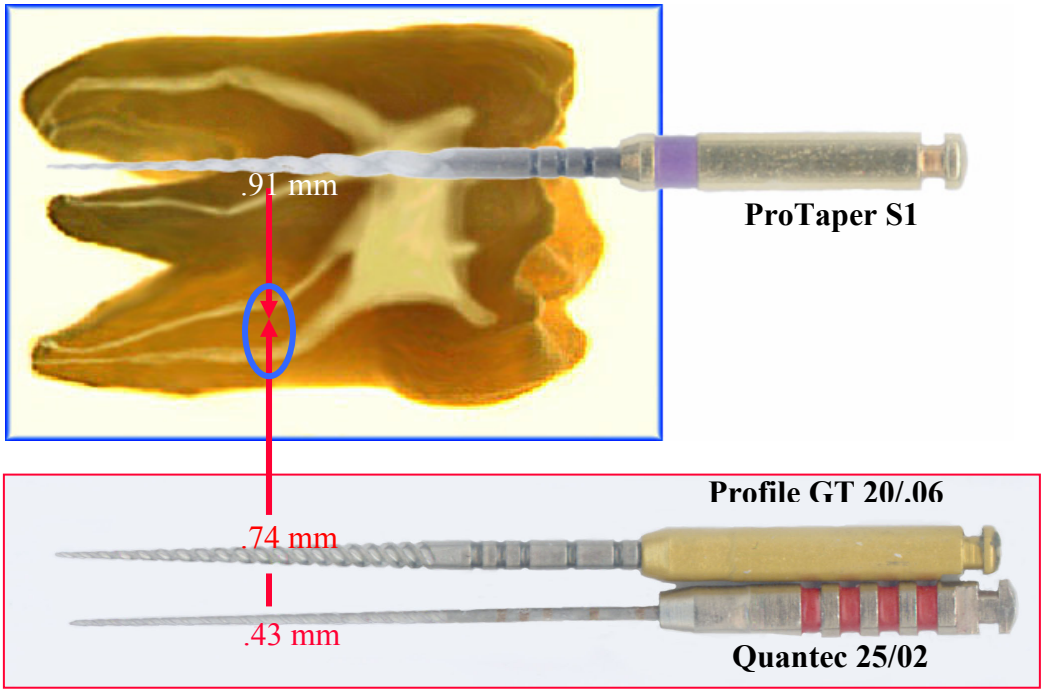
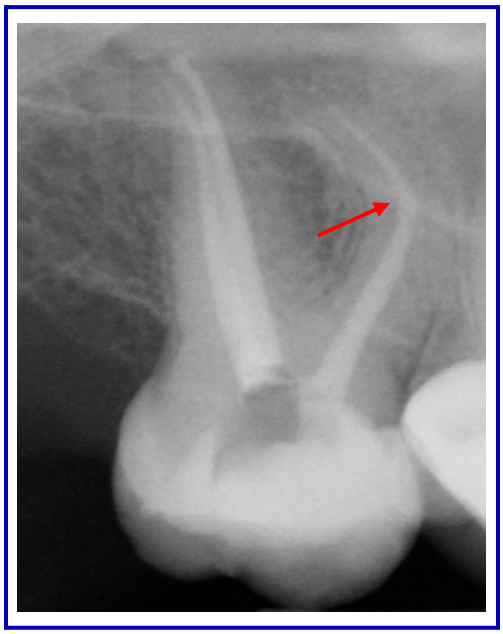
If one would attempt to bend the largest diameter handle end of a 25/.02-taper file, it would be easy to imagine how quickly the .57 mm diameter at the handle end would fail in a curvature. The rigidity of this diameter would cause concern for canal transportation even if the file did not fail. A beneficial exercise to conceptualize flexibility and the force of the file against the canal wall is to attempt to bend familiar diameters and tapers by hand to a 90-degree bend.



In a coronal curvature 9 mm from the root apex a ProTaper S1 has a .91 mm diameter, a Profile GT 20/.06 has a .74 mm diameter and a Quantec 25/.02 has a .43 mm diameter. Since fatigue is closely related to the square of the radius, the Quantec 25/.02 file has approximately 2 times more resistance to fatigue than the ProFile 20/.06 and 3 times more than the ProTaper S1. The larger diameters are more likely to transport the canal or break as a result of fatigue.

In addressing the potential for fatigue, file efficiency needs to be considered in addition to file diameter. Since efficient files require fewer rotations and less time to enlarge a canal, they can accomplish preparation with less fatigue.



The palatal and disto-buccal canals were easily prepared with 25/06 K-3 files since the canals were relatively straight, the curvature of the mesio-buccal canal necessitated not exceeding the taper of a 25/04 near the apex. Although the diameter of the file is larger than .50 mm at the fulcrum of the curvature the efficiency of the K-3 design enabled the preparation to be accomplished in minimum time avoiding fatigue failure and canal transportation.

Bill Watson

In order to avoid excessive flexion of the large diameters of files many clinicians advocate removing tooth structure to minimize coronal or mid-root curvatures by repositioning the orifice of the canal and establishing ***straight-line access***. Although this technique remains useful it was more of a necessity when root canal preparation was limited to stainless steel files. With the development of nickel titanium files one has the advantage of being more conservative and not needlessly compromising valuable coronal tooth structures or restorations, risking coronal perforations or file breakage. Rather than rigidly following some of the recommended straight-line access steps of popular techniques that became ingrained in our rationale for stainless steel file techniques, incorporating smaller tapered rotary nickel titanium files in the preparation technique can often accomplish the necessary, yet conservative, canal enlargement without routine intentional canal transportation. Even though the remaining tooth structure can seem to be adequately substantial after a less conservative approach rationalized as necessary for straight-line access, future demands or compromises on the tooth can be better served with the ability to save tooth structure.