

The art of patency

Dr Raphael Bellamy explains the rationale for not confining yourself to the canal in endodontics and explains the concept of patency in endodontic treatment

The aim of this article is to address the view that you should not confine yourself to the canal in endodontics. As a general principle, it could be held to be true but adherence to this principle relies very much on the clinician knowing where the root canal system begins and ends. If anybody knows exactly where it ends, then please let me know!

The root canal system is merely an invagination of the same mesenchymal tissue that makes up the periodontal ligament. They have the same origin. There is a continuum. When we attempt to deal with the root canal system we have to, and do, deal with the apical periodontium. In the business of three-dimensional obturation of the root canal system, the two are to be considered as one and the healing of one leads to the healing of the other. If we do not acknowledge this then we limit our thoughts. The danger is that if we limit our thoughts, then we will limit our actions. Herbert Schilder taught me and he said time and time again to, 'speak the language and the behavior will come'.

Practically though, it is desirable to know where the root canal begins and ends; we must accept that we are unlikely ever to know exactly, as it varies from tooth to tooth, age to age, and person to person. Therefore, we must make individual judgements on each and every canal that we see. This is why it is critical that a clinician carries out root canal therapy regularly in order to maintain a high level of perception and tactile acuity. To be able to feel for the constriction, to know the difference between a plug of collagen and dentin, to continue to think in three dimensions and maintain a sense of spacial awareness.

Radiography is a critical part of endodontics but it will never, and should never, be relied upon solely to determine the apical extent of the root canal system. The radiographic image pulls us back into two dimensions and sets the clinician up for an error of judgement. So, if you are to perform endodontic therapy, it ought to be carried out on a regular basis in order to maintain this level of acuity.

Defence

The basis of my position is that most of us would consider that the constriction, if there is one, represents a developmental anatomical effort to end the root. Naturally, it would be obvious to clean, shape and pack to at least this point if we are to attain a high degree of endodontic success.

The problem is that in so many cases there is no constriction. Where is the constriction in a root apex with a bifidity? Where is the constriction in a root apex with multiple portals of exit or a delta formation? If the clinician is to rely on radiographic analysis, as most do, then I would argue that the only consistent radiographic landmark is the radiographic terminus. Sure, it's not bullet proof but much better than the presumption that one to two millimeters short will be grand!

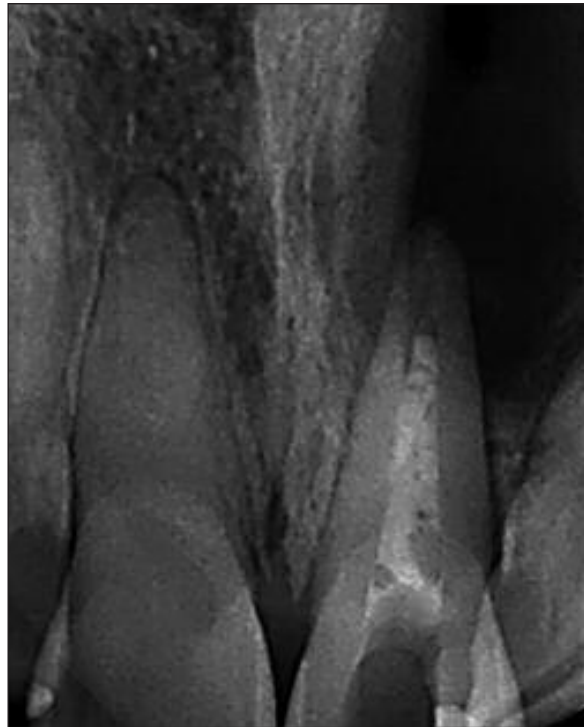


Figure 1:
Preoperative

If we are to attain the highest degree of success in endodontics, we must eliminate the root canal system totally. Extraction, in a healthy person, is always successful in eliminating disease of endodontic origin because removal of the tooth eliminates the root canal system totally and, unfortunately, the tooth. We know this to be true irrespective of where we were trained. So, that should eliminate immediately any desire to end a root filling short of this point (the constriction). Is this correct? Can we really be serious, therefore, when we say it is acceptable to fill 1-2mm short of this point?

Cognitive dissonance

To do one thing in the face of another is described in the endodontic literature by Seltzer and Bender (1965) as 'cognitive dissonance'. Certainly this behavior appears to be prevalent. Why do we:

- Struggle to remove all of the tooth during extraction?
- Struggle to remove root tips when the roots fracture

