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CLINICAL ARTICLE/ARTICOLO CLINICO

# Reciproc blue: the new generation of reciprocation



*Reciproc blue: la nuova generazione della reciprocazione*

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## KEYWORDS

Reciprocation;  
NiTi instruments;  
Thermal treatments;  
Reciproc blue.

## Abstract

**Aim:** This article introduces the Reciproc<sup>®</sup> blue system and describes the clinical technique with and without creating a glide path.

**Methodology:** The concept of canal preparation with only one mechanical instrument used in reciprocation was introduced several years ago. Studies and clinical research have shown the efficiency and the safety of the Reciproc<sup>®</sup> instrument in the preparation of the majority of canals without creating a glide path, and in the retreatment procedure.

**Results:** Reciproc<sup>®</sup> blue, a thermally treated instrument is an improved version of the original Reciproc<sup>®</sup> instrument; it has an increased resistance to cyclic fatigue and a greater flexibility enabling a safer and smoother canal preparation procedure, and a wider range of clinical applications.

**Conclusions:** This article introduces and describes the clinical technique with which the Reciproc<sup>®</sup> blue instrument is used, even without the need to create a glide path with manual files before using the mechanical instrument.

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**PAROLE CHIAVE**

Reciprocazione;  
Strumenti in nichel-titanio;  
Trattamenti termici;  
Reciproc blue.

**Riassunto**

**Obiettivi:** Questo articolo introduce il sistema Reciproc® blue e descrive la tecnica clinica di utilizzo con e senza glide path.

**Materiali e metodi:** Il concetto di preparazione del canale con un solo strumento meccanico usato in reciprocazione è stato introdotto diversi anni fa. Studi e ricerche cliniche hanno dimostrato l'efficienza e la sicurezza dello strumento Reciproc® nella preparazione della maggior parte dei canali senza dover creare un percorso di scivolamento (glide path) e nelle procedure di ritrattamento.

**Risultati:** Il Reciproc® blue, uno strumento trattato termicamente, è una versione migliorata dello strumento originale Reciproc®; ha una maggiore resistenza alla fatica ciclica e una maggiore flessibilità che consente una procedura di preparazione del canale più sicura e più scorrevole e una gamma più ampia di applicazioni cliniche.

**Conclusioni:** Questo articolo introduce e descrive la tecnica clinica con cui il sistema Reciproc® blue viene utilizzato, anche senza la necessità di dover creare un sentiero di scorrimento con strumenti manuali prima dell'utilizzo dello strumento meccanico.

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**Introduction**

The use of mechanical instruments in reciprocation with unequal forward and reverse rotation was introduced in 2008.<sup>1</sup> Reciproc® series of instruments (VDW GmbH, Munich, Germany) were designed specifically for this type of motion.<sup>2</sup>

Reciproc® blue (VDW GmbH, Munich, Germany), a thermally treated nickel–titanium instrument, is an improved version of the original Reciproc®.<sup>3</sup> It has an increased resistance to cyclic fatigue and a greater flexibility.<sup>4</sup>

The present article describes the use of Reciproc® blue series of instruments for the canal preparation without any prior instrumentation and without a glide path. Only one instrument is needed to enlarge the majority of the canals to an adequate size and taper regardless of the size of the canal, the degree of canal curvature or canal calcification.

**Report****Clinical applications**

The Reciproc® blue system includes 3 instruments, similar to the original Reciproc® series, the Reciproc® blue 25, Reciproc® blue 40 and Reciproc® blue 50, matching paper points, matching gutta-percha cones, and matching gutta-percha obturators (GuttaFusion®) (Fig. 1).

