Masterclass in Clinical Practice

Endodontics

with
Prof Martin Vorster[1]
Prof Peet J. van der Vyver[2]

Reciproc Blue: Overview and Case Presentation

[1] Martin Vorster,
BChD (Pret); PGDipDent (Endo); MSc(Dent), PhD

[2] Peet J. van der Vyver,
BChD (Pret); Dip. Odont (Aest Dent);
Dip.Odont (Endo); MSc Odont (Endo), PhD (Endo)

Introduction

The evolution of nickel-titanium (NiTi) rotary instrumentation has dramatically improved the efficiency, safety, and predictability of root canal preparation. One of the most significant innovations in this space is the development of reciprocating systems. Among them, Reciproc Blue (VDW, Munich, Germany) has emerged as a leading single-file reciprocating system due to its unique combination of proprietary blue heat treatment, advanced metallurgy, and efficient cutting design. Designed to simplify canal shaping, Reciproc Blue reduces procedural steps while enhancing safety and flexibility.

The Reciproc Blue system comprises three instruments: Reciproc Blue 25, Reciproc Blue 40, and Reciproc Blue 50, along with corresponding gutta-percha cones and paper points. These instruments share a similar design than the original Reciproc series and feature an S-shaped cross-section. Each file in the system incorporates a regressive taper that begins 3 mm from the tip. Reciproc Blue 25 has a tip diameter of 0.25 mm with an 8% taper over the initial 3 mm. The Reciproc Blue 40 has a tip measuring 0.40 mm in diameter and a 6% taper over the same length. Lastly, the Reciproc Blue 50 features a 0.50 mm tip diameter with a 5% taper over the first 3 mm from the tip. (Yared, 2017).

Literature demonstrates enhanced performance and clinical reliability of Reciproc Blue in comparison with similar rotary and reciprocating systems.

Metallurgical Advancements and Fracture Resistance

Reciproc Blue undergoes a proprietary heat treatment that imparts a distinct blue colour and significantly enhances its mechanical properties. This heat treatment increases cyclic fatigue resistance by making the file more flexible and reducing the risk of separation (De-Deus et al., 2017).

Efficiency and Simplicity in Shaping

The single-file approach of Reciproc Blue streamlines clinical workflow. Using just one instrument to complete the shaping phase reduces the time of instrumentation. An increase in cutting efficiency and greater penetration depth was reported when compared to another popular single file system (Plotino et al., 2015). The reduced number of instruments leads to lower cost, with the single use reducing the chance of cross-contamination. (Yared, 2008).

Preservation of Root Canal Anatomy and Glide Path Preparation

Maintaining the original canal curvature while effectively removing infected tissue is essential in endodontics. Reciproc Blue respects the canal anatomy and performs well in curved and narrow canals (Silva et al., 2021). Moreover, its flexible design allows it to reach working length with minimal or even

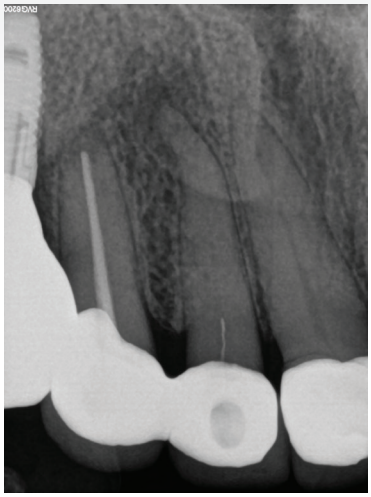

Figure 1: Periapical radiograph of maxillary right lateral incisor with a large periapical lesion, canal calcification and evidence of a broken root canal instrument located in the coronal aspect of the root canal system

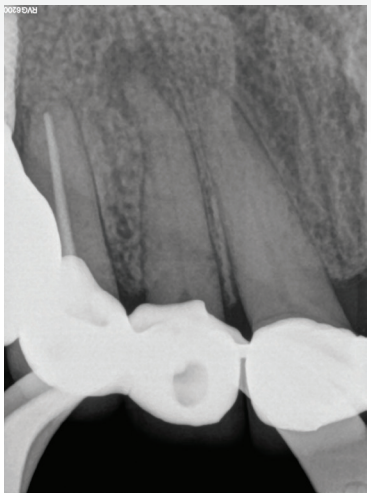

Figure 2: Periapical radiograph after removal of the fractured instrument

no glide path preparation in certain cases, further reducing preparation time and cost.

According to Yared (2017) only one Reciproc blue instrument can be used in reciprocation motion to complete the canal preparation without the need for hand filing or creating a glide path in most clinical cases.

Several authors report on the ability to use an M-Wire Reciproc instrument up to the working length without glide path preparation in in-vitro and in-vivo studies (De Deus et al, 2103; Zuolo, Carvalho and De-Deus G, 2015; Rodrigues et al, 2016; Bartols, Robra and Walther, 2017). The results of these studies show that the M-Wire Reciproc R25 instrument can be used to prepare standard root canal systems without any prior glyde path preparation in more than 90% of cases.

