10.5005/jp-journals-10031-1102

CASE REPORT

Minimally Invasive Endodontic Management of a Maxillary Second Premolar with an S-shaped Root Canal using the Self-adjusting File

[1]Ajinkya M Pawar, [2]Mansing G Pawar, [3]Sharad R Kokate

ABSTRACT

The main objective of an endodontic treatment is thorough shaping and cleaning of the root canal system, with the aim to obtain a fluid tight seal by a biocompatible obturating material. Complex unusual root canal morphology is an often-occurring phenomenon. Knowledge and understanding the unusual root canal morphology predicts the successful outcome in endodontic treatment. One such variant root canal morphology is the 'S' shaped root canal.

The self-adjusting file (SAF) is a hollow compressible file made up of nickel-titanium lattice. The new concept associated with the SAF is that it adapts itself to the anatomical shape of the root canal and performs mechanical shaping and chemical cleaning with continuous irrigation simultaneously.

This case report discusses endodontic treatment of a maxillary second premolar with a 'S' shaped root canal and its successful management with the SAF.

Keywords: S-shaped canals, Maxillary second premolar, Self-adjusting file.

How to cite this article: Pawar AM, Pawar MG, Kokate SR. Minimally Invasive Endodontic Management of a Maxillary Second Premolar with an S-shaped Root Canal using the Self-adjusting File. J Contemp Dent 2015;5(1):35-37.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Of all the phases of an anatomic study in human system, one of the most complex is that of the pulp cavity and its morphology.[1] Knowledge of the tooth and the root canal anatomy is an important factor in determining the endodontic treatment options and it's success. A wide range of variability in root anatomy is found in certain roots or teeth. In particular, certain roots seem to have a propensity for a 'S-shape' configuration.

According to Vertucci, the maxillary premolar teeth present the maximum anatomic variations.[2] One of the variations presented by the maxillary second premolar often is the presence of S-shaped root canal anatomy. This kind of variation is also frequently reported in maxillary lateral incisor, maxillary canine and mandibular molar teeth.

The advent and use of the self-adjusting file (SAF) system (ReDent-Nova, Ra'anana, Israel), introduces a new concept of minimally invasive endodontics. The SAF performs the vital steps of shaping and cleaning simultaneously.

The SAF is a hollow (Fig. 1A) compressible file, made up of nickel-titanium lattice. The SAF is operated in a trans-line (in-and-out) motion using a vibrating handpiece head (RDT3, ReDent-Nova) (Fig. 1B) that generates 5,000 vibrations per minute at amplitude of 0.4 mm. This file adapts itself to the 3D canal morphology both longitudinally and cross-sectionally. It effectively shapes up to 92% of the of root canal walls while allowing for the continuous flow of fresh NaOCl through the hollow file by using a peristaltic irrigation device (VATEA, ReDent-Nova) (Fig. 1C). The file continuously activates the irrigant by its sonic vibration.[3] The SAF are available in two diameters 1.5 and 2 mm.

The following case discusses the successful endodontic management of the S-shaped root canal presented by a maxillary second premolar using SAF system.

CASE REPORT

A 38-year-old healthy male patient was referred to the Department of conservative dentistry and endodontics, for management of a right maxillary second premolar. Clinical examination revealed a large carious lesion on the distoproximal aspect of the tooth 15. On history taking the patient revealed of severe pain for the past 5 days. The preoperative radiograph revealed a large radiolucency present distoproximally in very close proximity to the coronal pulp, with respect to the maxillary right second premolar 15. The radiograph also revealed the tooth in question presenting S-shaped roots. The diagnosis was made; an irreversible pulpitis in relation to tooth 15 and an endodontic treatment was planned and initiated.

