Commentary: Central aortic cannulation for acute type A dissection—Not just for patients with cerebral malperfusion

Leonard N. Girardi, MD

From the Department of Cardiothoracic Surgery, Weill Cornell Medical College, New York, NY.

Disclosures: Author has nothing to disclose with regard to commercial support.

Received for publication March 11, 2019; accepted for publication March 11, 2019; available ahead of print April 13, 2019.

Address for reprints: Leonard N. Girardi, MD, Department of Cardiothoracic Surgery, Weill Cornell Medical College, New York, NY 10065 (E-mail: lngirard@med.cornell.edu).

J Thorac Cardiovasc Surg 2020;159:796-7

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.03.046>

In this issue of the *Journal*, Shimura and colleagues¹ summarize their experience with echocardiographically guided aortic cannulation by the Seldinger technique in patients presenting with an acute type A dissection (ATAD) complicated by cerebral malperfusion. During a span of 10 years, Shimura and colleagues¹ treated 208 patients with ATAD by means of echocardiographically guided aortic cannulation by the Seldinger technique, and 16 of those 208 (7.7%) presented either with hemiplegia or in a comatose state. The mean time from the onset of symptoms to the initiation of cardiopulmonary bypass was 327 minutes, and the median time from skin incision to start of bypass was 34 minutes. There were no complications related to central aortic cannulation (cannulation site bleeding, aortic rupture, worsening malperfusion, cardioembolic events), and the operative mortality was 6.3% (1/16). There was significant improvement in neurologic function, with Glasgow Coma Scale scores in operative survivors increasing from a preoperative mean of 4.5 to 15 by 30 postoperative days. With excellent neurologic rehabilitation therapy after discharge, all 10 comatose patients fully recovered, as did 4 of the 6 presenting with hemiplegia. The 5-year survival was 93.8%. Should there still be debate as to whether we should be operating on those with neurologic injury and ATAD? Should we be more liberal in the application of central aortic cannulation in all patients presenting with ATAD?

According to the International Registry for Acute Dissection, 4.7% of patients with ATAD present with a cerebrovascular accident (CVA), whereas 2.9% present with coma.² The mortalities for each of these types of brain injury were 100% and 76.2%, respectively, when treated with medical management alone. The operative mortalities for those patients with CVA and coma undergoing surgery were 27% and 44%, respectively. Although there certainly are opportunities for further improvement in operative mortality, these results, particularly for the patients with CVA, are not statistically different from those undergoing surgery without preoperative brain injury (operative mortality, 22.7%). Interestingly, multivariable analysis of the

Epicardial echo confirming true-lumen cannulation in acute type A aortic dissection.

Central Message

Central aortic cannulation for acute type A dissection can be performed rapidly and safely. It may be very useful in quickly restoring true-lumen brain perfusion in patients with neurologic deficits.

See Article page 784.

International Registry for Acute Dissection data failed to demonstrate acute brain injury as an independent predictor of in-hospital death. Rather, the brain injury reversal that was seen after surgery in 80.4% of patients with CVA and 74.2% of patients with coma was actually “protective” against in-hospital mortality (odds ratio, 0.014; 95% confidence interval, 0.069-0.0742; $P = .226$). For transparency, the authors of the International Registry for Acute Dissection study,² like Shimura and colleagues,¹ do not advocate surgery for those presenting with “devastating” neurologic injury. Five such patients were not offered surgery in the report of Shimura and colleagues.¹ Devastating is ill-defined, however, and left to the discretion of the consulting surgeon. Postoperative complications are also not benign. Two of the 16 patients in this series had substantial reperfusion injury and cerebral edema. One of these episodes was fatal, and the other necessitated a decompressive craniotomy. Scary stuff for sure. Fortunately, there were no reported episodes of hemorrhagic conversion of an ischemic event. These outcomes are quite gratifying and similar to those previously reported by others advocating immediate surgery in the setting of neurologic injury and ATAD.^{3,4}

What is clear is that time is brain, and the sooner these patients can reestablish true-lumen brain perfusion, the better. The most recent American Stroke Association guidelines highlight the efficacy and importance of endovascular

treatment of acute ischemic CVA within 8 hours of the onset of symptoms.⁵ Interestingly, 13 years before these most recent recommendations, Estrera and associates³ failed to show neurologic improvement when those with ATAD and neurologic injury were taken for surgery beyond 10 hours after the onset of symptoms. Central cannulation may increase the percentage of surgical patients receiving treatment within the desired 8-hour window. It is fast and safe, particularly when a combination of epiaortic and transesophageal echocardiography is used to ensure true-lumen cannulation.^{1,6} Near-infrared spectroscopic data from this study lend further support to the efficacy of central cannulation. Significant increases in regional cerebral oxygen saturation levels were seen in both the right (from 55% to 74%) and left (from 66% to 79%) hemispheres on the initiation of cardiopulmonary bypass. Although axillary artery cannulation is quite efficacious in establishing true-lumen perfusion (and sets one up for the use of antegrade cerebral perfusion, if that is the cerebral perfusion adjunct of choice), it is time consuming and can be complicated. Femoral artery cannulation is fairly safe and also can be performed rapidly; however, the potential for retrograde embolization and malperfusion are real. Those treating significant numbers of patients with ATAD with femoral cannulation have certainly faced these disappointing events, which can leave one scrambling to cannulate centrally as an

emergency bailout. When performed cautiously and routinely, central true-lumen aortic cannulation can save time and brain, and it may also benefit all patients with ATAD, particularly those presenting with other forms of life-threatening malperfusion.

References

1. Shimura S, Odagiri S, Furuya H, Okada K, Ozawa K, Nagase H, et al. Echocardiography-guided aortic cannulation by the Seldinger technique for type A dissection with cerebral malperfusion. *J Thorac Cardiovasc Surg.* 2020;159:784-93.
2. Di Eusanio M, Patel HJ, Nienaber CA, Montgomery DM, Korach A, Sundt TM, et al. Patients with type A acute aortic dissection presenting with major brain injury: should we operate on them? *J Thorac Cardiovasc Surg.* 2013;145(3 Suppl):S213-21.
3. Estrera AL, Garami Z, Miller CC, Porat EE, Achouh PE, Dhareshwar J, et al. Acute type A aortic dissection complicated by stroke: can immediate repair be performed safely? *J Thorac Cardiovasc Surg.* 2006;132:1404-8.
4. Tsukube T, Haraguchi T, Okada Y, Matsukawa R, Kozawa S, Ogawa K, et al. Long-term outcomes after immediate aortic repair for acute type A aortic dissection complicated by coma. *J Thorac Cardiovasc Surg.* 2014;148:1013-8; discussion 1018-9.
5. Powers WJ, Derdeyn CP, Biller J, Coffey CS, Hoh BL, Jauch EC, et al; American Heart Association Stroke Council. 2015 American Heart Association/American Stroke Association focused update of the 2013 guidelines for the early management of patients with acute ischemic stroke regarding endovascular treatment: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke.* 2015;46:3020-35.
6. Inoue Y, Takahashi R, Ueda T, Yozu R. Synchronized epiaortic two-dimensional and color Doppler echocardiographic guidance enables routine ascending aortic cannulation in type A acute aortic dissection. *J Thorac Cardiovasc Surg.* 2011;141:354-60.