EXPERIMENTAL STUDY ON DENTAL CROWNS RETRIEVAL TOOLS: REMOVAL EFFICIENCY AND POTENTIAL PATIENTS' DISCOMFORT

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Introduction

Advantages of cement-retained dental crowns over screw-retained ones have been highlighted in several studies, in terms of aesthetics, ease of fabrication and passive fit [1]. However, minor complications in implant-supported dental prostheses are frequent [2], and the retrievability of the crown is important to allow an accurate inspection of the implant site. Several tools might be used to retrieve a cemented crown, most of which apply impulsive loads to the prostheses. The influence of the luting agent and abutment shape on the number of impulses needed for the crown retrieval has been already investigated experimentally [3]. However, clinical studies show weak or no correlation between the impulses number and the patients' discomfort, while the retentive force of the cement significantly affects their perceptions [4]. In this study, three impulse-generating tools were employed to retrieve cemented copings, measuring the force transmitted to the implants.

Materials and methods

Fourteen copings were welded at the extremities of 7 bars to create 7 noble-metal alloy dummies of a three-unit dental bridge. Each bridge had different copings height and taper angle, which are reported in Table 1.

Bridge ID	Coping 1	Coping 2
B1	5 mm, 0°	5 mm, 0°
B2	7 mm, 0°	7 mm, 0°
B3	7 mm, 2°	7 mm, 2°
B4	5 mm, 2°	5 mm, 4°
B5	5 mm, 0°	5 mm, 4°
B6	7 mm, 2°	7 mm, 4°
B7	7 mm, 0°	7 mm, 4°

Table 1: Three-unit bridge dummies used in the study.

The bridges were cemented with a temporary cement (Temp Bond NE) and removed with Sliding Hammer (SH) CORONAFlex (CF), and Magnetic Mallet (MM). Bridges not completely removed within 50 impulses were considered non-retrievable. An experimental setup comprising a piezoelectric load cell was designed to measure the forces generated during the procedure [5]. Each bridge was removed, cleaned, and cemented again 5 times for each tool. The three tools were compared in terms of percentage of successful retrieval and force transmitted to the implant; Kruskal-Wallis analyses and Bonferroni pairwise comparisons were performed to investigate the tools influence on the maximum force.

Results

The SH resulted the most efficient tool in terms of removal percentage (Figure 1), being able to retrieve all bridges in all tests, except for the ones with at least one 7 mm, 0° coping, which is the most retentive among the geometries used in the study. However, MM had a similar efficiency in this regard, while also achieving a significantly lower force (p<0.1) with most bridges (Figure 2).

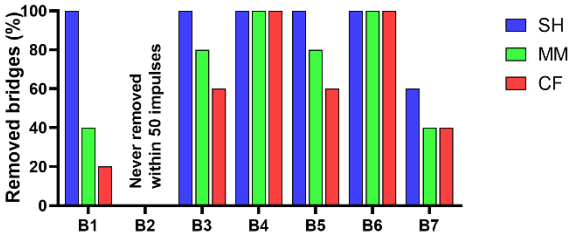

Figure 1: Percentage of successfully retrieved bridges.

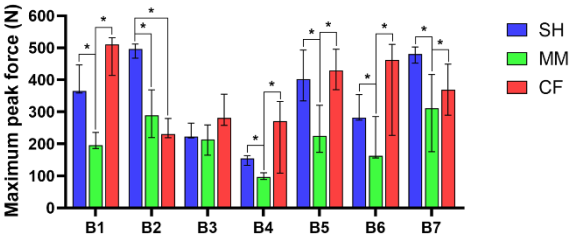

Figure 2: Maximum force generated during bridges removal; asterisks above the bars indicate significant differences.

CF was slightly worse than MM in retrieving the bridges, and, in addition, it generated a higher force.

Discussion and conclusions

MM can be considered a more suitable tool to retrieve cemented dental prostheses compared to CF. Moreover, since the force transmitted to the bone has a stronger influence on patients' comfort compared to the number of impulses needed for the retrieval [4], MM could also be preferable compared to SH for most situations, in particular when only conical abutments are involved.

References

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