# Analysis of micro leakage using a self-etching adhesive system on casting and fiber glass posts

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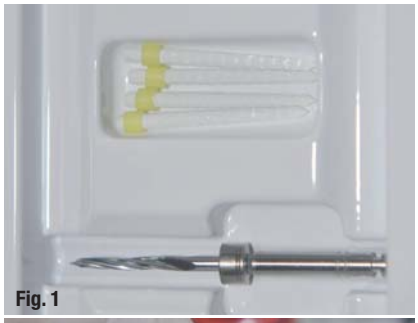


Fig. 1


Fig. 2


Fig. 3


Fig. 4

## _Introduction

One of the misconceptions surrounding endodontically treated teeth is that the use of posts reinforces the remaining tooth structure. Baldissara et al.,[1] for example, showed that an endodontically treated tooth loses 9% of its moisture, which does not cause any clinically significant changes. We can say that the structure loses a significant percentage of its hardness.[2] These points revalidate theories that state that there is an important relationship between the properties of the dentine and the remaining tooth structure. Preformed posts do not truly reinforce the tooth's root, but rather uniformly distribute the load and serve as anchors for the tooth reconstruction material.[3, 4]

There are various procedures and materials for cementing preformed posts and reconstructing the tooth. Resin cements can be a valid alternative even if their properties are not very similar to the missing dental tissue. These cements can be self-adhesive, self-etching or use an adhesive system. Possible materials for cementing fibreglass posts are self-etch resin cement and conventional resin cements with self-etch adhesives. From these, we can determine the most appropriate combination for the best marginal seal. The conventional etching technique produces strong adhesion to prevent marginal leakage. However, along with the benefits that this brings, this also causes excessive decalcification.[5]

Self-etch adhesive systems arose from the need to avoid unnecessary dental decalcification. These systems are based on the fixation of dental compos-

**Fig. 5**_Fibreglass post and dentine.
**Fig. 6**_Magnification of 400 x.

Fig. 5

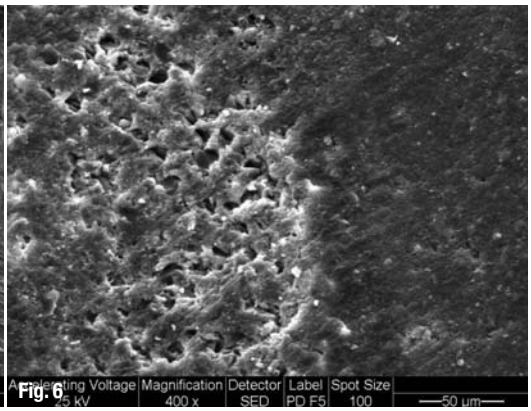
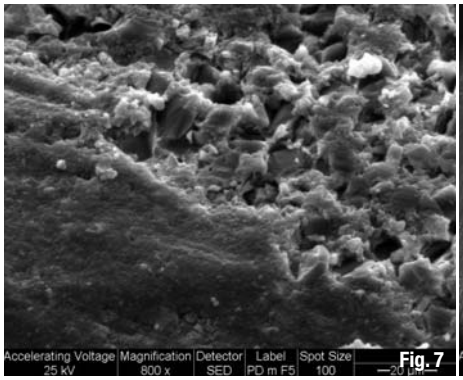
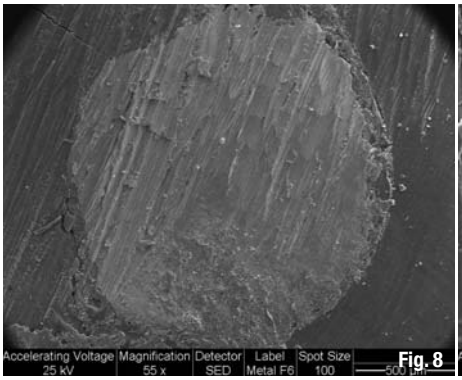
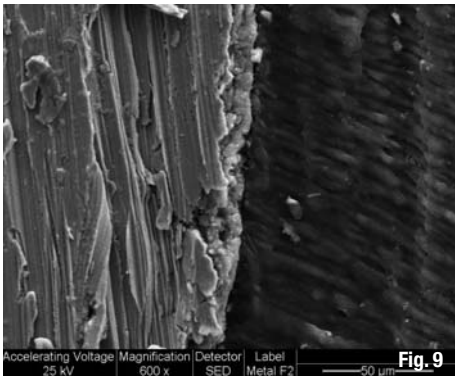


Fig. 6




ite after interaction with the dentine the subsequent formation of the hybrid layer. Its adhesive values may be somewhat lower than those obtained with the total-etch technique,[6] but the decalcification is substantially lower. It is necessary to discuss whether adhesive systems with lower adhesive value and better biocompatibility are sufficient to prevent bacterial infiltration within a root canal. Self-etch dental adhesives can be effective in setting prosthetic structures such as posts, both preformed and cast.[7]

