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## 10-Minute EBD: Can a Vacuum-Formed Retainer Replace a Bonded Orthodontic Retainer?

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# Can a Vacuum-Formed Retainer Replace a Bonded Orthodontic Retainer?




By Joshua Dickie

A new adult patient arrives to your office for a dental check-up. You notice that she has a heavy accumulation of calculus underneath and around a stainless-steel wire bonded to the lingual surfaces of #22-27. This localized irritation presents as moderate bleeding on probing and pseudopocket formation, but no clinical attachment loss is observed.

She admits that she often skips flossing that area because the floss threader is too time-consuming and plainly inconvenient. She would like to have the retainer removed now that she knows the gingival inflammation in her smile is due to suboptimal oral hygiene. Upon completing orthodontic treatment nearly a decade ago, the orthodontist told her, “You only need to wear a retainer so long as you want straight teeth.” She asks if switching to a clear retainer to wear at night would be sufficient in maintaining the alignment of her teeth.

Teeth tend to move away from their corrected positions following orthodontic treatment; consequently, a variety of appliances are used to provide retention. Historically, retention was viewed as a strategy to prevent teeth from relapsing back to the original malocclusion.<sup>1</sup> However, normal age-related changes in the periodontium and occlusion can lead to alternate tooth movements that also negatively impact esthetics and function.<sup>2</sup> Relapse does not occur in every patient; however, there is no reliable or accurate method of determining which pa-

**Considerations for removal of fixed orthodontic retainers: Do vacuum-formed retainers provide adequate retention?**

Clinical Scenario	Literature Search Strategies	Evidence Summary
 <p>A patient presents with poor oral hygiene about a longstanding mandibular anterior fixed orthodontic retainer. The patient is unable to floss under the bonded wire, resulting in negative periodontal effects. To foster improved home care, is it appropriate to offer removal of the bonded wire in conjunction with use of a vacuum-formed/clear removable retainer?</p>	 <p>An initial search with Google Scholar yielded approximately 1,000 results, and PubMed provided 148 to serve as the principal database. Broad terms such as “bonded retainers” or “fixed retainers” were refined using PubMed’s OR/AND feature with phrases including “bonded retainer OR fixed retainer AND vacuum-formed retainer AND retention” to generate relevant high-quality publications.</p>	 <ul style="list-style-type: none"> <li>■ Evidence shows that bonded retainers provide more effective retention than removable appliances in the first 6 months post-treatment.</li> <li>■ After 12 months little evidence exists showing bonded retainers are more effective in retentive capacity.</li> <li>■ Vacuum-formed retainers provide adequate retention to justify their use with advantages over bonded retainers.</li> </ul>

tients will experience post-treatment tooth movement. As a result, Little concluded that lifetime retention is the only predictable approach to maximize tooth positional stability.<sup>3</sup>

Orthodontic arch wires are commonly bonded to the lingual surfaces of mandibular anterior teeth after treatment is concluded. Since these retainers are fixed, patient compliance is not an issue so long as the wire remains bonded. This is advantageous because patients can misplace, break, or simply stop wearing removable appliances like Hawley or vacuum-formed retainers. The downside is the increased oral hygiene burden associated with a bonded retainer. Patients who neglect proper brushing and flossing techniques may demonstrate increased plaque around the

appliance, translating to an increase in gingival recession and bleeding on probing.<sup>4</sup>

Another popular retention method for post-orthodontic patients is vacuum-formed retainers (VFRs). VFRs do present the challenge of long-term patient compliance since they are removable, but assuming patient compliance can be upheld, they offer the benefit of easier oral hygiene maintenance. If VFRs can provide similar retention from a tooth-positioning standpoint while facilitating improved gingival health, they should be offered to certain patients. This “10-Minute EBD” seeks to understand how VFRs compare to fixed retainers regarding positional retention and gingival indices, and whether part-time VFR wear is adequate.

## PICO question

A PICO question was constructed to guide a search for quality evidence related to this topic: “For post-orthodontic patients, do VFRs effectively maintain corrected tooth positioning to justify their use over bonded retainers to promote oral hygiene homecare and part-time wear?”

- P** = Population/patient: Patients having completed orthodontic treatment.
- I** = Intervention: Vacuum-formed retainer.
- C** = Comparison: Bonded stainless-steel arch wire retainer.
- O** = Outcome: Effectiveness in maintaining tooth position post-treatment.

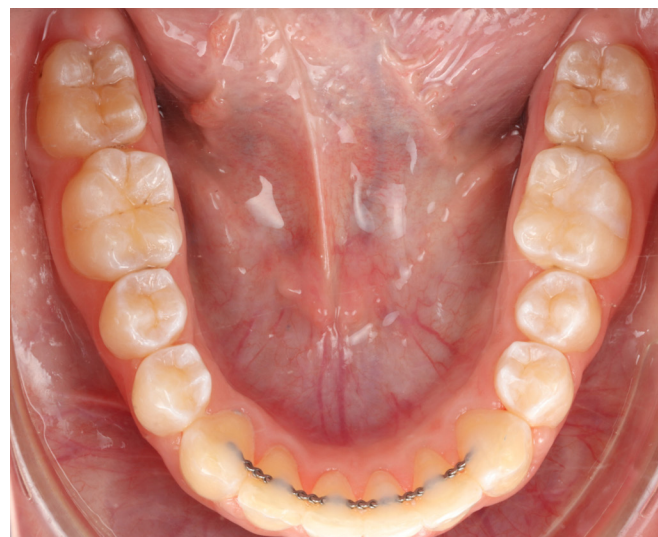
## Literature search

PubMed is a database that sources published literature from biomedical journals, while searches via Google Scholar yield both published and unpublished information from a multitude of outlets. This difference accounts for the vast discrepancy in results per average search: approximately 1,000 results for Google Scholar but only 148 for PubMed.<sup>5</sup> Therefore, PubMed served as the principal database for evidence retrieval to optimize both time efficiency and quality of results.

