Do orthodontic fixed retainers guarantee the stability of dental alignment at the end of orthodontic treatment?

Ra'ed Al-Dboush,*[1] Eman Al-Zawawi[2] and Tarek El-Bialy[3]

A Commentary on

Jedliński M, Grocholewicz K, Mazur M, Janiszewska-Olszowska J.

What causes failure of fixed orthodontic retention? – systematic review and meta-analysis of clinical studies. *Head Face Med* 2021; **17:** 32.

Practice points

- No specific orthodontic fixed retainer is proven to guarantee the stability of alignment after finishing orthodontic treatment.
- In terms of failure rates, there is no difference between wire or fibre-reinforced composite retainers. However, fibre-reinforced composite retainers are more sensitive to the treating orthodontist's skills, as failure rates are increased by poor bonding techniques

Abstract

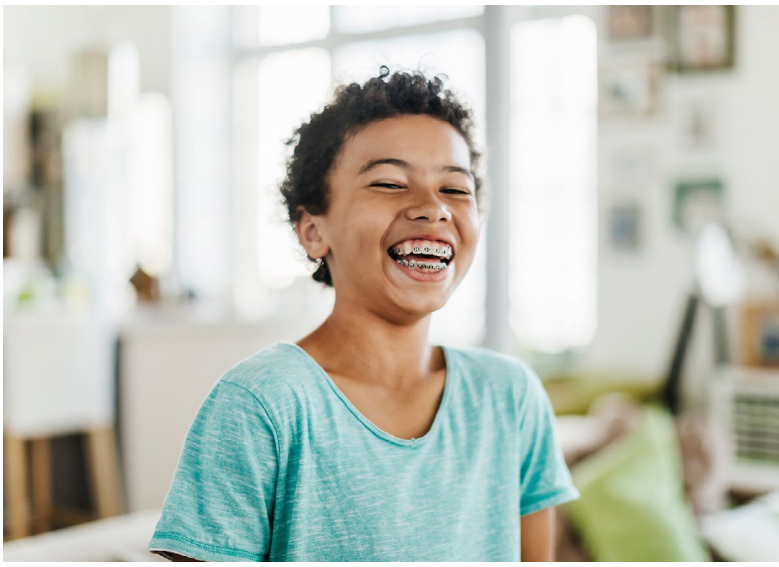
Data sources Electronic searches of studies on orthodontic retainers were conducted up to 12 February 2021 in four electronic databases including Scopus, Web of Science, Embase and PubMed. Only studies in English language were included.

Study selection Only clinical studies were included. The inclusion and exclusion criteria were reported. The initial search identified 117 results. After removing duplicate studies, studies were evaluated against the inclusion criteria. Finally, 21 papers were included. Selection of the studies was performed independently by two reviewers. The included studies assessed the effects of the type of orthodontic wire or fibre splint, the material used to bond it to the teeth and the procedure for bonding on the failure rate of the fixed orthodontic retainers.

Data extraction and synthesis Data extraction was performed independently by two reviewers. They followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines. The following items were extracted: authors, year, type of study, study objective, number of subjects, comparison made, outcome measured and results. Three tools were used to assess the risk of bias of the included studies including the revised tool for assessing risk of bias in randomised trials (RoB 2), the Newcastle-Ottawa Scale for case-control studies and the Newcastle-Ottawa Quality Assessment Form for Cohort Studies. Meta-analysis was performed using the random-effects model.

Results Twenty-one studies were included in the qualitative analysis while seven studies were included in the quantitative analysis. The included studies were three retrospective cohort studies, two case-controlled studies and 16 randomised clinical studies. The results showed that the failure rate of orthodontic fixed retainers ranged from 7.3% to 50%. Failure rates of fixed retainers placed in the maxilla were higher than those placed in the mandible. Previous failure increased the risk of repeat failure. Adhesive failure was considered the most common type of bond failure that was observed in fixed lingual retainers. The type of wire or splint has no effect on the failure rate. Results showed that retainers bonded to all teeth were more efficient in maintaining alignment when compared to retainers bonded on the teeth on the ends only. Indirect bonding techniques have no advantage over direct bonding techniques except for shorter chair time. Bonding fibre-reinforced composite retainers were more sensitive to operator skills, hence failure rates would be high if an incorrect technique was used when bonding.

