Figure 1. Aortogram performed from the right brachial route demonstrating a pseudoaneurysm of the proximal descending aorta just distal to the origin of the left subclavian artery. There is no extravasation.

cated, a clamp-and-sew technique might be a reasonable alternative, as suggested by Trachiolis and associates.⁴ In a selected group initial nonoperative management and stabilization with β -blockers while other comorbidities are addressed, followed by elective repair, might be a reasonable option.

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Reply to the Editor:

We appreciate the kind comments made by Dr Murala and colleagues, and we agree with the operative technique and indications they describe. They have highlighted an ongoing issue with respect to managing traumatic aortic disruption in a patient who has not finished growing. Not only do late complications of erosion need to be considered, but we wonder whether the stented aorta will be prevented from growing, leading in later life to possible coarctation physiology. Thus as we and others have noted, endovascular approaches to this problem need to be incorporated into an algorithm that includes open repair, medical management, or both. We would argue that endovascular stenting be considered if there are contraindications to operative repair and to medical management (recognizing that different surgeons and centers might vary in what is considered a contraindication). Furthermore, because the vast majority of pediatric patients will be candidates only for cuff extenders or contralateral limbs, these should be used only if they can be applied predominantly on the "straight" portion of the descending aorta (to minimize endoleak) and if the proximal points of endografts are not so close to the left common carotid artery that

any subsequent operation would require an anterior arch approach.

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I am afraid of using aprotinin because they say so?

To the Editor:

Cardiothoracic surgeons have become more aware of the worse outcomes associated with aprotinin after cardiac surgery, as discussed in the article by Mangano and colleagues¹ published in the *New England Journal of Medicine*. It remains an observational study that, as the authors point out, is in need of randomized studies. The main concern of the authors that has not been addressed is the analysis of a larger sample size in the aprotinin group compared with that for other antifibrinolytics. The weighted average effect of a large sample size can have a larger effect when outcomes are analyzed.

I will address further potential confounding factors by Mangano and colleagues.¹ The authors did not control for preoperative hemoglobin count. Zindrou and associates² reported on a cohort of 2058 patients and demonstrated that a preoperative hemoglobin concentration of 10 g/L or less had a 5-fold higher in-hospital mortality rate after coronary artery bypass grafting mortality rates seen in those with a higher hemoglobin concentration, despite having had blood transfusions. Maintaining a patient's hematocrit value within the normal range and avoiding extremes is important. The main surgical factor that affects outcome in coronary artery bypass grafting is anastomosis of the internal thoracic artery to the left anterior descending artery. Moreover, the absence of critical disease in other vessels also affected outcome.³ Mangano and associates¹ also provided no information about the mean number of grafts per patient, perioperative blood loss, blood-saving techniques, and "transfusion trigger." These issues are important because there is a dose-dependent association between blood transfusion and the development of severe postoperative infection and death in patients undergoing cardiac sur-

gery.⁴ The authors also mentioned use of multiple variables that might or might not be clinically relevant and assigned propensity scores in the outcome models to adjust for antifibrinolytic use. I believe that such an analysis is suboptimal to propensity score matching in quantiles. Surgeons need to take a closer look and revisit the data published in this article before banning aprotinin from their practice.

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About the activation of the coagulation system during on-pump and off-pump coronary surgery and the use of antifibrinolytic drugs To the Editor:

The results of the study by Paparella and colleagues¹ recently published in the *Journal* confirm part of the observations described in previous reports addressing the activation of coagulation and fibrinolysis in coronary surgery performed with (ONCAB) or without (OPCAB) cardiopulmonary bypass (CPB). However, some of the statements contained in their "Discussion" section deserve critical consideration. Because no difference in tissue factor (TF) "production" was observed in the 2 groups of patients while prothrombin fragment 1.2 levels were higher in patients undergoing ONCAB, the authors state that the extrinsic pathway of coagulation should not be con-

sidered the only trigger for thrombin formation during CPB. Although the intrinsic pathway might also play a role in thrombin formation during CPB, the observation of circulating levels of TF that are not significantly different does not per se demonstrate a similar activation of the extrinsic pathway of coagulation in the 2 groups of patients. TF is a transmembrane protein expressed by white blood cells under conditions of activation, and deposition of such cells in the CPB circuit has been shown before.² Therefore plasma levels of TF might not reflect the true "exposure" of TF to circulating blood. The authors state that in patients undergoing OPCAB, administration of a heparin dose similar to the one used during CPB (300 U/kg) eliminates the production of thrombin during the time of the operation. "Elimination" of thrombin production would lead to severe bleeding, which cannot obviously be the aim of heparin administration. The authors also state that platelet function, as analyzed by using an in vitro bleeding test (PFA-100), is better preserved during OPCAB surgery than during CPB and that the lack of CPB and cardiotomy suction, together with the reduced formation of thrombin, might explain why platelet function is preserved in patients undergoing OPCAB. The PFA-100 is influenced by the platelet count and the hematocrit level, which are both obviously higher in patients undergoing OPCAB, and by von Willebrand factor levels, which are known to increase postoperatively. Thus the PFA-100 can hardly be considered validated in evaluating platelet function in the setting of cardiac surgery. Despite the observation of a similar postoperative "hypercoagulable" pattern in the 2 groups of patients, the authors also emphasize that D-dimer levels are lower in patients undergoing OPCAB, advising against the use of antifibrinolytic drugs, which might increase the risk of vein graft occlusion in this surgical setting. These conclusions are in disagreement with the results previously reported by our group³ and with the clinical observations of the authors. A similar, although not negligible, 24-hour postoperative bleeding value was recorded in the 2 groups (total blood loss: ONCAB, 861.2 ± 340.3 mL; OPCAB, 933.7 ± 382.6 mL). In a pilot study carried out in patients not receiving antifibrinolytic drugs, we recorded an average total blood loss of 850 mL in patients undergoing

ONCAB and 750 mL in patients undergoing OPCAB.³ In a larger study powered to detect differences in bleeding between patients undergoing ONCAB and patients undergoing OPCAB randomized to receive tranexamic acid or placebo, the average total blood loss was 754 mL and 552 mL in patients undergoing ONCAB off or on tranexamic acid treatment and 654 and 375 mL in patients undergoing OPCAB off or on tranexamic acid treatment, respectively, with a significant reduction in bleeding for both groups in the tranexamic acid arm ($P < .006$).⁴ In both studies the difference in total bleeding observed between patients undergoing ONCAB and patients undergoing OPCAB was obviously affected by the different amount of heparin infused in the 2 groups (3 times higher in patients undergoing ONCAB). Moreover, in the same study we found that tranexamic acid administration not only significantly reduces perioperative bleeding and the need for allogeneic transfusions both in patients undergoing ONCAB and patients undergoing OPCAB but also modulates inflammation, particularly in OPCAB surgery.⁴ In view of these certain advantages of antifibrinolytic drugs and of a procoagulant postoperative state of uncertain significance,^{5,6} the advice against the use of antifibrinolytic agents is, in our opinion, at least debatable.

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