

Morphometric studies on wound healing after systemic administration of adriamycin and local application of fibrin sealant. Application of a new wound healing model using spongiosa implants.

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Abstract:

For investigations on the development of regenerative granulation tissue in wound healing a new model using bone spongiosa ('Kieler Spongiosa') implants is presented. Particular attention was devoted to developing a model which permits studies on wound healing without disturbance by foreign body reaction and infections. Two test groups of rats received four blocks of 'Kieler Spongiosa' each in a symmetrical fashion in a paramedian region underneath the dorsal skin. The spongiosa blocks had previously been treated with glutaraldehyde to achieve cross-linkage of the collagenous structures of the surfaces of the spongiosa trabeculae. After one week (group 1) and two weeks (group 2) the animals were sacrificed. The spongiosa blocks were removed, fixed and evaluated in layered serial sections after decalcification. Two blocks which had been removed randomly from the back and front served for morphometric determination of the total volume of bony substance and the developed granulation tissue. Moreover, the cellular composition of the granulation tissue was morphometrically examined with regard to its content of capillaries, granulation tissue cells and inflammatory cells. The two other blocks were examined for DNA and hydroxyproline content of granulation tissue. Comparison of the two experimental groups yielded marked differences in spongiosa space infiltrated by granulation tissue and its composition. Our model was used to assess the influence of systemic administration of adriamycin and/or local application of a fibrin sealant system on granulation tissue formation and its morphologic structure. A total number of 72 rats was divided into four equally sized groups and underwent paravertebral

implantation of two blocks of sterile lyophilised 'Kieler Spongiosa' for 14 days: In group 0 (F + A) spongiosa blocks filled with fibrin sealant system were implanted and, in addition, the animals underwent systemic administration of adriamycin. Group 2 (A) underwent systemic administration of adriamycin, without fibrin, on the day of surgery followed by implantation of the spongiosa blocks. In Group 1 (F) spongiosa blocks filled with fibrin sealant were implanted without adriamycin administration. Group 3 (CO) received spongiosa blocks without additives and without adriamycin administration (control group). The results revealed a significant inhibition of wound healing by adriamycin, which could not be prevented by local application of fibrin sealant. In the group treated only locally with fibrin sealant system a significant increase of local granulation tissue cells (mainly fibroblasts) was noted with slight reduction of the amount of granulation tissue and without striking changes in the composition of the inflammatory infiltrate.