Intravascular fracture of the Impella device during removal

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Introduction
Mechanical percutaneous left ventricular assist devices (P-LVADs) are being increasingly adopted for high-risk invasive electrophysiological procedures, such as during catheter ablation of hemodynamically unstable ventricular tachycardia (VT). In select patients with advanced heart failure status and/or with periprocedural acute hemodynamic decompensation due to a potentially reversible cause such as VT storm, P-LVADs can also be left in place for a few days after the procedure as a bridge to recovery. The Impella P-LVAD (Abiomed, Danvers, MA) is inserted with a 14F sheath into the common femoral artery and advanced to the left ventricle (LV) via a retrograde transaortic valve approach. The catheter is composed of an inlet area (positioned in the LV), motorized pump, and outlet area (positioned in the aorta). Where the body of the catheter is 9F, the motorized pump is 12F (Figure 1A). In this case...
KEY TEACHING POINTS

- Percutaneous left ventricular assist devices can be used as a bridge to recovery in hemodynamically unstable patients with ventricular tachycardia.
- Leaving an Impella for a prolonged period of time can cause a complication during device removal; because the proximal portion of the catheter is smaller than the distal part, the arteriotomy site can heal around the smaller part.
- Fractured device retrieval would be on a case-by-case basis, by either a surgical or an endovascular approach.

report, we describe a serious complication related to the extraction of an Impella 2.5 catheter a few days after the initial implant, namely, the intravascular fracture of the Impella catheter occurring at the level of the arteriotomy site.

Case report
A 67-year-old man with severe nonischemic cardiomyopathy (LV ejection fraction 10%) and recurrent implantable cardioverter-defibrillator shocks for sustained hemodynamically unstable VT was referred to our institution for catheter ablation. Owing to his comorbidities (diabetes, kidney disease, obesity), he was deemed to be a poor heart transplant candidate. Because of the high-risk profile, insertion of a P-LVAD (Impella 2.5) was planned up front.1 The left common femoral artery (LCFA) was accessed under ultrasound guidance, and the arteriotomy site was “pre-closed” by deploying 2 Perclose (Abbott Vascular, Santa Clara, CA) devices (left untied), as previously reported.1 The 14F Impella sheath was advanced in the LCFA to allow the insertion of the Impella catheter. After sheath insertion, the left lower limb pulses were lost and a repeat femoral arteriogram revealed complete occlusion of the common femoral artery by the 14F sheath (Figure 1A). The sheath was removed, and the Impella catheter was advanced into position and the previously placed Perclose tightened around the Impella without cinching the knots. There was no significant bleeding around the access site, and left lower extremity perfusion significantly improved. The case proceeded but, despite adequate flows with the Impella, the patient suffered a pulse electrical activity arrest. Because of the Impella, mean arterial pressures were never below 50 mm Hg. Once the patient was resuscitated and hemodynamics were stabilized, the case was concluded and he was transferred to the cardiac critical care unit with the sheathless Impella left in place, for continued hemodynamic support. The patient’s clinical course stabilized, and the P-VAD was eventually removed on day 8. Upon removal of the Impella, visual inspection revealed that the end of the Impella had broken off and remained within the patient’s LCFA (Figure 1A and B). Endovascular retrieval was discussed with the vascular surgery colleagues,2 and the decision was that surgical retrieval was deemed more appropriate for this case; thus, the patient was urgently brought to the operating room, where the Perclose devices and retained Impella tip were surgically removed without complication (Figure 1C and D).

Discussion
P-LVADs can be used to provide hemodynamic support for patients with severe LV dysfunction undergoing catheter ablation of hemodynamically unstable VT and may allow for prolonged induction, mapping, and ablation of hemodynamically unstable VT.3 Intravascular injury represents one of the most common complications of Impella use.3 Despite the fact that other device fractures had been previously reported in different segments of the device,2 device tip fracture during removal has, to our knowledge, not previously been described as a complication of Impella use. Leaving an Impella in place for prolonged periods of time may be problematic if the arterial size is too small to accommodate the 14F sheath and the device is left in place without a sheath. Because the proximal portion of the catheter (9F) is significantly smaller than the distal portion (12F), if the arteriotomy site heals around the smaller portion, percutaneous removal may result in intravascular device fracture.

References
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