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Commentary: A failure unhidden is an unfinished success

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Interventricular septal hematoma (IVSH) is a rare, potentially lethal complication of surgical ventricular septal defect (VSD) closure, with only 17 pediatric cases reported in the world literature. The majority of reported cases were managed expectantly, without surgical reintervention,¹ and a majority resolved within weeks to months. Likely a result of injury to septal coronary perforators, IVSH is also described as complicating catheter-based interventions in adults. Frisoli and colleagues² describe a massive IVSH during percutaneous coronary intervention for a right coronary artery occlusion in a 70-year-old patient. The extravasation was coil embolized, but cardiogenic shock ensued, requiring biventricular mechanical support for outflow tract obstruction, and the patient did not survive.

Septal hematoma following VSD closure likely propagates from a suture injury to the first septal branch of the left coronary artery, which courses through the interventricular septum toward the base of the medial tricuspid papillary muscle. Septal hematoma from catheter-based procedures results from injury to proximal or distal septal perforators that originate from left or right coronary circulations.

White and colleagues,³ in this issue of *Techniques*, report the first-recognized occurrence of an IVSH following the placement of a left ventricular assist device (VAD). By contrast to other reported mechanisms of injury, an injury following VAD placement likely occurred to the distal perforators that supply the apical septum. Whether this injury occurred during apicoseptal ventriculotomy or from placement of sutures for securing the sewing ring, IVSH propagating from an apical incision suggests that injury to

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CENTRAL MESSAGE

Interventricular septal hematomas are rare following ventricular assist device placement. Alternative cannulation strategies may help avoid this devastating complication.

even small distal septal perforators are capable of creating an expanding, catastrophic dissection.

Irrespective of mechanism, this is a valuable cautionary tale calling for vigilance, early recognition of IVSH, any evidence for which should prompt an urgent reintervention. Despite no established guidelines or criteria for diagnosis or intervention, surgical drainage of the septal hematoma has been successful in IVSH recognized early after VSD closure, and drainage may also have a role in salvation after a VAD-induced IVSH, along with an urgent change in cannulation strategy.

Most VADs were not designed for pediatric patients, and several creative alternative cannulation strategies have emerged that could find consideration in the setting of an evolving IVSH. Among alternatives to apical ventricular cannulation are various atrial cannulation techniques described for patients with small ventricular cavities.^{4,5} Katsuhide and colleagues⁶ report use of a ringed polytetrafluoroethylene graft anastomosed to the atrial septum for placement of the left atrial cannula for hypertrophic cardiomyopathy patients who have obstructive challenges similar to IVSH.

Many case reports focus on novel treatments that worked, but too few share the lessons of failure. Publication bias disfavors the sharing of negative results, distorting the body of scientific knowledge and wasting valuable opportunities to learn from mistakes.⁷ As Henry Ford

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reportedly said, “The only real mistake is the one from which we learn nothing.” We commend the authors for sharing the lessons of a surgical injury with an unfavorable outcome, heightening vigilance for a rare complication, and promoting thoughtful readiness to respond.

References

1. Yoneyama F, Matsubara M, Sakamoto H, Hiramatsu Y. Interventricular septal hematoma associated with congenital heart surgery: a case report and literature review. *J Thorac Cardiovasc Surg*. 2017;153:e55-7.
2. Frisoli TM, Afana M, Mawri S, Hadid M, Sayed L, O'Neill WW, et al. Respect the septal perforator: septal artery perforation during CTO PCI resulting in massive interventricular septal hematoma and biventricular cardiac obstructive shock. *JACC Cardiovasc Interv*. 2017;10:e91-2.
3. White BR, Savla JJ, Burstein DS, Mascio CE, O'Connor MJ, Szwast AL, et al. Interventricular septal hematoma complicating placement of a ventricular assist device in an infant and support with bi-atrial cannulation. *J Thorac Cardiovasc Surg Tech*. 2020;1:90-2.
4. Hoganson DM, Gazit AZ, Boston US, Sweet SC, Grady RM, Huddleston CB, et al. Paracorporeal lung assist devices as a bridge to recovery or lung transplantation in neonates and young children. *J Thorac Cardiovasc Surg*. 2014;147:420-6.
5. Mascio CE. Unique cannulation technique and atrioventricular valve excision for HeartWare HVAD in the small Fontan patient. *Op Tech Thorac Cardiovasc Surg*. 2017;21:322-9.
6. Maeda K, Rosenthal DN, Reinhartz O. Ventricular assist devices for neonates and infants. *Semin Thorac Cardiovasc Surg Pediatr Card Surg Ann*. 2018;21:9-14.
7. Fanelli D. Negative results are disappearing from most disciplines and countries. *Scientometrics*. 2012;90:891-904.