Transplantation of tracheal epithelial cells onto a prefabricated capsule pouch with fibrin glue as a delivery vehicle.

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Abstract:

Objective: The purpose of this study was to investigate whether in vitro cultured tracheal epithelial cells can be transplanted onto a prefabricated capsule surface in vivo for possible use in tracheal reconstruction. Methods: Tracheal epithelial cells from 12 donor inbred rats were harvested for culture and expansion. In 16 recipient inbred rats, 2 sterile cylinders made of silicone rubber were implanted in each rat bilaterally in the folds of both the left and right anterior rectus sheath by wrapping the sheaths around the cylinders to induce a capsule formation. Ten days later, the cell cultures were divided and suspended in 1 of 2 delivery vehicles (standard culture medium or fibrin glue) and implanted onto the capsule surface. To compare the 2 delivery vehicles, we used fibrin glue on one side and the standard culture medium on the other. Results: After 2 (group 1, n = 8) and 4 (group 2, n = 8) weeks, histologic findings, immunohistochemical staining, and electron microscopy demonstrated the capsule to be covered with a tracheal neoepithelium in group 1 and additional ciliated cells and secretory cells in a confluent layer in group 2 but only on the side with fibrin glue as the delivery vehicle. No viable epithelial cells were identified on the side with the standard culture medium in either group. Conclusion: We conclude that cultured epithelial cells can be successfully transplanted onto a prefabricated capsule surface with fibrin glue, which will differentiate into morphologic, nearly normal epithelium, showing potential for tracheal reconstruction.