

In vivo efficacy of a new autologous fibrin sealant.

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Abstract:

BACKGROUND: Fibrin-based sealants are commonly used to arrest bleeding following surgery. A new method has been developed for preparation of autologous fibrin sealant (FS) from protamine-precipitated fibrinogen concentrate. This FS has the potential to be a low-cost, safe, and convenient alternative to commercial sealants or cryoprecipitates usually prepared from patient or banked plasma. In this study, the efficacy of human FS was evaluated in a rat kidney model.

MATERIALS AND METHODS: FS containing various fibrinogen concentrations (ranging from 15 to 60 mg/mL) were applied to controlled renal incisions, and bleeding time and blood loss were measured. Bleeding from the wounds was also predicted using a mathematical model based on tensile strength and adhesion strength of the sealants.

RESULTS: The sealants, when applied under controlled conditions, reduced the blood loss and bleeding time more effectively than controls (where no sealant, plasma, or the commercial product Tisseel (Baxter Healthcare Corp., Westlake Village, CA) was applied). The sealant also significantly reduced bleeding time with a concomitant decrease in blood loss in rats that were anticoagulated with heparin. Bleeding times predicted by the mathematical model agreed well with experimental data and demonstrated that the ability of sealant to reduce bleeding time largely depended on its adhesion strength.

CONCLUSION: The autologous fibrin sealant can be prepared with any volume (e.g., 5 to 500 mL)

of patient's blood, within minutes, and exhibits equal or greater hemostatic efficacy compared with the leading commercial sealant.