

Oct 30, 2024

Version 2

Success Rate of Ultrasonic Retrieval for Separated Instruments with Different Lengths using Modified Staging Platform: A Comparative In-Vitro Study V.2



DOI

<https://dx.doi.org/10.17504/protocols.io.yxmvm9o15l3p/v2>

Basim Samir Mohamed¹, Prof. Dr. Nihal Ezzat Sabet², Assoc. Prof. Dr. Dina Ahmed Morsy²

¹Faculty of Dentistry, Cairo University; ²Faculty of Dentistry - Cairo University



Basim Samir Mohamed

Faculty of Dentistry, Cairo University

Create & collaborate more with a free account

Edit and publish protocols, collaborate in communities, share insights through comments, and track progress with run records.

Create free account

OPEN  ACCESS



DOI: <https://dx.doi.org/10.17504/protocols.io.yxmvm9o15l3p/v2>

Protocol Citation: Basim Samir Mohamed, Prof. Dr. Nihal Ezzat Sabet, Assoc. Prof. Dr. Dina Ahmed Morsy 2024. Success Rate of Ultrasonic Retrieval for Separated Instruments with Different Lengths using Modified Staging Platform: A Comparative In-Vitro Study. **protocols.io** <https://dx.doi.org/10.17504/protocols.io.yxmvm9o15l3p/v2> Version created by **Basim Samir Mohamed**

License: This is an open access protocol distributed under the terms of the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Protocol status: Working

We use this protocol and it's working

Created: October 28, 2024

Last Modified: October 30, 2024

Protocol Integer ID: 111221

Keywords: Ultrasonic retrieval, Separated instruments, Staging platform, Vertical root fracture resistance, curved mesial roots of mandibular molar, mandibular molar, success rate of ultrasonic retrieval, ultrasonic retrieval, resistance to vertical root fracture, vertical root fracture, curved mesial root, separated instruments with different length, separated instrument, vitro study the present study, vitro study, root

Abstract

The present study aims to evaluate the time and success rate of ultrasonic retrieval of separated instruments of 3, 5 and 7 millimeters lengths and resistance to vertical root fracture when modified staging versus conventional staging platforms techniques are used in moderately curved mesial roots of mandibular molars.

Guidelines

PICO:

P: Population

Mesiobuccal canals of moderately curved mesial roots of mature mandibular molars with separated instruments.

I: Intervention

I: Ultrasonic retrieval of 3mm separated instrument by modified staging platform.

C: Control

C: Ultrasonic retrieval of 3mm separated instrument by conventional staging platform.

O: Outcome

O1: Retrieval time.

O2: Retrieval success rate.

Introduction:

Through the years, endodontics has been continuously developed in terms of new technologies, materials, procedures, and scientific advancements. Because of this, root canal therapy is quite safe and has a high success rate, even in challenging clinical scenarios. However, endodontic treatment can also be difficult, with different degrees of difficulty and risks associated with the cleaning, shaping, and filling of the root canals (Amza et al., 2020).

However, the main disadvantage associated with NiTi files is the separation of the instrument during use which can happen with no warning to the operator. There are two types of failure by which rotary instruments may separate; torsional and flexural cyclic failures (Terauchi et al., 2007). Many factors were found to be associated with these two types of failure including the rotational speed, torque, operator experience, canal curvature, instrument design and technique, manufacturing procedure, repeated use and glide path preparation (Pruett et al., 1997; Bryant et al., 2002; Gambarini, 2000; Patiño et al., 2005; Al-Fouzan, 2003).

To manage a case of a broken instrument, endodontists use either orthograde or surgical approaches. Rotary NiTi instruments were found to be more difficult to remove when compared to hand instruments because they tend to fracture at shorter lengths, at or around the curve of the canal and due to their rotation, they are usually impacted in the canal walls. (Souter and Messer, 2005). Moreover, the ultrasonic removal of NiTi-separated in

Recently, using ultrasonic tips has been found to be a very effective method for removing separated instruments from root canals. The combination of the dental operating microscope (DOM) with an ultrasonic device has improved the potential and safety of removing broken instruments (Traumatol, 1999).

Thus, the present study aims to evaluate the time and success rate of ultrasonic retrieval of separated instruments



when modified staging versus conventional staging platforms techniques are used in moderately curved mesial roots of mandibular molars.

