

The Early Outcome In Antibacterial Activity Of Orthopaedic Metal Implant Coated With Silver Composite As Future Implant Related Infection Treatment – Preliminary Results

¹Mohd Jan NH, ¹Zulkifly AH, ¹Ibrahim MZ, ²Sha'ban M

¹Department of Orthopaedics, Traumatology and Rehabilitation, Kulliyah of Medicine, International Islamic University Malaysia, Jalan Hospital Campus, Kuantan, Pahang Darul Makmur, 25150, Malaysia.

²Department of Biomedical Science, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Kuantan, Pahang Darul Makmur, 25200, Malaysia.

INTRODUCTION:

Bacterial infection during implant placement is a serious complication. The reason for this infection is mainly due to contamination during surgical implantation with the formation of a resistant biofilm at the implant surface. The infection risks may be overcome by application of orthopaedic metallic implant coated with 3% silver composite as alternative treatment of implant-infection related. The purpose of this study was to investigate the potential effect of test material against infection through *in vitro* and *in vivo* experimental settings.

MATERIALS & METHODS:

The antibacterial property of orthopaedic metal implants was investigated using *Staphylococcus aureus* ATCC 25923. The silver coated plate and non coated plate which served as control were placed on the surface of sterile agar media. The samples then were incubated with temperature 37°C for 24 hours and continued incubated up to 48 hours for assessment. In this study, the antibacterial effect was evaluated based on the diameter of inhibition zone using *in situ* inhibitory test. As for pilot study through *in vivo* evaluation, the silver coated plate was surgically implanted at right tibia and non coated plate which served as control was implanted at left tibia of New Zealand White Rabbit after six hours of exposure at surgical site. The subject was observed daily for infection effect up to three weeks. Microbial analyze was performed after euthanasia for assessment day. No antibiotics were administered. Animal was sacrificed at 3 weeks and evaluated for infection through microbial assessments.

RESULTS:

The outcome of this study revealed positive response of the silver as antibacterial agent as illustrated in Figure 1 and Figure 2.

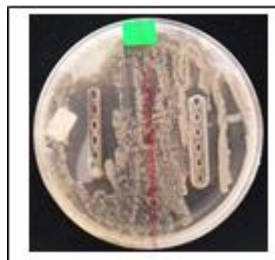


Figure 1 show the inhabitation zone with diameter 5mm was noted after 48 hours of incubation at study plate (left side) on the agar media compared to control

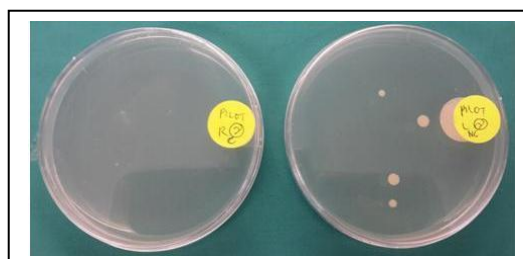


Figure 2 illustrates the culture assessment after 24 hours of incubation at 37°C. There are no colonies noted at study plate on the agar media (left side) compared to control.

DISCUSSIONS:

The outcome of this study revealed positive response of the silver as antibacterial agent. The study is still ongoing

CONCLUSION:

In conclusion, this result suggested that orthopaedic metal implant coated with silver composite has the intended potential as antibacterial and provide protection against medical device-related infection.

REFERENCES:

- 1 Pollak AN et. al. J Bone Joint Surg Am 2010;92(1):7-15
2. Kyle PK et. al. The Duke Orthop J 2013; 3(1):48–53.