Research article

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THE MORPHOGENESIS FEATURES OF BURN WOUNDS BY APPLYING CHITOSAN MEMBRANES IN DIFFERENT AGE PERIODS

ABSTRACT. Background. The number of research devoted to chitosan application for burn defects treatment has increased during the last decades. However, the age-related features of skin regeneration with chitosan application are still uninvestigated **Objective.** The aim of our research was to evaluate effectiveness of chitosan coatings application to treat burns in different age periods. **Methods.** We studied the tissue morphogenesis features of the thermal damaged skin. We modeled the burn wounds of IIIb degree on the rats of experimental and control groups. And then we applied chitosan coatings on the animals of the experimental group to analyze the effectiveness of topical treatment. We analyzed the healing of burn wounds by the following morphological criteria: types of the epidermis and dermis damage; terms and features of wound cleaning; presence and degree of inflammation intensity and blood circulation disorders; quantity and quality of cellular infiltration. Other criteria were terms and degree of connective and epithelial tissue formation and levels of their differentiation and distribution; presence or absence of synchrony regenerative processes in the epithelium and connective tissue (especially features of vessel formation); presence or absence of morphological manifestations of pathological regeneration in the epithelium and connective tissue. **Results.** We found that the rate of burn healing applying chitosan coatings speeded up as they stimulated both macrophage reaction (with further inflammation reduction); cellular proliferation of fibroblasts and vessel formation. Moreover, granulation tissue and collagen fibers formed faster. Besides, epithelium regeneration and scar formation enhanced. As a result, epithelial cell migration and tissue contraction covered the wound. **Conclusion.** Application of chitosan membranes to treat thermal burns enhanced wound cleaning from dead tissue and reduced eschar, decreased the intensity of inflammatory reactions and disorders of blood circulation, improved epithelization of the wound and regulated formation of the scar tissue. Nevertheless, application of topical treatment for rats (aged 22 months) changed insignificantly the regenerate structure comparing with the animals from other groups.

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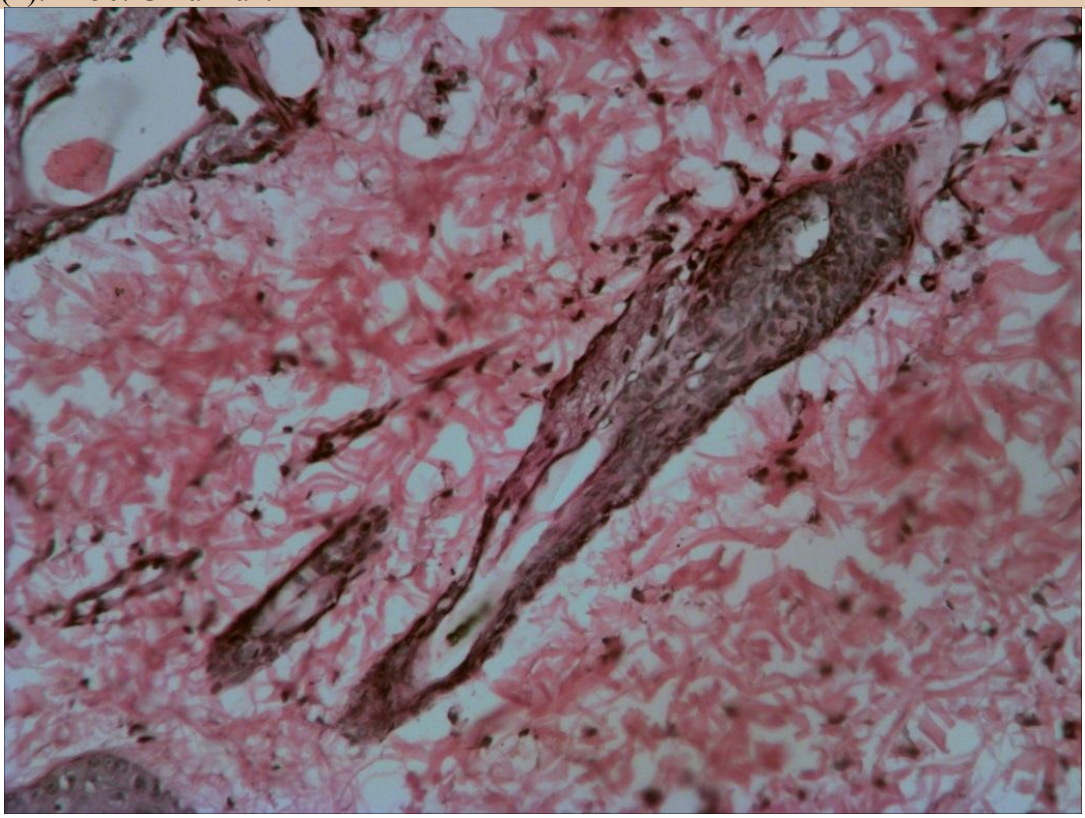

Fig. 1. Area of skin of young rat in experiment on the 3rd day after thermal injury modeling. Hematoxylin&Eosin staining. ×200.

