

## Bilateral endovascular uterine artery embolization for dysfunctional uterine artery bleeding with heartware left ventricular assist support device

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### ABSTRACT

We report a 40-year-old lady with post-partum cardiomyopathy for more than 4 years and had left ventricular assist device (LVAD) implantation. She was New York Heart Association Class IV and Interagency Registry for Mechanically Assisted Circulatory Support Level I. She had HeartWare (HeartWare Inc, Framingham, MA, USA) LVAD implantation. She was admitted to emergency department with dysfunctional uterine bleeding with a hemoglobin level 3 gr/dL and a hematocrit level 10%, 3 months postoperatively. The ultrasonographic evaluation revealed blood coagulum in the uterine cavity, she was diagnosed with dysfunctional uterine bleeding, and hospitalized. Since there was a probability of LVAD pump thrombosis, a surgical intervention was not planned. Gonadotropin releasing hormone analogue therapy and embolisation of bilateral uterine arteries prevented further dysfunctional uterine bleeding. We report the first case in the literature with advanced heart failure supported with LVAD and bilateral uterine artery embolization due to dysfunctional uterus artery bleeding with an endovascular procedure.

**Keywords:** Dysfunctional uterine bleeding; endovascular procedures; heart assist devices; uterine artery embolization.

Left ventricular assist device (LVAD) therapy is a life saving treatment in end-stage heart failure, and the patients receive anti-coagulation and anti-platelet treatment to prevent pump thrombosis. Dysfunctional uterine bleeding (DUB) is defined as excessive, prolonged, unpatterned bleeding from endometrium without any anatomic pathology of uterus. It is more frequent in adolescents, and also observed in 10-15% of adults. It is the most frequent gynecologic urgency of adolescence.<sup>[1-3]</sup> The hypothalamic-pituitary-ovarian (HPO) axis immaturity is the most common cause, and anovulatory periods are observed during first 18 months after menarche. The most common cause of abnormal bleeding in adolescence is coagulation disorders. A normal bleeding lasts 2 to 8 days, and the amount of the blood loss is approximately 30 mL. If the duration of menstrual bleeding is more than 8 days without an intrauterine device, and the number of the

sanitary pads used is 4 or more, the patient requires a careful evaluation.

Herein we describe the management of a young lady with DUB who had been suffering from post-partum cardiomyopathy, and had HeartWare (HeartWare Inc, Framingham, MA, U.S.A) LVAD implantation as a bridge to heart transplantation.

### CASE REPORT

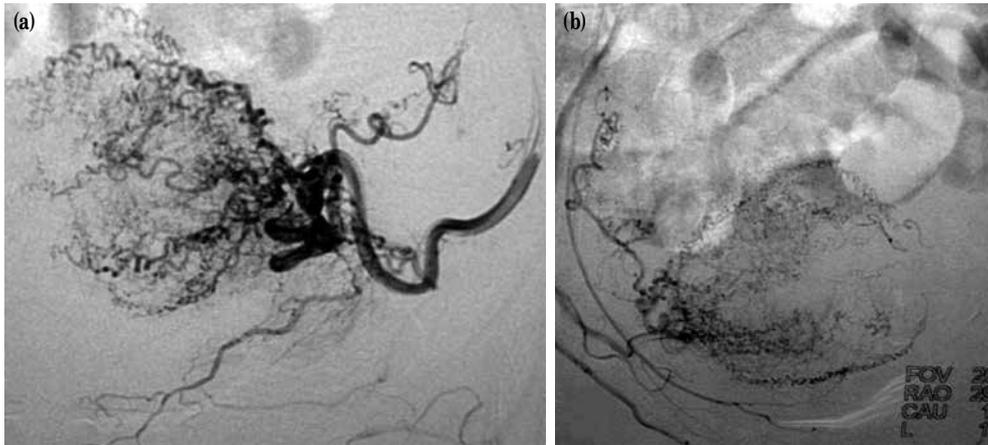
A 40-year-old woman was admitted to our heart failure clinic in May 2013. She was suffering from post-partum cardiomyopathy since 2009. She was New York Heart Association Class IV, Interagency Registry for Mechanically Assisted Circulatory Support I-II, and on hospitalization her ejection fraction (EF) was 25%, cardiac index (CI) was 2.0 L/min/m<sup>2</sup>, and cardiac

*Received:* October 30, 2014 *Accepted:* December 03, 2014 *Published online:* December 25, 2014

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#### Citation:

Demiröz ZT, Akgül Ö, Poyanlı A, Küçükaksu DS. Bilateral endovascular uterine artery embolization for dysfunctional uterine artery bleeding with heartware left ventricular assist support device. Turk J Vasc Surg 2019;28(1):51-54



**Figure 1.** Endovascular imaging of (a) Left uterine artery, (b) right uterine artery.

output (CO) was 2.9 L/min. She had HeartWare (HeartWare Inc, Framingham, MA, USA) LVAD implantation as a bridge to heart transplantation.

