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Editorial Open Access

High-Risk Eyes: Can We Increase Corneal Graft Survival Rate?

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Corneal transplantation is the most commonly performed transplantation procedure, and in most cases also the most successful type of transplantation. This is however only true for corneal diseases which are considered to be a low-risk diseases. The main characteristic of such eyes is avascularity and lack of inflammation; corneal graft success rate in such eyes is over 90%. Namely, cornea and anterior eye chamber are immune-privileged sites of our body; meaning that the foreign antigen grafted in those sites has unexpectedly high survival rate even without any anti-inflammatory treatment. However, in eyes with vascularisation and/or inflammation of the cornea, corneal graft survival rate drastically decreases to only 20-40%, even with the use of systemic anti-inflammatory treatment. Such a low graft survival rate makes the decision to perform a corneal graft a questionable one, especially in patients with systemic diseases disabling the postoperative use of aggressive systemic drugs.

Graft survival in such cases mainly depends on the corneal inflammation rate, quality of the ocular surface and the amount of vascularisation. Namely, the newly formed corneal vessels enable afferent and efferent "arm" of immune reaction to act as in other non-privileged tissues, and both the recognition of the foreign tissue and migration of immune cells into it becomes easy. Research into the mechanisms of immune reaction toward corneal graft placed in a high-risk recipient give us hope that we could fortify our current treatment with additional anti-inflammatory agents which are already in use in ophthalmology, but not specifically in a prevention of corneal graft reaction. Such anti-inflammatory drugs and methods are:

1. Bevacizumab is a humanized monoclonal antibody that recognizes and blocks vascular endothelial growth factor A (VEGF-A), cytokine which is important mediator for the growth of new, pathological vessels into different tissues including the cornea. Bevacizumab is currently used off-label in several eye diseases, with a main goal to decrease the amount of neovascularization, such as in case of neovascular AMD, neovascular glaucoma, diabetic retinopathy, central vein occlusion and retinopathy of prematurity. The role of bevacizumab in a suppression of corneal neovascularization has been already studied, however the optimal dosage and way of administration; whether subconjunctival or topical or both, is still under investigation.

2. Amniotic membrane (AM) is a part of the human placenta, which is preserved and tested for its quality in eye or tissue banks, and then used in ocular surgery. It has been shown that AM improves healing of the epithelium defects as it serves as a basement membrane for endothelial cell growth, prevents inflammatory cell infiltration and reduces apoptosis in keratocytes. It's anti-inflammatory properties can be explained by the fact that epithelium of AM expresses various antiangiogenic and anti-inflammatory proteins such as: interleukin (IL)-1 receptor antagonist and IL-10, basic fibroblast growth factor, hepatocyte growth factor and transforming factor β; and it's avascular stroma reduces fibrovascular ingrowth and abnormal neovascularisation.

Currently available treatment of high rejection risk patients is based on topical and systemic steroids, sometimes combined with a cyclosporine or immuno-suppressive treatment. It has been shown on small number of patients that corneal transplant survival can be extended in most, but not all high rejection risk patients, with a combination of oral sirolimus and mycophenolate mofetil, without significant drug adverse events. However, due to the known side-effects of systemic immunosuppressants, these drugs will hardly be appropriate for all high-risk recipients. In a last two years we have started to treat such patients with a "fortified" topical immunosuppressive treatment consisting of subconjunctival and topical bevacizumab, and/or amniotic membrane transplantation additionally to the conventional agents. The proper dosage and treatment time is still under investigation by our and other research groups worldwide, but the first results of such treatment bring us to a corneal graft survival rate of 85% at two years after surgery, which is significantly better as compared to our previous experience with such high-risk grafts. Fifty graft recipients with more than two quadrants of corneal neovascularization at the time of corneal transplantation were included in the study: those with vascularised corneal scars of herpetic and other genesis, corneal combustions, rejected grafts and ulcers. These results give us hope that, even with the use of less aggressive postoperative treatment, we can indeed increase corneal graft survival rate in patients with high-risk corneal diseases.

In order to reach our goal in a quickest possible manner it is necessary to exchange our research knowledge in a quick and constructive way, and this can be achieved with the help of open access Journals like those from OMICS Publishing Group, since they enable us efficient and quick exchange of knowledge among all the experts in the field worldwide.

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