

Introduction

Removal of cement retained implant crowns proves to be challenging once technical or biological issues arise. Removal of the crowns traditionally requires sectioning with rotary instruments which causes irreversible damage to the crown and potential detriment to the periodontal apparatus stabilizing the implant. This study explores the feasibility of Er Cr: YSGG laser as a minimally invasive alternative in retrieval of zirconia implant crowns from CAD/CAM titanium abutments. Leaving the abutment, the implant, the crown and surrounding structures intact.

Materials and Methods

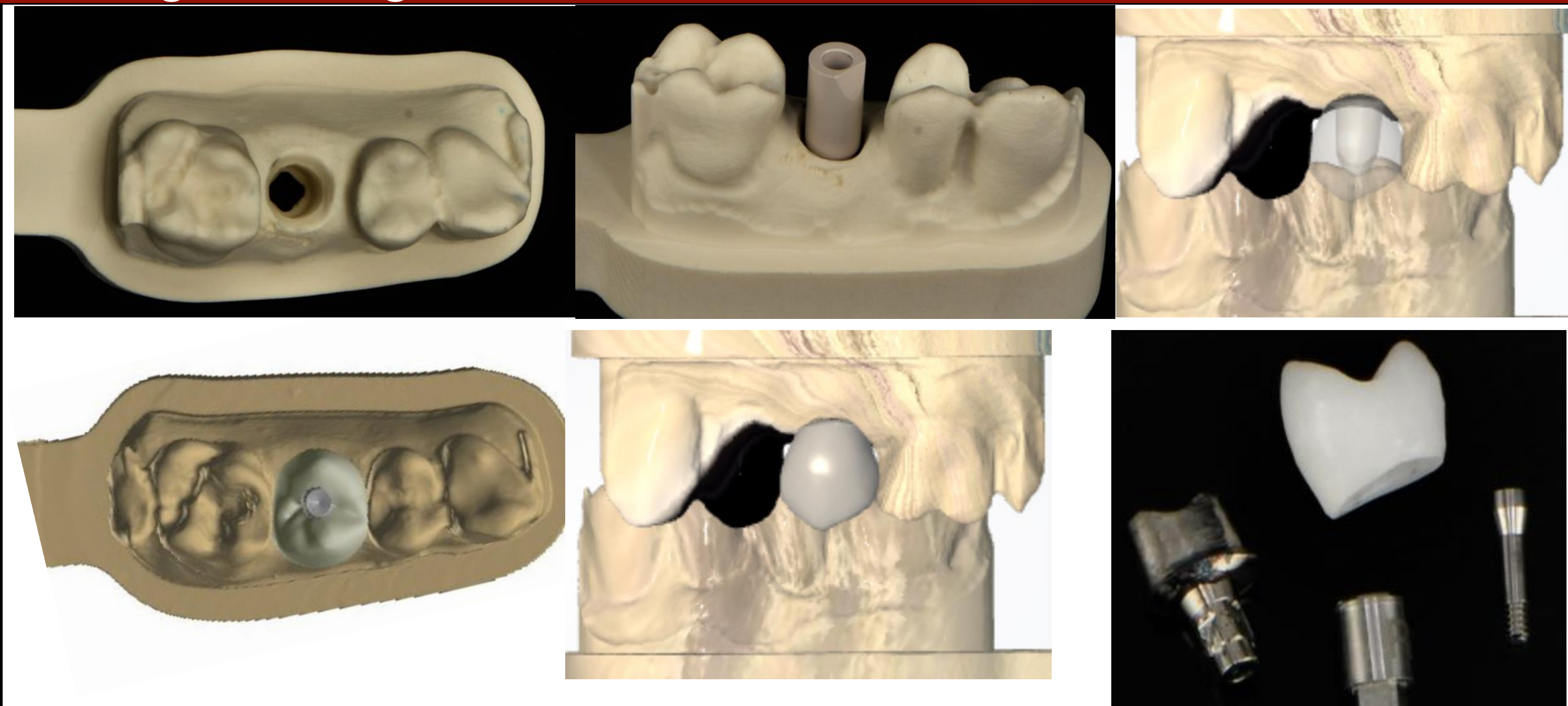
MATERIALS:

Waterlase iPlus by Biolase, 3Shape Scanner (Er,Cr:YSGG), Cadent Models, Ceramil Preshade Zolid Zirconia, TiBase Abutment, Relyx Unicem, Temp Bond NE, MX9 tip, Turbo Handpiece

METHODS:

Cement retained implant crowns for tooth #13 were designed based on iTero CADENT models. Four implant abutments were designed by scanning a care RC Mono scanning body (D 4.1 mm, H 10mm) with Trios 3 Basic intraoral scanner. A total of 20 customized milled #13 Zirconia crowns (Ceramil zolid preshade), were designed with standard guidelines based on articulated models and designed abutments. Ten #13 Zirconia crowns were cemented with Relyx Unicem and the remaining 10 were cemented with Tempbond NE. K-type thermocouple was placed through the apical access hole to 1 mm beneath the upper surface of the abutment. Laser irradiation was done with Er,Cr:YSGG Waterlase iPlus. The crowns were irradiated continuously with a walking technique starting at the margin interface between the abutment and crown. An attempt to remove the restoration with a mechanical instrument was made after each cycle; if the crown was still bonded to the underlying abutment, then attempts were repeat in increments of 3-5 minutes until successful decementation was achieved.