Yared (2017) also recommends using only one Reciproc blue instrument to complete canal preparation without the need for hand filing or creating a glide path in most clinical cases.

In a study by De Deus et al (2019) they assessed the frequency in which Reciproc Blue R25 instruments reached the full working length of mandibular molar canals (308) on extracted teeth without prior glide path preparation. The Reciproc Blue R25 instrument were able to reach the full working length in 304 root canals (98.70%). Reciproc Blue R25 instruments were unable to reach the full working length without a glide path in only four canals out of 308. Three dimensional micro-CT images of these four canals revealed that two of these canals presented with apexes terminating in extreme abrupt para-foraminal exits and no apparent reasons were found to explain why Reciproc Blue R25 instruments did not reach the full working length in the other two cases.

However, an in-vitro study on extracted maxillary premolar teeth showed that canal preparation with prior glide path still leads to more centered canal preparation with less canal transportation compared to a "no glide preparation" protocol with Reciproc Blue. (Hage et al.2020)

It is recommended to check patency and create a glide path with hand files or the R-Pilot dedicated glide path instrument for the system when the Reciproc Blue R25 files struggles to progress or stop advancing down the canal (Yared, 2019).

Debris Removal

Reciproc Blue's reciprocating motion mimics a balanced-force technique, reducing apical extrusion of debris associated with postoperative pain. (Dincer et al., 2015).

Case Presentation

The patient, a 50-year-old female, presented with a non-vital maxillary right lateral incisor that had a large periapical lesion. She had a history of a previous attempt at root canal treatment, which was unsuccessful due to canal calcification. Radiographically, there was also evidence of a broken root canal instrument located in the coronal aspect of the root canal system (Figure 1).

The fractured root canal instrument was removed using an ultrasonic instrument (Figure 2). Canal preparation was

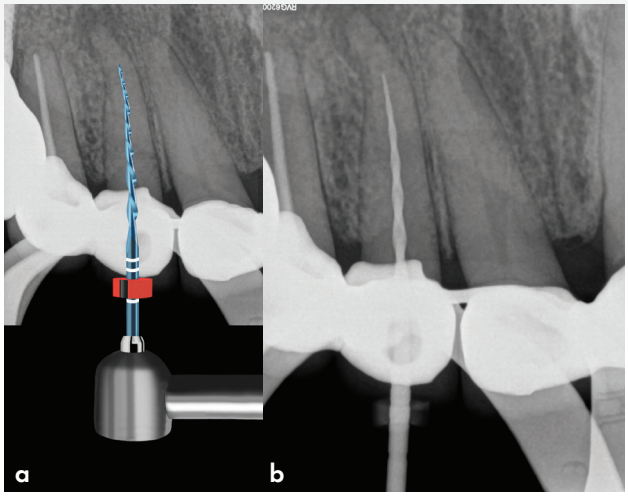

Figure 3: (a) Reciproc Blue R25 was used for initial canal preparation; (b) Periapical radiograph confirming the progress of the Reciproc Blue R25 instrument

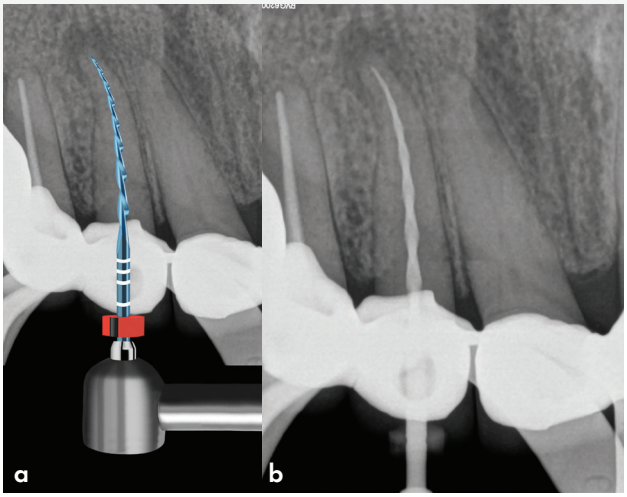

Figure 4: (a) Reciproc Blue R25 was used to full working length, indicated by the file engaging the auto-reverse mode on the X Smart Pro Endodontic motor; (b) Periapical radiograph confirming the progress of the Reciproc Blue R25 instrument to full working length

then initiated with a Reciproc Blue R25 instrument without any prior canal negotiation with hand instruments or glide path preparation.

Light pressure was applied to the file while employing three slow in-and-out pecking motions without completely pulling the file out of the canal. The file was then removed from the canal to clean its flutes. This protocol was repeated four times as the file advanced to approximately two-thirds of the way down the canal system. After each pecking cycle, the canal was irrigated with sodium hypochlorite. A periapical radiograph was taken to assess the progress of the instrument at this level (Figure 3).

A size 08 K-file was used to check canal patency before the Reciproc Blue R25 was again used in the same manner as described above until it reached the full working length (Figure 4), indicated by the file engaging the auto-reverse mode on the X-Smart Pro+ Endodontic motor. According to the manufacturer, the integrated apex locator with dynamic accuracy technology on the motor accurately reads the canal measurement signal while the instrument is shaping the canal and activates the auto-reverse function when the major apical foramen is reached.

