One abutment, one time

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Background: Titanium healing abutments (HAs) are used during the healing period after implant placement to guide the soft tissue profile and protect the internal aspect of dental implants. While this temporary component is marketed as single-use only, a safe and reliable way to sterilise and reuse this component could result in financial and environmental benefits.

Aim/Hypothesis: To assess the amount of contamination remaining on used HAs after sterilisation by autoclave, and to develop and compare the effectiveness of additional decontamination methods.

Material and Methods: A total of 120 used HAs after autoclaving was divided equally into three groups. Group 1- Used HAs after autoclaving. Group 2- Used HAs after autoclaving and mechanical decontamination with air-flow polishing (EMS Master Piezon®) using erythritol powder (EMS Prophylaxis Powder). Group 3- Used HAs after autoclaving and chemical decontamination with sodium hypochlorite (NaOCl+ 25 g/L). Residual contaminants were stained using Phloxine B (400 μg/mL) and six aspects of each HA were photographed using a light microscope (2× magnification) with digital capture system (Nikon SMZ800). The proportion of stained (i.e. contaminated) area on each HA was then measured using an imaging software (ImageJ). The HAs were also examined using scanning electron microscopy (SEM) to investigate any adverse effects of each decontamination procedure on the surface characteristics of titanium HAs.

Results: The mean proportion of surface area affected by residual contaminants on the body, top (screw driver-engaging) and bottom (implant-abutment interface) surfaces for group 1 were 38.2% (sd 28.34), 30.0% (sd 19.55) and 18.7% (sd 17.87) respectively whereas group 2 showed 3.5% (sd 4.90), 5.3% (sd 3.74) and 5.4% (sd 8.49) respectively, and for group 3 the results were 0.2% (sd 0.16), 1.9% (sd 2.14) and 0.7% (sd 1.02) respectively. Autoclaving alone was insufficient for successful decontamination while additional decontamination procedures significantly reduced the proportion of residue remaining on used HAs. NaOCl was significantly more effective than air-polishing at improving decontamination on all HA surfaces. The body surface of HAs was more readily cleaned, followed by the bottom, then the top surfaces. The SEM analysis showed no detectable differences in the surface appearance of titanium HAs after additional decontamination procedures.

Conclusions and Clinical Implications: Currently, there is no decontamination procedure for used HAs that guarantee a successful outcome. The current results support the use of NaOCl in addition to autoclaving to achieve effective decontamination, however, further development such as increasing the concentration or exposure time to NaOCl is warranted. This study also supports the use of NaOCl to decontaminate used titanium healing abutments as the chemical had no significant adverse effects on titanium surface characteristics.