Materials

Reagents:

- Extracted human mandibular molars (Oral Surgery Department, Faculty of Dentistry, Cairo University, Egypt)
- 5.25% sodium hypochlorite solution (Clorox, Tenth of Ramadan City, Egypt)
- Rubber Base Putty Molds (Zhermack SpA, Badia Polesine , Italy)
- High speed Endo-Z bur (Dentsply, Maillefer, Ballaigues, Switzerland).
- Dental Operating Microscope (Zumax Medical Co., Ltd)
- K-Files sizes 10 and 15 (Mani Inc., Kiyohara, Tochigi, Japan).
- MG3 Gold Rotary NiTi files Sizes 19/.10, 20/.04 and 25/.06 (Shenzhen Perfect Medical Instruments Co., Ltd., China)
- Gates-Glidden drill (Mani Inc., Kiyohara, Tochigi, Japan)
- Ultrasonic tip E6 and E14D (Guilin Woodpecker Medical Instrument Co., Ltd, China)
- Universal Testing machine



Procedure

30m

- 1 Clean the external root surfaces of the teeth with a curette to remove calculus and periodontal tissues and then disinfect with 5.25% sodium hypochlorite.
- 2 Prepare access cavities under the dental operating microscope, using high-speed diamond round bur and Endo-Z bur.
- 3 Negotiate the mesiobuccal canal with size 10 K-file to establish apical patency and then the working length adjust at 1mm shorter after the first inspection of the file at the apex.
- 4 Glide path will be formed using a size 15 K-file.
- 5 Instrument the coronal 3 mm of the mesiobuccal canal using orifice opener rotary file (#19/.10) then enlarge to rotary file (#20/.04).
- 6 Divide molars into 2 main groups according to the method of ultrasonic retrieval of the separated instrument as follows:
 - 6.1 **Group 1 (G1):** Ultrasonic retrieval of separated instrument using conventional staging platform.
 - 6.2 **Group 2 (G2):** Ultrasonic retrieval of separated instrument using modified staging platform.

Protocol references

1. Abdeen MA, Plotino G, Hassanien EE, Turkey M. (2023): Evaluation of Dentine Structure Loss after Separated File Retrieval by Three Different Techniques: An Ex-vivo Study. *Eur Endod J*, 8(3):225-230.
2. Al-Fouzan, K. S. (2003): Incidence of rotary ProFile instrument fracture and the potential for bypassing in vivo. *Int Endod J*, 36: 864-867.
3. Amza O, Dimitriu B, Suciul et al (2020): Etiology and prevention of an endodontic iatrogenic event: instrument fracture. *J Med Life* 13:378-381.
4. Bryant, Thompson, Al-Omari, & Dummer. (2002): Shaping ability of Profile rotary nickeltitanium instruments with ISO sized tips in simulated root canals: Part 1. *Int Endod J*, 31: 275-281
5. Cujé, J., Bargholz, C. & Hülsmann, M. (2010): The outcome of retained instrument removal in a specialist practice. *Int Endod J*, 43, 545-554.
6. Duarte MA, Bernardes RA, Ordinola-Zapata R, Vasconcelos BC, Bramante CM, Moraes IG. (2011) Effects of Gates-Glidden, LA Axxess and orifice shaper burs on the cervical dentin thickness and root canal area of mandibular molars. *Braz Dent J*, 22(1):28-31.
7. Dulundu M, Helvaciloglu-Yigit D. (2022): The Efficiency of the BTR-Pen System in Removing Different Types of Broken Instruments from Root Canals and Its Effect on the Fracture Resistance of Roots. *Materials (Basel)*. Aug 24; 15(17):5816.
8. Ferreira, M., & Ferreira, H. (2012): Defects in ProFile rotary nickel-titanium files after clinical use. *J Endod*, 6: 113-117.
9. Fors, U. G. H., & Berg, J. O. (1983): A method for the removal of broken endodontic instruments from root canals. *J Endod*, 9: 156-159.
10. Friedman, ShimonStabholz, AdamTamse &Aviad (1990): Endodontic Retreatment-Case selection and technique. Part 3. Retreatment techniques. *J Endod*, 16: 543-549.
11. Fu M, Huang X, Zhang K, Hou B. (2019): Effects of Ultrasonic Removal of Fractured Files from the Middle Third of Root Canals on the Resistance to Vertical Root Fracture. *J Endod*. Nov; 45(11):1365-1370
12. Gambarini, G. (2000): Rationale for the use of low-torque endodontic motors in root canal instrumentation. *Dent Traumatol*, 16: 95-100.