Effect of Neutralizing Agents on Feldspathic Porcelain Etched by Hydrofluoric Acid

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OBJECTIVES

1. To study the effect of neutralizing agents on the shear bond strength of feldspathic porcelain etched by hydrofluoric acid.
2. To analyse the surface texture and to identify the crystalline composition phase of feldspathic porcelain etched by hydrofluoric acid in combination with neutralizing agents.

RESULTS

SHEAR BOND STRENGTH TEST

The shear bond strength values of the control group (Group I), when compared with that of the experimental group II (HF), group III (calcium hydroxide), group IV (calcium gluconate) and Group V (sodium bicarbonate), showed statistically high significance. This indicated that calcium hydroxide has better bonding capability than the other neutralizing agents.

When intergroup comparison was done between group III, group IV and group V using Tukeys HSD test, the results proved to be significant statistically. Showing that HF had better bond strength than calcium gluconate and sodium bicarbonate. Whereas, when group IV and group V were studied in comparison, the sodium bicarbonate had a higher shear bond strength than calcium gluconate.

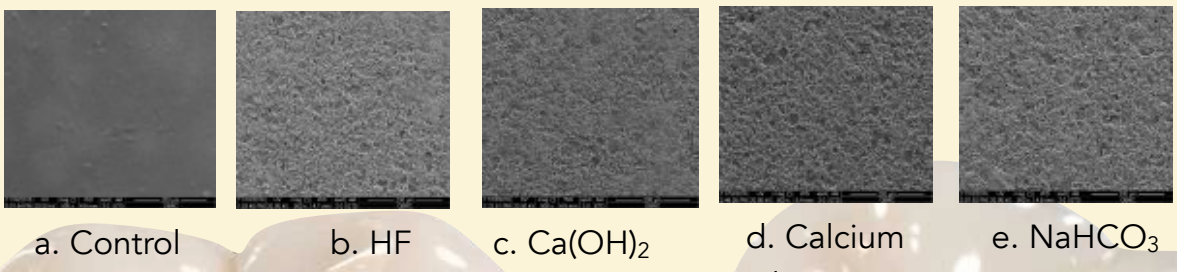
FAILURE ANALYSIS

From Table 1, the fracture pattern mode and the number of pre-testing failures observed in this experiment are shown. The overall number of cohesive failures were higher in all groups when compared to mixed failures and found the highest of cohesive failures in $Ca(OH)_2$ group, while the highest of mixed failures is found in HF group and $NaHCO_3$ group.

Control	HF	$CaOH_2$	Calcium gluconate	$NaHCO_3$
4.54	24.74	22.45	19.46	16.34
3.24	20.98	21.3	18.45	19.55
5.38	17.43	20.34	21.33	20.45
4.75	18.29	19.67	17.56	18.46
3.92	21.34	21.23	18.88	19.67
3.65	19.77	18.21	17.45	20.23
5.56	20.54	21.72	17.8	18.45
4.37	19.05	18.44	24.1	17.68
6.33	18.45	19.34	18.34	19.45
4.67	17.5	18.92	20.06	21.44
All adhesive failure	Mixed 4 Cohesive in porcelain 6	Mixed 2 Cohesive in porcelain 8	Mixed 3 Cohesive in porcelain 7	Mixed 4 Cohesive in porcelain 6

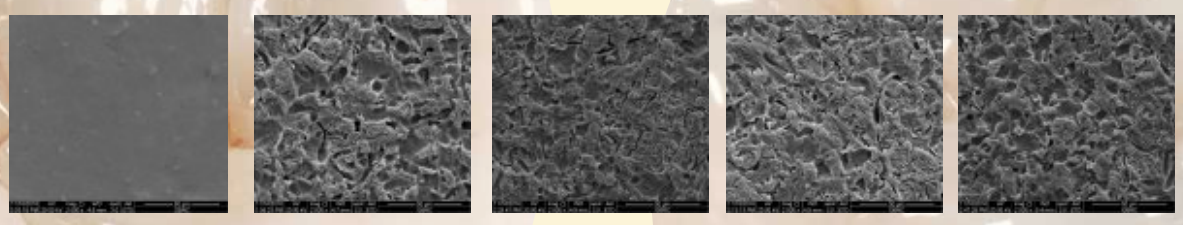
Table 1

Figure 1 (500x)



