

MORPHOLOGICAL AND CHEMICAL CHARACTERISTICS OF DIFFERENT TITANIUM SURFACES TREATED BY BICARBONATE AND GLYCINE POWDER AIR ABRASIVE SYSTEMS

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Purpose

The aim of this *in vitro* study was to investigate possible morphological and chemical changes induced by the use of glycine powder or sodium bicarbonate powder air polishing on machined and acid-etched titanium surfaces.

Materials and methods

The glycine powder (granulometry <math><65 \mu\text{m}</math>) and sodium bicarbonate powder (granulometry <math><150 \mu\text{m}</math>) were applied on 2 machined healing abutments and on 2 acid-etched healing abutments. The samples were characterized by scanning electron microscopy (SEM) coupled with energy dispersive X ray spectroscopy (EDXS). The analyses were performed at different steps: 1) as received (right after opening their packaging, **Fig.1,2**); 2) after 20 minutes air exposure (**Fig.3,4**); 3) after aging in artificial saliva (**Fig.5,6**); 4) after glycine or sodium bicarbonate powder air polishing for 5 seconds (**Fig.7,8**); 5) after repetition of steps 3 and 4 with longer time of polishing (20 seconds) (**Fig.9-14**).

Results

SEM observations did not reveal any change in the morphological characteristics of titanium surfaces either using glycine or bicarbonate powder. EDX analysis demonstrated a greater quantity of carbon on abutments treated with sodium bicarbonate powder and a greater amount of silicon on abutments treated with glycine. After immersion in artificial saliva, abutments treated with sodium bicarbonate showed a greater amount of salts on their surface. Greater oxidation and more salts were visible on acid-etched surfaces compared with machined ones.

Conclusions

Air polishing using glycine and sodium bicarbonate powder appeared to be a safe system for professional oral hygiene of titanium dental implants both with machined and acid-etched surfaces, although acid-etched abutments and abutments treated with sodium bicarbonate harbored more salts. More studies are needed to evaluate the clinical significance of the present results.

References

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- Cochis A**, Fini M, Carrassi A, Migliario M, Visai L, Rimondini L. Effect of air polishing with glycine powder on titanium abutment surfaces. *Clin Oral Implants Res* 2012.

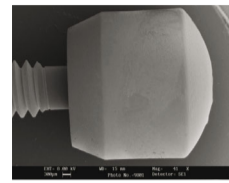


Fig.1 Machined abutment (Ra = 0.0263 ± 0.0036 μm).

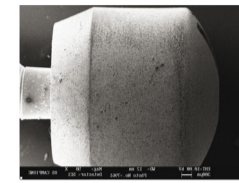
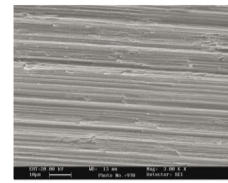


Fig.2 Acid-etched abutment (Ra = 0.489 ± 0.079 μm).

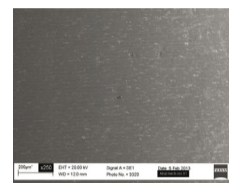


Fig.3 Machined abutments after oxidation (SEM 250x).

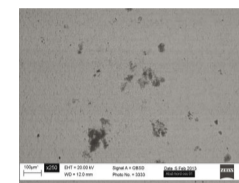
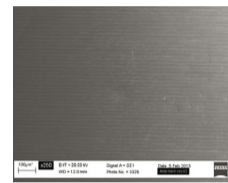


Fig.4 Acid-etched abutments after oxidation (SEM 250x).

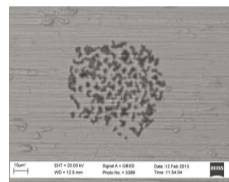


Fig.5 Machined abutments aged in artificial saliva (SEM 2000x).

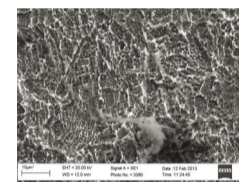
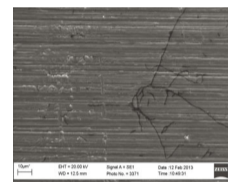


Fig.6 Acid-etched abutments aged in artificial saliva (SEM 2000x).

