



## Sharpness of Dental Explorers at King Saud University College of Dentistry

Huda A Al-Shehri\*

Department of Prosthodontics, King Saud University College of Dentistry, Saudi Arabia

### Abstract

**Aim:** To measure sharpness of a sample of randomly chosen dental explorers (DE) from King Saud University, College of Dentistry (KSUCD) compared to new ones.

**Methods:** Sixty DE were drawn out of random examination kits at KSUCD to be measured as study group. Ten new DE were measured to serve as control group. Tip diameter measurements were done for all seventy DE under digital light microscope (n=70) ( $\mu\text{m}$ ). Comparison was done using SPSS (v.16) at significance level  $p \leq 0.05$ .

**Results:** Mean tip diameter of study group was  $57.58 \pm 20.06$  while it was  $30.34 \pm 5.62$  for control group. Independent sample t-test shows significant difference between the two groups ( $p=0.000$ ).

**Conclusion:** There is wide variation in tip diameter of study sample and difference in sharpness between study and control DEs

**Clinical Significance:** Dull explorers might negatively affect the clinical judgment of marginal integrity of crowns.

### Introduction

Marginal integrity is essential to the long term success of indirect restorations [1]. Loss of good marginal adaptation leads to plaque accumulation and subsequent recurrent caries and periodontal disease [2]. The American Dental Association have stated cement film thickness of zinc phosphate cement to be 40 microns [3]. However, on clinical practice, acceptable marginal gap is highly variable. Mclean and Fraunhofer examined over 1000 crowns and found that 120 microns was the maximum tolerable marginal gap [4] while Blackman et al. [5] stated that an acceptable gap should not be more than 50 microns. Methods to measure marginal gap in-vitro are variable like using direct microscopy [6], profilometry [7], and replication of cement space with silicone material and microcomputed tomography [8]. However, in clinic, the evaluation of marginal gap is most commonly done subjectively with the use of DE tip. When the tip of the explorer is able to penetrate the junction between unprepared tooth structure and the crown, the margin is considered not acceptable. One study evaluated the ability of experienced operative dentists to detect marginal gaps of varying degrees using DEs and found that explorer dullness significantly affected their decision regarding marginal fidelity [9]. Up to the author's knowledge, no previous studies have surveyed the tip diameter of regularly used DEs used in dental schools. The aim of the study is to measure tip diameter of a sample of dental explorers used in the college of dentistry, King Saud University, Riyadh, Saudi Arabia.

### Materials and Methods

The study was approved by the college of dentistry research center (#00275). A total of sixty DEs (n=60) were randomly chosen out of sterilized examination kits that is ready to be used in clinical courses in the college in both campuses (test group). Also, additional unused explorers were measured to serve as control group (n=10). Tip diameter was measured in microns ( $\mu\text{m}$ ). All measurements were done using digital microscope (Hirox KH-7700, Tokyo, Japan) by the same investigator. Intra examiner reliability was measured by repeating measurements of ten explorers on a one week interval (97%). Descriptive statistics as well as independent sample t-test were carried out using Statistical Package for Social Sciences (SPSS) at significance level of 0.05 ( $p=0.05$ ).

### Results

The mean and standard deviations of DEs are presented in table 1. Mean tip diameter of control

### OPEN ACCESS

#### \*Correspondence:

Huda A Al-Shehri, Department of Prosthodontics, Sharpness of Dental Explorers at King Saud University College of Dentistry, Saudi Arabia, E-mail: hAIShehri@KSU.EDU.SA

Received Date: 12 Dec 2016

Accepted Date: 30 Jan 2017

Published Date: 09 Feb 2017

#### Citation:

Al-Shehri HA. Sharpness of Dental Explorers at King Saud University College of Dentistry. *J Dent Oral Biol.* 2017; 2(4): 1035.

Copyright © 2017 Al-Shehri HA. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Table 1:** Means and Standard deviations (SD) of unused (control) and used (test) Des.

