journal of prosthodontic research 63 (2019) 271–276

Contents lists available at ScienceDirect

Journal of Prosthodontic Research

journal homepage: www.elsevier.com/locate/jpor

Original article

Effect of different cleansing agents and adhesive resins on bond strength of contaminated zirconia

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ARTICLE INFO

Article history:
Received 14 August 2018
Received in revised form 7 December 2018
Accepted 12 December 2018
Available online 28 January 2019

Keywords:
Zirconia
Adhesive resin
Cleansing agent
Bond strength
Contaminated surface

ABSTRACT

Purpose: This study was observed the effect of cleansing agents and adhesive resins on shear bond strength (SBS), surface morphology and phase transformation of saliva and silicone disclosing medium contaminated zirconia.
Methods: The 110 zirconia specimens size 5 × 5 × 1 mm were fabricated and randomly divided into 5 surface treated groups: Non-contaminated (PC) Saliva and silicone disclosing medium contaminated without cleansing (NC) Surface contaminated and cleansing with Phosphoric acid (PO) Ivoclean (IC) or Hydrofluoric acid (HF). The twenty of each surface treated specimens were selected and bonded with Panavia F2.0 (P) and Superbond C&B (S) for SBS test (n = 10). The data was analyzed by Kruskal–Wallis H and Mann–Whitney U test. The remaining specimens of each surface treated groups were examined by SEM and XRD.
Results: The saliva and silicone disclosing medium contaminated zirconia without cleansing group (PNC) had the lowest SBS when Panavia F2.0 was used for cementation ($p < 0.05$). The SBS of surface cleansing groups (PPO, PIC and PHF) were not different from the non-contaminated group (PPC) ($p > 0.05$). However, there were no difference in SBS among groups when cementation with Superbond C&B (SPC, SNC, SPO, SIC and SHF) ($p > 0.05$). There was no morphologic changing that could be observed by SEM. The XRD showed little phase transformation when surfaces were contaminated and cleaned.
Conclusions: The saliva and silicone disclosing medium contaminated zirconia should be cleaned with Phosphoric acid, Ivoclean or Hydrofluoric acid for 20 s prior to cementation with Panavia F2.0. However, the surface cleansing was not necessary when cementation with Superbond C&B.

1. Introduction

Nowadays, zirconia is widely chosen as an esthetic restorative material. Zirconia has many mechanical properties which are better than other materials such as chemical resistance, high fractural resistance and biocompatibility [1]. The previous studies showed that zirconia restoration should have been bonded with adhesive resin to obtain optimal bond strength. The zirconia surface could be prepared by both mechanical and chemical procedures. From the previous studies, the effective method for zirconia surface preparation is Tribochemical technique followed by silane-coupling agent application. However, the sandblasting is the most popular technique with a lower cost to create mechanical retention. The zirconia could be bonded chemically to adhesive resin with 10-MDP which could be found in some adhesive resin or separate bottles primer as surface priming agents [2–4].

Even though the fabrication technique of zirconia restoration is more accurate than the past, the try in procedure still necessary to assure that restoration is already seated in place before cementation. Many studies show that contamination of zirconia surface with saliva, blood or silicone disclosing medium from the try in procedure could reduce the bond strength of cemented zirconia. The surface cleansing after contamination could be done by both mechanical and chemical methods. The most effective mechanical cleansing method is sandblasting with alumina oxide particles but these may create the crack on the surface of restoration. Thus, many chemical cleansing agents were recommended to recover the bond strength after surface contamination such as hydrofluoric acid, phosphoric acid and sodium hydroxide solution [5–8].

Some studies show that phosphoric acid had a negative effect on cleansing the zirconia surface due to significantly reducing in bond strength when compared to non-contaminated surface. However, some studies show that phosphoric acid reduces the

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https://doi.org/10.1016/j.jpor.2018.12.007
1883-1958/