The canal was irrigated with 17% EDTA and 3.5% heated sodium hypochlorite and the solutions activated with the SmartLite Pro EndoActivator. A Reciproc Blue R25 ISO size 25 gutta percha point was placed into the prepared root canal system and fit was confirmed with a periapical radiograph (Figure 5).

The prepared canal was dried with paper points. Canal obturation was done with Pulp Canal Sealer EWC root canal cement, the gutta percha cone and the Gutta Smart Obturation system using the continuous wave of condensation technique. Figure 6 depicts the result after canal obturation.

Conclusion

Reciproc Blue offers an efficient, safe, and simplified approach to root canal shaping with or without glide path preparation. Its superior fatigue resistance, shaping ability, and preservation of original canal anatomy makes it a valuable tool in both routine and complex endodontic cases.

References

Bartols A, Robra BP, Walther W. The ability of Reciproc instruments to reach full working length without glide path preparation: a clinical retrospective study. PeerJ 2017;19:3583.

De-Deus G, Arruda TE, Souza EM, et al. The ability of the Reciproc R25 instrument to reach the full root canal working length without a glide path. International Endodontic Journal, 2013;46:993–8.

De-Deus G, Silva EJNL, Vieira VTL, et al. Blue thermomechanical treatment optimizes fatigue resistance and flexibility of the Reciproc files. Journal of Endodontics,2017,

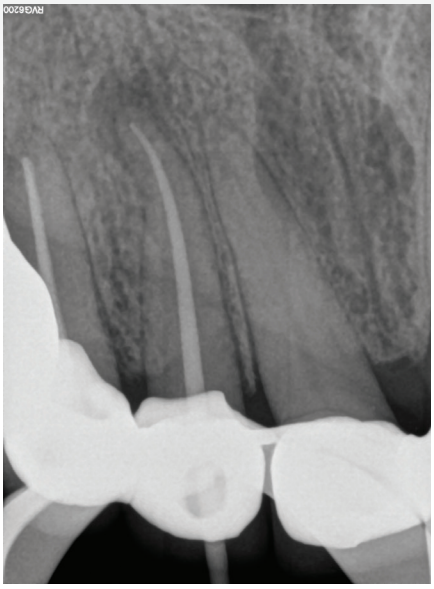

Figure 5: Periapical radiograph confirming the fit of the Reciproc Blue R25 ISO size 25 gutta-point to full working length

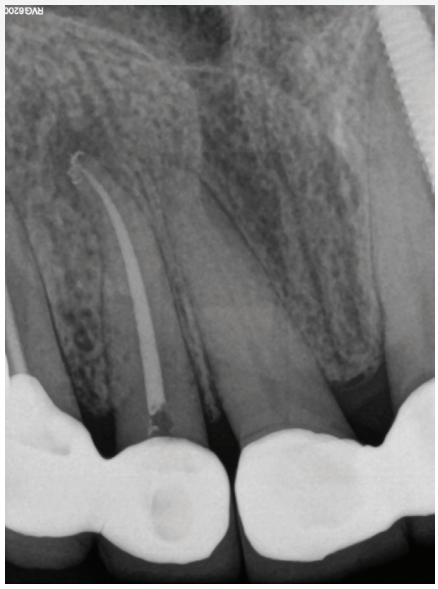

Figure 6: Periapical radiograph showing the result after canal obturation

43(3), 462–466.

Dincer A, Er O, Canakci B. Evaluation of apically extruded debris during root canal retreatment with several NiTi systems. International Endodontic Journal. 2015;48(12):1194-1198.

Hage W, Zogheib C, Bukiet F, et al. Canal transportation and centring ability of reciproc and reciproc blue with or without use of glide path instruments: A CBCT study. European Endodontic Journal. 2020;5(2):118.

Silva RV, Alcalde MP, Rodrigues CT, Silveira FF, Duarte MA., Nunes, E. Root canal shaping of curved canals by Reciproc Blue system and Pro Taper Gold: A micro-computed tomographic study. Journal of Clinical and Experimental Dentistry. 2021;13(2):112.

Plotino G, Giansiracusa Rubini A, Grande NM, Testarelli L, Gambarini G. Cutting efficiency of Reciproc and WaveOne reciprocating instruments. Journal of Endodontics, 2015, 41(6), 1007–1010.

Rodrigues E, De-Deus G, Souza E, Silva EJ. Safe mechanical preparation with reciprocation movement without glide path creation: result from a pool of 673 root canals. Brazilian Dental Journal, 2016;27:22–7.

Yared G. Canal preparation using only one Ni-Ti rotary instrument: Preliminary observations. International Endodontic Journal, 2008,41(4), 339–344.

Yared G. Reciproc blue: the new generation of reciprocation. Giornale Italiano di Endodonzia. 2017;31(2):96-101.

Zuolo ML, Carvalho MC, De-Deus G. Negotiability of second mesiobuccal canals inmaxillary molars using a reciprocating system. Journal of Endodontics, 2015;41:1913–7.

Scan QR code to view the video