



**EXPAND  
YOUR  
MIND**

[www.fkg.ch/xpendo](http://www.fkg.ch/xpendo)

**SCIENTIFIC OVERVIEW**  
**12/2019**

MECHANICAL PROPERTIES	SHAPING ABILITY	CLINICAL TRIAL	BACTERIA / DEBRIS REMOVAL	RETREATMENT	APICAL DEBRIS EXTRUSION	TESTED AT BODY TEMPERATURE	
		●					<p style="text-align: center;"><b>2019</b></p> <p style="text-align: center;">(1) <b>Adiguzel M, et al. DCDP. 2019</b></p> <p><b>Compared with:</b> iRace and Reciproc Blue.  <b>Comments:</b> Postoperative pain was similar for all 69 patients included into this study. XP-endo Shaper produced significantly less pain than Reciproc Blue at 24h and 48h post-treatment.</p>
	●						<p style="text-align: center;">(2) <b>Veloza C &amp; Albuquerque D. MRT. 2019</b></p> <p><b>Compared with:</b> none. Review article.  <b>Comments:</b> Based on the 5 articles retained for the literature review, XP-endo Shaper shows good performances in terms of untouched canal walls.</p>
	●						<p style="text-align: center;">(3) <b>Pacheco-Yanes J, et al. IEJ. 2019</b></p> <p><b>Compared with:</b> Reciproc and Reciproc blue.  <b>Comments:</b> XP-endo Shaper produced significantly less transportation than Reciproc blue and Reciproc. All groups showed significantly more transportation at the inner wall of the endodontic training blocs.</p>
				●			<p style="text-align: center;">(4) <b>De-Deus G, et al. JOE. 2019</b></p> <p><b>Compared with:</b> Reciproc and Reciproc blue.  <b>Comments:</b> The XP-endo Shaper instrument removed a higher percentage of root fillings. The apical enlargement improved the removal of root fillings in all groups. None of them was able to render root canals completely free from root fillings.</p>

● All comparisons are at least equal to XP-endo Shaper  
 ● At least 1 comparison is negative for XP-endo Shaper  
 ● All comparisons are negative for XP-endo Shaper

✓ Yes    ✗ No

MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE
			●		✓	<p>(5) <b>Borges MMB, et al. MRT. 2019</b></p> <p><b>Compared with:</b> Passive ultrasonic irrigation and manual instrumentation.</p> <p><b>Comments:</b> XP-endo Shaper is used as a "complementary cleaning method". After instrumentation with Waveone Gold, Reciproc Blue, or ProDesign R, XP-endo Shaper was used to remove more remaining filling material. PUI and manual (Hedström) were also used for complementary cleaning. All 3 techniques removed a significant amount of filling material. XP-endo Shaper removed significantly more filling material in the apical and middle thirds when investigated with MicroCT. No difference was observed during the SEM investigation.</p>
●					✓	<p>(6) <b>Cardoso RM, et al. JCDP. 2019</b></p> <p><b>Compared with:</b> iRace and ProDesign Logic.</p> <p><b>Comments:</b> Body temperature (37°C) significantly lowers the resistance to cyclic fatigue of all instruments compared with 20°C. XP-endo Shaper instruments were more resistant to cyclic fatigue and time to failure compared at 20°C and 37°C (p&lt;0.001).</p>
	●				✓	<p>(7) <b>Uğur Aydın Z, et al. MRT. 2019</b></p> <p><b>Compared with:</b> Reciproc Blue and Waveone Gold.</p> <p><b>Comments:</b> None of the tested groups showed new dentinal microcracks nor cracks propagation after instrumentation.</p>
			●		✓	<p>(8) <b>Machado AG, et al. IEJ. 2019</b></p> <p><b>Compared with:</b> SAF and TRUShape.</p> <p><b>Comments:</b> Overall there was no difference between the systems. However, canals were completely cleaned of filling material in 70% of the specimens for XP-endo Shaper, 55% for SAF and 30% for TRUShape; the difference between XP-endo Shaper and TRUShape was significant (P = 0.03). The use of XP-endo Finisher R resulted in an additional 38% reduction in filling material (P&lt; 0.001).</p>

	MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE	
	●		●					<p>(9) Zhao Y, et al. IEJ. 2019</p> <p><b>Compared with:</b> Reciproc Blue.  <b>Comments:</b> The amount of untouched walls were similar for the two groups, but XP-endo Shaper resulted in significantly less remaining dentinal debris.</p>
	●							<p>(10) Poly A, et al. COI. 2019</p> <p><b>Compared with:</b> Waveone Gold.  <b>Comments:</b> Micro-CT technique revealed a significantly better centering ability and less canal transportation with XP-endo Shaper compared to Waveone gold. The double-digital radiography (DDR) technique was not capable of detecting significant difference between the tested groups.</p>
	●							<p>(11) Aksoy Ç, et al. JOE. 2019</p> <p><b>Compared with:</b> Protaper Universal and Reciproc Blue.  <b>Comments:</b> Protaper universal significantly increased the rate of microcracks. Instrumentation with XP-endo Shaper and Reciproc Blue did not cause microcracks.</p>
	●							<p>(12) Tabbara A, et al. JCDP. 2019</p> <p><b>Compared with:</b> None.  <b>Comments:</b> XP-endo Shaper is considered as safe and efficient by the authors, in order to achieve preparations of a size 30 and a 0.04 taper.</p>
				●				<p>(13) Kaya BÜ, et al. IEJ. 2019</p> <p><b>Compared with:</b> Hyflex EDM and Waveone Gold.  <b>Comments:</b> XP-endo Shaper and Hyflex EDM were significantly superior to Waveone Gold in removing enterococcus faecalis in round and straight canals. Round canals tend to favor round files and are not the norm in clinics.</p>

MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE	
	●						<p>(14) <b>De-Deus G, et al. IEJ. 2019</b></p> <p><b>Compared with:</b> None.  <b>Comments:</b> Extending the period of XP-endo Shaper active instrumentation at working length significantly influenced several parameters such as volume (<math>P &lt; 0.001</math>) and surface area (<math>P &lt; 0.001</math>) of the instrumented canal, surface area of non-instrumented canal areas (<math>P &lt; 0.001</math>), and volume of removed dentine (<math>P &lt; 0.001</math>).</p>
<b>2018</b>							
●							<p>(15) <b>Azim AA, et al. JOE. 2018</b></p> <p><b>Compared with:</b> Hyflex EDM, Protaper Universal and Waveone Gold.  <b>Comments:</b> The XP-endo Shaper showed the greatest number of cycles to fracture.</p>
			●	●			<p>(16) <b>Azim AA, et al. JOE. 2018</b></p> <p><b>Compared with:</b> Hyflex EDM and Waveone Gold.  <b>Comments:</b> XP-endo Shaper was the most efficient in gutta-percha removal from the canals when operated at a higher speed (3000 rpm) followed by Hyflex EDM and Waveone Gold. No difference of apically extruded debris was observed.</p>
●							<p>(17) <b>Keskin C, et al. JOE. 2018</b></p> <p><b>Compared with:</b> K3XF and Protaper Gold.  <b>Comments:</b> XP-endo Shaper showed significantly higher resistance to cyclic fatigue when compared with other devices.</p>
			●	●			<p>(18) <b>Alves FRF, et al. JOE. 2018</b></p> <p><b>Compared with:</b> Reciproc.  <b>Comments:</b> XP-endo Shaper was superior than Reciproc in bacterial reduction while there was no difference in extrusion of debris.</p>

MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE	
	●						<p>(19) Hassan R, et al. AOL. 2018</p> <p><b>Compared with:</b> Waveone and OneShape.  <b>Comments:</b> Waveone showed the best centering ratio followed by XP-endo Shaper and OneShape. XP-endo Shaper showed the lowest significant mean transportation among the three systems. No difference was found between Waveone and OneShape.</p>
					●		<p>(20) Uslu G, et al. JOE. 2018</p> <p><b>Compared with:</b> Hyflex EDM and Reciproc Blue.  <b>Comments:</b> XP-endo Shaper extruded significantly less debris compared to Reciproc Blue. Hyflex did not show statistically significant difference compared to the other two groups.</p>
●							<p>(21) Elnaghy A, et al. COI. 2018</p> <p><b>Compared with:</b> iRace, Profile Vortex, TRUShape and Vortex Blue.  <b>Comments:</b> XP-endo Shaper was significantly more resistant to cyclic fatigue than all other files tested.</p>
	●						<p>(22) Versiani MA, et al. JOE. 2018</p> <p><b>Compared with:</b> EdgeFile and iRace.  <b>Comments:</b> Although there was no statistical difference in the parameters measured the XP-endo Shaper prepared the canals in a more conical shape i.e. maintained the original shape of the canal better.</p>
	●						<p>(23) Silva EJNL, et al. JOE. 2018</p> <p><b>Compared with:</b> TRUShape.  <b>Comments:</b> Cyclic fatigue resistance was superior for XP-endo Shaper while torsional fatigue resistance was superior for TruShape. Test for torsional fatigue locks the tip artificially – if this is the case in the canal both instruments will fracture. The superior resistance to cyclic fatigue allows the XP-endo Shaper to be used at a faster speed thus decreasing the chance of tip lock.</p>

MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE	
●						✓	<p>(24) Elnaghy AM, et al. IEJ. 2018</p> <p><b>Compared with:</b> Flexmaster, Profile Vortex and TRUShape.  <b>Comments:</b> There was no difference (torsional resistance) found between XP-endo Shaper and TRUShape but Flexmaster and Vortex were superior. These results are expected due to core size and tips are artificially locked into position for the test.</p>
				●	✗		<p>(25) Caviedes-Bucheli J, et al. IEJ. 2018</p> <p><b>Compared with:</b> Manual instrumentation, Reciproc Blue and WaveOne Gold.  <b>Comments:</b> The expression of substance P and calcitonin gene-related peptide was higher for instrument groups than in the healthy periodontal ligament (PDL) group. XP-endo Shaper showed lower expression than manual instrumentation but higher expression than the other groups. No indication that the experiment was performed at body temperature.</p>
●						✓	<p>(26) Adiguzel M, et al. JDRDCDP. 2018</p> <p><b>Compared with:</b> Flexmaster, Hyflex CM and Race.  <b>Comments:</b> The number of cycles to fracture showed the following hierarchy: XP-endo Shaper &gt; Hyflex CM &gt; Felxmaster &gt; Race.</p>
<b>2017</b>							
	●		●			✓	<p>(27) Lacerda MFLS, et al. JOE. 2017</p> <p><b>Compared with:</b> SAF and TRUShape.  <b>Comments:</b> There were no significant differences for specimen length, canal volume, and canal surface area before preparation. SAF showed less amount of untouched canal walls than the other instruments. No significant difference between the systems in terms of the amount of vital pulp remnants was observed.</p>

MECHANICAL	SHAPING	CLINICAL	BACTERIA	RETREATMENT	EXTRUSION	BODY TEMPERATURE	
	●		●				<p>(28) Azim AA, et al. JOE. 2017</p> <p><b>Compared with:</b> vortex blue.  <b>Comments:</b> XP-endo Shaper left significantly less untouched canal walls (38.6% ± 8.1%) than Vortex blue (58.8% ± 8.5%). Low amount debris remained into the canal for both brands of instruments. The mechanical preparation of the root canal space was faster, by almost 1 minute, when XP-endo Shaper was in use.</p>
	●						<p>(29) Bayram HM, et al. JOE. 2017</p> <p><b>Compared with:</b> Protaper Universal, Protaper Next and SAF.  <b>Comments:</b> Protaper universal caused significantly more microcracks while there was no difference between the other groups.</p>

