ORODEKA Plex V instruments

Cutting efficiency evaluation

Aim of these tests was to evaluate cutting efficiency of Plex V (Orodeka, China) nickel titanium rotary instruments. For this purpose, we employed a new customized testing machine (**Figure 1**). This new device allows to test cutting ability at different file inclinations and different millimeters from the tip. Standardized gypsum samples were used as substrates to evaluate cutting efficiency because their similar properties to dentine.

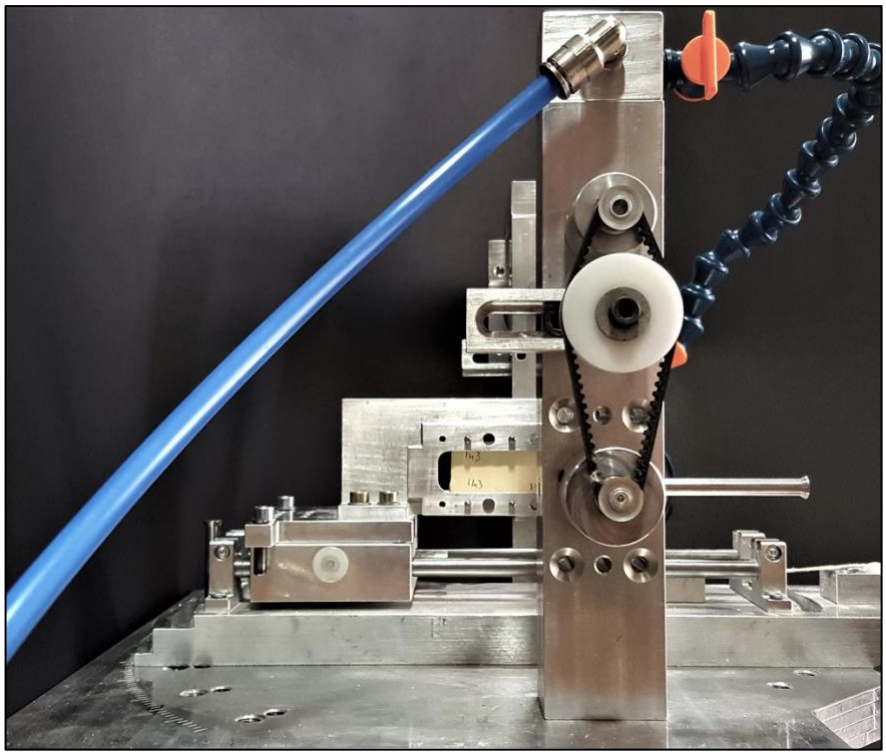


Figure 1. Customized testing machine employed for cutting efficiency tests.

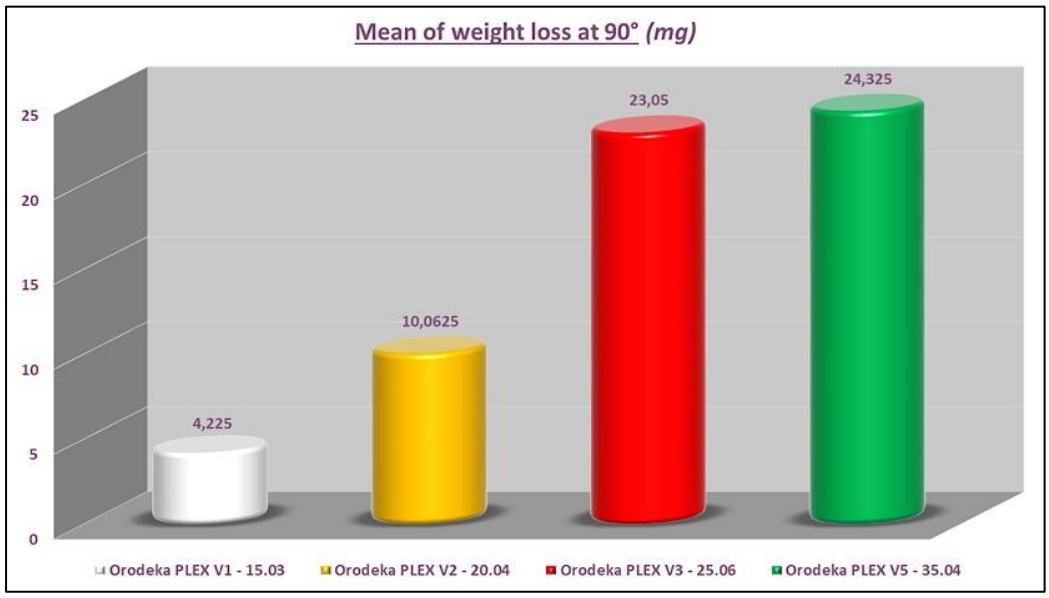
40 new Plex V files of 25-mm length were used: Plex V1 15.03, Plex V2 20.04, Plex V3 25.06 and Plex V5 35.04.

