Laparoscopic intraperitoneal mesh fixation with fibrin sealant (Tisseel) vs. titanium tacks: a randomised controlled experimental study in pigs.

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Abstract:

BACKGROUND: The main reason for hospital stay after laparoscopic ventral hernia repair (LVHR) is probably pain, which also causes a lengthening of the patient's time to assume normal daily activities and work. It is likely that titanium tacks may be the main contributing factor to early (and maybe chronic) pain after LVHR. Therefore, non-invasive and patient-friendly mesh fixation methods must be considered. The present study was designed to investigate the technical applicability, safety and effect of Tisseel for intraperitoneal mesh fixation.

METHODS: Nine 40-kg Danish Landrace female pigs had two pieces of MotifMESH and two pieces of Proceed mesh fixed in the intraperitoneal position by a laparoscopic technique. The two pieces of the same mesh were fixed with fibrin glue (Tisseel) and titanium tacks, respectively. All pigs were euthanised on the 30th postoperative day and the mesh-tissue samples were tested for strength of ingrowth (peel test), adhesion formation, mesh shrinkage and examined for histological alterations.

RESULTS: No meshes were displaced from their initial position at autopsy, but we observed two cases of mesh folding that could have resulted in hernia recurrence in real patients. There were no significant differences in the strength of ingrowth between different mesh types or fixation methods, measured as peel work per area of mesh (J/m2) and peak force per width of mesh (Nmax/cm). The Proceed mesh shrank by 11% compared to 4% for the MotifMESH mesh (p = 0.002). There was no

difference in the grade of adhesions (%) between fixation methods ($p = 0.794$) or different mesh types ($p = 0.296$). In the same fashion, there was no difference in the strength of adhesions (grades 0-4) between the two fixation methods or different mesh types ($p > 0.5$, chi2 test). There was no significant difference in the formation of fibrosis or inflammation between the different meshes or fixation methods. All samples showed significant foreign-body reaction with giant cells.

CONCLUSION: Our results suggest that the laparoscopic fixation of an intraperitoneal mesh with Tisseel is safe and technically feasible in a pig model. There is still no evidence that fibrin-sealing alone is appropriate for intraperitoneal mesh fixation in hernia repair, but the technique might become an alternative or supplement to mechanical mesh fixation. Until then, further experimental research in animal hernia models with larger meshes is needed, especially with a focus on mesh folding and displacement.