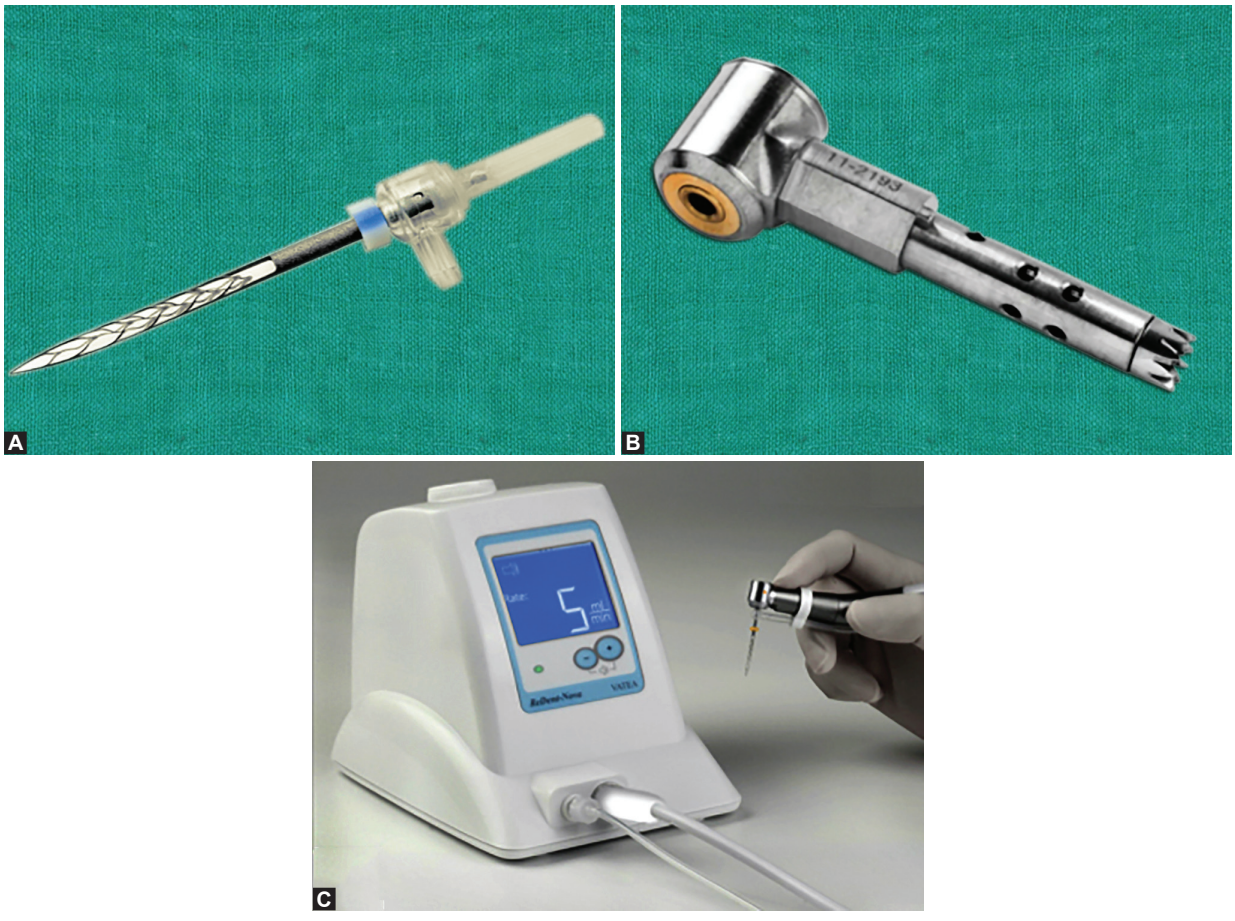
[1]Assistant Professor, [2]Dean, [3]Dean, Professor and Guide

[1]Department of Conservative Dentistry and Endodontics DY Patil Dental School, Pune, Maharashtra, India

[2]Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, Maharashtra, India

[3]Department of Conservative Dentistry and Endodontics, YMT Dental College and Hospital, Kharghar, Maharashtra, India

Corresponding Author: Ajinkya M Pawar, Assistant Professor Department of Conservative Dentistry and Endodontics Y-10/155, Government Colony, Bandra East, Mumbai-400051 Maharashtra, India, Phone: +91-9867636233, e-mail: ajinkya@drpawars.com



Figs 1A to C: (A) The self-adjusting file, (B) RDT3 head, (C) Peristaltic VETEA pump for continuous irrigation

After the administration of the local anesthesia, the tooth was isolated and a standardized oval access cavity was made using the Endo Access Kit (Dentsply, Tulsa Dental Specialities) under magnification (2.5× loupes, Carl Zeiss, Germany) (Fig. 2A). The root canal patency was checked by #06,08 and 10 K-files. The working length was recorded using an electronic foramen locator (Root ZX, J Morita, Mfg Corp, Japan) and confirmed by a radiograph (Fig. 2A).

