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INFLUENCE OF TREATMENT MODALITIES OF NITI ROTARY FILES ON FLEXIBILITY AND CYCLIC FATIGUE RESISTANCE (IN VITRO STUDY)

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INTRODUCTION

This study aims to evaluate the influence of T-wire NiTi rotary files on flexibility and cyclic fatigue resistance in comparison to conventional wire NiTi files.

METHODOLOGY

Forty-eight (# 25) files were divided into two equal groups according to their type: Group I: Treated 2Shape (Micro-Mega SA, France). Group II: Non-treated ProTaper Universal (DENTSPLY Tulsa Dental Specialties, Tulsa, OK.) Groups were further divided into 2 subgroups according to the type of test conducted. Flexibility test was performed in subgroups I. A and II.A by means of a 3-point bending test (Fig 1) using a Universal Testing Machine. The load necessary to maintain a constant feed rate of (1min/mm) was recorded every 0.1 seconds with a specified maximum force of 10N. In subgroups, I.B and II.B cyclic fatigue resistance was tested using a custom-made dynamic device with a 60-degree stainless-steel artificial canal (Fig 2). Number of Cycles to Fracture (NCF) and Time to Fracture (TTF) were recorded. All data were tabulated and statistically analyzed using SPSS for Windows version 23.

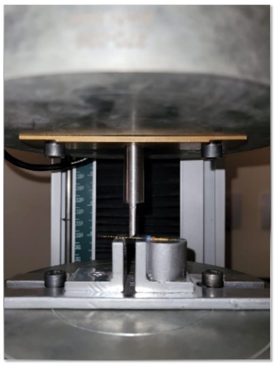


Figure 1

Figure (1): 3-point bending test

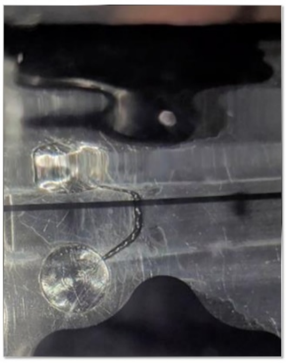


Figure 2

Figure (2): 60-degree stainless steel artificial canal

RESULTS

Regarding the flexibility test (Table 1, Graph 1), no statistical significant difference between both groups was observed. However, concerning NCF and TTF, a statistical significant difference was found between the tested groups ($P \leq 0.05$). Accordingly, 2Shape had superior cyclic fatigue resistance (Table 2, Graph 2).

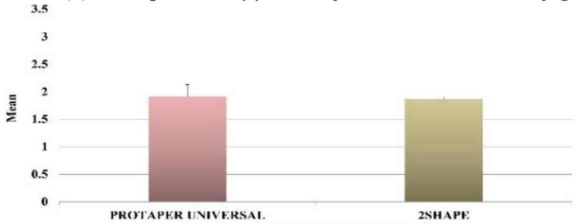
CONCLUSION

T-Wire heat treatment significantly improved cyclic fatigue resistance while it did not affect flexibility.

	PROTAPER UNIVERSAL (n=12)	2SHAPE (n=12)
Mean (SD)	1.91 (0.22)	1.86 (0.05)
Median (IQR)	1.89 (0.40)	1.87 (0.08)
Min - Max	1.63 – 2.33	1.79 – 1.96
Test (P value)	0.814	

*Statistically significant difference at p value≤0.05

Table (1): Comparison of flexibility values between study groups

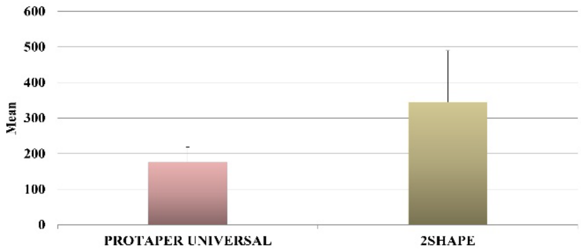


Graph (1): Flexibility test values

	PROTAPER UNIVERSAL (n=12)	2SHAPE (n=12)
Mean (SD)	176.10 (42.06)	345.18 (144.40)
Median (IQR)	174.38 (71.87)	340.00 (256.38)
Min - Max	99.16 – 229.16	150.00 – 555.50
Test (P value)	0.005*	

*Statistically significant difference at p value≤0.05

Table (2): Comparison of cyclic fatigue values between study groups



Graph (2): Cyclic fatigue test values

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