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Treatment of MRSA induced biofilm formed on metal implants by bacteriophage cocktail therapy - An experimental study

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Biofilms are aggregates of microorganisms embedded within the self-produced matrix of extracellular substances. Biofilms are of serious concern especially related to artificial devices. The bacteria in biofilm state become 10 to 100 times more resistant to antibiotics usually due to poor penetration. Orthopedic implants related infections are often associated with biofilm formation and mostly due to Staphylococcus aureus.

Objective: As bacteriophages are known to penetrate the biofilm and are able to lyse the bacteria which are multidrug resistant, in the present study we decided to look into the effect of bacteriophage therapy in vivo on biofilms formed on stainless steel K-wires by methicillin-resistant S. aureus (MRSA).

Subject: For in vivo study, MRSA biofilm containing K-wire were implanted at the proximal end of ulna of both the limbs of 12 rabbits.

Method: While the 6 rabbits of experimental group were given the local injection of the cocktail of 3 different bacteriophages, the 6 rabbits belonging to control group did not receive any kind of therapy. Rabbits of both groups were monitored up to 8 weeks. One K-wire was removed from each limb sequentially with the interval of 1 week and evaluated on the basis of clinical, radiological, microbiological, histopathological examinations.

Results: Control group rabbits usually showed either death or continuation of infection with the presence of biofilm. However, phage therapy group showed cure of the infection as removed k wire were found sterile.

Conclusions: Thus, our findings suggest definite role of bacteriophage therapy in the treatment of the biofilm formed on metal implants by MRSA.

Biography

Aditya Malik is currently working as a Senior Resident in the Department of Orthopaedics at Safdarjung and VMMC hospital, New Delhi. He completed his MBBS and MS in Orthopaedic surgery from Institute of Medical Sciences, Benaras Hindu University (Currently AIIMS BHU). He has other publications to his name along with extensive experience in Trauma surgery. This research was a part of his Thesis for his MS orthopedics.

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