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Figure 2:
Postoperative



Figure 3: At 20 months



Figure 4: Tooth 11 underfilled

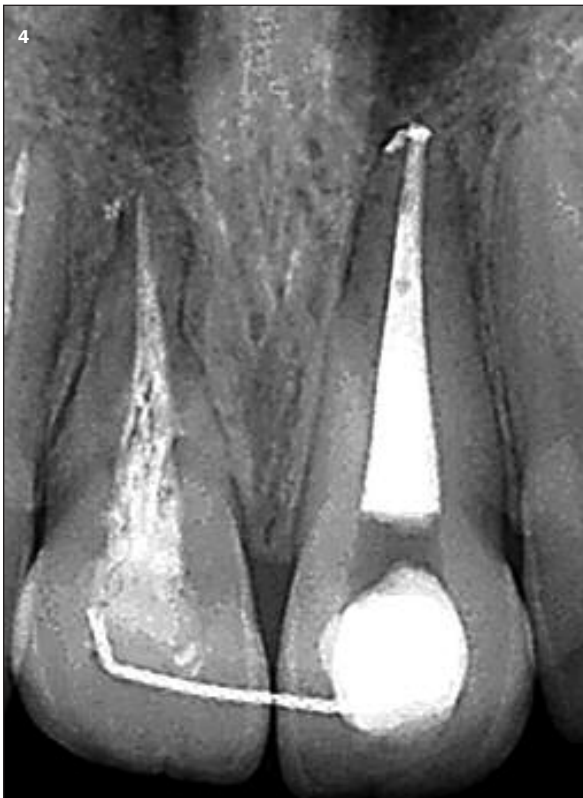
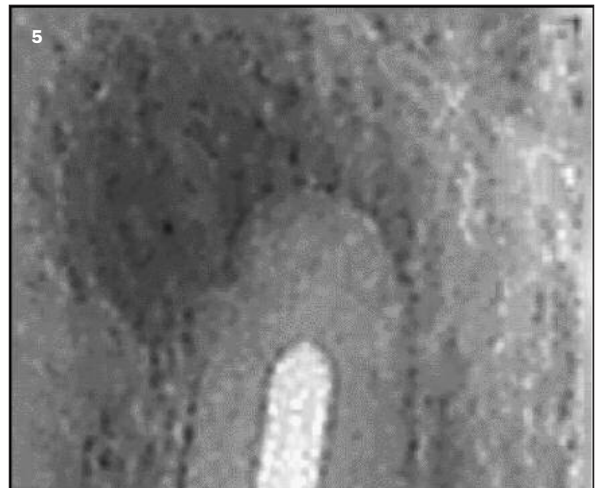


Figure 5: The consequences of filling short



during extraction?

- Retreat an endodontically-treated tooth when the case is 'short'?
- Acknowledge that extraction is 100% successful?
- Yet clean and shape only the first 90% of the root canal system?

Why do clinicians acknowledge and accept one fact to be true, yet continue with behavior to the contrary?

Patency

Assuming that we intend to carry out endodontics to the

highest standard and wish to attain the highest order of success, then we must be sure to fill to the point of constriction or the radiographic terminus. We may obturate the canals successfully only if the apical area, including the constriction, is clear of debris. It is a physical impossibility to attain this pre-requisite for success unless we practice the art of patency.

Patency is defined in the American Association of Endodontics' glossary of terms as 'a canal preparation technique where the apical portion of the canal is maintained free of debris by recapitulation with a small file through the apical foramen'. The passage of a fine instrument (.06 or .10 ISO) past the apex during initial measurement of the root canal or occasional gentle probing no deeper than a fraction of a millimeter into the periodontal ligament space during cleaning and shaping is not a major irritant to the periapical tissues.

Repeated passage of numerous instruments into periapical lesions or bone, however, will produce apical inflammation and exudate formation with attendant discomfort and disruption of treatment.

Overfilling/overextension

There is no doubt in my mind that clinicians have an unnatural fear of 'the other side'. Certainly dental training on this side of the Atlantic would foster this fear. About 75% of the American endodontic postgraduate programs are now advocates of patency. It has taken over 40 years for Schilder's message to be heard. The fear that going outside the tooth will result in overfilling is unfounded within the confines of well-executed endodontic therapy conforming to Schilder's five mechanical objectives. If by overfilling we mean three-dimensional obturation of the root canal system and 'surplus', then this will not result in failure.


In the case illustrated here we see dramatic healing with bony regeneration over a 20-month period and notice the 'overfill' has been dealt with by the host. Overfills should be avoided only because of their needlessness. Any irritation caused by cement will result in a sub clinical phenomenon of no consequence (see Figure 4).

Certainly in cases of vertical overextension and underfilling where the root canal has neither been cleaned nor shaped, they are doomed to failure (see Figure 5).

The clinician should fill to the radiographic apex, or more to the point where the root canal appears to join the periodontal ligament as viewed on the radiograph. The order of business is to seal the portals of exit of the root canal system. This is the reality. Shake hands with the periodontal ligament... embrace it. Don't fear it! Patency is the pathway to successful endodontics. It will result in less blockage, less loss of working length, fewer ledges, fewer

false paths, fewer transportations, fewer perforations and less discomfort for patients by eliminating postoperative 'flare ups'.

It is impossible to eliminate totally the root canal system without the act of patency. It is impossible to gain patency by confining yourself to the canal. Without the simple act of patency, a clinician could go through the whole root canal procedure and never know whether the hole that you are trying to fill is already filled.

As I am a firm advocate of patency, which involves the passage of a small file through the apical foramen, it is logical therefore that I defend the view that you should not confine yourself to the canal. 

References

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Acknowledgements

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Q1

The question of patency requires an understanding of what constitutes the end of the root canal. Which of the following comments regarding this issue are incorrect?

- Root canal tissue and periodontal tissue have the same embryonic origin
- Radiography should be used as the sole criteria for length determination
- The radiographic terminus is the only consistent landmark as a guide to the correct end point of preparation
- Using the so-called apical constriction as our end point is an erroneous notion

Q2

Which of the following comments regarding patency are incorrect?

- Less blockage occurs
- Less loss of working length
- Fewer ledges
- Temporarily more postoperative discomfort
- Fewer transportations

Q3

Overfilling is an argument used against the use of patency. Why is this comment erroneous?

- An overextended root filling and underfilled canal is a setup for failure
- An apical surplus causes a sub-clinical phenomenon of little consequence
- Three-dimensional obturation is the goal of Schilder's objectives
- All of the above
- None of the above

Q4

Which of the following comments regarding root canal obturation are incorrect?

- Fill to the radiographic apex
- Fill to where the periodontal ligament joins the root canal as viewed on the radiographic
- Try to fill all the portals of exit
- The ideal end point is 1mm from the radiographic terminus