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Allogenic fibroblasts reconstructs tympanic membrane integration

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The first clinical experience with the successful application of fetal fibroblasts for reconstruction of tympanic membrane is presented. Purpose: Estimate efficiency of fetal fibroblasts in reconstruction of tympanic membrane.

Introduction: Treatment of traumatic perforations is an actual problem in ENT surgery. It is connected with its prevalence rate, especially in working age young people. One of the classical methods of reconstruction of tympanic membrane after traumatic perforation is myringoplasty, which is attended with definite surgical difficulties.

One of the attempts of solving this question is using of cell transplantation, in particular also fetal fibroblasts, coming with apparent regenerative properties. Today clinical experience of application of cell technologies in ENT practice is minimal, that is connected with poor research and practical materials, difficulties of fetal cells obtaining and it is attended with insufficiently worked-out methodical and methodological approaches of its application.

Purpose of study is effectiveness estimation of influence of fetal fibroblasts on processes of regeneration at traumatic perforation of tympanic membrane.

Materials and approaches: After experimental animal studies, within the framework of scientific agenda of the National Scientific Medical Research center «Innovative technologies in development of cell transplantations and reconstruction of functional activity of organs and tissues», on the basis of MOH of the RK order «On permission of using fetal cells transplantation in comprehensive treatment of chronic diseases» № 211 as of 22 April, 2009, permission of academic council (protocol №3 as of 19 February 2010) and Ethics Committee «NSMRC» (protocol №2 as of 22 January, 2010), the decision to use this method of treatment in ENT pathologies was made. On 20.04.2010 patient A., 25 years old, was hospitalized to ENT Department with posttraumatic perforation of tympanic membrane. After necessary examination patient was conducted transplantation of fetal fibroblasts. Culture of fetal fibroblasts was collected under the laboratory conditions of cell technologies according to developed by us method (innovative patent № 19899 Agency on innovations of the MOH of the RK) from the derma of 18-20 week fetus through cultivation in Iscov «Sigma» environment with addition of FBS 10% «HyClone». After 14 days of cultivation monolayer of fetal fibroblasts was received, which were washed out from the environmental components and inserted into collagenic matrix for further transplantation. Deepithelialization of the edge of ruptured hole was conducted after anesthesia of auditory passage skin, whereafter transplant from fetal fibroblasts on collagenic matrix in the amount of 2x10⁶ cells in 0, 5 ml of physiological solution was placed on humid wound surface of tympanic membrane. Otoscopic and audiometric studies were conducted overtime for estimation of processes of reconstructive regeneration of tympanic membrane and auditory acuity after cell transplantation.

Results: Patient's left ear examination using microscope (Carl-Zeiss OPMI pico) identified acute posttraumatic perforation of tympanic membrane in strained part up to 3,3 mm in diameter with areas of bleeding of 4 day limitation (fig.1).

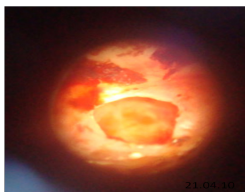


Fig. 1. Otoscopic image of posttraumatic perforation of tympanic membrane of the left ear (d=3,3 mm) in patient A., 25 years old.

Audiometric study of patient identified left conductive hearing loss with bone-air interval 30-40 dB (fig.2).