Conclusions No fixed retainer can guarantee the stability of alignment stability after orthodontic treatment. Retainers that are bonded to all teeth are preferable to those bonded only at the ends of the wire. Wires and fibre splints were similar regarding failure rates and stability of alignment.



© Tom Werner/DigitalVision/Getty Images Plus

GRADE rating ●●○○

Commentary

Orthodontic retention is considered a crucial and challenging part of orthodontic treatment that starts directly after finishing active orthodontic tooth movement.[1] The aim of this phase is to prevent the relapse of the teeth to their pre-treatment positions. There are two options for orthodontic retention, either short-term retention using removable appliances, such as Hawley retainers and vacuum-formed retainers, or long-term retention using fixed orthodontic retainers. Fixed retainers are considered less dependent on the patient's compliance when compared to removable retainers.

Within the National Health Service (NHS), both short-term retainers and long-term retainers (that is, fixed retainers) require regular monitoring by the treating orthodontist for a minimum of 12 months after finishing active orthodontic treatment.[2] Indeed, fixed retainers should be checked regularly in the first two years of retention,[3] as it is reported that most common failures of fixed retainers occur in the first two years post-treatment.[4] These failures could occur due to bonding failure in the interface between the adhesive and the tooth surface (that is, enamel), deformation of the wire, breakage of the wire, or untwisting of the wires. The materials that could be used to fabricate fixed retainers are variable; for example, plain stainless steel wire, spiral wires and soft wires. However, no material is immune to failures. Placing the bonded retainer passively is crucial to prevent unwanted tooth movement. Soft wires can be adapted with finger pressure intraorally so are less likely to store energy or become activated during fabrication.4 Other types of materials with any degree of flexibility should be formed as a fixed retainer by adapting them on a working model to attain a close fit, and to reduce the risk of placing a fixed retainer with an active component which could induce inadvertent tooth movement.[4] A carrier can be used to place the fabricated fixed retainer on the teeth to eliminate any finger pressure during placement.

There are two ways to bond the fixed retainer, either bonding the fixed retainer to each tooth or bonding the wire ends to the canines only. While the stability of the alignment is better when all six anterior teeth are bonded, the failure rates are higher due to the fact that the bond failure of a single tooth is much more likely to go unnoticed by the patient. This can result in tooth movement before the failure of the retainer is detected.[4] In the case of those bonded only to the canines, bond failure on one side will trigger the attention of the patient that the retainer is dislodged. Hence, the patient will call his treating orthodontist earlier which should prevent any unwanted movement of the teeth. Although the protocol of bonding all teeth is more favourable in terms of alignment stability, it increases the importance of regular checks of the retainer. As mentioned above, the treating orthodontist is responsible for carrying out these regular check-ups for a minimum of 12 months. After that, the retainers should be monitored by the family dentist during regular dental check-up visits. In case of detection of any relapse or failed bonded retainer by the family dentist, it is recommended to refer the patient back to the treating orthodontist.

Author affiliations

[1]Orthodontic Department, Jordanian Royal Medical Services, Amman, Jordan; [2]Dental Department, Ministry of Health, Amman, Jordan; [3]Division of Orthodontics, School of Dentistry, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, AB, Canada.

****Correspondence to: Ra'ed Al-Dboush***

References

1. Millett D. The rationale for orthodontic retention: Piecing together the jigsaw. *Br Dent J* 2021; **230:** 739–749.
2. UK Government. The National Health Service (Dental Charges) Regulations 2005. 2005. Available at https://www.legislation.gov.uk/ukdsi/2005/0110736400 (accessed September 2020).
3. Molyneaux C, Sandy J R, Ireland A J. Orthodontic retention and the role of the general dental practitioner. *Br Dent J* 2021; **230:** 753–757.
4. Shaughnessy T G, Proffit W R, Samara S A. Inadvertent tooth movement with fixed lingual retainers. *Am J Orthod Dentofacial Orthop* 2016; **149:** 277–286.

Evidence-Based Dentistry (2021) **22**, 148-149.
https://doi.org/ 10.1038/s41432-021-0224-9