

protocol. This study compared the tensile bond strength (TBS) of three cements (Rely X Luting Plus, Rely X Unicem 2 and Panavia V5) to three zirconia materials (KATANA HTML, STML and UTML) after three different surface treatments (No Air Abrasion, Air Abrasion with Glass Beads and Aluminum Oxide).

Objective

To evaluate the effects of various surface treatments and cement types on the tensile bond strength (TBS) of cements to three zirconia materials.

Materials and Methods

Three zirconia materials (KATANA Zirconia HTML, STML and UTML), 135 specimens each, were divided into three surface treatment groups: no air abrasion (NO), air abrasion with glass beads (GB) and air abrasion with aluminum oxide (AL). A representative sample of each zirconia material with and without surface treatments was examined using a scanning electron microscope (SEM; Figures 1 & 2). For each group, printed resin (Formlabs Grey Resin) was cemented to zirconia specimens using three cement types: RelyX Luting Plus (RXL), RelyX Unicem 2 (RXU) and PANA VIA V5 (PAN). A total of 405 cemented specimens (27 groups, N=15/group) were stored in distilled water at 37 °C for 24 hours and tested for TBS in a universal testing machine (Instron Type 5943; Figure 3). All specimens were inspected to determine failure modes utilizing cement remnant index (CRI) scores (Tables 1 & 2). Data were analyzed with Kruskal-Wallis and Mann-Whitney U tests ($\alpha = 0.05$).

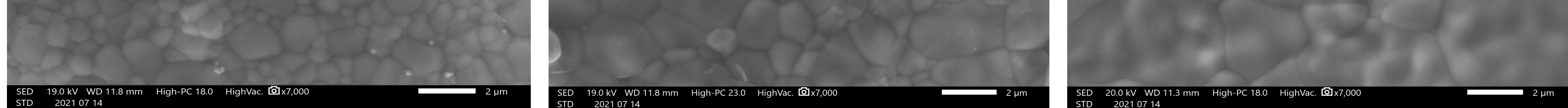


Figure 1. SEM Images (x7,000 / 2 μm) of Three Zirconia. Left: HTML; Middle: STML; Right: UTML.



Figure 2. SEM Images (x1,000 / 10 μm) of STML with Various Surface Treatments. Left: No Air Abrasion; Middle: Air Abrasion with Glass Beads; Right: Air Abrasion with Aluminum Oxide.



Figure 3. The Specimen (Staged for Photo).

Cement Remnant Index (CRI)	
Score	Quantity of Cement Remaining on Zirconia
0	No Cement on Zirconia
1	< 50% on Zirconia
2	≥ 50% on Zirconia
3	All Cement on Zirconia

Table 1. Cement Remnant Index Score (CRI).

Cement Type	Total Number and Percentage of Each CRI Score			
	0	1	2	3
RXL	11 (8.2%)	91 (67.4%)	33 (24.4%)	0 (0%)
R XU	31 (23%)	60 (44.4%)	42 (31.1%)	2 (1.5%)
PAN	0 (0%)	1 (0.7%)	122 (90.4%)	12 (8.9%)

Table 2. CRI Score Distribution for Each Cement.

exhibited (Table 2). highest m with GB median T with AL a significant (Table 3).

Surface Treatment
NO
GB
AL

Based on type of per column are r

Table 3. Med Each Group.

Cement significant and PAN treatment.