

## Root Canal Preparation Of Permanent Teeth – A Single File System

Research Article

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## Abstract

Root canal therapy entails the requirement to treat vital, non-vital or diseased teeth with the primary intention to restore and rehabilitate the natural teeth. Rotary instrumentation being the primary requirement to perform root canal treatment has undergone various innovations. One such innovation is the advent of ProFit S3 rotary file system. This file system is well acquainted with the different canal morphology and provides for adequate cleaning and shaping and obturation of the root canals.

**Keywords:** Endodontic Treatment; NiTi Files; Profit S3; Root Canal Treatment; Rotary System.

## Introduction

Root canal therapy necessitates the treatment of vital and non vital or diseased teeth with the objective to preserve the natural teeth[1]. Rotary instrumentation is required for shaping of the root canals and maintaining the original anatomy of the tooth/teeth which is one of the challenging procedures in endodontics. Mechanical instrumentation enhances the effectiveness of irrigation protocol and the intracanal medicament used by providing adequate space for the same and facilitating the canal to receive 3-dimensional obturation[2,3]. ProFit S3 (PS3) (Reeganz Dental Pvt Ltd) is based on Blue Technology and new heat-treated rotary system introduced in 2019. It has a variably variable taper design with a rectangular cross-section. This cross-section has two-point contact thereby reducing the apical extrusion of debris. The microstructure, the behavior, and its clinical performance are influenced by the thermomechanical treatment of nickel-titanium (Ni-Ti) instruments[4-6].

## Case 1

A 38-year-old male patient reported the chief complaint of pain in the right lower back tooth region. The pain was localized, sharp, and aggravated at night. The patient had no past medical history. Based on clinical and radiographic evaluation it was (Figure 1A) it was diagnosed as Class I dental caries with symptomatic irreversible pulpitis in 46 (mandibular right first molar).

## Case 2

A 36-year-old male patient reported the chief complaint of pain in the right upper back tooth region. The pain was localized, sharp, and aggravated at night. The patient had no past medical history. Based on clinical and radiographic evaluation it was (Figure 1C) it was diagnosed as Class II dental caries with symptomatic irreversible pulpitis in 16 (maxillary right first molar).

Both the teeth were anesthetized using 2% lignocaine hydrochloride.

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Figure 1 :A - Preoperative Radiograph of 46, B-Post Obturation Radiograph of 46, the yellow arrow denotes the conserved dentinC- Preoperative Radiograph of 16, D-Post Obturation Radiograph of 16

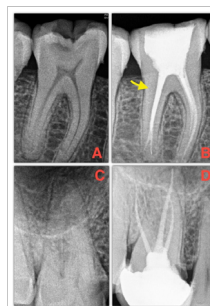
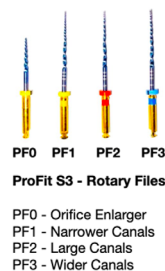


Figure 2: Profit S3 Rotary files. P0 (Gold), PF1 (Yellow band), PF2 (Red band), PF3 (Blue band)



ride and 1:2,00,000 adrenaline bitartrate (Neon laboratory Ltd, Mumbai, India). After adequate anesthesia was achieved, rubber dam isolation was carried out. Conventional access cavity was prepared using Endo-access bur, 21mm size 2 (Dentsply Maillefer, Swiss made) was used and the walls of the cavity were refined with an Endo Z bur, 21mm (Dentsply Maillefer, Swiss made). Once the access was gained into the canals, K file (Mani, Utsunomiya, Tochigi, Japan) of size #10 hand file was used to achieve the initial patency of the canal to full working length. The working length was determined with Root ZX apex locator (J Morita Europe GVBH, Frankfurt, Germany) and confirmed with digital radiographs. Followed by the use of #15 and #20 hand files to achieve initial enlargement of the canal before using the rotary files.

The orifice opener P0 was used to enlarge the orifice at 300 rpm and torque 3NCM in all the canals in 46 and 16. Followed by copious irrigation with 3% sodium hypochlorite (Prime dental products, India) and normal saline (Nirma Healthcare, Gujarat) to flush out the dentin debris and remaining pulpal tissue. Ethylenediaminetetraacetic acid (17%) (Desmear, Anabond Stedman) was used for smear layer removal. The next file PF1 was used at 300 rpm and torque 2.6NCM in all the canals followed by adequate irrigation and further cleaned and shaped using PF2 at 300 rpm and torque 2.6NCM, tip size #25. Gutta-percha points (Meta Biomed, Korea) were used. In 16 palatal canal was cleaned and shaped till PF3 size #30. Master cone radiograph was taken to confirm adequate cleaning and shaping. The canals were finally flushed with 2% Chlorhexidine Gluconate solution (Anabond ASEP-RC). The canals were obturated with AH-Plus sealer (Dentsply, Maillefer). Post obturation radiographs were taken with entrance filling in 46 (Figure 1B) and after full veneer crown cementation in 16 (Figure 1D).

## Discussion

Innovation to provide for better root canal treatment led to the

evolution of the Single file system of adult rotary files. ProFit S3 (Figure 2) is an exclusive system with better cutting efficacy and flexibility. Being a heat-treated file system consisting of 508 nitinol wire - M wire added with Titanium oxide coating gives it higher resistance to fracture[7]. Profit S3 files have a variably variable (VV) taper design with a rectangular cross-section. This cross-section has a two-point contact thereby reducing apical extrusion of dentin and thus reducing the tendency of the file to bind in the canal and thus reducing the tendency to fracture. This also provides smoothly prepared canals which can receive the obturating material.

All files are designed to cut dentin, with its controlled taper avoiding excess root dentin removal. PF1 , PF2 , PF3 is designed to cut dentin, in a crown down manner, with its controlled taper avoiding excess root dentin removal.PCD (pericervical dentin) is the dentin near the alveolar crest, the more dentin is conserved, the longer the tooth is kept as stated by Clark and Khademi[8]. According to Antony SP et al that PS3 (ProFit S3) files removed less amount of dentin during cleaning and shaping which in turn preserves the peri-cervical dentin[9] which increases the longevity of the root canal treated tooth.

## Conclusion

Profit S3 is an effective endodontic instrument for root canal preparation in permanent teeth, which has good flexibility and fracture resistance.

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