Surgical Glue and Necrosis of Arterial Wall

To the Editor:

I read with interest the report by Kirsch and colleagues on aortic wall alterations after application of glue [1].

Necrosis of arterial wall after application of glue is not new. Thirty-nine years ago, while working in the vascular laboratory of Dr Robert H. Goetz, I used the adhesive methyl 2-cyanoacrylate (Eastman 910 monomer) for nonsuture vascular anastomoses in dogs. Because all the anastomoses disrupted, we conducted the following experiments: 39 arteries in 13 dogs were dissected, with no arterial incisions or anastomoses performed. In 34 arteries, the adhesive was applied to the surface of a short arterial segment. Five arteries served as controls. They were dissected free, but no adhesive was applied. On arteriography within the first week, 31 of the 34 arteries developed fusiform dilatations of the segment to which the adhesive had been applied. No dilatations were noted in the control group. The arteriographic findings were confirmed by gross examination. Histologic studies of dilated segments showed necrosis of the entire arterial wall with complete absence of all cellular structures, strictly limited to the area to which the monomer had been applied. The development of necrosis was followed by an infiltration of polymorphonuclear leukocytes from the intima to the media, which in some cases took on the proportions of an abscess in the arterial wall [2, 3]. In our later, long-term study, 43 canine arteries, similarly treated, were observed for 7 months. The necrosis and abscesses in the arterial wall were finally replaced by dense fibrous tissue [4].

Tissue adhesives are not innocuous when applied to the arterial wall. This is apparently true not only with regard to the methyl 2-cyanoacrylate, but also to gelatin-resorcinol-formalin glue, and mitigates against its indiscriminate use.

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What Are the Risks of Using Biologic Glues?

To the Editor:

The article by Kazui and colleagues [1] on the role of biologic glue and the risk to aortic root redissection caught my attention. In the last 1½ years, I have reoperated (for pseudoaneurysm) on 3 of approximately the last 15 patients where Bio-glue was used to assist in the repair of a dissection of the ascending or aortic arch. I cannot recall a pseudoaneurysm in my non-glue patients. This may be purely chance, but it does raise my suspicion that the glue may be having unexpected consequences. In the literature, several authors have suggested that the use of aortic glue is associated with local tissue damage, a local inflammatory response, or an increased risk of pseudo-aneurysm formation [1–4].

Pseudoaneurysms in patients treated with a glue may arise for many reasons including:

1. Local cell death from toxic products in the glue that lead to tissue breakdown over time.
2. The aortic glue may have stopped bleeding in an area that would have been better served over the long term with a suture than by glue closure (analogous to duct taping an area that should have been bolted together).
3. Patients who would not have survived surgery due to bleeding from coagulopathy and local tissue compromise are now surviving. They may be at more risk for late complications than patients who did not need the glue to get out of the operating room.

If there is a trend toward more pseudoaneurysms in glue-treated patients, hopefully, it will be due to reason number three and not numbers one and two. Biologic glues may be very useful, but there is not free lunch in this world. We should be alert for any patterns of late complications that would suggest that the use of biologic glue has some downsides.

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Reply

To the Editor:

I thank Dr Downing for his concern about the potential harmful effects of biological glues used in the surgical treatment of acute type A aortic dissection. The complication of pseudoaneurysm formation at the site of Bio-glue application certainly deserves attention. Bio-glue was introduced with the expectation that it is less toxic than GRF glue and causes minimum tissue necrosis. GRF glue was not approved by the FDA (Food and Drug Administration) because of concerns regarding tissue toxicity. Bio-glue, which obtained FDA approval, was welcomed by many aortic surgeons in the US.

We have extensive clinical experience with GRF glue, and

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