All instruments were previously inspected using an optical stereomicroscope with 20 magnification for any signs of visible deformation. No instrument was discarded. All files were tested at 90° and at 10 ± 0,75 mm from the tip and activated following manufacturer's instructions.

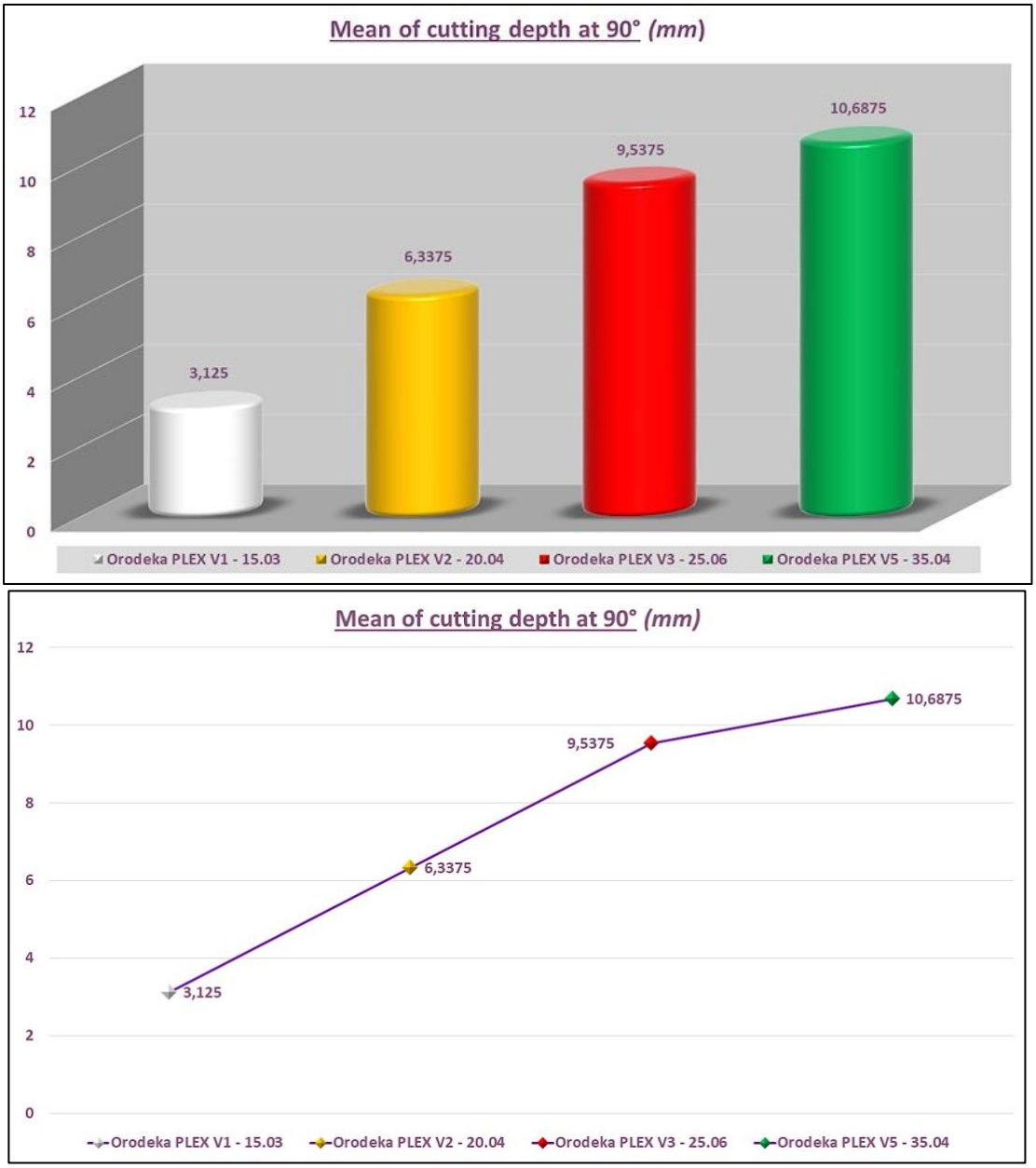
Cutting efficiency of the instruments (n=10) was evaluated by the weight loss of gypsum plates using an analytical balance (sensitivity of ± 10^{-1} mg) (Balance E42-B, Gibertini, Italy). The samples were measured at the beginning and at the end of the experiment.