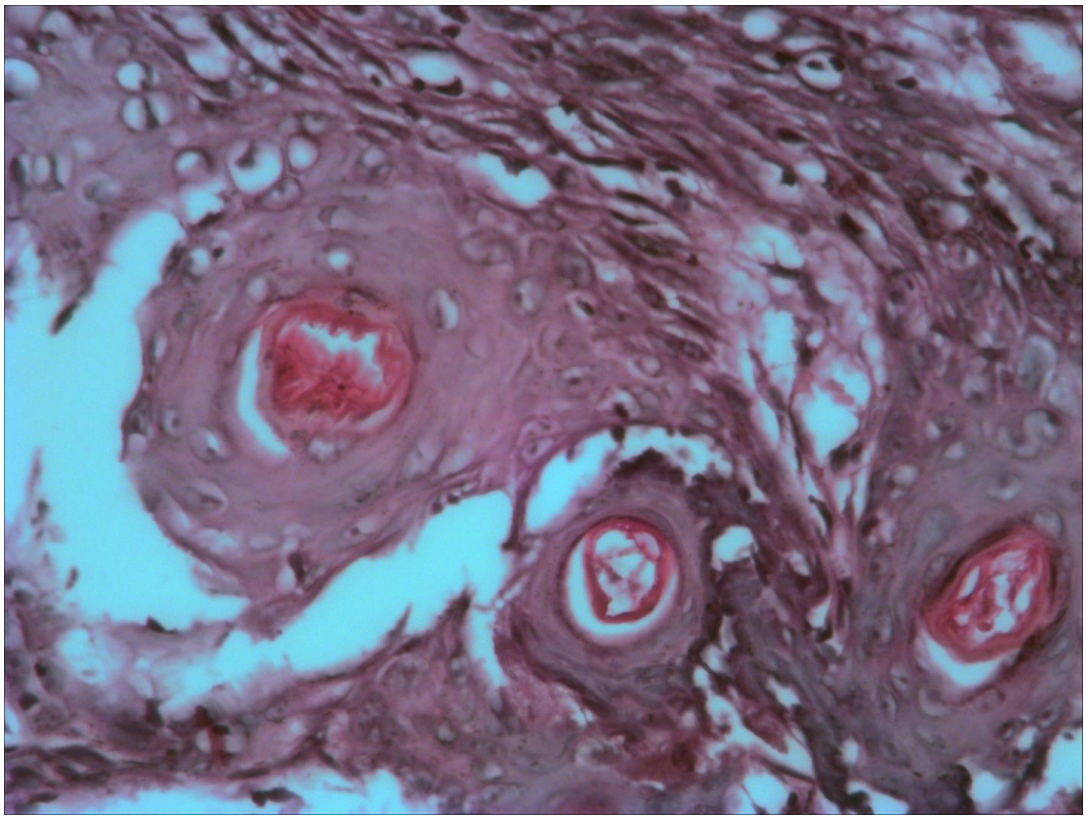

Fig. 2. Area of skin of adult rat in experiment on the 7th day after thermal injury

modeling. Hematoxylin&Eosin staining. ×400.

