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IN VITRO EVALUATION OF SILVER-COATED SILICONE TRACHEOBRONCHIAL STENTS ON GROWTH AND ATTACHMENT OF CLINICAL ISOLATES

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OBJECTIVES

Silicone stents are often used for treating obstructions of the central airways. Bacterial colonization can result in halitosis, respiratory infections and even sepsis. The main objectives were to determine the microorganisms involved in stent colonization and to evaluate silver-coating as a mechanism to reduce bacterial growth and adhesion.

METHODOLOGY

Clinical isolates were obtained from bronchial washing (BW) in 32 patients during routine flexible bronchoscopy after 1 month of stenting. Silver was deposited on PDMS (polydimethylsiloxane) by a process based in the activation of silicone surface through low pressure plasma treatment. Silicone and silver-coated silicone slides were covered with 106 cfu/ml bacterial cultures and incubated 24h at 37°C. Viability of adhered bacteria was assessed by confocal examination of Live/Dead staining on Pseudomonas aeruginosa (PA01 & clinical isolates) and Staphylococcus aureus clinical isolates.

RESULTS

The main microorganisms isolated from BW were P. aeruginosa (22%), S. viridans (22%) and S. aureus (15%). After 24h of static growth, bacteria adhered to the silver-coated slides were dead in contrast to bacteria on uncoated silicone slides. Clinical isolates were more resistant to silver than the P. aeruginosa PA01 type strain usually used for these experiments, with the need of concentrations 0.8-0.9 mcg/mm2 for the clinical P. aeruginosa isolates, >1 mcg/mm2 for S. aureus and 0.4 mcg/mm2 for PA01 strain.

CONCLUSIONS

S. aureus and P. aeruginosa were the main pathogens associated to tracheobronchial silicone stent colonization. Clinical pathogens were more resistant to silver-mediated killing than the P. aeruginosa PA01 type-strain, with a silver concentration above 1 mcg/mm2 needed to kill clinical pathogens adhered to the silver-coated silicone slides.