Mesothelial cell sheets cultured on fibrin gel prevent adhesion formation in an intestinal hernia model.

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Abstract:

In the present study, we examined a novel technique to prevent adhesion formation in a rat intestinal hernia model with mesothelial cell sheets cultured on fibrin gel. Mesothelial cells were obtained from isologous rats by enzymatic disaggregation of mesentery and cultured on fibrin gel. Electron microscopy revealed that these cultured cells form contiguous monolayer cell sheets with well-developed microvilli. These tissue-engineered constructs were grafted in vivo to an intestinal hernia model that results in regular surgical adhesions without treatment. Five days postgrafting, rats were sacrificed. Adhesion formation was not observed in rats grafted with the constructs, whereas severe adhesions were observed in all control rats. Constructs seeded with mesothelial cells isolated from EGFP-transgenic rats clearly revealed that grafted mesothelial cells remained at the host tissue site even after fibrin scaffold degradation. These cells developed more abundant microvilli in vivo than those in vitro. These results show that cultured mesothelial cell sheets are effective in preventing adhesion formation and should reduce postoperative complications caused by adhesion formation.