

# Research & Table Clinic Day 2020 Structured Abstract

**TITLE:** Hand Fatigue Differences Between Air-Driven and Electric Handpieces

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**IS THIS A COMPETING PRESENTATION:**

**YES**

**SELECT RESEARCH / SCHOLARLY TOPIC:**

**CLINICAL SCIENCES (benchtop - Dental Materials, etc)**

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## **TITLE:**

Hand Fatigue Differences Between Air-Driven and Electric Handpieces

## **OBJECTIVES:**

To compare “hand fatigue” between use of air-turbine and electric handpieces following preparation of a full coverage crown.

## **METHODS:**

Prosthodontic faculty (2) prepared extracted human teeth (mandibular 1<sup>st</sup> or 2<sup>nd</sup> molars) for full-coverage crowns using either a high-speed, air-turbine handpiece (Solara QT, StarDental), or an electric handpiece with a high speed attachment (200,000 rpm) (Bien Air). Similar new diamond burs were used (G6878K/FGSS016, Komet), for each preparation, without water spray. Extracted molars were embedded in a dentiform, placed in a patient simulator mannequin. Crown preparation time was limited to 15 minutes. Immediately prior to tooth preparation, each clinician was measured for finger pressure strength by using a custom-made, pencil-style grip and pressing a capacitive load-sensing button placed in a 3D printed instrument, similar in dimensions as a handpiece. Each operator was instructed to press as hard as they could for a period of at least 35 sec (S). The sensor output was directed to standalone data acquisition device (Arduino-based), and then to a personal computer. The sensor response was previously calibrated using standardized loads. Immediately following crown preparation, the clinicians were instructed to repeat the same finger pressure measurement. The difference in areas under the data collection time-load profiles prior to and subsequent to crown preparation was determined (measured in N\*S (impact)), and compared statistically. (n=10 per condition).

## **RESULTS:**

2-way ANOVA (pre-set alpha 0.05) indicated neither factor (Handpiece  $p=0.106$ ; Operator  $p=0.078$ ) nor the interaction term ( $p=0.821$ ) significantly affected differences in pre-post preparation values. However, repeated measures, 2-way ANOVA comparing before/after values within each operator did indicate significantly less force development using the electric handpiece for one operator ( $p<0.001$ ).

## **CONCLUSIONS:**

Use of an electric highspeed handpiece can result in significantly greater finger gripping force, but the effect is seen as being operator-dependent.

## **LEARNING OBJECTIVES:**

- 1. Recognize possible effects of using different types of high speed handpieces on operator hand fatigue over time.**
- 2. Identify handpiece variables that can influence operator hand fatigue. while prepping teeth, and how it can vary among clinicians.**
- 3. State factors among individual operators that potentially affect operator hand fatigue from highspeed handpiece use.**