



Endodontic Working Width: The known and the obscure

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ABSTRACT :

The rationale of the endodontic therapy is to eliminate the source of infection, followed by proper cleaning and shaping to facilitate 3-D obturation of the root canal system. In order to achieve an ideal obturation, various factors like working length, working width and taper of the preparation need to be predetermined. This article sheds light on the earliest protocols along with the newer technology which attempted to incorporate the working width concept.

Keywords: Binding file, Master apical preparation, Schilder's biomechanical principles, Working width

1. INTRODUCTION :

Recent developments in the field of endodontics have greatly enhanced the clinician's ability to fulfil the biologically-based objectives of the root canal treatment in accordance with the Schilder's bio-mechanical principles for the preparation of root canals. According to the biologic principles, there should be a continuously tapering canal with narrower diameter at each cross-sectional level while progressing towards the apex. Moreover, the apical foramen ideally should be maintained at its original position and should be kept as small as practically possible (1).

2. CONCEPTS OF WORKING WIDTH-

Jou et al. (2004) defined working width as the initial and post-instrumentation horizontal dimensions of the root canal system at working length and other levels. It is the diameter of the root canal which corresponds to the tip size of the final file used till the working length (2). Determining the working width and working length is a prerequisite for accomplishing thorough cleaning and shaping of the root canal system.

Erroneous determination of working width can lead to consequences such as overzealous and aggressive removal of radicular dentin which can make the tooth more prone to fractures and perforations. In case of inadequate preparation of the canals, it can lead to chances of reinfection due to the necrotic debris remaining in the canal (3).

However, the optimum or ideal determination of working width, till date remains a debatable concept as there are no clear guidelines or gadgets to determine the same, unlike the working length concept in which some standard guidelines are available (4). Hence, more research is required in this arena.

Different authors have recommended different master apical preparation sizes. One of the earliest protocols by Haga et al. recommended that the final apical preparation size should be atleast two or three sizes greater than the first binding file at the apex (5). However, there are certain limitations to this method, like, how to determine where the file truly binds in the canal, does that file diameter truly represents the size of apical foramen (6). Also the design of instrument, its taper and coronal pre-flaring affects the binding of the instrument with the canal. Hence, it becomes difficult to accurately ascertain the first binding file in the canal to eventually determine the final apical preparation size to which the canal should be prepared (7).

Certain authors recommended that the final apical preparation size should be atleast 6-8 sizes larger than the previously recommended sizes. But this in turn can result in excessive removal of dentin especially in case of a severely curved canal and can lead to straightening of the root canal (8).

Traditionally, various authors have recommended the master apical file sizes for each of the maxillary and mandibular teeth, viz., 50k-70k for maxillary central incisors and 45k-60k for maxillary lateral incisors. However, in accordance with this concept, all the teeth, whether vital or non-vital should be enlarged till the standard master apical file size. The limitation of this concept is that, in a necrotic tooth, the apical preparation size needs to be enlarged more than the standard recommended size for sufficient removal of infected radicular dentin to prevent re-infection. On the other hand, for the vital teeth, the preparation till the standard recommended size can lead to unnecessary removal of healthy dentin which could be avoided (3). Hence, it can be concluded that all teeth can not possibly have a standardized master apical preparation size.

Some of the recent advances in the rotary file systems have also been developed to incorporate the working width concept. TruShape (Dentsply) which has a 'S-curve design' (9) and Self-adjusting file systems (SAF) (with a hollow-core) have the ability to modify their shape according to the width of the canal (10). The manufacturers have marketed these files on the basis of their canal adaptive properties.

Advancements in the radiographic imaging techniques like the micro-CT imaging, some specially designed instruments and photographic analysis can be done to determine the root canal anatomy (11). The presence of ramifications and isthmuses in the apical third contribute to the already complex root canal system.

CONCLUSION-

Despite the technological advancements, the working width concept is still an obscure arena with no ideal gadget or instrument that has been devised till date which is able to accurately determine the working width of a root canal. It is a known yet obscure concept in the field of endodontics.

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