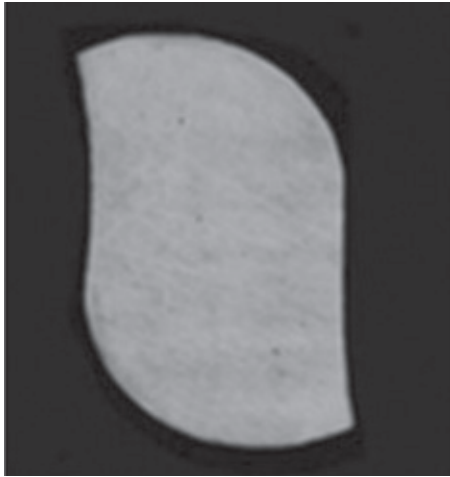
The Reciproc® blue instruments have an S-shaped cross-section (Fig. 2). The three instruments have a regressive taper starting at 3 mm from the tip. The Reciproc® blue 25 has a diameter of 0.25 mm at the tip and an 8% (0.08 mm/mm) taper over the first 3 mm from the tip. The Reciproc® blue 40 has a diameter of 0.40 mm at the tip and a 6% (0.06 mm/mm) taper over the first 3 mm from the tip. The Reciproc® blue 50 has a diameter of 0.50 mm at the tip and a 5% (0.05 mm/mm) taper over the first 3 mm from the tip.

The instruments are used in conjunction with a motor (Fig. 3) at 10 cycles of reciprocation per second. The motor is programmed with the angles of reciprocation and speed for the three instruments. The values of the forward and reverse rotations are different. When the instrument rotates in the cutting direction (forward rotation) it will advance in

the canal and engage dentine to cut it. When it rotates in the opposite direction, the reverse rotation (smaller than the forward rotation) the instrument will be immediately disengaged. The end result, related to the forward and reverse



**Figure 1** Reciproc blue instruments, and matching paper points, gutta-percha points and GuttaFusion obturators (from top to bottom).



**Figure 2** S-shape cross section of the Reciproc blue instrument.

rotations, is an advancement of the instrument in the canal. The angles set on the reciprocating motor are specific to the Reciproc blue instruments. They were determined using the torsional properties of the instruments.

### Technique

The technique is simple. In the majority of the canals, only one Reciproc<sup>®</sup> blue instrument is used in reciprocation to complete the canal preparation without the need for hand filing or creating a glide path. The requirements for the access cavity and the straight-line access to the canals, and the irrigation protocols remain unchanged. The use of drills or orifice openers is not required prior to starting the canal preparation with the Reciproc<sup>®</sup> blue instrument.

The selection of the appropriate Reciproc<sup>®</sup> blue instrument is based on an adequate radiograph (Fig. 4). If the canal is partially or completely invisible on the radiograph, the canal is considered narrow and the Reciproc<sup>®</sup> blue 25 is



**Figure 3** Reciprocating motors.

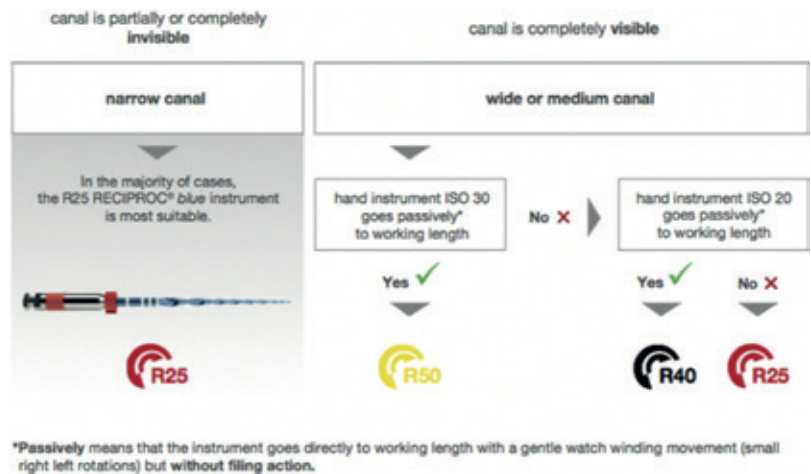


Figure 4 Selection of Reciproc blue instrument.



