

# Formaldehyde

# **Sutureless technique for oozing type postinfarction left ventricular free wall rupture. [Japanese]**

Authors: Hayashi H., Nishimura Y., Mori H., Komori S., Hiramatsu T., Okamura Y.

Publication Date: 2005

## **Abstract:**

We report our experience using a sutureless technique for oozing type postinfarction left ventricular free wall rupture. Several materials such as fibrin seal, autologous or heterologous pericardial patch, fibrin glue, and geratin-resorcin-formaldehyde (GRF) glue have been used. Nine patients, who developed postinfarction left ventricular free wall rupture, underwent surgical repair using a sutureless technique between 1999 and 2004. All patients survived and discharged our hospital without any postoperative complications. And all are alive in an excellent condition in 5 to 44 months. A sutureless technique for the treatment of oozing type postinfarction left ventricular free wall rupture is simple, effective, and associated with a favorable outcome.

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

Authors: Basu S, Marini CP, Bauman FG, Shirazian D, Damiani P, Robertazzi R, Jacobowitz IJ, Acinapura A, Cunningham JN Jr

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.

# Improved techniques of applying fibrin glue in lung surgery.

Authors: Morikawa T., Katoh H.

Publication Date: 1999

## **Abstract:**

To enhance the adhesive property of fibrin glue, two techniques were developed. The first is an improvement of the conventional layer method, and the second is a further improvement of the first technique. Their adhesive properties were tested in canine lungs in two phases. In phase 1 of the experiment, two new techniques were compared with the conventional methods in the retrieved lung. In phase 2 of the experiment, the second technique examined how its adhesive properties changed after treatment comparing them with gelatin-resorcinol-formaldehyde-glutaraldehyde (GRFG) glue. In phase 1, the first technique showed a 3-fold enhancement of the adhesive properties as compared with the conventional methods, and with the second technique the adhesive properties were further improved by more than 2-fold in the retrieved canine lung. In phase 2, it was revealed that the bursting pressure of both the second new technique and GRFG glue was eventually equal, and enough to close the cut surface of the lung. In the clinical setting, two techniques showed a safe and satisfactory performance in closing the cut surface of the lung. Due to the low toxicity of fibrin glue and absorbable material, these two techniques, especially the second technique, provide better circumstances for the healing of lung injury.

# **The use of biological glue in aortic surgery.**

Authors: Bachet J., Guilmet D.

Publication Date: 1999

## **Abstract:**

The biologic sealants presently available on the market that are used in cardiovascular surgery and particularly during surgery of the aorta are described in this article. Two of these biological sealants, the gelatin- resorcinol-formaldehyde (GRF) glue and two-component fibrin sealant have been in use for two decades. Their respective properties are described and compared, and the authors' experience with the GRT glue in 212 cases of acute type A aortic dissection is briefly reported.

# **Assessment of alternative tissue approximation techniques for laparoscopy.**

Authors: Eden C.G., Coptcoat M.J.

Publication Date: 1996

## **Abstract:**

**Objective:** To investigate the feasibility and results of applying alternative techniques of tissue approximation for experimental urothelial re-anastomosis in an open and laparoscopic setting.

**Materials and methods:** The study was carried out in two phases; in phase 1, an open porcine ureteric re-anastomosis was performed using gelatin/resorcin/formaldehyde (GRF) glue, fibrin glue or potassium-titanyl-phosphate laser tissue-welding with a fluorescein-doped human albumin solder. The anastomoses were assessed both immediately, by leak pressure, and by the operating time, upper tract urodynamic studies and light and scanning electron microscopy, 6 weeks after surgery. In phase 2, the best technique from phase 1 was compared with sutured controls for porcine retroperitoneoscopic dismembered pyeloplasty, using the same assessment criteria. **Results:** In phase 1, GRF glue produced adhesion which was insufficiently flexible to withstand rotation of the anastomosis and this technique was therefore abandoned. Fibrin-glued anastomoses withstood leak pressures equal to those from laser-welding ( $P=0.91$ ) and gave similar changes in maximum pressure with a Whitaker test at 6 weeks ( $P=0.30$ ), but were superior in requiring a shorter operating time ( $P=0.02$ ) and in their electron and light microscopic appearances. In phase 2, fibrin glue gave similar changes in maximum pressure with a Whitaker test to those from polyglactin 910 sutures ( $P=0.51$ ) but withstood higher leak pressures ( $P=0.01$ ), had a shorter operating time ( $P=0.01$ ) and had superior electron and light microscopic appearances. **Conclusion:** Fibrin glue produced effective experimental laparoscopic pelvi-ureteric anastomoses within less operating time than did sutured controls. Such anastomoses withstood supra- physiological pressures, with no evidence of

functional obstruction and with a more favourable histological result after 6 weeks. Laparoscopic evaluation of this modality in a clinical setting is now justified.



