

Mesh-and-Glue Method to Prevent Cerebrospinal Fluid Leakage after Implantation of a Synthetic Dura Mater Substitute: Pressure Resistance and Histologic Studies.

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Abstract:

Expanded polytetrafluoroethylene (ePTFE) as a dural substitute is sometimes associated with leakage of cerebrospinal fluid through the suture line. A new procedure-the "mesh-and-" (MAG) technique-has been developed by our group to seal the suture line with an absorbable mesh and fibrin glue. The results of preliminary studies to assess the efficacy of this technique using in vitro and in vivo experimental models and its use in clinical situations are reported here. The efficacy of conventional fibrin glue, simple glue spray, MAG, and MAG plus fibrin glue spray was estimated in vitro by measuring the leakage of water through a 1-cm suture line on ePTFE dural substitute. The burst pressures were 4.3 ± 1.2 cm H₂O, 64.4 ± 21.4 cm H₂O, 142.7 ± 22.2 cm H₂O, and 406.1 ± 29.7 cm H₂O, respectively, for the different sealing methods and 2.8 ± 0.4 cm H₂O for nonsealed controls. Although MAG alone was sufficient to seal a small dural defect, the seal formed when MAG was combined with the glue spray method was sufficiently strong to withstand arterial pressure (300 mm Hg). The type and incidence of long-term pathologic changes associated with MAG were assessed using a murine craniotomy model. Within 2 months of implantation, mesh and fibrin glue was transformed into connective tissue that adhered firmly to the surrounding tissues. These results indicate that MAG will be effective in clinical situations. Given that the seals can withstand arterial pressure, the MAG plus glue spray technique could potentially be used to seal other incisions such as the arachnoid membrane after spinal surgery or the suture line of an arteriotomy in carotid endarterectomy.