Evaluation of fibrin sealants for central nervous system sealing in the mongrel dog durotomy model.

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Abstract:

BACKGROUND: Watertight repair of the dura is imperative after neurosurgical procedures involving the brain or spinal cord because inadequately treated leakage of cerebrospinal fluid (CSF) from punctured dura can have serious consequences such as meningitis, arachnoiditis, or epidural abscess.

OBJECTIVE: To assess the efficacy of Evicel Fibrin Sealant (Human) to prevent CSF leakage using a 2.0-cm durotomy mongrel dog repair model and to compare the tissue response with Tisseel (a fibrin sealant) and Duraseal (a synthetic polyethylene glycol [PEG] hydrogel sealant).

METHODS: The canine durotomy repair model was used. This well-characterized model assesses the ability of sealants to achieve intraoperative watertight seals of the dura mater, as well as long-term safety and efficacy. This study included 27 mongrel dogs and had a 28-day duration.

RESULTS: The 3 sealants were 100% effective in preventing CSF leakage intraoperatively at 15 mm Hg. The 2 fibrin sealants were 100% effective in postoperative sealing; the PEG hydrogel was not. Microscopically, the tissue changes induced by Evicel at the durotomy site were similar in nature except for foamy macrophages seen only with the PEG hydrogel. The extent and severity of adhesions at 28 days were less with the fibrin sealants than with the PEG hydrogel.

CONCLUSION: Evicel, a fibrin sealant, was safe and effective in achieving and maintaining a watertight seal of the dura. The performance of the fibrin sealants was similar to that of the synthetic PEG hydrogel sealant with the exception of a Duraseal seal, which leaked.