Posts and the root-filled tooth

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It is clear that teeth often require significant reconstruction following root canal treatment. It is also evident that there is an enormous variety of ways that can be used to achieve this. Although there is some debate about the relative contributions of the root filling and coronal restoration to endodontic success,^{1,2} it is agreed that the best results are gained with a good root filling and a well-sealed coronal restoration. Posts, pins and/or bonding are all possible solutions to retain the coronal restoration but it is often difficult to decide, on the basis of evidence rather than fashion or anecdote, which is preferable.

Forces that are applied to restorations often involve a complex interaction of fatigue-cycling coupled with compression, shear and torsion. Understanding of these occlusally-generated forces is important when designing the restoration as they may ultimately affect the long-term success. However, many traditional post studies have evaluated the retention of posts using simple 'pull-out' tests. Despite their limitations, these tests are the basis for many of the recommendations that are currently used to select a metallic post. It is widely accepted that, to maximise retention of a post, it should be:

- at least 2/3 of the root length (or as long as possible consistent with leaving 3–5 mm of apical root filling present)
- parallel
- serrated and
- wide³

The effect of achieving these upon the quality of the remaining root filling and the integrity of the root appear to have been secondary to mechanical considerations. One may also question the validity of whether retention itself is of prime importance. Many clinicians will have had to deal with a post-retained crown that has become loose. Actually pulling out these 'loose' posts can be difficult; suggesting that the post has failed due to some other force rather than a pull out force. Although this 'anecdotal' evidence may not be quantifiable and has not been subject to the high-level peer review of the laboratory-

based studies, it may be more relevant to clinicians and their patients. Evidence that non-axial loads are more significant in the failure of endodontically treated teeth is also now being reported in the literature.⁴

Other biologically-based evidence is also accumulating. Various cross-sectional studies^{5–8} have noted apical lesions in 41–67% of teeth restored with posts. Even accepting differences in the methodologies of the various studies it would appear that placing a post (of whatever length) does not enhance the biological outcome. The preparation for a post leaving 4 mm of root filling may maintain the apical seal of GP but tends to remove the most well-prepared, cleaned and obturated part of the root filling. Few clinicians perform post channel preparation under rubber dam or clean the prepared post channel with hypochlorite, perhaps considering it a restorative rather than an endodontic procedure. Unless those steps are performed, however, we may be introducing bacteria directly to the apical portion. As temporary post crowns do not provide a good coronal seal⁹ it would appear that, when a post is required (and assuming a good root filling is present), a better option would be to definitively cement a prefabricated post after obturation.

Data on the long-term success of fibre-based post systems is accumulating.^{10,11} Although there is appeal in using an adhesive post that has the potential for increased retention and therefore requires removal of less tooth structure or root filling, it is worth considering that there are many interfaces that could fail. In most systems, increasing their complexity introduces more stages where failure can occur and restoration of the endodontically treated tooth is no exception. Failure can be related to failure

of the root filling, the tooth structure, the intraradicular or the coronal restoration. To reduce the stages and risks to a minimum, what is the simplest way to restore the root filled tooth with predictable success? To conserve the maximum amount of root-filling and root structure is there really a need for a post? If one is placed how can we ensure that the tooth is retrievable if/when failure occurs? An alternative approach may be to consider a step-wise progression wherever possible and hold the ultimate sanction in reserve.

1. Ray H A, Trope M. Periapical status of endodontically treated teeth in relation to the technical quality of the root filling and the coronal restoration. *Int Endodont J* 1995; 28: 12–18.
2. Tronstad L, Asbjornsen K, Doving L, Pedersen I, Eriksen H M. Influence of coronal restorations on the periapical health of endodontically treated teeth. *Endodont Dent Traumatol* 2000; 16: 218–221.
3. Shillingburg H T, Kessler J C. Restoration of the endodontically treated tooth. Chicago: Quintessence Publishing Co, 1982.
4. Torbjørner A, Fransson B. A literature review on the prosthetic treatment of structurally compromised teeth. *Int J Prosthodont* 2004; 17: 476–482.
5. Turner C H. Post-retained crown failure: A survey. *Dent Update* 1982; 9: 221–234.
6. Eckerbom M, Magnusson T, Martinsson T. Prevalence of apical periodontitis, crowned teeth and teeth with posts in a Swedish population. *Endodont Dent Traumatol* 1991; 7: 214–220.
7. Grieve A R, McAndrew R. A radiographic study of post-retained crowns in patients attending a dental hospital. *Br Dent J* 1993; 174: 197–201.
8. Fox K, Wood D J, Youngson C C. A clinical report of 85 fractured metallic post-retained crowns. *Int Endodont J* 2004; 37: 561–573.
9. Fox K, Gutteridge D L. An in vitro study of coronal microleakage in root-canal treated teeth restored by the post and core technique. *Int Endodont J* 1997; 30: 361–368.
10. Ferrari M, Vichi A, Manocci F, Mason P N. Retrospective study of the clinical performance of fiber posts. *Am J Dent* 2000; 13: 9b–13b.
11. Bateman G, Ricketts D N J, Saunders W P. Fibre-based post systems: a review *Br Dent J* 2003; 195: 43–48.

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