The root canal facilitated the placement of the #15 K-file passively till the working length hence the glide path was prepared till #20 K-file for effective placement of the SAF 1.5 mm till the apex (Fig. 2B) as described by Solomonov.[4] The root canal orifices were then enlarged till Gates-Glidden #2 followed by placement of the SAF.

The placement of the SAF till the working-length was confirmed with a radiograph (Fig. 2C). The shaping and cleaning procedure for the canal was carried out for 4 minutes in each canal with continuous irrigation. The file was operated in a transline motion of 5,000 vibrations/min at amplitude of 0.4 mm using RDT3 head with continuous irrigation at a flow rate of 4 ml/min using a VETEA pump.

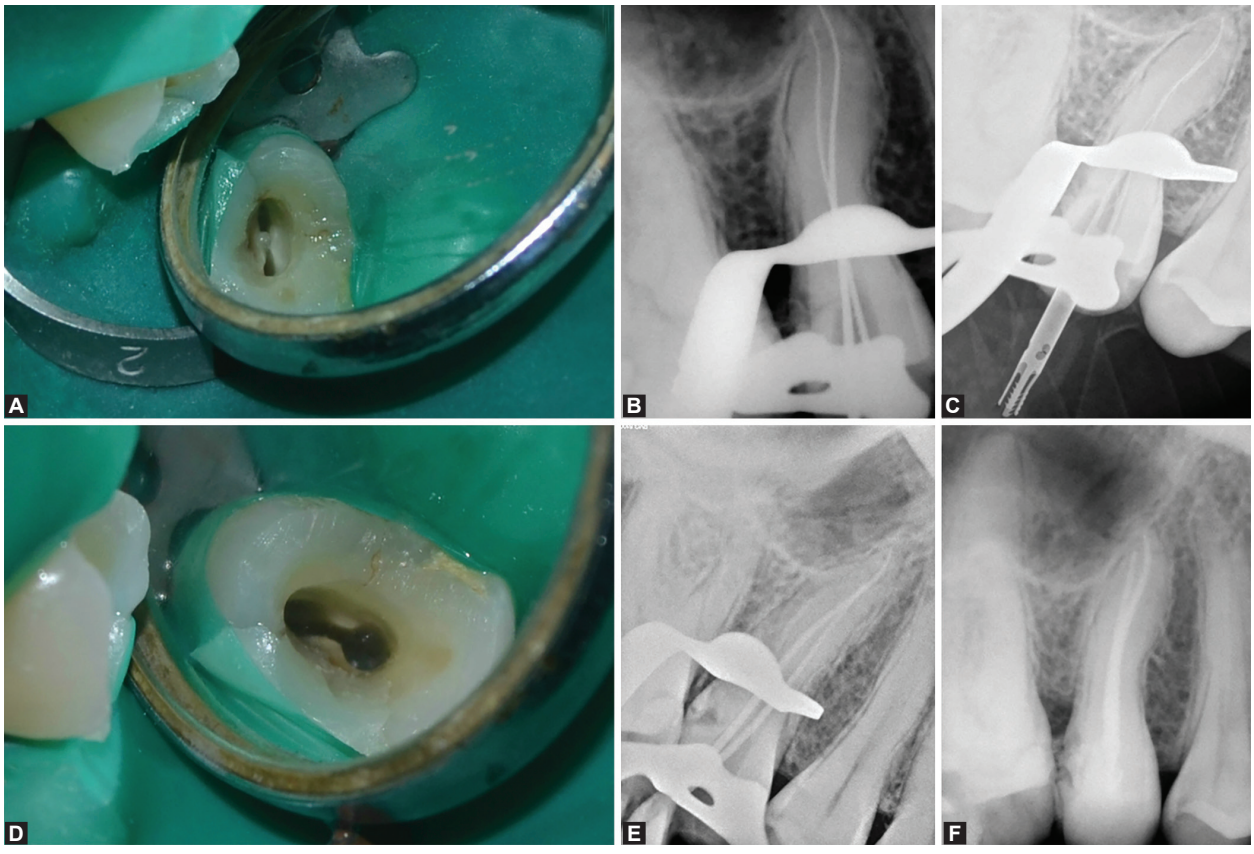
Following the completion of the shaping procedure, the effect shaping and continuous irrigation was seen in the isthmus area, which presented a clean surface devoid of any debries (Fig. 2D). The canals were then dried using sterile paper points, mastercones were selected and obturation was done with lateral cold condensation using AH-Plus (De Trey-Dentsply, Konstanz, Germany) as sealer. A postobturation radiograph was taken to confirm the quality of obturation. The endodontic access cavity was temporarily restored with Cavit (Figs 2E and F).

