# Comparative study of biological glues: cryoprecipitate glue, two-component fibrin sealant, and "French" glue.

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Publication Date: 1995

## Abstract:

BACKGROUND: Although biological glues have been used clinically in cardiovascular operations, there are no comprehensive comparative studies to help clinicians select one glue over another. In this study we determined the efficacy in controlling suture line and surface bleeding and the biophysical properties of cryoprecipitate glue, two-component fibrin sealant, and "French" glue containing gelatin-resorcinol-formaldehyde-glutaraldehyde (GRFG).

METHODS: Twenty-four dogs underwent a standardized atriotomy and aortotomy; the incisions were closed with interrupted 3-0 polypropylene sutures placed 3 mm apart. All dogs had a 3- by 3-cm area of the anterior wall of the right ventricle abraded until bleeding occurred. The animals were randomly allocated into four groups: in group 1 (n = 6) bleeding from the suture lines and from the epicardium was treated with cryoprecipitate glue; in group 2 (n = 6) bleeding was treated with two-component fibrin sealant; group 3 (n = 6) was treated with GRFG glue; group 4 (n = 6) was the untreated control group. The glues were also evaluated with regard to histomorphology, tensile strength, and virology.

RESULTS: The cryoprecipitate glue and the two-component fibrin sealant glue were equally effective in controlling bleeding from the aortic and atrial suture lines. Although the GRFG glue slowed bleeding significantly at both sites compared to baseline, it did not provide total control. The

control group required additional sutures to control bleeding. The cryoprecipitate glue and the two-component fibrin sealant provided a satisfactory clot in 3 to 4 seconds on the epicardium, whereas the GRFG glue generated a poor clot. There were minimal adhesions in the subpericardial space in the cryoprecipitate and the two-component fibrin sealant groups, whereas moderate-to-dense adhesions were present in the GRFG glue group at 6 weeks. The two-component fibrin sealant was completely reabsorbed by 10 days, but cryoprecipitate and GRFG glues were still present. On histologic examination, both fibrin glues exhibited minimal tissue reaction; in contrast, extensive fibroblastic proliferation was caused by the GRFG glue. The two-component and GRFG glues had outstanding adhesive property; in contrast, the cryoprecipitate glue did not show any adhesive power. The GRFG glue had a significantly greater tensile strength than the two-component fibrin sealant. Random samples from both cryoprecipitate and the two-component fibrin glue were free of hepatitis and retrovirus.

CONCLUSIONS: The GRFG glue should be used as a tissue reinforcer; the two-component fibrin sealer is preferable when hemostatic action must be accompanied with mechanical barrier; and finally, the cryoprecipitate glue can be used when hemostatic action is the only requirement.