Selective arterial embolization for uncontrollable urethral hemorrhage in a patient with a left ventricular assist device

Yujiro Hayashi, Atsunari Kawashima, Kazutoshi Fujita, Taigo Kato, Toyofumi Abe, Takeshi Ujike, Akira Nagahara, Shinichiro Fukuhara, Motohide Uemura, Hiroshi Kiuchi, Ryoichi Imamura, Tetsuya Saito, Koichi Toda, Yoshiki Sawa, Kentaro Kishimoto, Keigo Osuga, Norio Nonomura

A 52-year-old man underwent percutaneous coronary intervention for acute myocardial infarction and implantation of a paracorporeal left ventricular assist device (LVAD). Anticoagulation therapy was initiated because pump thrombosis is one of the most feared complications of LVAD therapy. He was referred to our department for the management of severe hematuria that occurred just after the exchange of a urethral catheter. Anemia due to hematuria was so intense that blood transfusion was needed, and a wider-diameter urethral catheter was initially placed as preservation therapy. Although the hematuria was controlled to some extent by the larger catheter, perioperative enhancement of anticoagulation therapy required for conversion of the patient to a totally implantable LVAD worsened the hematuria again and more transfusions were required. Cystourethroscopy and computed tomography revealed active bleeding within the urethra and extra space of corpus spongiosum penis (Fig. 1). More active treatment for the urethral hemorrhage was required, and transcatheter arterial embolization was performed to prevent new bleeding from the urethra, which was expected to easily exacerbate during the perioperative period. Pelvic angiography revealed active bleeding from the end of pubic branch of left obturator artery and extravasation into the extra space of corpus spongiosum penis (Fig. 2a). A microcatheter was advanced to the left obturator artery as close possible to the bleeding point, and embolization was performed using absorbable gelatin sponge particles (Serescue, Astellas Pharma Inc.). The bleeding disappeared completely (Fig. 2b). LVAD conversion surgery was successfully conducted on the 44th day after embolization with no recurrence of urethral hemorrhage, and he was discharged on the 207th day after surgery.

Discussion

Urethral hemorrhage is caused by tumor, trauma, infection, and other conditions. At present, there is no clinical guideline for urethral hemorrhage, but urethral catheterization is usually selected as an initial therapy for hemostasis. However, uncontrollable urethral
hemorrhage caused by urethral catheterization can sometimes occur, and the use of arterial embolization rather than surgery has been reported to manage such uncontrollable urethral bleeding.\(^1\)

Continuous-flow LVADs have drastically improved the prognosis of patients with advanced heart failure. The number of LVADs implanted as destination therapy has been increasing recently.\(^2\) Regardless of its usefulness, mucosal bleeding mainly from the gastrointestinal tract occurs as the most common adverse event in one-third of these patients. This nonsurgical uncontrollable bleeding has emerged as a major source of morbidity and mortality in this fragile population. The mechanisms responsible for these adverse events include impaired platelet aggregation, overuse of anticoagulation therapy, arteriovenous malformation and acquired von Willebrand disease.\(^3\) Because of the ongoing concerns for pump thrombosis and thromboembolic events, the thrombotic/bleeding paradigm has led to a difficult clinical dilemma for clinicians managing patients with an LVAD.

In the present case, this clinical dilemma was the control of urethral bleeding due to urethral injury. Although the urethral bleeding was finally managed, conservative treatment was not effective, resulting in an unnecessary waste of time and extra transfusions. Because arterial embolization can be performed under local anesthesia with fewer complications, we should have selected this treatment at an earlier stage.

Regarding the adverse events of arterial embolization, Savoca et al. reported that arterial embolization for high-flow priapism did not result in fibrosis or changes in erectile function at the long-term follow-up examination.\(^4\) Although transient erectile dysfunction can occur shortly after embolization in some cases,\(^5\) it is not clear whether embolization is actually associated with a risk of erectile dysfunction. Erectile dysfunction is an expression of systemic vascular disease and in particular of endothelial dysfunction. It was reported as a frequent disease in heart transplant recipients although we could find no data specific to heart failure patients with an LVAD.\(^5\) Actually, this patient was not worried about his sexual function, and thus, this was not an important adverse event in this case.

![Figure 1](image1.png)

**Fig. 1.** Computed tomography image showed pooling of contrast medium in the extra space of corpus spongiosum (arrow).

![Figure 2](image2.png)

**Fig. 2.** Selective angiogram of the pubic branch of obturator artery showed the active bleeding within urethra and the extra space of corpus spongiosum (arrow) before embolization (a). This bleeding was controlled after embolization (arrow) (b).
Conclusion

To our knowledge, this is the first case of penile arterial embolization for urethral hemorrhage in a patient with an LVAD. Immediate arterial embolization should be considered for these fragile patients to manage uncontrollable hemorrhage.

Consent

Informed consent and permissions were obtained from this patient.

Conflicts of interest

There is no conflict of interest.

References

1. Radhakrishnan S, Marsh R, Sheikh N, Johnson P, Greene D. Urethral catheter induced pseudoaneurysm of the bulbar artery. Int J Urol. 2005;12:922–924.
2. Kirklin JK, Naftel DC, Pagani FD, et al. Seventh INTERMACS annual report: 15,000 patients and counting. J Heart Lung Transplant. 2015;34:1495–1504.
3. Suarez J, Patel CB, Feller GM, Becker R, Hernandez AF, Rogers JC. Mechanisms of bleeding and approach to patients with axial-flow left ventricular assist devices. Circ Heart Fail. 2011;4:779–784.
4. Savoca G, Pietropaolo F, Scieri F, Bertolotto M, Mucelli FP, Belgrano E. Sexual function after highly selective embolization of cavernous artery in patients with high flow priapism: long-term followup. J Urol. 2004;172:644–647.
5. Caretta N, Feltrin G, Tarantini G, et al. Erectile dysfunction, penile atherosclerosis, and coronary artery vasculopathy in heart transplant recipients. J Sex Med. 2013;10:2295–2302.