular anterior region, various types of removable or fixed retainers are used either for an extended period of time or permanently. Two types of fixed retainers are mainly used: retainers bonded only on the lingual surfaces of the canines (3-3 retainers) and retainers bonded on all 6 anterior teeth.10-12 The most frequently used type of fixed retainer bonded on all 6 anterior mandibular teeth is the flexible spiral wire (FSW) retainer.

Several advantages and disadvantages of fixed retainers have been described in the literature (see the article by Zachrisson and Buyukyilmaz13 for a review). However, we have noticed over the years that FSW retainers in the mandible are sometimes related to unexpected posttreatment changes in the labiolingual inclination or position of mandibular anterior teeth; to our knowledge, this has not been discussed until now.

Our aims in this article are to show these unexpected posttreatment changes in the labiolingual position of mandibular anterior teeth associated with FSW retainers and to discuss aspects that should be considered in the planning of orthodontic retention.

CASE PRESENTATIONS

The postgraduate orthodontic clinic of the Department of Orthodontics and Oral Biology, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands, schedules regular follow-ups at 1, 2, 5, and 10 years after treatment. During the follow-up visits of the last 3 years, 21 patients were identified with unexpected posttreatment changes in the mandibular anterior region, although after treatment all these patients had received FSW retainers bonded on the 6 mandibular anterior teeth. Almost half of these patients needed retreatment.

Two distinct patterns of posttreatment changes were recognized in these 21 patients: torque difference between 2 adjacent mandibular incisors (18 patients) and increased buccal inclination and movement of 1 mandibular canine (3 patients). One patient from each group is presented to illustrate these patterns of posttreatment changes.
Torque difference between 2 adjacent mandibular incisors (patient 1)

This male patient, who was treated with fixed appliances in both jaws because of crowding, visited our clinic at the age of 16.8 years for his regular 2-years posttreatment follow-up. During the clinical examination, marked differences in labiolingual inclination were seen in the mandibular central incisors; the left central incisor had excessive lingual root torque, and the right central incisor had buccal root torque. These tooth movements took place even though the bonded retainer of .0195-in 3-strand heat-treated twist flex wire (Wildcat; GAC International, Bohemia, NY) was still in place (Fig 1, A-C). This difference in labiolingual inclination, also expressed as a difference in the height of the clinical crowns (Fig 1, C), was not present either before (Fig 1, D and E) or after treatment (Fig 1, F and G).
Increased buccal inclination and movement of a mandibular canine (patient 2)

This 13.5 year-old female patient, treated with fixed appliances in both jaws because of palatally erupting canines, had a notable change in the position of the mandibular left canine at her 1-year posttreatment visit. This canine, buccally inclined and distobuccally rotated, could not occlude properly with its antagonists (Fig 2, A and B); the retainer of .0195-in 3-strand heat-treated twist flex wire (Wildcat; GAC International) was still in place. This unfavorable canine position was not evident either before (Fig 2, C and D) or after treatment (Fig 2, E and F).

DISCUSSION

These 2 patients demonstrate that the use of FSW retainers in the mandible is sometimes associated with unexpected posttreatment changes in the mandibular anterior teeth. They represent 21 patients with problems who were identified during regular follow-up visits in a 3-year period. We estimate that about 5% of the patients who received this type of retainer have 1 of these complications.

Of the 2 clinical situations in our patient group, the difference in torque between 2 adjacent mandibular incisors appears to be the most common. Pizarro and Jones14 presented 2 cases with FSW retainers in the maxilla, with relapse in crown inclination recorded during the posttreatment period. In both patients, the relapse was toward the pretreatment inclination. However, the striking finding in our patients is that the torque difference between the 2 adjacent incisors was not present either before or at the end of orthodontic treatment. Thus, this posttreatment torque change cannot be characterized as relapse. Although the retainer was always adapted on a working dental cast to be

Fig 2. Records of patient 2: A and B, 1 year posttreatment; C and D, pretreatment records; E and F, end of treatment.
entirely passive, it cannot be excluded that the operator might have induced elastic deflection of the wire during the bonding technique. Furthermore, mechanical deformation of the wire during the posttreatment period, caused by biting on hard food, cannot be excluded.

The clinical pattern in which the inclination and position of a canine changes during the retention period resembles the posttreatment changes in the maxillary central incisors presented by Brenchley, who used a 1:1 FSW retainer. In his 3 patients, Brenchley also observed unexpected movement of 1 of the 2 central incisors in the distolabial direction. This movement was attributed to active straightening of the short piece of wire during function. To overcome this problem, an extension of the retainer to incorporate all 4 incisors was suggested. In our patients, however, all 6 anterior teeth were fixed with the retainer, and the interdental distances between the mandibular anterior teeth are generally rather small. Moreover, these posttreatment changes cannot be considered relapse of the orthodontic treatment, since the canine was not in such an unfavorable position either before or after treatment. The possible etiological factors described above for the torque difference between 2 adjacent mandibular incisors—eg, an active component of the wire, elastic deflection caused by the clinician, and mechanical deformation of the wire—might also hold true for the changes in canine inclination and position.

In both patterns, the answer might be hidden in the mechanical properties that the multi-stranded wires acquired as a result of the fabrication process. Further research on this is required.

Interestingly, none of these posttreatment complications was observed in 235 patients examined at 5 years posttreatment, when thick stainless steel retainers bonded only on the mandibular canines and not on the incisors were used. Although such a retainer might be a good alternative, there is evidence that a relatively high percentage of patients have a slight to moderate increase in posttreatment irregularity of the mandibular incisors with it. For this reason, in patients who require perfect control of the alignment of the mandibular incisors, we now use 0.016 × 0.022-in stainless steel retainers bonded on all 6 anterior teeth with the 0.022-in side in contact with the tooth surface. Both the teeth and the wire surface are prepared by sandblasting the area of fixation. Whether this type of retainer is superior to the other forms of lingual retainers in the long term is not yet known.

The fact that these posttreatment changes needed retreatment in so many patients stresses the importance of early detection. Patients and general dentists should be informed about the possibility of such complications and should be instructed in how to detect them, if possible, at an early stage.

CONCLUSIONS

FSW retainers bonded on all 6 mandibular anterior teeth might induce unexpected movement of anterior teeth to such an extent that retreatment is necessary. Clinicians should consider this possibility when planning their retention strategy.

REFERENCES