Sutureless amniotic membrane fixation using fibrin glue for ocular surface reconstruction in a rabbit model.

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Abstract:

PURPOSE: Amniotic membrane transplantation has become an important treatment option for corneal surface reconstruction. However, suture fixation of the transplant has various disadvantages like corneal irritation, scarring, graft loss due to membrane shrinkage, and the need for subsequent suture removal. Replacement of sutures by bioadhesives might be an advantageous alternative. This controlled study was designed to evaluate a new sutureless technique for amniotic membrane fixation onto the corneal surface by using fibrin glue. METHODS: Standardized disks of cryopreserved amniotic membranes were transplanted onto the deepithelialized cornea of 12 rabbits using either conventional suture fixation or a new fibrin glue technique. The rabbits were followed-up with slit-lamp examination and fluorescein staining until epithelialization was completed. Consecutively, the rabbits were killed and the eyes processed for histology and immunohistochemistry for cytokeratin-3. RESULTS: All membranes of both groups stayed in place throughout the follow-up time and showed a progressive graft epithelialization that was completed after 12 days. Whereas suture-fixated membranes showed progressive tissue shrinkage, fibrin-glued sheets remained unaltered. In the bioadhesive group, histology revealed a smooth fibrin layer in the graft-host interface and a continuous, stratified layer of cytokeratin-3 expressing corneal epithelial cells on the membrane surface. In contrast, suture-fixated membranes showed contracted and prominent membrane edges with epithelial ingrowth into the submembrane interface. CONCLUSION: Our results demonstrate the general feasibility of reproducible and reliable

sutureless amniotic membrane fixation onto the corneal surface in rabbits. Stable adherence is maintained until epithelialization is completed. The sutureless technique gives sufficient manipulation time for the sheet before the final cross-linking process is completed. Furthermore, several advantageous characteristics could be demonstrated as increased biocompatibility, better epithelialization pattern and the lack of membrane shrinkage.