Author’s response to reviews

Title: In Vitro comparison of cyclic fatigue resistance of TruNatomy in single and double curvature canals compared with different nickel-titanium rotary instruments

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Author’s response to reviews:

Date: 17th December 2019
To: Dr Dafne Solera, “BMC Oral Health”
From: "Amr Elnaghy", aelnaghy@mans.edu.eg
Subject: Submission OHEA-D-19-00580
Ref.: Ms. No. OHEA-D-19-00580
Title: In Vitro comparison of cyclic fatigue resistance of TruNatomy in single and double curvature canals compared with different nickel-titanium rotary instruments

Dear Dr. Dafne Solera,

Many thanks for your message and the constructive comments of the reviewers to our paper OHEA-D-19-00580. We have read through the comments and our response to each of them is as stated below. The manuscript has been revised and the modified sections highlighted using the "track changes".

Yours sincerely,

Amr Elnaghy

Regarding the reviewer’s comments:

M Dioguardi (Reviewer 1):
Comment 1: The study is very interesting. It concerns new instruments for shaping the endodontic canal. A cyclic fatigue test was performed on single and double curvature artificial channels and the rpm at break and the fragment length were measured and a SEM analysis was also performed. Only some changes are recommended.
Response: Many thanks for the reviewer’s valuable comments and suggestions. The changes had been performed and highlighted.
Comment 2: Introduction
Discuss if there are studies in literature dealing with TruNatomy with the relative conclusions of previous studies and how this study differs from the previous ones (for example: INTERNATIONAL DENTISTRY - AFRICAN EDITION VOL.9, NO. 4)

Comment 3: materials and methods
Describe better how the calculation of the rpm at break (for example chronometry or other) was performed
Response: It was mentioned in the Materials and methods section of the cyclic fatigue test as follows: “The NCF was calculated by multiplying the time recorded in minutes by the recommended motor speed.”

Comment 4: I recommend the publication of the study, given the innovation of the instrument and the absence in scientific literature of tests performed on TruNatomy
Response: Many thanks and we appreciate your valuable suggestions.

Gianluca Gambarini (Reviewer 2):

Comment 1: The article is on the study of lifespan of endodontic instruments when used in double curvature canals: a very challenging situation for the clinician. as known, double curvatures are often associated with instrument's failure which could compromise the therapeutic outcome.
The article is good written and the methodology is common for other previous published studies. However, small revisions for the english should be made.
Response: Many thanks for the reviewer’s valuable comments and suggestions. The manuscript had been language edited and the changes are highlighted.

Comment 2: Introduction
Many typos have to be corrected. For example in the abstract significance is written in three different ways: it should be uniformed according to instruction for authors guidelines.
Response: The manuscript had been revised and the changes are highlighted. The word “significance” had been uniformed.

Comment 3: in the abstract:
The subtitle conclusion should be corrected in conclusions.
Response: The subtitle “conclusion” in the abstract had been corrected to “conclusions”

Comment 4: at line 37 The sentence ...were more resistance... should be corrected in ...were more resistant...
Response: It had been corrected to “were more resistant”.

Comment 5: keyword cycle fatigue should be changed in cyclic fatigue.
Response: It had been corrected to “cyclic fatigue”.

Comment 6: at page 5 line 29 "manufacture" should be changed in "manufacturer".
Response: It had been corrected as follows: “It had been reported that the TRN instruments preserve
the structural dentine and tooth integrity due to instrument geometry, regressive tapers and the slim design, along with the heat-treatment of the NiTi alloy [21, 22].”

Comment 7: at page 7 line 5 "control" and "allow" should be changed in "controls" and "allows".
Response: It had been changed to “controls” and “allows”.

Comment 8: when referring to the taper of the instruments, for example "0.04" should be changed in ".04"
Response: The taper had been changed as required for the whole manuscript.

Comment 9: When talking about the thermally treated instruments, I suggest to insert a short statement on the different kind of heat treated alloys: this article could be useful to you:
Response: It had been added in the third paragraph in the Background section statement about the heat-treated alloy using the above mentioned reference (Ref no. 14) as follows: “The Blue technology allows the instrument to reach the martensitic phase during clinical treatment that enhances the fatigue resistance compared with the other instruments which are mainly in the more rigid austenitic phase”.

Ugur Inan (Reviewer 3):
Comment 1: This paper is about cyclic fatigue resistance of four different rotary NiTi systems and this is a popular topic in recent years as there are several studies published for different rotary NiTi systems.
Response: Many thanks for the reviewer’s valuable comments and suggestions. The manuscript had been revised and the changes are highlighted.

Comment 2: Abstract: Statistical analysis should be written in this section either.
Response: Statistical analysis had been written in the Abstract section as follows: “Data were statistically analyzed by Kruskal-Wallis and Dunn’s multiple comparison tests.”