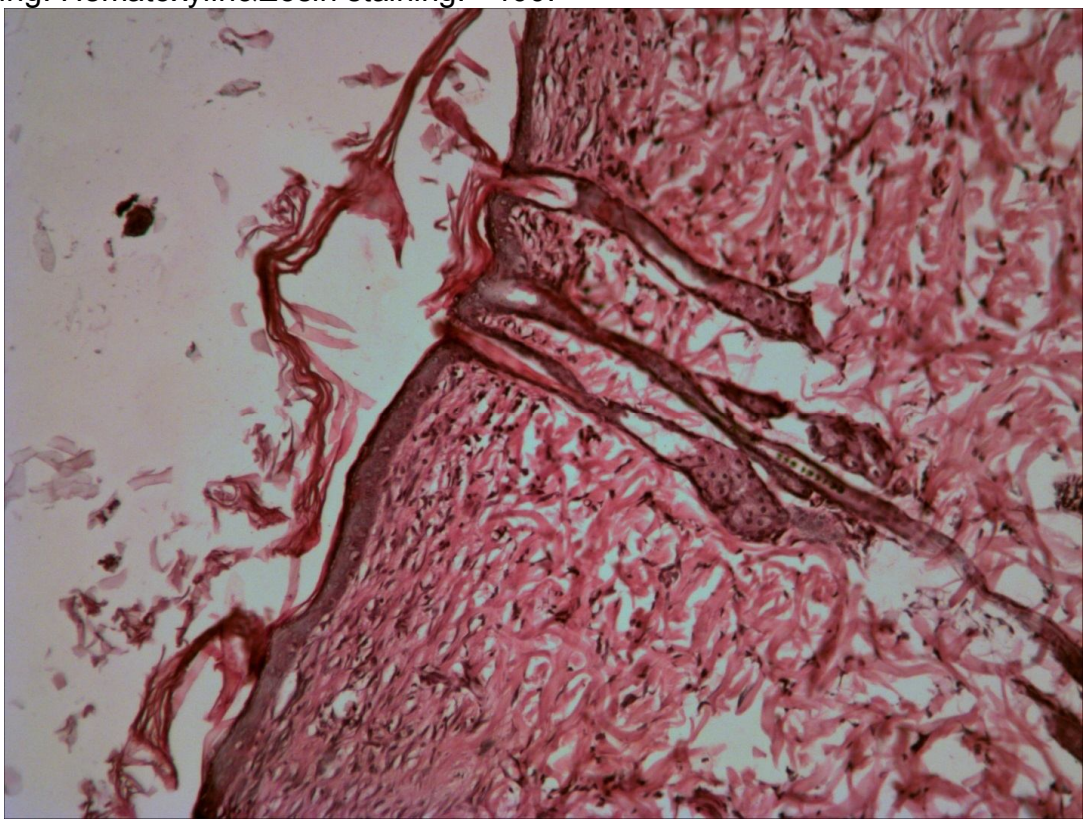

Fig. 3. Area of skin of senile rat in experiment on the 14th day after thermal injury modeling. Hematoxylin&Eosin staining. ×100.

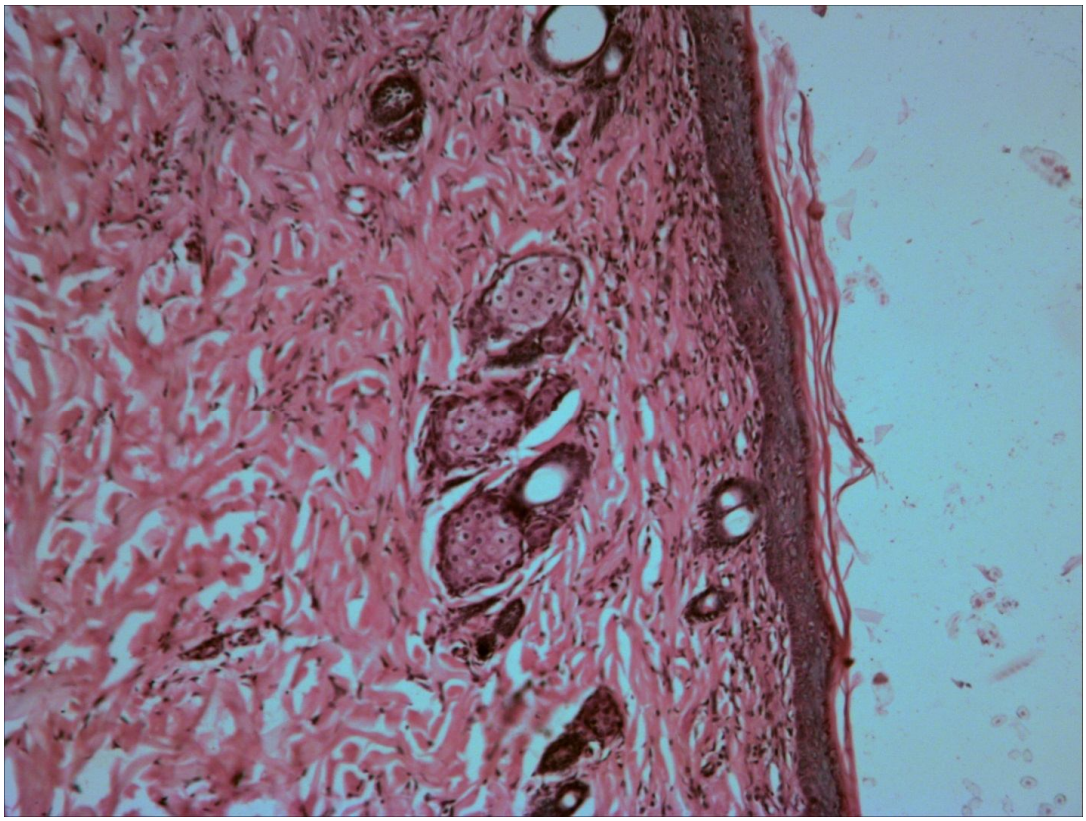

Fig. 4. Area of skin of young rat in experiment on the 21st day after thermal injury

modeling. Hematoxylin&Eosin staining. ×100.

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