Group	N	Minimum ( $\mu\text{m}$ )	Maximum ( $\mu\text{m}$ )	Mean ( $\mu\text{m}$ )	SD
Control (unused)	10	20.97	38.60	30.34	5.62
Test (used)	60	22.78	124.67	57.58	20.06

group was  $30.34 \pm 5.62 \mu\text{m}$  while it was  $57.58 \pm 20.06 \mu\text{m}$  for the test group. Comparison of the two groups was done using independent sample t-test and there was a highly significant difference between the two groups ( $p=0.000$ ).

## Discussion

Marginal integrity is one of the most important mechanical factors in success of full coverage crowns<sup>1</sup>. The ability of the dentist to evaluate crown margins in clinic accurately is essential to the success of the cemented crowns. Many factors could obscure that ability; these might include visibility, location of the margin, presence of vertical steps (over contouring) and use of a dull explorer. A dull explorer that looks sharp to the naked eye can influence the decision of the dentist to accept or discard a restoration or a crown. Explorers measured in this study were randomly selected from daily used examination kits that could be used by students and faculty to evaluate integrity of direct and indirect dental restorations. According to ADA, cement film thickness should be 40 microns and in order for an explorer to effectively detect a gap larger than 40 microns, its tip should be equal or less than that number. In the current study, there was a wide range in tip diameter of the measured explorers with a minimum of 22.78 microns to a maximum of 124.67 microns. Only thirteen explorers examined were below 40 microns (23.33%). The clinical use of the remaining explorers might cause errors by acceptance of faulty restorations that might consequently affect teeth and periodontal health of many patients. Unused sharp explorers showed a mean tip diameter of  $30.34 \pm 5.62 \mu\text{m}$  compared to used explorers  $57.58 \pm 20.06 \mu\text{m}$  with highly significant difference ( $p=0.000$ ). Hayashi found that tip diameter of DEs had a significant effect on the detection of horizontal gaps. They suggest that diagnosis of restoration marginal

discrepancies in clinical trials is best achieved using techniques other than using DE to probe margins. However, this could be argued that DE is the most affordable and accessible instrument to measure marginal gap of crowns. Instead, we recommend regular sharpening protocol and random microscopic measurement of DEs in clinical practice as a quality control measure in dental settings.

## Acknowledgement

The author would like to thank the College of Dentistry Research Center and Deanship of Scientific Research at King Saud University, Saudi Arabia for funding this research project (#00275).

## References

- Hunter AJ, Hunter AR. Gingival margins for crowns: a review and discussion. Part II: discrepancies and configurations. *J Prosthet Dent.* 1990; 64: 636-642.
- Behrend DA. Crown margins and gingival health. *Ann R Australas Coll Dent Surg.* 1984; 8: 138-145.
- American Dental Association. ANSI/ADA Specification no.8 for zinc phosphate cement. In: *Guide to dental materials and devices.* 5th ed. Chicago: American Dental Association. 1970-1971.
- McLean JW, von Fraunhofer JA. The estimation of cement film thickness by an *in vivo* technique. *Br Dent J.* 1971; 131: 107-11.
- Blackman R, Baez R, Barghi N. Marginal accuracy and geometry of cast titanium copings. *J Prosthet Dent.* 1992; 67: 435-440.
- Yeo IS, Yang JH, Lee JB. In vitro marginal fit of three all-ceramic crown systems. *J Prosthet Dent.* 2003; 90: 459-464.
- Good ML, Mitchell CA, Pintado MR, Douglas WH. Quantification of all-ceramic crown margin surface profile from try-in to 1-week post-cementation. *J Dent.* 2009; 37: 65-75.
- Contrepolis M, Soenen A, Bartala M, Laviolle O. Marginal adaptation of ceramic crowns: a systematic review. *J Prosthet Dent.* 2013; 110: 447-454.
- Rappold AP, Ripps AH, Ireland EJ. Explorer sharpness as related to margin evaluations. *Oper Dent.* 1992; 17: 2-6.