Comment 3: Abstract: Page 2 (line 37): Change "resistance" to "resistant"
Response: The word “resistance” had been changed to “resistant”

Comment 4: Background: In this section there is some information about 3 NiTi systems tested. I suggest the authors to add some information about RaCe instruments too. The authors will better explain why they compared these instruments (2 heat treated, 1 blue wire and 1 conventional electropolished instrument).
Response: It had been added more information about RaCe instruments in the Background section as follows: “RaCe (RC; FKG Dentaire, La Chaux-de-Fonds, Switzerland) is an electropolished instrument that is manufactured from a conventional NiTi alloy [15]. The RC instruments have sharp cutting edges to enhance efficiency and alternating cutting edges to remove screwing [16].”

Comment 5: Backgraound, para #5 (page 4, line 29): Change "manufacture" to "manufacturer"
Response: It had been changed to “manufacturer”.

Comment 6: Methods: There is so little information about the cyclic fatigue testing device. The authors referred their previous study (J Endod 2018); however, there is so little information about their testing
device in that study either. As a result, I suggest the authors to add the description of their testing device (a container? How did they keep the temperature at 37°C? etc.). Also, a figure of the device must be included for the readers to better understand the testing device.

Response: A figure of the cyclic fatigue testing device had been added (Figure 1).

Comment 7: Methods, para#2 (page 5, line 22): Did the authors take SEM images of all instruments or representative samples in each group?
Response: Representative fractured specimens from each system had been examined under SEM and it was clarified in the Methods section as follows: “The fractured surface of representative specimens was examined using a scanning electron microscope (SEM) (Stereoscan 260; Cambridge Instruments, Cambridge, UK).”

Comment 8: Statistical analysis: Were the data distributed normally? Please mention it here.
Response: The data showed the nonparametric distribution and the tests used for evaluating the data were added to the statistical analysis section as follows: “The normality of the data distribution and the homogeneity of variances were tested using Kolmogorov–Smirnov and Levene tests. The data showed a nonparametric distribution.”

Comment 9: Discussion: TRN and HCM instruments revealed a higher fatigue resistance than Vortex Blue and RaCe instruments and the authors attributed this finding to heat treatment and design of the instruments. However, Vortex Blue is also a heat treated instrument. This should be cleared. It is known that an HCM instrument is more martensitic than VB instruments at body temperature. The authors might discuss the effect of $A_f$ temperatures of these heat-treated alloys (previous studies of differential calorimetric analysis (DSC) about these instruments might be referred).
Response: The effect of $A_f$ temperatures had been discussed in the Discussion section as follows: “The thermomechanical treatment of endodontic instruments produced an instrument with different austenite finishing temperature ($A_f$), which affect the mechanical properties especially the fatigue resistance and bending properties [31, 32]. The heat treatment of HCM instrument is based on shifting the austenite/martensite transition temperature so that a stable martensitic microstructure is obtained at body temperature [32]. Although HCM and VB instruments are manufactured from heat-treated NiTi alloy, HCM instrument had a higher fatigue resistance. It had been reported that VB instruments had a higher degree of austenite than HCM instruments at body temperature [33].”

Comment 10: Conclusions, (page 9, line2): "VR" should be "VB"
Response: It had been corrected to “VB” in the Conclusions of the abstract and the Conclusions of the paper.

Comment 11: References #8: "Clin Oral Investig" should be "Clin Oral Invest"
Response: It is the abbreviation in NLM Title Abbreviation: “Clin Oral Investig” and ISO Abbreviation

Comment 12: Fig 1: SEM images should be commented with some details in order to be more informative (arrows showing crack origins, striation marks etc.)
Response: Note: Figure 1 changed to Figure 2 after adding Figure 1 of the cyclic fatigue testing device. It had been added to the legend and the images of Fig 2 more details as the origin of the crack, fatigue zone and the overload fast fracture zone as follows: “Fig. 2 SEM images ($\times$200) of fractured fragments in double curvature canals. Fracture of instruments in apical curvature (A-D) and coronal curvature (E-H). (A, E) TRN, (B, F) HCM, (C, G) VB and (D, H) RC; respectively. The following features could be observed: the origin of the crack (arrow), fatigue zone (F), and overload fast fracture zone (O).”
Comment 13: Fig 2 is a poor quality image. It could not be seen well even when downloaded.
Response: Note Figure 2 changed to Figure 3 after adding Figure 1 of the cyclic fatigue testing device. Figure 3 with separate images had been uploaded with high resolution.

Finally, many thanks to referees’ comments, efforts, and valuable suggestions regarding our paper. Also, many thanks to the Editor and all the Editorial Boards for their efforts.