EFFICACY OF POVIDONE-IODINE IN ERADICATING STAPHYLOCOCCUS AUREUS BIOFILM ON STAINLESS STEEL ALLOY 316L USING COLONY FORMING UNIT AND SCANNING ELECTRON MICROSCOPE AS VERIFICATION

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Introduction: Staphylococcus aureus (SA) and staphylococcus epidermidis are the leading biofilm-forming microorganisms in orthopaedic implant infections 1. The biofilms formed are difficult to eradicate and resistance to antibiotics 2. A common material used for fracture fixation in orthopaedic is stainless steel. Antiseptic solutions had been used as an adjunct to debridement which goal is to eradicate the infection. This current study aimed to determine the effectiveness of povidone-iodine in eradicating SA biofilm on stainless steel alloy 316L. Apart from the usual colony-forming unit (CFU) used for verification, scanning electron microscope (SEM) was added to validate the formation and eradication of the biofilms.

Methodology: In this in-vitro laboratory study, the biofilm was formed by inoculating clinically isolated SA incubated over 24-hours onto a stainless steel alloy 316L implant. The implant was then irrigated using povidone-iodine solution with varying concentrations and at different duration. There was also a control group. Following the irrigation, CFU was counted and SEM was used to verify the effectiveness. The process was repeated after 24-hours of post-irrigation reincubation to detect any rebound growth.

Discussion: There were no biofilm seen after irrigation with povidone-iodine with 5% and 10% concentrations, and at 30s, 60s and 180s respectively in both CFU count and SEM. This result were replicated after 24-hours reincubation in assessing for rebound growth.

Conclusion: Our study support that a minimum concentration of 5% povidone-iodine with a minimum irrigation time of 30s are effective at eliminating SA biofilm on stainless steel alloy. Both CFU count and SEM gave similar value in validating the presence of biofilm. However, SEM allows visualisation of the morphology of the biofilm. Reference: [1]Montanaro L, Speziale P, Campoccia D, et al. Scenery of Staphylococcus implant infections in orthopedics. Future Microbiology.2011;6(11):1329- 1349. [2]Nazhat SN, Young AM, Pratten J. Sterility and infection. Biomedical Materials. Springer;2009:239-260.