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Antibacterial Properties of Impression Tray Adhesives

Objectives: Iatrogenic infections are a serious problem in dental offices. Impression tray adhesives are delivered in glass containers with a fixed brush attached inside the cap. Using the brush for application of the impression tray adhesive on a contaminated impression tray or prostheses, pathogen transmission by replacing the cap with the brush is possible.

Material and Methods: Three different dental impression tray adhesives were used in this study to investigate the antimicrobial effects of these adhesives: a product for alginate impressions (Fix, DENTSPLY DeTrey GmbH, Konstanz, Germany), for silicone impression materials (Universal Adhesiv, Espe 3M GmbH, Seefeld, Germany) and for polyether impressions (Polyether Adhesive, Espe 3M GmbH, Seefeld, Germany) were compared. Bacterial strains (patient strains and in vitro strains) were super vaccinated on Columbia-agar. The bacterial solution was diluted with TSB and aerobically grown, starting concentration was 1×10^7 cfu/ml. The stock solution was placed on Columbia-agar. Alginate, polyether and silicon impression tray adhesives were applied to the centre of the particular blood agar plates and incubated for 48 hours. The expansion of the inhibition zone assays were measured using a

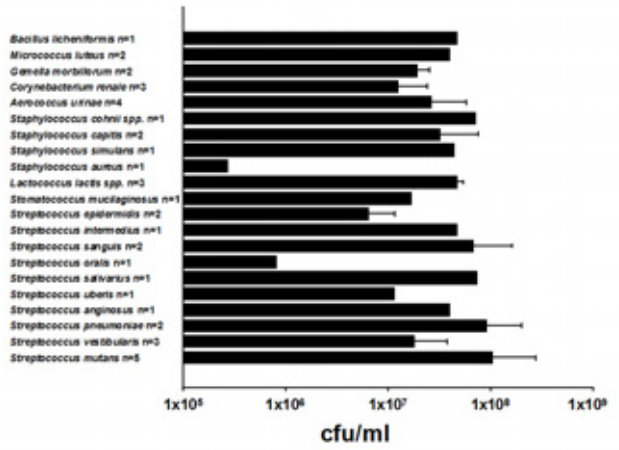

Fig.1 Mean and standard deviation of the quantity of all detected bacteria in millilitre saliva (cfu/ml).

Results: Twenty-one different bacterial strains were selected in the saliva samples of 20 patients (Fig.1). The growth inhibition for alginate impression tray adhesive was 1.1% (± 0.3) of the patient strains. The overgrowth of polyether impression tray adhesive was 30.6% (± 9.3) and for silicon impression tray adhesive 11.8% (± 5.0). In in vitro strains alginate impression tray adhesive performed a inhibition 0.7% (± 0.3). The overgrowth of polyether impression tray adhesive was 7.0% (± 1.6) and for silicon impression tray adhesive 6.5% (± 1.3). The differences of bacterial growth inhibition between the three used impression tray adhesives were significant ($p<0.05$; Fig.2).

Only Fix showed small antibacterial characteristics which are not able to avoid any microbiological cross contamination sufficiently.

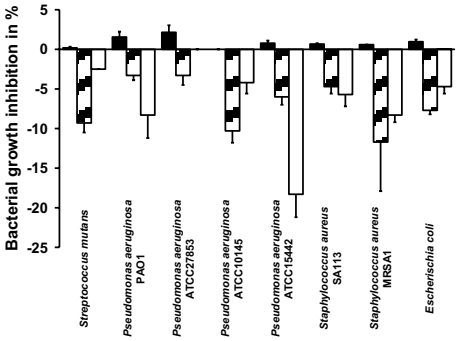

Fig. 2 Mean and standard deviation in percentage of the inhibition of bacterial growth in alginate (■), polyether (▨) and silicon (□) impression tray adhesive

Discussion: Crucial for nowadays hygienic requirements is not the survival of pathogens in the fluid but rather in critical areas, for example on the bottle-neck of the glass container. Bacterial contamination of the bottle-neck by replacing the fixed brush can lead to a pathogen settling on the dried adhesive. Antimicrobial ingredients such as isopropyl alcohol or acetone have been evaporated immediately. Based on the results of this study, bacteria can survive in dental adhesives in an augmentable quantity. Multiple use of the brush can transmit pathogens to further patients. Regarding to the hygienic guidelines of centres for disease control a multiple use of the fixed brush is not reasonable. Therefore the manufacturer should eliminate the brush in future.

Conclusion: An application of the impression tray adhesive with a pipette and a single-use brush would eliminate the contamination. Using the fixed brush for application of the impression tray adhesive on multiple patients, a cross contamination cannot be ruled out.

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