# Experimental evaluation of gelatin adhesive. [Japanese]

Authors: Kiyotani T., Teramachi M., Takimoto Y., Okumura N., Nakamura T., Shimizu Y.

Publication Date: 1994

## **Abstract:**

We examined the effectiveness of gelatin glue (GRF glue, E.H.S., France) for wound-healing in rats. On each rat, two or three 2-cm incisions were made with a scalpel in the back skin. Each wound was closed with GRF glue, fibrin glue or 3-0 nylon sutures. The tensile strength of each wound was measured and histological examination was conducted sequentially. Three days after surgery, the wounds treated with GRF glue had a higher tensile strength than those in the other two groups. From seven days of surgery, however, the tensile strength of wounds in the GRF group was not markedly greater than that of wounds in the other two groups. On histological examination, the GRF-treated wounds showed greater infiltration of inflammatory cells than the fibrin glue-treated wounds, but the GRF group showed no necrotic change in the surrounding tissue. At three weeks after surgery, the GRF glue remained in three out of six wounds, whereas the fibrin glue had disappeared by seven days in all wounds. We also examined the efficacy of GRF glue for sealing air leakage from lung tissue and for hemostasis of the liver and kidney in rabbits. GRF glue was effective for sealing air leakage from the lung tissue. It also had a hemostatic effect on oozing from parenchymal organs, but its hemostatic effect seemed insufficient for continuous arterial bleeding.

# **Tissue sealing by local application of coagulation factors. [German]**

Authors: Stemberger A., Blumel G.

Publication Date: 1983

## **Abstract:**

Not Available

# **Haemostasis on the liver by fibrin glue and GRF glue; A comparative study. [German]**

Authors: Stenzl W., Hofler H., Tscheliessnigg K.H.

Publication Date: 1982

## **Abstract:**

After experimental hepatic resection in rabbits and piglets, haemostasis was achieved by using two types of tissue glue - fibrin glue and gelatin-resorcin-formaldehyde glue (GRF-glue). With both glues, an elastic adhesive film could be produced. Fibrin glue was completely absorbed by granulation tissue at the 11th postoperative day. After using GRF-glue a toxic necrosis and a subsequent demarcation of necrotic tissue could be observed, with the adhesive substance being not absorbed after 11 days. When used together with a collagen fleece, fibrin glue was not spilled away by tissue haemorrhage. Therefore it seems to be especially suited for haemostasis on the liver. With both glues, no leakage was observed after raising the portal vein pressure to 300 mm Hg during in vitro experiments.

**The use of surgical glue in acute type A aortic dissection.**  
**[Review][Erratum appears in Gen Thorac Cardiovasc Surg. 2014**  
**Apr;62(4):214]**

Authors: Suzuki S, Masuda M, Imoto K

Publication Date: 2014

**Abstract:**

Acute type A aortic dissection (AAAD) remains a lethal disease. With advances in operative methods and perioperative management, surgical outcomes continue to improve, but in-hospital mortality still ranges from 10 to 30% in most series. The surgical technique of choice for aortic root repair remains controversial. Surgical glue created a breakthrough in surgery for acute aortic dissection. We review the surgical techniques with the use of surgical glue for AAAD.

# **[Changes in the vascular wall induced by surgical glues. Experimental study]. [French]**

Authors: Portoghesi M, Acar C, Jebara V, Chachques JC, Fontaliran F, Deloche A, Carpentier A

Publication Date: 1992

## **Abstract:**

The effects on vascular tissues of two different types of surgical glue, gelatin-resorcinol-formaldehyde (GRF) and fibrin (Tissucol) were tested on the rat abdominal aorta. The GRF glue induced destruction of the vascular wall: multiple inclusions of the glue were noted in the media. Conversely, the fibrin glue preserved the normal architecture of the three arterial layers. The use of GRF glue therefore should be avoided on particularly fragile tissues (e.g. coronary arteries), and it seems preferable in such cases to use the fibrin glue.