Moreover, maximum cutting depth of the instruments was also registered. The length of the gypsum block cut was measured using a digital caliper (sensitivity of ± 10^{-1} mm).

The mean values for the weight loss and cutting depth were calculated for all tested files and are represented in **Figures 2-5**.



Figures 2-3. Histogram and line graph of mean weight loss at 90° of PLEX V instruments.



Figures 4-5. Histogram and line graph of mean cutting depth at 90° of PLEX V instruments.

Additionally, the data recorded were compared to those of conventional and heat treated Ni-Ti instruments **(Tables 1-2) (Figures 6-7)**.

	Weight loss (mg)	Cutting depth (mm)
Conventional Ni-Ti 15.03 file	4	2
Plex V1 15.03	4.22	3.12

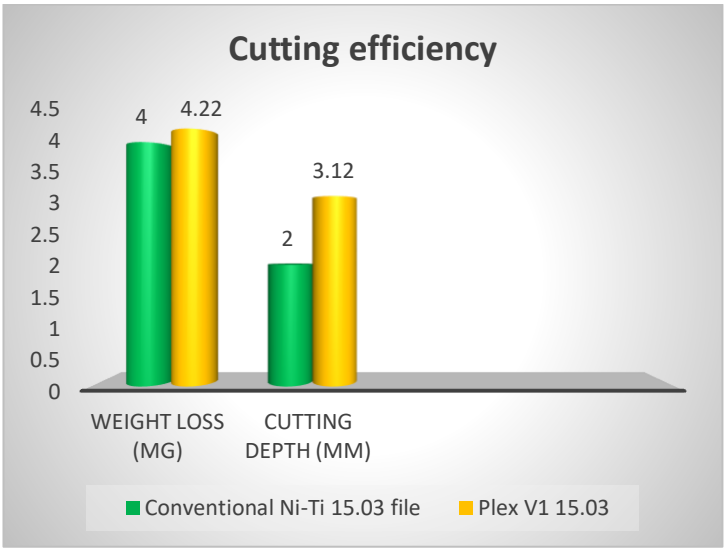
Table 1. Mean weight loss and cutting depth of a conventional Ni-Ti 15.03 file and Plex V1 15.03.

