Figure 1. Dynamic magnetic resonance-based phase contrast flow images taken at a level 2 to 3 mm above the plane of the nadirs of the cusp hinge points (ie, the valvular portion of the root) frozen at peak opening (late systole) in a normal volunteer (A), preoperative Marfan patient (B), and postoperative Marfan patient (C). Note that *white areas* represent blood flowing perpendicular to the plane of the image out toward the viewer or laminar, antegrade flow.

*Galter 10-105
201 East Huron St
Chicago, IL 60611-3056*

References

1. David TE. Sizing and tailoring the Dacron graft for reimplantation of the aortic valve. *J Thorac Cardiovasc Surg.* 2005;130:243-4.
2. Aybek T, Sotiriou M, Wohleke T, Miskovic A, Simon A, Doss M, Dogan S, Wimmer-Greinecker G, Moritz A. Valve opening and closing dynamics after different aortic valve-sparing operations. *J Heart Valve Dis.* 2005; 14:114-20.
3. Kvitting JP, Ebbers T, Wigstrom L, Engvall J, Olin CL, Bolger AF. Flow patterns in the aortic root and the aorta studied with time-resolved, 3-dimensional, phase-contrast magnetic resonance imaging: implications for aortic valve-sparing surgery. *J Thorac Cardiovasc Surg.* 2004;127:1602-7.
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Surgical management of pulmonary embolism

To the Editor:

We read with interest the study reported by Leacche and associates¹ regarding their surgical experience in treating massive pulmonary embolism. We would like to congratulate the authors for their excellent outcomes in this relatively large number of patients and for the encouraging results that they achieved with this patient population. The authors used a technique of cardiopulmonary bypass and temporary flow reductions for visualization of the pulmonary arterial tree for clot removal.

In the past 3 months we have treated 3 patients with massive pulmonary embolism by surgical embolectomy. The first was a 45-year-old patient who had rib fractures and subsequently deep vein thrombosis. The patient was admitted with shortness of breath and chest pain and had a cardiac arrest. After initial successful resuscitation, a pulmonary angiogram confirmed bilateral massive emboli in the pulmonary tree. A second 65-year-old patient had subdural and intracerebral hemorrhage from a fall down a stair while in an alcoholic stupor. This patient needed increasing inotropic and ventilatory support to maintain his oxygenation, and a subsequent computed tomographic scan of the chest revealed bilateral massive pulmonary emboli. A third 47-year-old patient with significant peripheral vascular disease was admitted with chest pain and shortness of breath. Massive pulmonary emboli were confirmed by computed tomographic scan. The first patient did not respond to thrombolysis, whereas the other 2 patients had documented right ventricular strain and dysfunction with paradoxical movement of the ventricular septum.

We performed surgical embolectomy under cardiopulmonary bypass with systemic cooling to 34°C with asystole induced by antegrade cold blood cardioplegia. This allowed excellent visualization of the branches of the pulmonary artery in a bloodless field. In the first 2 cases fresh embolus was easily extracted with a short crossclamp time (39 and 28 minutes) and cardiopulmonary bypass time (75 and 63

minutes). The third patient was found to have adherent organized thrombus. This was extremely difficult to remove but was extracted successfully due to good visualization with cardioplegic arrest (bypass time 107 minutes; crossclamp time 70 minutes).

We believe that cardioplegic arrest greatly facilitates the operation and obviates the need to reduce the flow to improve visualization. In a simple case of fresh thrombus, the time required is short and therefore is unlikely to have any detrimental effect on cardiac or immunologic function. In complicated cases, such as our third case with late presentation, the disadvantage of the longer ischemic time is easily balanced by the ability to successfully remove adherent clot without injury to the pulmonary artery.

Again, we would like to congratulate the authors for their exciting and encouraging results.

*Pramod Bonde, MD, FRCS
Alastair Graham, MD, FRCS
Department of Cardiothoracic Surgery
Royal Hospitals
Belfast, BT12 6BA, United Kingdom*

Reference

1. Leacche M, Unic D, Goldhaber SZ, Rawn JD, Aranki SF, Couper GS, et al. Modern surgical treatment of massive pulmonary embolism: results in 47 consecutive patients after rapid diagnosis and aggressive surgical approach. *J Thorac Cardiovasc Surg.* 2005;129: 1018-23.

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