Letter to editor

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Working width, a deserted aspect of Endodontics

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Understanding the complexity of the root canal system and the aim to provide successful endodontic treatment has led to the development of newer techniques, instruments, and materials. These recent developments have greatly enhanced the clinician's ability to achieve biologically-based objectives of root canal treatment. 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 WL.[1] Inadequate determination of the width of the canal and subsequently the WW amplifies the possibilities of its insufficient cleaning and shaping.

A thorough search of the literature failed to express what an optimal preparation size might be, and it still remains a subject of uncertainty. Early protocols suggested apical enlargement to be two or three sizes greater than the first binding file at the apex.[2,3] These techniques have been demonstrated to be inadequate for bacterial elimination, thus undermining success of the treatment.[4] Furthermore, there is no evidence that the first binding instrument truly reflects the diameter of the canal at the apex, and it remains unclear as to where this binding occurs along the entire length of the canal.[1,4] Variability in instrument design, cross-section, size and taper, canal anatomy, cross-section, calcifications, and the concept of pre-flaring and the instrument utilized for pre-flaring have significantly affected gauging the first apical binding file.[5-7] Thus, these early-proposed concepts were without reliable and reproducible scientific method, and also lacked the support of literary evidence to accurately determine the WW of the canal.

Subsequent *in vitro* studies exploring specially designed instruments, mathematical and photographic analyses, and micro-computed tomography (μ-CT) imaging have been attempted to ascertain the appropriate WW of canals in different teeth.[8-10] Wider apical preparation of six to eight sizes larger than previously recommended sizes has been proposed to allow for adequate apical canal surface instrumentation.[11] However, increased apical enlargement of curved canals (20 - 50°) was shown not to result in a complete apical preparation, whereas it did lead to the unnecessary removal of dentin.[12]

Newer innovative cleaning and shaping methods like the '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 distorts externally and internally based on the canal shape and dimension, attempt to incorporate the WW concept.[10,13]

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Other methods of management of uninstrumented areas of the canal could include the recently introduced XP-endo finisher file (FKG Dentaire SA, La Chaux-de-Fonds, Switzerland) or ultrasonic irrigant activation.[14,15]

Multi-planar radiographic imaging like μ-CT imaging has provided a comprehensive understanding of the anatomy of the root canal system and also the width of the canals along its length, up to the apex.[6,9,10,16] However, due to its lengthy exposure time of up to a few hours, accompanying high dose of radiation and small gantry size, μ-CT is presently available only as a laboratory *in vitro* mode of analysis. Cone beam computed tomography (CBCT) appears to be the most promising preoperative investigation that delineates the canal width along the length of the tooth.[17] Concerns regarding excessive radiation exposure compared to traditional intraoral radiographs need to be satisfied entirely to allow for wide range of usage.

The concept of the width of the canal must not only be limited to its apical width. It needs to be understood and applied to supplementary aspects of endodontics like variable anatomy in the form of ramifications and isthmuses of root canals. Thus, no reliable technique, device, gadget, or guideline exists to accurately and consistently determine, and adequately manage the width or diameter of the root canal and apical constriction. Further studies, technological advancements, and clinical guidelines should focus on providing valuable data that would shed more light on this presently deserted but indispensable concept of WW.

Key words: Root canal anatomy; Working length; Working width

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