NEW EXPERIMENTAL MODEL FOR STUDYING THE SKIN DEFECTS OF DIFFERENT ENIOLOGY ON LABORATORY RATS

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Introduction. Nowadays studying and development of methods to treat skin defects have become quite relevant. According to WHO, more than 50 millions of people sustain injuries every year. 11 millions of those who were admitted to hospital got burns of different etiology. The number of deaths caused by burns comprised 195 thousands. More than 25 million of patients, who visited doctors, had scars and cicatricial deformity, 4 millions of those got burns. The number of fatal outcomes was almost 195 thousands per year.

Thus, it is a burning issue for modern medicine to improve existing and develop completely new methods to treat skin defects. Experimental models can standardize wounds of adjusted area and depth, reproduce injuries similar to real clinical cases and reduce or eliminate possible side effects.

Aim. Considering that the traditional methods to treat skin surface defects and experimental models have drawbacks, we may claim that they need modernization. That's why, our aim was to develop an experimental model that could reduce severity of wound and prolong survival in order to observe reparative process; eliminate side effects that affect additionally on experimental animal; standardize wounds models of adjusted area and depth.

Materials and methods. We used the male Wistar laboratory rats that aged 5–6 months weighting 200–250 g, which were kept in a vivarium of the Medical Institute of Sumy State University.

After anesthesia (10 % ketamine at a dose 10mg per 1 kg) the rat was immobilized on a stage and then the rat's interscapular region was shaved in order to form a designed injury with a square of 9 cm2. The studied skin area was additionally fixed by lowering a bar, which was sliding easily over the axis of a holder. The total square of the bar was 20 cm2 weighting 0.5 kg with the diameter of the hole 1.6 cm

Thermal injury was made by a metal bar (square – 1.76 cm2, diameter – 1.5 cm, thickness – 0.1 cm) at the end of a soldering pit that was maintained in contact with the animal skin at 250 ºC for 15 sec.

Chemical burn was made by applying an oval cotton wool of 1.76 square centimeters (diameter – 1.5 cm). It was previously treated with 10 % hydrogen chloride solution. The exposure time was 3 sec.

Mechanical injury was made by a stomatological mounted diamond pint (diameter – 1.5 cm; regime – 5.000 RPM for 2 sec). Force of the mounted diamond pint acting upon the rat's skin can be counted according to the following formula: $F=mg=0.5\times9.8=4.9$ N.

Results. We performed histological study of the biopsy materials, which were taken at day of modeling, to assess the degree of burn depth.

The histologic patterns for all burns were identical showing complete destruction of epidermis and demonstrating dermal and subcutaneous fat edemas as a consequence of the increased vascular permeability.

We also observed perivascular edema and the increase of pressure in vessels of the microcirculatory blood flow, here and there were stases of erythrocytes. We also pointed out diffuse neutrophilic infiltration and lymphocytic infiltration in the skin layers, which burns did not reach. More excessive infiltration was at the edges of burns. Some hair follicles were partially preserved, but other hair follicles were completely destructed, we could identify them by intensity of hematoxylin staining.

Conclusion. Using the suggested experimental model one can easily model skin injuries of different etiology: thermal injury, mechanical injury and chemical burn. Besides, it can standardize experiment by ensuring the adjusted area and wound depth; reducing time and minimizing side effects (we reduced period duration of side effects and anesthesia). Economic accessibility enables to study widely regenerative processes and treatment of skin defects.

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