Mesh and glue technique as a new sealing technique for the use of expanded polytetrafluoroethylene dura substitute: The experimental studies of its tolerance for pressure and long-term histological changes. [Japanese]

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Abstract:

Expanded polytetrafluoroethylene (ePTFE) as a dural substitute is sometimes associated with leakage of cerebrospinal fluid through the suture line. We have developed a new technique to seal the suture line with an absorbable mesh and fibrin glue. It is named as the mesh-and-glue technique. In this paper, the basic background of the efficacy of this technique was examined using in vitro and in vivo experimental models. The sealing effect was estimated on water leakage through 1cm of suture line on the ePTFE sutured with 4 - 0 braided nylon at intervals of 2mm. The burst pressure of the non-sealed, conventional fibrin glue, simple glue spray, mesh-and-glue, and mesh-and-glue combined with spray was 2.8+/-0.4, 4.3+/-1.2, 64.4 +/-21.4, 142.7+/-22.2 and 406.1+/-29.7cm H<inf>2</inf>O respectively. It was worth noting that mesh-and-glue combined with the spray method can tolerate even arterial pressure. It was also observed that mesh-and-glue can seal a small dural defect. Long-term pathological changes of the mesh-and-glue was examined in a murine craniotomy model. Implanted mesh and fibrin glue was gradually transformed into a tight connective tissue firmly adhering to the surrounding structure within two months. These experimental results well support the clinical efficacy of the mesh-and-glue technique. This technique can also be applied to seal the arachnoid membrane after spinal surgery or to seal the suture line of arteriotomy in carotid endoarterectomy.