AXILLARY ARTERY CANNULATION PITFALLS

To the Editor:

We read with interest the article by Orihashi and colleagues¹ concerning axillary artery cannulation pitfalls. We present another possible drawback of axillary artery cannulation. A 69-year-old woman was admitted to the Department of Cardiac Surgery for a type A acute aortic dissection involving the innominate artery. After the usual cannulation of the right axillary artery, with a prosthetic side graft, and the right atrium, cardiopulmonary bypass (CPB) was established with no perfusion problems. At 26°C core temperature, CPB was arrested and the aorta was opened longitudinally. The entry tear was located in the ascending aorta. The innominate artery was clamped, and brain perfusion was begun through the axillary artery cannulation. The dissected aorta was excised, and a 30-mm prosthetic vascular graft was sutured to the distal aortic stump, just proximal to the innominate artery. The vascular graft was clamped, and, always via the axillary artery, systemic perfusion was restored. Near-infrared spectroscopy revealed poor cerebral perfusion, whereas the arterial line inflow pressure increased significantly. Suspecting an obstruction in the axillary artery or innominate artery, we directly cannulated the vascular graft and continued CPB antegradely. This allowed an uneventful completion of the procedure.

In aortic dissections involving the innominate artery, there may be a reentry

tear in this vessel or the right carotid artery. Initially, this may not cause any problem. In fact, even if the axillary artery perfusion is partly directed through the reentry tear into the false lumen, this will empty through the proximal tear and malperfusion will not occur. But once the vascular graft has been sutured to the distal aortic stump and systemic perfusion is restarted, blood from the axillary artery cannulation may still enter the false lumen via the reentry tear in the innominate artery, but the proximal tear has been removed and there is a suture line instead. The false lumen is a blind pocket now, and it may dilate and obstruct the true lumen. To avoid this, after completion of the distal anastomosis of the prosthetic vascular graft, it is advisable to restore systemic perfusion antegradely, cannulating the vascular graft either directly or through a side branch. This is our current practice, and we strongly recommend it. In other words, during axillary artery perfusion serious complications may arise even from that short pathway that goes from the site of axillary artery cannulation to the origin of the innominate artery. We completely agree with Orihashi and colleagues¹ that near-infrared spectroscopy represents an invaluable tool to monitor cerebral perfusion during surgical aortic procedures.

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Reference

1. Orihashi K, Sueda T, Okada K, Takahashi S. Compressed true lumen in the innominate artery: a pitfall of right axillary arterial perfusion in acute aortic dissection. *J Thorac Cardiovasc Surg.* 2009;137:242-3.

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Reply to the Editor:

We thank Rescigno and colleagues for their insightful comments regarding the pitfalls of axillary arterial perfusion. The case they presented illustrates

another important mechanism of cerebral malperfusion under axillary perfusion. The surgical intervention can form a blind pocket (cul-de-sac) under retrograde perfusion, dilate the false lumen, and occlude the orifice of the right common carotid artery. We believe that the mechanism they postulated is right.

The “Y-junction” consisting of the innominate, right common carotid, and right subclavian (axillary) arteries is a tricky zone in aortic surgery, where cerebral malperfusion can be induced by various mechanisms: compression of the true lumen in the innominate artery in our case; blind pocket-induced malperfusion in the case of Rescigno and colleagues; and malposition of a selective perfusion cannula.¹

An intimal flap is responsible for malperfusion not only in antegrade perfusion before surgery but also in retrograde perfusion during cardiopulmonary bypass. A switch between entry and reentry under retrograde perfusion creates a new perfusion status in this Y-junction. Surgical intervention can generate another change as Rescigno and colleagues mentioned. However, preoperative assessment is unlikely to be helpful for predicting an occurrence of malperfusion in the altered situation.

They proposed 2 solutions for this problem: direct cannulation of the aortic graft or the use of a branched graft to establish antegrade perfusion. The only drawback of these solutions is the necessity of an additional cannula or branched graft in every case for a rare complication. Extra safeguard is needed because intravascular events are not visible. In an attempt to elucidate the events in the blind zone, we established a method of visualizing arch branch arteries by means of transesophageal echocardiography.² It was shown that morphologies and blood flow in the branch arteries, as well as the mechanism of malperfusion, vary considerably among individual patients. With such information, however, it is hardly possible to predict an occurrence of malperfusion under axillary artery perfusion.

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