

Clear plastic retainers

Karl Grimes
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Objectives

- Understand how vacuum formed retainers (VFR's) are fabricated and their design
- Explain appropriate retention regimes and the advantages and disadvantages of VFR's

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Development

- 'Vacuum retainer', 'vacuum-formed retainer', 'Essix retainer', 'thermoplastic retainer', '(clear) overlay retainer', 'invisible retainer' and '(clear) slipover'.
- The VFR is a removable thermoplastic retainer and was introduced by Ponitz in 1971 and further developed by Sheridan.

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Manufacture

- A VFR may be manufactured on two types of plastic thermoforming machine:
- Pressure machines – force the heat-softened 'plastic' over the end of treatment plaster mould with positive pressure
- Vacuum machines – which adapt the heat-softened plastic to the mould by negative pressure



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Materials

- Examples of material types used in its manufacture include:
- Essix type 'A' co-polyester (more aesthetic, but tends to crack and fracture more easily)
- Essix type 'C' polypropylene or ethylene co-polymer (more resilient, but less retentive)

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Clear Blanks

- Rectangular and round blanks are available
- 'Blank thicknesses' ranging from 0.63 to 2.0 mm have been described.



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Design

- Two main retainer designs have been described.
- The original 'Essix' retainer was canine-to-canine coverage only and is still popular in the US
- Whereas the VFR tends to describe full occlusal coverage or coverage extending to halfway across the most terminal molar



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- The marginal extension in each design is commonly 1–2 mm buccal and 3–4 mm lingual to the gingival margins.
- Additional designs have been described

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VFR fit and maintenance

- A VFR must be a precision fit.
- It clicks into place and is not easily removed.
- The appliance is retained in the mouth by engagement in the undercuts gingival to the contact points of the teeth.
- The fit may be adjusted at chairside by increasing or reducing the depth of the undercuts in the plastic.
- Blanching will be evident if the retainer is engaging too tightly on the gingiva.
- Adjustment with scissors and/or a greenstone in a slow speed handpiece may be required.



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- Patients are advised to refrain from using toothpaste to clean a VFR as this will 'dull' the appearance.
- Regular cleaning with a soapy cotton-tip swab and/or a proprietary cleaning agent (eg Retainer Brite) has been recommended



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Part-time vs full-time wear of VFRs

- Recent studies have investigated whether the effectiveness of VFRs differs with regard to the amount of daily wear of the retainer
- No difference between full time V part time wear
 - Thickett & Power, 2010
 - Shawesh et al., 2010
 - Littlewood et al., 2016 (Systematic review)

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Quality of life assessment

- Patients have reported difficulty with speech (22%), soreness (13%), bad taste (10%) and difficulty with cleaning (10%).
- Most (97%), however, found their VFRs 'easy to get used to'
- Patients also found BRs significantly more 'acceptable to wear' than VFRs, but VFRs were significantly better than Hawley retainers in terms of speech and appearance (92.8% vs 82.6%).

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Survival of retainers

- The survival rate of retainers is an important consideration as it may have an impact on cost, patient satisfaction and effectiveness.
- In the six months following orthodontic treatment, significantly fewer breakages were reported with VFRs (6.6%) compared to Hawley retainers (19.4%), although loss rates were similar.
- In the first 12 months post-orthodontic treatment, more problems have been reported with VFRs compared with BRs.
- Fractures (28%), wear (28%) and loss (14%) were the most common problems with VFRs and composite loss (5%) and de-bond (12%) were most commonly reported with BRs

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Cost-effectiveness

- In the UK, VFRs were found to be more cost-effective than Hawley retainers in the six months after orthodontic treatment.
- This is not only from the perspective of the patient (mean difference in cost per patient: €4.71) but particularly the NHS (mean difference in cost per patient to the NHS: €31.34) and the orthodontic practice (mean difference in cost per patient to the practice: €32.60).

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Clinician perceptions

- Clinicians have found VFRs significantly easier to fit than BRs.
- One study found that 97% of VFRs took less than 10 minutes to fit compared with 'up to 20 minutes' for 96% of BRs.

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Compliance

- A limitation with removable appliances is patient compliance.
- If the retainer is not worn as instructed, relapse is inevitable.
- Patient-reported compliance with instructed VFR wear was found in 35–95% of patients at 6–12 months after orthodontic treatment
- A study has reported that stability of mandibular incisor alignment is proportional to patient reported wear.

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Advantages

- Clear plastic retainers offer a number of potential advantages over traditional Hawley retainers:
- Aesthetics
- Less impact with speech
- Quick to make
- Less tendency to break
- Ease of fabrication
- Superior retention of the lower incisors.



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Disadvantages

- Compromised appliance retention where there is hyperplastic gingivae, poor oral hygiene or a spaced dentition;
- Loss, breakage and poor wear resistance (particularly along the occlusal and incisal surfaces – this may be a concern with bruism);
- A possible inability to maintain expanded arches shows a modified VFR that attempts to overcome this and to maintain alignment of previously severely rotated and/or displaced teeth due to its lack of rigidity
- Inhibition of any desired vertical 'settling-in' of the occlusion subsequent to active orthodontic treatment;
- The potential for demineralization, caries and poor gingival health if a careless dietary lifestyle with frequent 'fizzy' drink intake is adopted while the VFR is being worn;
- Reliance on patient compliance with instructed wear in view of the retainer being removable.

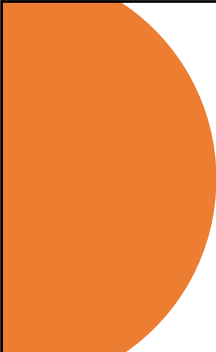


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- Clear plastic retainers only need to be worn at night, every night.
- It is important that the patient is instructed never to drink with the clear plastic retainer *in situ*, particularly cariogenic drinks.
- The retainer can act like a reservoir, holding the cariogenic drink in contact with the incisal edges and cuspal tips and leading to decalcification.

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- Clear plastic retainers may be contraindicated in patients with poor oral hygiene.
- This is because these types of retainers are retained by the plastic engaging the undercut gingival to the contact point.
- If the oral hygiene is poor, then hyperplastic gingivae can obliterate these areas of undercut, which means the retainer may be loose.

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Questions?

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