Figure 5 (a) Canals not completely visible on pre-operative radiograph. A Reciproc blue size 25 was used to shape the canals. (b) Fitted gutta-percha cones. (c) Obturated root canals.

selected (Fig. 5). In the other cases, where the radiograph shows the canal clearly from the access cavity to the apex, the canal is considered as relatively large (Fig. 6). A size 30 hand instrument is inserted passively to the working length (verified with an apex locator) with a gentle watch winding movement but without a filing action. If the file reaches the working length, the canal is considered large; the Reciproc® blue 50 is selected for the canal preparation. If the size 30 hand file does not reach the working length passively, a size 20 hand file is inserted passively in the canal. If it reaches the working length, then the canal is considered medium in size and an Reciproc® blue 40 instrument is used for the canal preparation. If the hand file 20 does not reach the working length passively, the Reciproc® blue 25 is selected.

Before commencing preparation, the length of the root canal is estimated with the help of an adequately exposed and angulated pre-operative radiograph. The silicone stopper is set on the Reciproc® blue instrument at two thirds of that

length. The Reciproc® blue instrument is introduced in the canal with a slow in-and-out pecking motion without pulling the instrument completely out of the canal. The amplitude of the in- and out- movements (pecks) should not exceed 3–4 mm. Only very light pressure should be applied. The instrument will advance easily in the canal in an apical direction. After 3 pecks, or if resistance is encountered before the 3 pecks are completed, the instrument is pulled out of the canal to clean the flutes. A #10 hand file is used to check patency to two thirds of the estimated length. The canal is copiously irrigated. The Reciproc® blue instrument is then re-used in the same manner until it reaches the two thirds of the estimated length. The canal is irrigated and a #10 file is used to determine the working length with the aid of an apex locator and a radiograph. The Reciproc® blue instrument is re-used as described until it reaches the working length. As soon as the working length is reached, the Reciproc® blue instrument is withdrawn from the canal to avoid an unnecessary over-enlargement. The

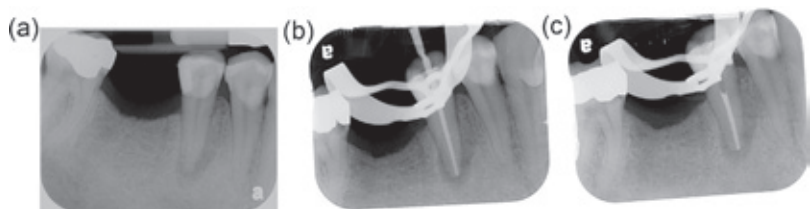


Figure 6 (a) Canal completely visible on pre-operative radiograph. A Reciproc blue larger than size 25 was used to shape the canal. (b) Fitted gutta-percha cone. (c) Obturated root canal.



**Figure 7** R-Pilot glide path reciprocating instrument.



**Figure 8** Mesio-buccal canal in tooth #17 with a coronal curvature, an indication to create a glide path with the reciprocating R-Pilot prior to using the Reciproc blue instrument.

Reciproc<sup>®</sup> blue instrument can also be used with a brushing motion against the walls of wide canals.

## Discussion

With continuous rotation it is necessary to create a glide path in order to minimize instrument binding and the risk of fracture.<sup>5,6</sup> Binding is less likely to occur when an instrument is used in reciprocation with unequal forward and reverse angles and with the limited in- and out- movements as described earlier.<sup>9</sup> Therefore, a glide path is not required in the majority of the canals when instruments are used in this manner. It has been shown the incidence of fracture of instruments used in reciprocation with unequal forward and reverse angles and with a pecking motion is very low<sup>7,8</sup> in comparison to rotary instruments. However, just as with any continuous rotary system, it is possible to use the Reciproc<sup>®</sup> blue instruments after creating a glide path with reciprocating instrument, the R-Pilot<sup>®</sup> (VDW GmbH, Munich, Germany) (Fig. 7) specifically designed for this purpose.