mg: milligrams, mm: millimeters

	Weight loss (mg)	Cutting depth (mm)
Conventional Ni-Ti 25.06 file	13.6	9.7
M-wire Ni-Ti 25.08 file	19	7.4
Blue-heat treated Ni-Ti 25.08 file	20	7.8
Plex V3 25.06	23	9.5

Table 2. Mean weight loss and cutting depth of a conventional Ni-Ti 25.06, M-wire Ni-Ti 25.08, blue-heat treated Ni-Ti 25.08 files and Plex V3 25.06.

mg: milligrams, mm: millimeters



Figures 6. Histogram of mean weight loss and cutting depth of a conventional Ni-Ti 15.03 file and Plex V1 15.03.

MG: milligrams, MM: millimeters

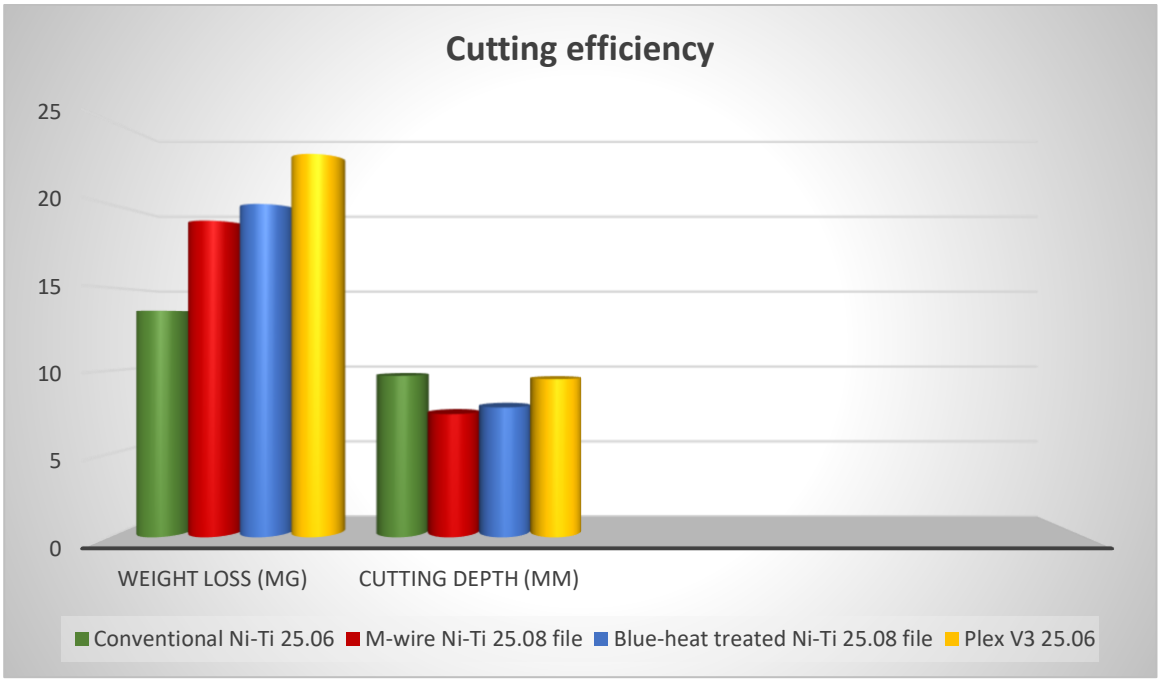


Figure 7. Histogram of mean weight loss and cutting depth of a conventional Ni-Ti 25.06, M-wire Ni-Ti 25.08, blue-heat treated Ni-Ti 25.08 files and Plex V3 25.06.

mg: milligrams, mm: millimeters

Conclusions

The Orodeka tested instruments had a good cutting efficiency compatible with a safe and efficient use during root canal shaping procedures. Moreover, Orodeka Plex V instruments achived cutting efficiency results similar or better of other NiTi files made by conventional or heat-treated NiTi.