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Efficacy of electric-powered cleaning instruments in edentulous patients with implant-supported full-arch fixed prostheses: a crossover design

Toru Maeda, Taro Mukaibo*, Chihiro Masaki, Sirapat Thongpoung, Shintaro Tsuka, Akiko Tamura, Fumiko Aonuma, Yusuke Kondo and Ryuji Hosokawa

Abstract

Background: The aim of this study was to evaluate the plaque removal efficacies of electric toothbrushes and electric dental floss compared with conventional manual toothbrushing in cleaning the fitting surface of an All-on-4™ concept (Nobel Biocare, Zürich-Flughafen, Switzerland) implant-supported fixed dental prosthesis (FDP).

Methods: Nine patients with maxillary edentulous arches participated in the study. We investigated two electric-powered brushes (Sonicare Diamond Clean®, Koninklijke Philips N.V., Amsterdam, the Netherlands [SD group], and the Oral-B Professional Care Smart Series 5000®, Braun GmbH, Kronberg, Germany [OralB group]) and one electric dental floss unit (Air Floss®, Koninklijke Philips N.V. [AF group]). A manual toothbrush (Tuft24® MS, OralCare Inc., Tokyo, Japan) was used by the control group. The fitting surface of the FDP was stained to allow visualization of the entire accumulated plaque area. Both the buccal and palatal portions of the plaque area were assessed before and after brushing to evaluate each instrument's plaque removal rate using a crossover study design. Two-week washout periods were employed between each evaluation.

Results: The plaque removal rates were 53.5 ± 8.5%, 70.9 ± 6.5%, 75.4 ± 6.3%, and 74.4 ± 4.2% for the control, AF, OralB, and SD groups, respectively. When participants were divided into two groups based on their plaque removal rates with a manual toothbrush (poor brushing and good brushing), the poor brushing group showed significant improvement in the plaque removal rate when using electric-powered toothbrushes. The plaque removal rates for the buccal area were significantly higher for the OralB and SD groups than for the manual brushing group (control group), with rates of 52.8 ± 7.9%, 70.1 ± 7.3%, 77.7 ± 6.5%, and 79.5 ± 3.7% for the control, AF, OralB, and SD groups, respectively. The plaque removal rates in the palatal area were consistently lower than those in the buccal area for each of the three electric instruments.

Conclusions: The results suggest that patients who are not adept at manual toothbrushing may potentially improve their removal of plaque from the fitting surfaces of FDPs by using electric toothbrushes.

Keywords: Oral hygiene, Manual toothbrush, Electric toothbrush, Dental implant, Implant-supported full-arch fixed prosthesis, All-on-4

* Correspondence: r07mukaibou@fa.kyu-dent.ac.jp
Division of Oral Reconstruction and Rehabilitation, Kyushu Dental University, 2-6-1 Manazuru, Kokurakita-Ku, Kitakyushu City, Fukuoka 803-8580, Japan