DISCUSSION

Key to the successful root treatment of teeth with S-shaped roots is the recognition of the challenges that will be encountered in the enlarging, shaping and cleaning of the root canal system. The 'S' shaped canal has two curves, with the apical curve being very difficult to negotiate with increased chances of strip perforation being very high with this anatomic variation.

Gutman has suggested the use of preflaring the coronal 1/3rd of the root canal to reduce the angle of curvature, facilitating easy negotiation of these canals.[5] However, this procedure is done at the expense of the tooth structure.

In the presented case we used a #2 gates-glidden, which causes acceptable tooth destruction when compared to the large tapered orifice openers of the



Figs 2A to F: (A) Access opening presenting uncleaned isthmus area, (B) Working length X-ray showing one of the roots as S-shaped, (C) Compressibility and placement of the SAF till the working length, (D) Cleaned root canal orifices and the isthmus, effect of adaptation of the SAF and continuous irrigation, (E) Mastercone X-ray, (F) Obturation X-ray showing minimal preparation of the root canal, resulting in maximum preservation of the radicular dentin and maintaining the S-shape

rotary files. The coronal third dint had to be enlarged as we used a SAF, which is highly compressible. The 1.5 mm SAF used for the case can be easily compressed in a canal where the glide path is prepared till #20 K-file.[3]

The SAF instrumentation includes continuous simultaneous irrigation with any desired irrigant. This continuous flow of irrigant does not build up any pressure in the canal as the metal meshwork allows the free escape of irrigant at all times.[6]

For using a SAF the initial glide path preparation is the most important. The initial glide path should always be prepared till the working length till a #20 for 1.5 mm diameter or #30 for 2 mm diameter SAF to reach the working length. The SAF till the working length should always be confirmed by an X-ray.[4]

The SAF is devoid of any flutes or cutting blade or any taper like those of the currently available rotary or reciprocating files. Instead it is hollow that facilitates its compression in the root canals when it is placed and has an abrasive surface. When it is compressed it tries to regain its original shape resulting is equal circumferential pressure and the abrasive surface abrades the radicular dentin and results in its least removal.[3] The amount of remaining dentin can be clearly seen in the postobturation radiograph of the presented case.

CONCLUSION

Understanding the complex root canal morphology and choosing the most recent and minimally invasive canal preparation technique will contribute to successful endodontic treatment. The SAF represents a new advent in endodontic file design and use and is truly a minimal invasive endodontic system.

REFERENCES

1. Pawar AM, Kokate SR, Hegde VR. Contemporary approach in successful endodontic intervention in radix entomolaris. World J Dent 2013;4(3):208-213.
2. Reuben J, Velmurugan N, Vasanthi S, Vijaylakshmi P. Endodontic management of maxillary second premolar with an S-shaped root canal. J Conserv Dent 2008;11(4): 168-170.
3. Metzger Z, Teperovich E, Zary R, Cohen R, Hof R. The self-adjusting file (SAF). Part 1: respecting the root canal anatomy: a new concept of endodontic files and its implementation. J Endod 2010;36(4):679-690.
4. Solomonov M. Eight months of clinical experience with the self-adjusting file system. J Endod 2011;37(6):881-887.
5. Guttman JL. Problem solving in endodontics. 3rd ed. Missouri: Mosby–Year book Inc; 1997. p. 116.
6. Hof R, Perevalov V, Eltanani M, Zary R, Metzger Z. The self-adjusting-file (SAF). Part 2: mechanical analysis. J Endod 2010;36(4):691-696.