a. Control b. HF c. $Ca(OH)_2$ d. Calcium gluconate e. $NaHCO_3$

Figure 2 (2000x)



a. Control b. HF c. $Ca(OH)_2$ d. Calcium gluconate e. $NaHCO_3$

SEM ANALYSIS

The SEM images of porcelain surfaces are shown in Figure 1 and 2 at magnifications of 500x and 2000x respectively. The SEM image of porcelain surfaces with no treatment is shown in Figure 1a and 2a. There is no dissolution of glassy and crystalline phases. For the porcelain etched HF only for 90 seconds, which is shown in Figure 1b and 2b, there is high dissolution of glassy phase and high exposure of crystalline phase. A smooth porcelain surface can be seen in the first group in contrast to surface irregularities present in a similar fashion in all the other groups.

EDX ANALYSIS

From Figure 3, the crystalline phase of silicon and oxygen are shown prominently in control group. Moreover, they are increased than control group as well as the crystalline phases of aluminium, sodium and potassium in HF group. The other groups are shown the same crystalline phases of silicon, oxygen, aluminium, sodium and potassium.

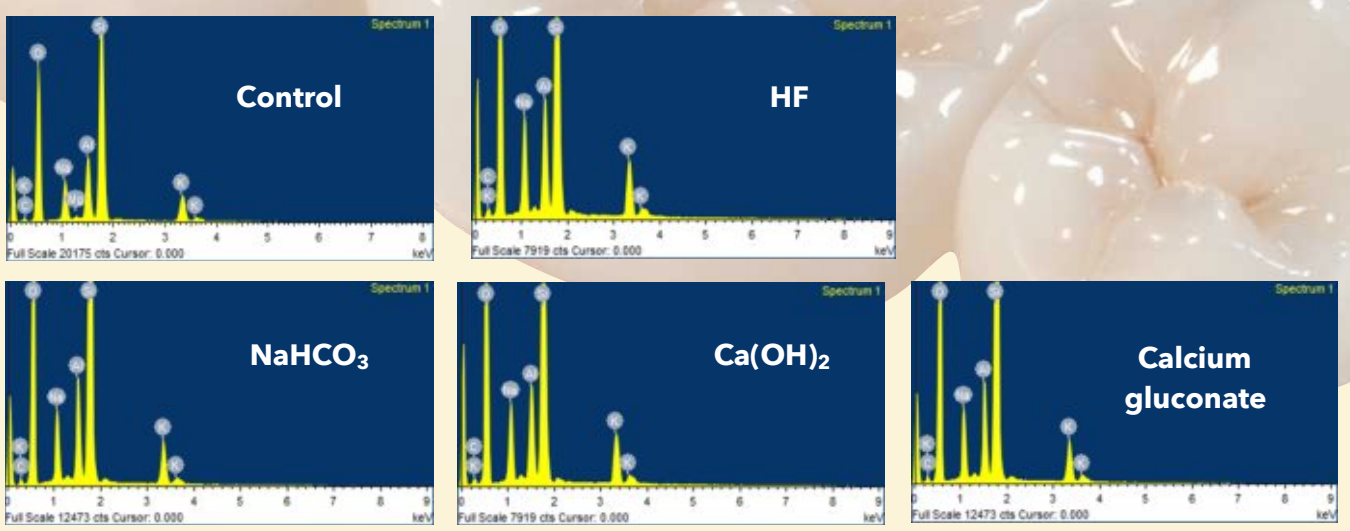


Figure 3