## References

- Adiguzel M, Tufenkci P, Pamukcu ismail I. Comparison of postoperative pain intensity following the use of three different instrumentation techniques: A randomized clinical trial. J Dent Res Dent Clin Dent Prospects. 2019;13(2):133–40.
- Veloze C, Albuquerque D. Microcomputed Tomography Studies of the Effectiveness of XP-endo Shaper in Root Canal Preparation: A Review of the Literature. Sci World J. 2019 Aug 19;2019.
- Pacheco-Yanes J, Gazzaneo I, Pérez AR, Armada L, Neves MAS. Transportation assessment in artificial curved canals after instrumentation with Reciproc, Reciproc Blue, and XP-endo Shaper Systems. J Investig Clin Dent. 2019 Aug;10(3):e12417.
- De-Deus G, Belladonna FG, Zuolo A de S, Cavalcante DM, Simões Carvalho M, Marinho A, et al. 3-dimensional Ability Assessment in Removing Root Filling Material from Pair-matched Oval-shaped Canals Using Thermal-treated Instruments. J Endod. 2019 Jul 23;
- Borges MMB, Duque JA, Zancan RF, Vivan RR, Bernardes RA, Duarte MAH. Efficacy of reciprocating systems for removing root filling material plus complementary cleaning methods in flattened canals: Microtomography and scanning electron microscopy study. Microsc Res Tech. 2019 Jul;82(7):1057–64.
- Cardoso RM, Carvalho Alves NC, de Menezes SEAC, Batista SM, Vieira TM, Elgarten Rocha GN, et al. Influence of Temperature on the Cyclic Fatigue of Nickel-Titanium Instruments with Different Heat Treatments on Severely Curved Canals. J Contemp Dent Pract. 2019 Jun 1;20(6):697–701.
- Uğur Aydın Z, Keskin NB, Özyürek T. Effect of Reciproc blue, XP-endo shaper, and WaveOne gold instruments on dentinal microcrack formation: A micro-computed tomographic evaluation. Microsc Res Tech. 2019 Jun;82(6):856–60.
- Machado AG, Guilherme BPS, Provenzano JC, Marceliano-Alves MF, Gonçalves LS, Siqueira JF, et al. Effects of preparation with the Self-Adjusting File, TRUShape and XP-endo Shaper systems, and a supplementary step with XP-endo Finisher R on filling material removal during retreatment of mandibular molar canals. Int Endod J. 2019 May;52(5):709–15.



