

## WORKING WIDTH IN ENDODONTICS: A REVIEW

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### ABSTRACT:

Anatomy of the tooth is the foundation of the art and science of healing. Working width is nothing but the horizontal dimension of a root canal. Many in vitro studies have recorded the scales and average sizes of root canals, but there have been few clinical attempts to determine the working width. Some clinicians may still have the impression that all root canals are round in shape because of two dimensional radiographs. This article reviews importance and recent considerations in the field of working width in endodontics.

**Keywords:** Apical, anatomy, canal, cleaning, obturation, length.

### INTRODUCTION

Root canal morphology is a critically important part of root canal therapy. The basic aim of the successful endodontic therapy is to provide micro-organism free environment and hermetic seal to prevent entry of microorganisms and other irritants in the root canal. In order to achieve these objectives, it is imperative to accurately determine the endodontic working length (WL) and working width (WW) of each root canal.

The term 'Working Width' aims to address the horizontal dimension of a root canal and was first coined by Jou et al. to describe the diameter of the canal that corresponded to the tip size of the final instrument used up to working length.<sup>[1]</sup>

#### Need for working width determination-

Inadequate determination of working width enhances the possibilities of its insufficient cleaning and shaping.

Unfortunately, this area of critical information has not been investigated thoroughly. Earlier protocols have stated that apical enlargement of the canal should be two or three sizes greater than the first binding file at the apex.<sup>[2,3]</sup> However, some of the authors have stated that these techniques are inadequate for bacterial elimination and are responsible for decreasing the success of endodontic therapy. In addition to this, there is no evidence that the first binding instrument actually reflects the diameter of the canal at the apex, and it also remains unclear as to where this binding occurs along the entire length of the canal.<sup>[4]</sup> There are various other factors which affect the binding of first apical file such as canal anatomy, instrument design variability, size and taper of file, cross section of both file and root canal, canal calcifications, and the concept of pre-flaring and the instrument utilized for

pre-flaring.<sup>[5,6,7]</sup> Therefore, enlarging of the canal during root canal treatment is known to all but how large is large enough is a question that still needs serious attention. D. K. Rechenberg & F. Paqu (2013) conducted a study and concluded that the endodontic procedures under investigation were significantly influenced by the cross-sectional root canal shape.<sup>[8]</sup>

### **Determination of working width-**

The horizontal dimension of the root canal system is not only more complicated than the vertical dimension but is also more difficult to investigate, because the horizontal dimension varies greatly at each vertical level of the canal. A.P Tikku et al stated that very few clinical attempts and studies have been done to determine the working width of the canal and hence it is very aptly referred to as the "Forgotten Dimension". D. K. Rechenberg & F. Paqu (2013) concluded from the study that in normal conditions, the cross sectional root canal shape, calculated as the average ratio between bucco-lingual and mesio-distal canal diameter, had a major impact on the canal volume that could be filled by cold lateral compaction and the amount of filling material that could be removed during retreatment. Root canals with a round cross-sectional root canal shape can be mechanically cleaned, filled and retreated using rotary NiTi instruments under the defined conditions, more thoroughly than counterparts with an oval or long oval cross-sectional root canal shape. Root

filling materials can be compacted into previously non-filled root canal irregularities during retreatment with rotary NiTi files. One common method of deciding on the size of the apical preparation is to first determine the preoperative canal diameter by passing consecutively larger instruments to the working length until one binds. In some textbooks, the master apical file size is suggested to be three International Standards Organization (ISO) file sizes larger than that of initial binding file. Weiger R et al proposed that wider apical preparation of six to eight sizes larger than previously recommended sizes should be used to allow for adequate apical canal surface instrumentation.<sup>[9]</sup> Specially designed instruments, mathematical and photographic analyses, and micro-computed tomography ( $\mu$ -CT) imaging have been attempted to ascertain the appropriate working width of canals in different teeth.<sup>[10,11,12]</sup>  $\mu$ -CT imaging has provided a comprehensive understanding of the anatomy of the root canal system and also the width of the canals. However,  $\mu$ -CT is presently available only as in vitro mode of analysis.<sup>[13]</sup> Cone beam computed tomography (CBCT) also has proven to be the most promising preoperative investigation that delineates the canal width along the length of the tooth.<sup>[14]</sup> Newer and innovative cleaning and shaping methods should be employed for the effective achievement of required working width. 'S-curve' design of the TRUShape (Dentsply Tulsa Dental

Specialties, Tulsa, OK, USA) or the hollow core self-adjusting file (SAF, Redent-Nova, Ranaa, Israel) that adjusts itself externally and internally based on the canal shape and dimension are some of examples of file systems that can be used for effective cleaning and shaping upto required working width.<sup>[15]</sup> TRUShape is a novel instrument with s-shaped longitudinal design. According to study done by Ana Arias et al (2017), TRUShape appeared to better conform to the original ribbon-shaped anatomy of the root canal.<sup>[16]</sup> The SAF file is hollow and designed as a thin cylindrical nickel-

titanium lattice that adapts to the cross-section of the root canal.

## CONCLUSION:

Minimal literature is available on the concept of working width and techniques available for its measurements. However, quality of endodontic treatment can definitely get better by maintaining the aseptic chain, using adequate irrigating solutions by properly making use of working width concept which will require further research and studies.

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