In an adhesive system, both the adhesive and the solid substrates must be analysed. Fibreglass posts are sealed through the binding of the adhesive to the organic matrix of the post and through micro-mechanical fixation.[8] Cast posts generally present irregularities on their surface, which can serve to anchor the fixation system.[9]

We must take into account that the solid adherent, the post, can produce movements during the polymerisation of the cement that can detach the adhesive. In these cases, gaps[10] are formed between the material and substrate tooth. These spaces allow bacterial infection. The entry of micro-organisms is known as micro-leakage.[11] To prevent this, slight pressure must be maintained during the cement's hardening time.

**Fig. 7**_Magnification of 800 x.
**Fig. 8**_Metal post.
**Fig. 9**_Metal, cement and dentine.


Fig. 10

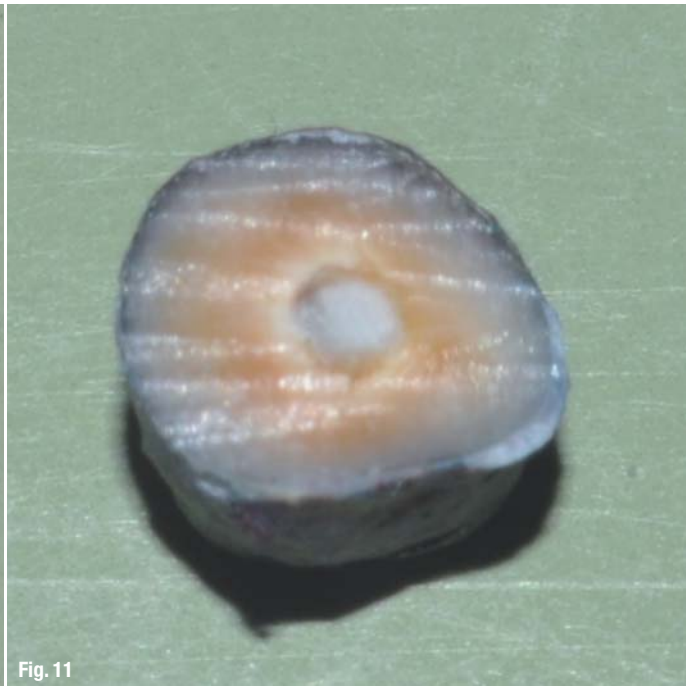


Fig. 11

**Fig. 10**_Fibreglass post (Fibrapost).
**Fig. 11**_Metal post.

The aim of this study was to analyse the marginal leakage in preformed and cast posts cemented with self-etch systems based on the visualization of the interfaces using SEM technique.

## _Materials and methods

Endodontic treatment was performed on ten single-rooted teeth. They were mechanically unsealed with Gate drills, provided by the manufacturer (Fig. 1), according to the diameter of the fibreglass post. The coronal portion was removed for later reconstruction. We used the Sealacore self-etch dual-cure resin cement system and the Fibrapost fibreglass post (both Produits Dentaires; Fig. 2).

The root canal preparations were all of the same length. The cement was distributed inside the root canal with a lentulo spiral and the post was placed (Figs. 3 & 4). The tooth stump was reconstructed with the same bonding resin, concluding with the construction of a provisional element. An impression of the cast post was taken with silicone and the casting was done with a non-noble alloy.

This was followed by 300 thermo-cycles at temperatures of between 5 and 55°C. The samples were soaked in methylene blue for a week. Once dry, the teeth were separated from the provisional part by a cut at the neck of the tooth. In the root and coronary part, the presence or absence of micro leakage was analysed (Philips 505 SEM), as was dye penetration in the third cervical root. Analysis of micro leakage was performed using the image with the highest optical magnification.

## _Results and microscopic analysis

*Fibreglass post*

Figure 5 shows the dentine system, cement and post with no micro leakage (at 45x magnification). Figures 6 & 7 show excellent bonding with no micro leakage between the adhesive system, dentine and fibreglass post (400x–800x magnification). The thin layer of the Sealacore cement was noticeable..

*Cast post*

For this type of post, a marginal closure similar to that produced for the fibreglass posts was observed. Micro leakage were not seen at a magnification of 600x (Figs. 8 & 9).

## _Penetration of the dye

Completing the cut at the cervix showed no penetration of the dye in all the specimens analysed for both fibreglass and cast posts (Figs. 10 & 11).

## _Conclusion

The Sealacore self-etch adhesive showed excellent performance for fibreglass and cast posts. This adhesive system produced an appropriate marginal closure. For achieving marginal closure, we recommend this type of adhesive system, as it causes less decalcification._

*Editorial note: A complete list of references is available from the publisher.*

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