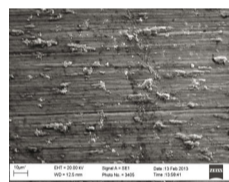


Fig.7 Machined abutments treated with glycine (left, SEM 2000x) and sodium bicarbonate (right, SEM 2000x) for 5 seconds.

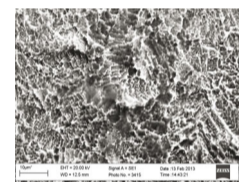
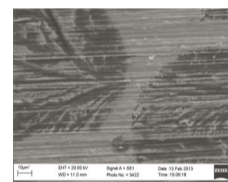


Fig.8 Acid-etched abutments treated with glycine (left, SEM 2000x) and sodium bicarbonate (right, SEM 2000x) for 5 seconds.

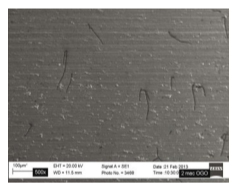


Fig.9 Machined abutment treated with glycine and aged in artificial saliva on the left; machined abutment treated with bicarbonate and aged in artificial saliva on the right (SEM 500x).

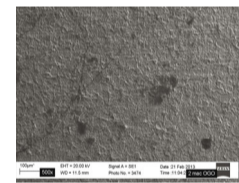
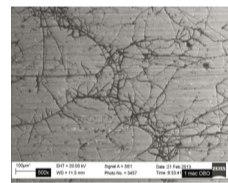


Fig.10 Acid-etched abutment treated with glycine aged in artificial on the left; acid-etched abutment treated with bicarbonate and aged in artificial on the right (SEM 500x).

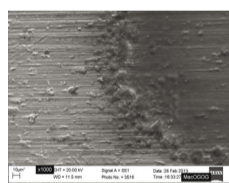


Fig.11 Machined abutment treated again with glycine for 20 seconds on the left (SEM 1000x); machined abutment treated again with bicarbonate for 20 seconds on the right (SEM 1000x).

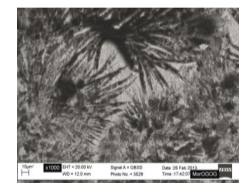
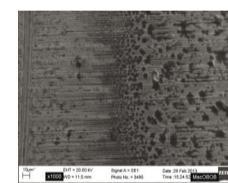


Fig.12 Acid-etched abutment treated again with glycine for 20 seconds on the left (SEM 1000x); acid-etched abutment treated again with bicarbonate on the right (SEM 1000x).

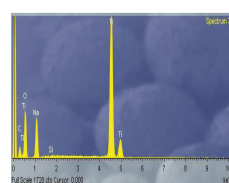
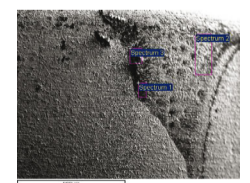
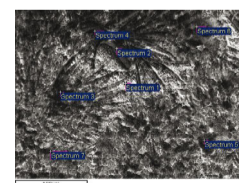
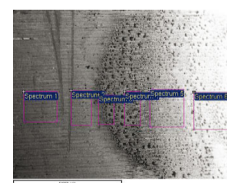
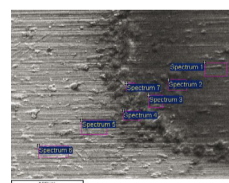


Fig.13 Machined abutment treated again with glycine for 20 seconds on the left and EDX analysis below; machined abutment treated again with bicarbonate for 20 seconds on the right and EDX analysis below.

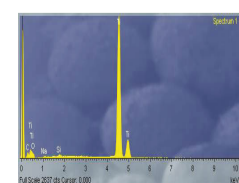
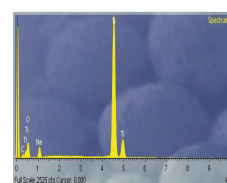


Fig.14 Acid-etched abutment treated again with glycine for 20 seconds on the left and EDX analysis below; acid-etched abutment treated again with bicarbonate on the right and EDX analysis below.