The PubMed search function allows for very specific information to be acquired relatively quickly if done correctly. By using concise broad phrases such as “bonded retainers” or “fixed retainers,” a maximum number of articles will be presented; contrast this with the amount of search results from the statement “the effect of bonded orthodontic wire to the lingual surfaces of mandibular anterior teeth on gingival health.” Highly exacting searches such as the one just mentioned are dependent upon articles matching that specificity nearly identically. The problem with this approach is that tangential publications which may have greatly enriched the evidence are likely to be missed.

Another asset to the search function of PubMed is the OR/AND feature. By searching for [bonded retainers OR fixed retainers], PubMed sources the entire database for articles that utilize either term, so articles using synonymous terminology are not overlooked. The AND filter is the key to incorporating precision into the search. Instead of broadening the search as the OR filter does, AND only sources articles that include both terms. Combining these filters, searches such as [bonded retainer OR fixed retainer AND vacuum-formed retainer AND retention] along with similar variations generated relevant, high-quality publications.

**Figure 1**



**Fixed retainer** — Image shows stainless steel wire bonded to lingual surface.

## Evidence summary

Several studies have analyzed the effectiveness of bonded retainers versus VFRs in maintaining treatment stability. Some find that VFRs are inferior to bonded retainers in providing retention, from both a statistical and clinically significant perspective.<sup>6,7</sup> Conversely, findings by Kramer and colleagues suggest that there is no difference in retentive capacity for dental stabilization in the mandible when using vacuum-formed or bonded retainers.<sup>8</sup> These opposing results highlight the difficulty in evaluating the performance of the two retainers, because the major limitation is the compliance of the patients wearing VFRs. When Forde et. al and Al-Moghrabi et. al observed a statistical difference, can this difference be attributed to the superiority of the bonded retainers, or did patient compliance interfere with the VFRs fully expressing their retentive capacity? The cause of this disparity across studies is unclear.

When heterogeneity exists between different randomized controlled trials (RCTs) and therefore imparts ambiguity onto a clinical question, a systematic review serves to minimize the effect of interstudy variance. Bellini-Pereira and colleagues attempted to accomplish this by sourcing 10 databases containing published and unpublished RCTs comparing the two retainers. Out of an initial 511 studies identified, only five were determined to be eli-

*(Continued on Page 32)*

## 10-Minute EBD (Continued from Page 31)

gible for statistical analysis. The pooled results suggest that bonded retainers provide more effective retention than VFRs in the first six months. After 12 months and 24 months, the retainers demonstrated a similar retentive capacity.<sup>9</sup>

In addition to providing retention, retainers must also allow for adequate periodontal health maintenance, particularly if patients are to wear them indefinitely. Storey and colleagues evaluated gingival and periodontal indices in patients with fixed retainers compared to VFRs. Increased levels of plaque, gingival inflammation, and calculus were noted in the presence of bonded retainers. This did not translate to clinically significant periodontal health outcomes, but the study only measured the gingival indices up to the 12-month follow-up appointment.<sup>10</sup> It is reasonable to surmise that increases in plaque and calculus will lead to tooth and periodontal problems over time.

After reviewing the literature, there is no definitive one-size-fits-all retainer. Orthodontists should consider previous cases and experiences, patient preferences and adherence, the initial malocclusion, treatment rendered, and post-treatment objectives when deciding which retention strategy to prescribe. However, the results of the systematic review by Bellini-Pereira et al do lend credence to the philosophy that mandibular anterior teeth should be bonded with orthodontic wire for optimal retention at least in the short term (up to 12 months).<sup>9</sup> And if the first six months post-treatment is the critical period for ensuring tooth positional stability,<sup>11</sup> a fixed lingual retainer needs to be strongly considered. At the one-year follow-up appointment, the patient can then be given options

for retention moving forward.

For patients who doubt their commitment to wear a removable appliance such as a VFR consistently, perhaps the bonded retainer is the best option. These patients must be informed, however, that proper interproximal cleaning aids should be used routinely to sustain favorable oral health.<sup>1</sup> For other patients who would prefer the easier oral hygiene home care of VFRs and who demonstrate good compliance with the retention protocol, a VFR is a great option. As an added benefit, a systematic review by Kaklamanos and colleagues suggests part-time wear of VFRs is adequate in maintaining tooth alignment.<sup>12</sup> Therefore, patients who select VFRs simply need to wear the retainer at night, making VFRs an excellent choice for both lifestyle and periodontal compatibility while providing acceptable long-term retention. ●

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### About the Author

**Joshua Dickie** graduated from Louisiana State University in 2018 with a bachelor of science degree in biological sciences. Following graduation, he worked as an orthodontic lab technician for a year in Baton Rouge, Louisiana, before enrolling at UT Health San Antonio School of Dentistry. Dickie is in his third year of dental school, where he is involved in the many predoctoral orthodontic opportunities offered at UT Health. He hopes to enroll in an orthodontic residency program upon graduation in 2024.



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