

Wound healing on application of natural and synthetic polymer materials with silver nanoparticles

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Abstract.

Purpose. Comparison of the healing rates of different wound types using natural and synthetic polymers, containing silver nanoparticles.

Material and methods. Experimental purulent and aseptic wounds were created on white rats. In the course of treatment, dressings were performed daily, including photographing the wound and applying various types of nanocomposite polymer materials. Cotton gauze, which is a polysaccharide, was taken as a natural polymer. The synthetic polymer was a non-woven hydro-bonded polypropylene material produced by extrusion of polypropylene filaments. Silver nanoparticles used in the study were obtained by the metal-steam synthesis method.

Results. It was found that in all animals with aseptic or purulent created wound in the first 4 days of the experiment, an increase in the area of the wound is observed with respect to the initial one, much less pronounced in the presence of silver nanoparticles in the material. On the following days of treatment, up to complete healing, the decrease in the wound area in relation to the initial one in the experimental group (with silver nanoparticles) occurs more intensively than in the control group of animals ($p < 0.05$).

Conclusions. Both natural and synthetic polymeric materials coated with silver nanoparticles synthesized by metal-steam synthesis method accelerate the healing of both experimental aseptic and purulent wounds. However, the rate of wound healing when using natural or synthetic materials differs depending on the type of wound and the presence of microbial contamination, which should be taken into account when creating a new generation of dressings.