

Mesh fixation with fibrin glue (Tissucol/Tisseel) in hernia repair dependent on the mesh structure--is there an optimum fibrin-mesh combination?--investigations on a biomechanical model.

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Abstract:

BACKGROUND: Because of its hemostatic and adhesive properties, fibrin glue has been used in many areas of surgical treatment in recent years. One example is hernia repair, where fibrin gluing has become increasingly established as an alternative method for mesh fixation. Clinically, fixation with fibrin glue shows a reduced postoperative complication rate compared to other fixation methods (staples, sutures), particularly with regard to pain.

MATERIALS AND METHODS: Six different lightweight meshes were tested: TiMesh light, TiMesh extralight, Parietene light, Ultrapro, Optilene LP, and BARD Soft Mesh. Two millimeters Tissucol was used for fixation. Five meshes from each group were tested on muscular tissue with and without fibrin glue. The defined defect was 4.5 cm in diameter. The biomechanical measurements were taken in a standardized way using a materials testing machine. The minimum fixation strength required was 32 N, calculated from a corresponding model.

RESULTS: The fixation strength measurements without fibrin glue gave a mean value for all 30 meshes of 2.98 N with a SD of 0.92 N. This was far below the 32 N required. With fibrin glue, the mean of all the measurements (30 meshes) was 61.86 +/- 23.0 N (min 34.9 N, max 97.3 N). The lowest value was recorded for Ultrapro (34.9 +/- 12.5 N). All the other meshes had a significantly higher fixation strength when fixed with fibrin glue than Ultrapro ($p = 0.001$). The best results were

found for Optilene LP, and this was significantly better than all the other meshes (97.3 +/- 8.9 N; $p < 0.001$).

CONCLUSION: Given the adequate stability and superior biocompatibility of lightweight large pore monofilament polypropylene meshes, heavyweight polypropylene meshes should no longer be used. It is possible to achieve adequate fixation of the meshes using fibrin glue. However, careful consideration should be given to the particular structure of the mesh in each case. Not every mesh is equally suitable for this purpose.