A glide path should be created with the R-Pilot<sup>®</sup> prior to using the Reciproc<sup>®</sup> blue in some canals for example when the Reciproc<sup>®</sup> blue instrument stops advancing in the canal or if advancement becomes difficult. In these canals, apical pressure should not be exerted on the Reciproc<sup>®</sup> blue instrument. The instrument should be removed from the canal and the canal should be irrigated. Patency is established to the working length with a #8 file and the R-Pilot<sup>®</sup> instrument is

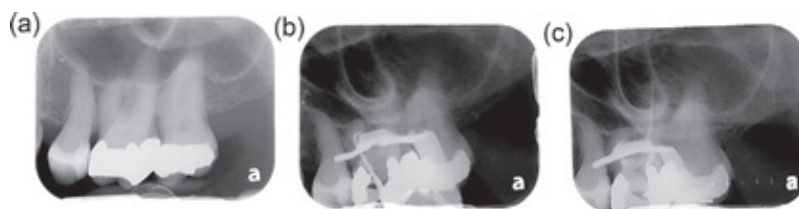
used to create a glide path to the working length. The Reciproc<sup>®</sup> blue instrument can then be used safely to the working length. The R-Pilot<sup>®</sup> instrument is used with the same reciprocating motor and settings, with a pecking motion similar to the use of the Reciproc<sup>®</sup> blue instrument. A glide path can also be created with the R-Pilot to reduce the stresses on the Reciproc<sup>®</sup> blue instruments for example in canals with difficult access or canals presenting with a curvature in their coronal third (Fig. 8).

The access to the orifices of some canals such as the mesio-buccal orifice of a mandibular second molar may be difficult. Due to the thermal treatment of the Reciproc<sup>®</sup> blue instruments, it is safe to gently pre-curve their tip in order to make the access to these orifices easier.

If an increased apical enlargement is required, a larger Reciproc<sup>®</sup> blue instrument, or a nickel–titanium hand or rotary instrument can be used.

## Conclusion

In conclusion, the use of instruments in reciprocation with unequal forward and reverse rotations and with a limited pecking motion has been shown to be very safe.<sup>7,8</sup> The introduction of the Reciproc<sup>®</sup> blue instruments with enhanced physical properties<sup>4</sup> makes the procedure even safer with respect to instrument fracture and maintenance of canal curvature (internal evaluation) (Fig. 9).



**Figure 9** Severely curved canal shaped with Reciproc blue size 25, without any prior instrumentation and without a glide path. The canal curvature was maintained.

## Conflict of interest

Dr. Ghassan Yared has financial interests in Reciproc® blue.

## References

1. Yared G. Canal preparation using only one Ni–Ti rotary instrument: preliminary observations. *Int Endod J* 2008;**41**(April (4)): 339–44.
2. <https://www.vdw-dental.com/fileadmin/Dokumente/Sortiment/Aufbereitung/Reziproke-Aufbereitung/RECIPROC/VDW-Dental-RECIPROC-product-brochure-EN.pdf>.
3. <https://www.vdw-dental.com/fileadmin/Dokumente/Sortiment/Aufbereitung/Reziproke-Aufbereitung/RECIPROC-blue/VDW-Dental-Reciproblue-brochure-EN.pdf>.
4. De-Deus G, Silva EJ, Vieira VT, Belladonna FG, Elias CN, Plotino G, et al. Blue thermomechanical treatment optimizes fatigue resistance and flexibility of the reciproc files. *J Endod* 2017;**43**(March (3)):462–6.
5. Yared G. In vitro study of the torsional properties of new and used ProFile nickel titanium rotary files. *J Endod* 2004;**30**(June (6)):410–2.
6. Pereira ES, Singh R, Arias A, Peters OA. In vitro assessment of torque and force generated by novel ProTaper Next Instruments during simulated canal preparation. *J Endod* 2013;**39**(December (12)):1615–9.
7. De-Deus G, Arruda TE, Souza EM, Neves A, Magalhães K, Thuanne E, et al. The ability of the Reciproc R25 instrument to reach the full root canal working length without a glide path. *Int Endod J* 2013;**46**(October (10)):993–8.
8. Plotino G, Grande NM, Porciani PF. Deformation and fracture incidence of Reciproc instruments: a clinical evaluation. *Int Endod J* 2015;**48**(February (2)):199–205.
9. Ha J-H, Kwak SW, Sigurdsson A, Chang SW, Kim SK, Kim H-C. Stress generation during pecking motion of rotary nickel-titanium instruments with different pecking depth. *J Endod* 2017;**43**(October (10)):1688–91.