3D Digital design

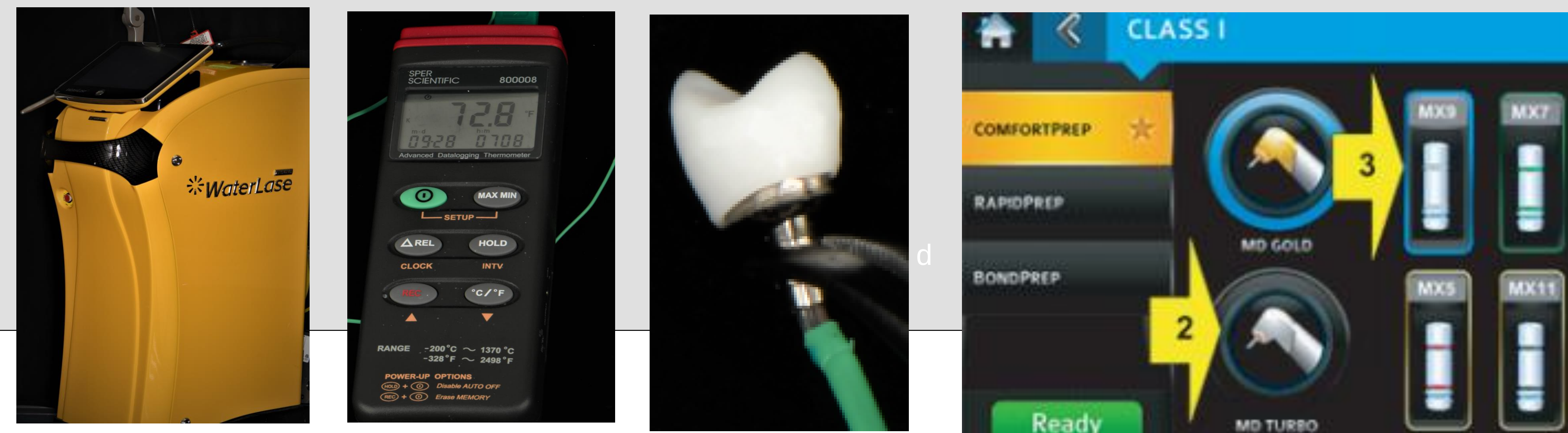


Decementation Design

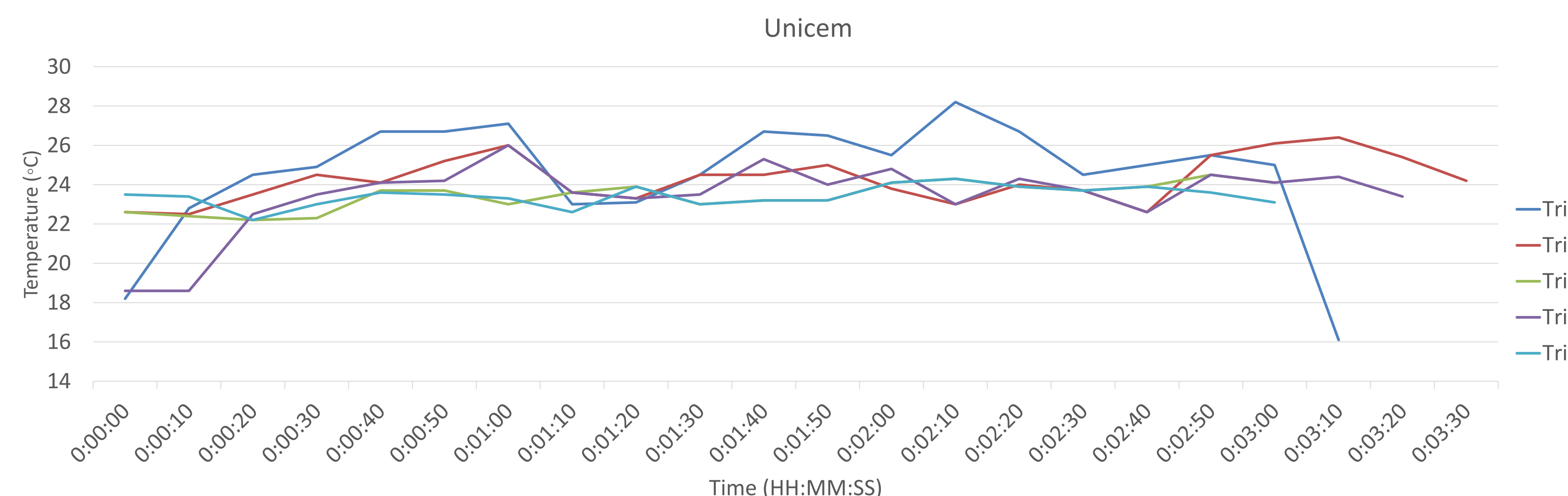
Tip	MX9	WaterLase Er,Cr:YSGG	iPlus	Biolase	.	2780 nm
Handpiece	Turbo	Power	Hz	Mode	Water	Air
Distance from tooth	2-3mm	6W _e	20	H _e	80%	60%