9. Zhao Y, Fan W, Xu T, Tay FR, Gutmann JL, Fan B. Evaluation of several instrumentation techniques and irrigation methods on the percentage of untouched canal wall and accumulated dentine debris in C-shaped canals. *Int Endod J*. 2019 Mar 21;
10. Poly A, AlMalki F, Marques F, Karabucak B. Canal transportation and centering ratio after preparation in severely curved canals: analysis by micro-computed tomography and double-digital radiography. *Clin Oral Investig*. 2019 Mar 5;
11. Aksoy Ç, Keriş EY, Yaman SD, Ocak M, Geneci F, Çelik HH. Evaluation of XP-endo Shaper, Reciproc Blue, and ProTaper Universal NiTi Systems on Dentinal Microcrack Formation Using Micro-Computed Tomography. *J Endod*. 2019 Mar;45(3):338–42.
12. Tabbara A, Grigorescu D, Yassin MA, Fristad I. Evaluation of Apical Dimension, Canal Taper and Maintenance of Root Canal Morphology Using XP-endo Shaper. *J Contemp Dent Pract*. 2019 Feb 1;20(2):136–44.
13. Kaya BÜ, Erik CE, Çetin ES, Köle M, Maden M. Mechanical reduction in intracanal *Enterococcus faecalis* when using three different single-file systems: an ex vivo comparative study. *Int Endod J*. 2019;52(1):77–85.
14. De-Deus G, Belladonna FG, Simões-Carvalho M, Cavalcante DM, Ramalho CNMJ, Souza EM, et al. Shaping efficiency as a function of time of a new heat-treated instrument. *Int Endod J*. 2019;52(3):337–42.
15. Azim AA, Tarrosh M, Azim KA, Piasecki L. Comparison between Single-file Rotary Systems: Part 2—The Effect of Length of the Instrument Subjected to Cyclic Loading on Cyclic Fatigue Resistance. *J Endod*. 2018 Dec 1;44(12):1837–42.
16. Azim AA, Wang HH, Tarrosh M, Azim KA, Piasecki L. Comparison between Single-file Rotary Systems: Part 1—Efficiency, Effectiveness, and Adverse Effects in Endodontic Retreatment. *J Endod*. 2018 Nov 1;44(11):1720–4.
17. Keskin C, Inan U, Guler DH, Kalyoncuoğlu E. Cyclic Fatigue Resistance of XP-Endo Shaper, K3XF, and ProTaper Gold Nickel-titanium Instruments. *J Endod*. 2018 Jul 1;44(7):1164–7.
18. Alves FRF, Paiva PL, Marceliano-Alves MF, Cabreira LJ, Lima KC, Siqueira JF, et al. Bacteria and Hard Tissue Debris Extrusion and Intracanal Bacterial Reduction Promoted by XP-endo Shaper and Reciproc Instruments. *J Endod*. 2018 Jul 1;44(7):1173–8.
19. Hassan R, Roshdy N, Issa N. Comparison of canal transportation and centering ability of Xp Shaper, WaveOne and Oneshape: a cone beam computed tomography study of curved root canals. *Acta Odontol Latinoam AOL*. 2018 Jun;31(1):67–74.
20. Uslu G, Özyürek T, Yılmaz K, Gündoğar M, Plotino G. Apically Extruded Debris during Root Canal Instrumentation with Reciproc Blue, HyFlex EDM, and XP-endo Shaper Nickel-titanium Files. *J Endod*. 2018 May 1;44(5):856–9.
21. Elnaghy A, Elsaka S. Cyclic fatigue resistance of XP-endo Shaper compared with different nickel-titanium alloy instruments. *Clin Oral Investig*. 2018 Apr;22(3):1433–7.
22. Versiani MA, Carvalho KKT, Mazzi-Chaves JF, Sousa-Neto MD. Micro-computed Tomographic Evaluation of the Shaping Ability of XP-endo Shaper, iRaCe, and EdgeFile Systems in Long Oval-shaped Canals. *J Endod*. 2018 Mar 1;44(3):489–95.
23. Silva EJNL, Vieira VTL, Belladonna FG, Zuolo A de S, Antunes H dos S, Cavalcante DM, et al. Cyclic and Torsional Fatigue Resistance of XP-endo Shaper and TRUShape Instruments. *J Endod*. 2018 Jan 1;44(1):168–72.
24. Elnaghy AM, Elsaka SE. Torsional resistance of XP-endo Shaper at body temperature compared with several nickel-titanium rotary instruments. *Int Endod J*. 2018;51(5):572–6.
25. Caviedes-Bucheli J, Rios-Osorio N, Rey-Rojas M, Laguna-Rivero F, Azuero-Holguin MM, Diaz LE, et al. Substance P and Calcitonin gene-related peptide expression in human periodontal ligament after root canal preparation with Reciproc Blue, WaveOne Gold, XP EndoShaper and hand files. *Int Endod J*. 2018;51(12):1358–66.
26. Adiguzel M, Isken I, Pamukcu II. Comparison of cyclic fatigue resistance of XP-endo Shaper, HyFlex CM, FlexMaster and Race instruments. *J Dent Res Dent Clin Dent Prospects*. 2018;12(3):208–12.
27. Lacerda MFLS, Marceliano-Alves MF, Pérez AR, Provenzano JC, Neves MAS, Pires FR, et al. Cleaning and Shaping Oval Canals with 3 Instrumentation Systems: A Correlative Micro-computed Tomographic and Histologic Study. *J Endod*. 2017 Nov 1;43(11):1878–84.
28. Azim AA, Piasecki L, Neto UX da S, Cruz ATG, Azim KA. XP Shaper, A Novel Adaptive Core Rotary Instrument: Micro-computed Tomographic Analysis of Its Shaping Abilities. *J Endod*. 2017 Sep 1;43(9):1532–8.
29. Bayram HM, Bayram E, Ocak M, Uygun AD, Celik HH. Effect of ProTaper Gold, Self-Adjusting File, and XP-endo Shaper Instruments on Dentinal Microcrack Formation: A Micro-computed Tomographic Study. *J Endod*. 2017 Jul 1;43(7):1166–9.

