Biomechanical evaluation of fixation properties of fibrin glue for ventral incisional hernia repair.

Authors: Stoikes N, Sharpe J, Tasneem H, Roan E, Paulus E, Powell B, Webb D, Handorf C, Eckstein E, Fabian T, Voeller G

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Abstract:

INTRODUCTION: Use of adhesives for mesh fixation in hernia is increasing. There has been minimal study of mesh incorporation and interface strength with adhesive fixation for ventral hernia repair. The purpose of this study was to evaluate the fixation properties of fibrin glue as it compared to suture fixation of mesh in an onlay position.

METHODS: Twenty-four mongrel pigs were divided into three study arms based on time points for biomechanical evaluation: 24 h (n = 8), 7 days (n = 8), and 14 days (n = 8). Initial procedures included placement of two 4 x 6 cm pieces of wide-pore polypropylene mesh in an onlay position. One was fixated with 4 ml of fibrin glue and the other with four interrupted 2-0 polypropylene sutures. The shear strength of fixation was evaluated using a uniaxial testing device along with histological evaluation. Maximum force was normalized by the width of the mesh.

RESULTS: Mesh-tissue interface of glued and sutured specimens at 7 and 14 days did not fail in our testing configuration. Only at the 24-h time point the mesh detached from the tissue, and the sutured interface (10.4 N/cm) was significantly stronger than glued interface (4.9 N/cm, p = 0.004). Histopathologic and gross evaluations of the specimens revealed similar histologic features at all time points for both glued and sutured specimens.

CONCLUSIONS: With mesh in the onlay position, fixation to the abdominal wall occurs quickly. Though sutures were stronger at 24 h, as early as 1 week, the strength of the fixation exceeded the tissue or the mesh strength in our testing configuration for both glue and suture groups. Fixation strength is independent of technique at the latter time points. There are potential clinical advantages to the exclusive use of fibrin glue for fixation including acute post-operative pain, chronic post-operative pain, and recurrence for ventral incisional hernia repair.