She was discharged from the hospital uneventfully, her cardiac output increased with LVAD implantation to approximately 4.0 lt/min. She started to have her menstrual cycle which ceased due to low cardiac output.

She admitted to emergency unit with heavy menstrual bleeding in August 2013. The patient was on anti-platelet and anti-coagulation regimen when her vaginal bleeding started, and her bleeding increased to 20 pads/day. During that period, her International Normalized Ratio (INR) was as 8. Ultrasonography revealed coagulum in the uterine cavity, and she was bleeding excessively. Her hemoglobin (hgb) level was 3 gr/dL and hematocrit level was 10%. She was hospitalized, and had infusion of blood products, her hemoglobin level increased to 10 gr/ dL. Her ovaries had antral follicles, it was decided to put her in pseudomenopause with a bolus injection of Lucrin Depot 11.25 mg (Abbott Laboratories, Illinois, USA), when her INR level dropped to 2.5, and bilateral uterine artery embolization was performed with Bead Block, Embolic Bead (Biocompatibles UK Limited, Surrey, UK) in invasive radiology department (Figures 1, 2).

One day after the procedure, anti-coagulation regimen was started and her INR level was between 2.5-3. She was discharged from the hospital 10 days after bilateral uterine artery embolization procedure, without any vaginal discharge or pain.

The appearance of the endometrium was normal 2 weeks after the procedure in her outpatient follow-up examination. Her echocardiographic studies revealed

that her LVAD pump was working efficiently. Three months after the procedure, her ultrasonographic study showed that the appearance of the endometrium was thin and regular, her ovaries were grade 1 which showed that the function of the ovaries was low. Second dose of Lucrin 3M Depot 11.25 mg was administered. Twelve months after the embolization procedure, she was hemodynamically stable with her LVAD pump, and her dysfunctional uterine bleeding episodes were ceased. She is waiting for heart transplantation with good quality of life, 16 months after the implantation (Figure 3).



**Figure 2.** Left uterine artery embolization with the embolic beads.



**Figure 3.** (a) Left ventricular assist device: patient is in the outpatient clinic 16 months after implantation. (b) Mock model of HeartWare left ventricular assist device.

## DISCUSSION

Left ventricular assist device implantation is a life saving treatment for the end-stage heart failure patients, and a strict anti-coagulation and anti-platelet regimen is mandatory for preventing pump thrombosis. The ovulatory cycles cease particularly in women with low cardiac-output syndrome, they start after LVAD implantation or heart transplantation, and the patients might experience DUB.

The most common cause of DUB is anovulation due to the immaturity of HPO axis, and second most common cause of abnormal uterine bleeding in adolescence is coagulation disorders.<sup>[1-3]</sup> Vascular system alterations (local vasoconstriction), coagulation, and re-epithelization ends the process, uterine bleeding, corpus luteum hemorrhagicum can be observed in women while taking oral anticoagulant treatment.

In our case, the use of oral contraceptives or estrogen to stop the ovulation or to treat uterine bleeding might have caused thrombosis which might have caused LVAD malfunction. The patients was not a good candidate for total abdominal hysterectomy and bilateral salpingo-oophorectomy due to her unstable hemodynamic status. As well as classical treatment modalities for DUB like oral contraceptives, estrogen-only or progesterone-only treatments, dilatation and curettage.

Endovascular bilateral uterine artery embolisation and gonadotropin releasing hormone (GnRH)

therapy was the only option in this case. After the GnRH analogue application and endovascular bilateral uterine artery embolization, number of antral follicles decreased, and ovaries were grade 1. Even after embolization, the number of antral follicles decreased, use of GnRH analogues may help to decrease bleeding until embolization was effective.

On the opposing side of the LVAD therapy, bleeding-thrombosis paradigm, there was a high interest in understanding the risk of thrombosis and associated phenomena such as hemolysis. A multi-center study on 837 patients undergoing HeartMate II LVAD implantation between 2004 and 2013, 72 device thrombosis episodes were reported in 66 patients.<sup>[4]</sup>

Mechanical circulatory support (MCS) continues to evolve in device technology, patient selection and long-term management of patients undergoing implantation of durable MCS systems.

A larger number of end-stage heart failure patients worldwide are being considered for the therapies due to growing experience with these devices, and management of adverse events is very important for the patients while bridging to heart transplantation without LVAD-related complications.

We report the first advanced heart failure case supported with LVAD and had bilateral endovascular uterine artery embolization procedure due to DUB.

### Conclusion

When a LVAD patient admits to emergency department with DUB and a hemodynamically unstable status, all the classical treatment modalities should be in mind first, since the patient had been supported with LVAD and decided to bridge to heart transplantation. Durability of LVAD is very important since any intervention or medical therapy that causes the pump thrombosis is not a good option for the patient. It was decided to treat her with GnRH analogues and endovascular bilateral uterine artery embolization, which will prevent the DUB under anti-coagulation therapy, and bridge her to heart transplantation without LVAD related-complications.

### Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

### Funding

The authors received no financial support for the research and/or authorship of this article.

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