Table 1 Pre-established components

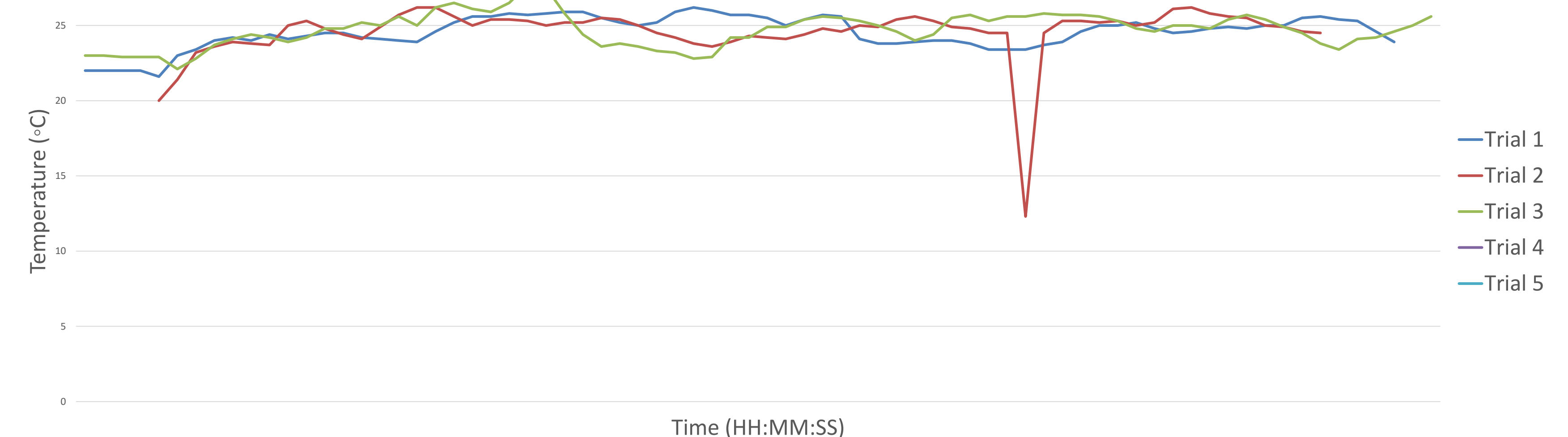
Table 2. Recommended Laser Settings



Results



Graph 1. Averages - Time vs Temperature Relyx Unicem



Graph 2. Averages Time vs Temperature TempBond NE

Results Continued

	Unicem	TempbondNE
Average	196.80	142.80
STDEV	13.08	5.40
z-value	2.65	
p-value	0.01*	
Statistical level, p=0.05		
STDEV: standard deviation		
p-value from Wilcoxon signed rank test		
p=0.0080* for RelyX Unicem vs TempbondNE		

	Unicem	TempbondNE
Average	6.78	6.84
STDEV	3.92	3.97
Z-value	0.00	
p-value	1.00	
Statistical level, p=0.05		
STDEV: standard deviation		
p-value from Wilcoxon signed rank test		
p=1 for RelyX Unicem vs TempbondNE		

Table 3 Comparison of time change (seconds) for TempBond NE and Relyx Unicem

Table 4 Comparison of temperature change (°C) for TempBond NE and Relyx Unicem

Discussion / Conclusions

- Removal of cemented custom milled zirconia crowns with Er Cr:YSGG laser is efficient and causes no damage to the crowns, abutments or adjacent tissues.
- There is no significant difference in temperature change between the two samples; due to appropriate water (80%), air (60%) ratio that kept the environment under steady temperature.
- There is a difference in decementing time; favoring Temp Bond NE on an average of two minutes and thirty eight seconds vs. three minutes and twenty eight seconds for Relyx Unicem. This difference is due to the mechanical properties of each cement; Temp Bond NE being a weaker cement.
- The study established safe and effective laser settings to remove crowns with minimal structural damage and minimal temperature change.

Acknowledgements

- The authors would like to acknowledge Constantin Petric Dental Studio for the fabrication and milling of the experimental samples. We would like to thank Dr. Marina Polonsky DDS MSc, Steve Jang and BIOLASE USA for the laser training and laser materials. We would like to thank Ms. Sapna Nath DMD Class of 2024 for all the contribution to the project . Special gratitude to Dr. David M. Kim DDS DMSc and Harvard Periodontics for making the laser available to AGE Prosthodontics.

References

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