

Quantitative Analysis of Biofilm Removal Following Irrigation with EndoActivator and GentleWave Systems: Microbiological Study

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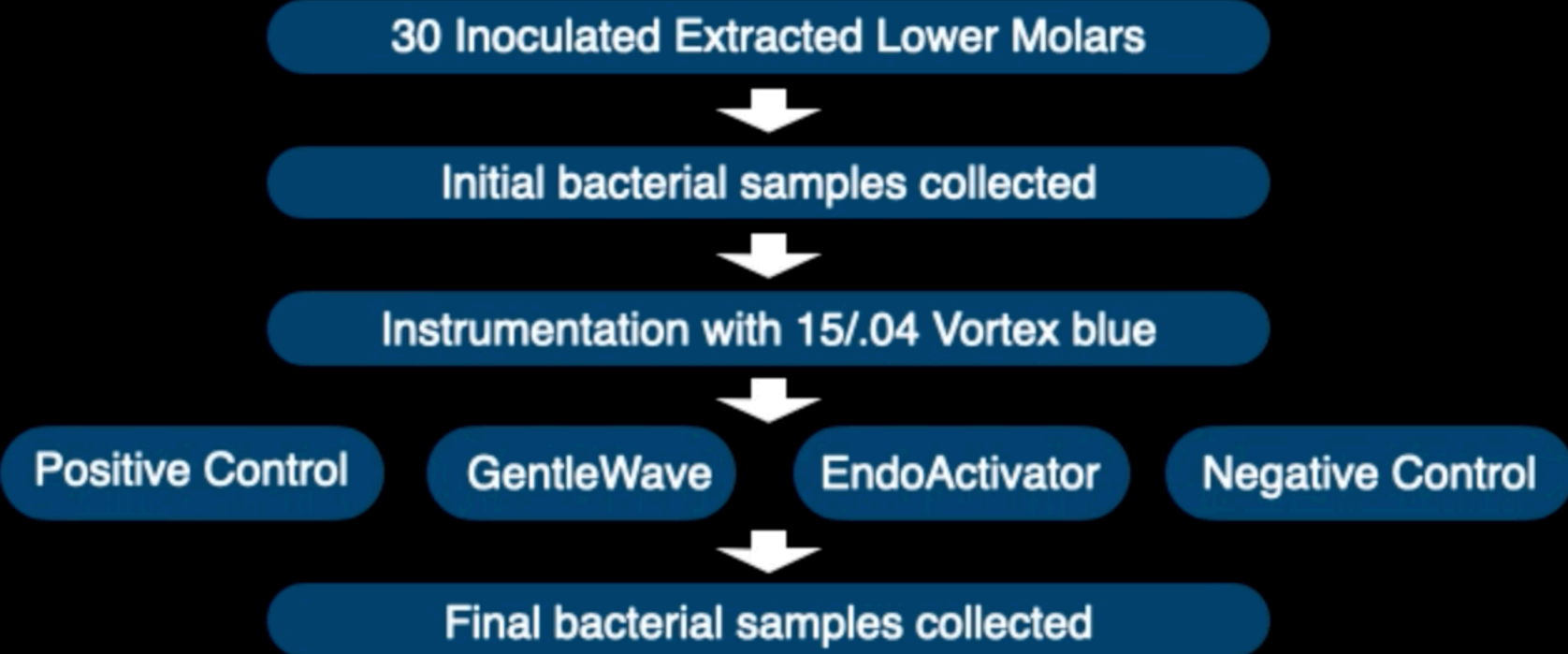
INTRODUCTION

- The success of Root canal treatment is highly dependent on the complete removal of pulp tissues, bacteria and their byproducts from the root canal system.
- *E. faecalis* is a gram positive bacterium with many properties that allow it to persist in root canal systems despite thorough cleaning and shaping.
- Many studies have explored different irrigants and techniques for bacteria elimination.
- Some companies have developed new technology to aid in complete removal of bacteria from root canal systems.
- The SmartLite Pro EndoActivator™ from Dentsply uses sonic activation to aid in the removal of bacteria and debris from canals.
- Another advancement, the GentleWave System® uses both acoustics and advanced fluids mechanics to thoroughly clean canals by using timed treatments with sodium hypochlorite and EDTA with minimal instrumentation.

OBJECTIVES

The aim of this study was to compare the effectiveness of the SmartLite Pro EndoActivator™ (EA) (Dentsply Sirona, York, PA, USA) and GentleWave System® (GWS) (Sonendo Inc, Laguna Hills, CA) in removing *Enterococcus faecalis* (*E. faecalis*) from the mesial canals and isthmuses of mandibular molars.

METHODS



Primers specific for *E. faecalis* were used for qPCR. The bacterial reduction between pre- and post-instrumentation was calculated. One-way analysis of variance (ANOVA) with Tukey post hoc tests were performed to assess statistical significance of ($p < 0.05$).

RESULTS

The average percentage reduction in *E. faecalis* was 89.40 and 91.07 for GentleWave and EndoActivator, respectively. Both irrigation systems were able to reduce the load of *E. faecalis* from the prepared root canals. There was no significant difference between the effectiveness of the EndoActivator and the GentleWave in removing *E. faecalis* from the mesial canals and isthmuses of mandibular molars.

DISCUSSION

- Currently, there are no studies comparing GentleWave® and the SmartLite Pro EndoActivator™ in the effectiveness of the removal of *E. faecalis* in minimally prepared mesial canals of mandibular molars. The results of this experiment shows that both technologies, when used according to manufacturer's recommendation, will result in approximately 91% reduction in the level of *E. faecalis* culturable in a root canal.
- The GentleWave® utilizes advanced multistep fluid technology that claims to offer superior cleaning of complex anatomy and saves natural tooth structure by requiring less canal preparation. Based on the results of this study, the GentleWave® was able to significantly reduce the amount of *E. faecalis* found in the more challenging mesial canals and isthmuses of mandibular molars prepared only to a size 15/.04 VortexBlue rotary file
- The Dentsply's new SmartLite Pro EndoActivator™ is improved design most likely aids in the additional dislodgment of bacterial biofilms and debris from root canals leading to our finding of approximately 91% reduction in bacteria.

CONCLUSION

Our study showed that using the Smartlite Pro EndoActivator™ with a higher concentration of NaOCl for one minute in each canal followed by 8% EDTA for 30 seconds in each canal produced similar results as the GentleWave System® in removal of *E. faecalis* from minimally prepared mandibular molars. This study shows that either modality is appropriate for thorough irrigation of minimally prepared canals.