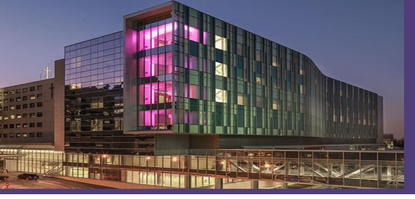

# Low Flow Alarms! A Case of Percutaneous Decommissioning of a Durable LVAD

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## Background

- Low flow alarms in left ventricular assist devices (LVAD) (defined as >2 L/min below average) can occur due to a multitude of conditions.

**Differential of Low Flow Alarms**

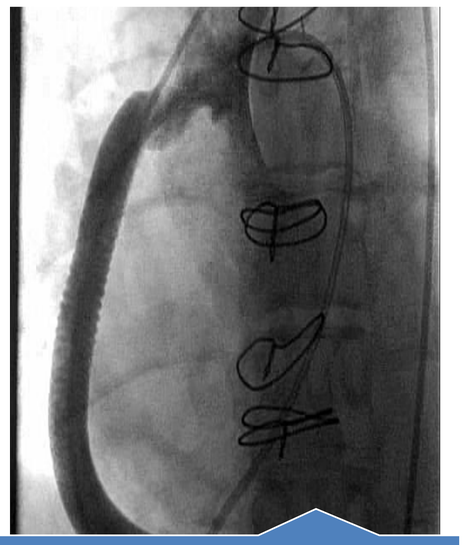
- Inflow and outflow cannula obstruction
- Hypovolemia (Dehydration, Bleeding)
- Pump thrombosis
- Right Ventricular Failure
- Cardiac Tamponade
- Arrythmias

- The evaluation, management, and troubleshooting for LVAD patients to be a unique clinical challenge
- A focused physical exam is needed to check for any signs of volume overload, pulmonary edema, or shortness of breath which may indicate acute device malfunction
- Ventricular arrythmias seen on EKGs can lead to right ventricular decompensation and need to be terminated immediately.
- An LDH value greater than >2.5x normal is concerning for pump thrombosis which is usually confirmed with an ECHO

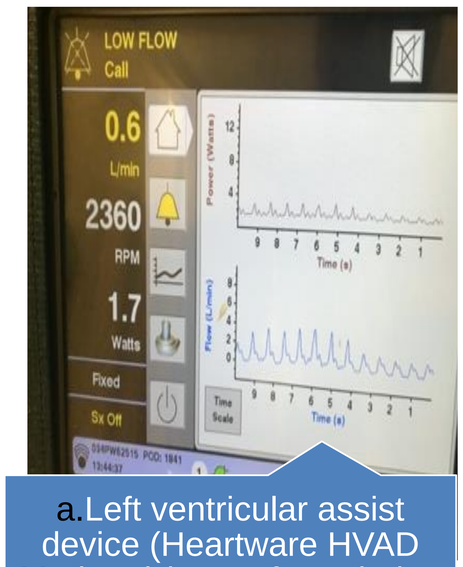
## Case Summary

- A 44 y/o female who underwent destination therapy HVAD placement three years prior presented with one week of low flow alarms (LFA's) with low pulsatility.
- A controller exchange did not resolve LFA's. CT angiography showed no outflow graft obstruction.
- Given no obvious cause of LFA and apparent myocardial recovery, we opted for percutaneous device commissioning. The patient was a poor candidate for surgical explant.
- A 0.035 inch Rosen wire was placed into the outflow graft with subsequent placement of a long 6-French sheath into the outflow graft. A 12-mm Amplatzer vascular plug was then deployed into the outflow graft with subsequent ventriculogram demonstrating retrograde flow (Figure).
- The device was powered off, the driveline buried, and the patient discharged home with lifelong Coumadin (INR goal 2-3) and Aspirin 81 mg.

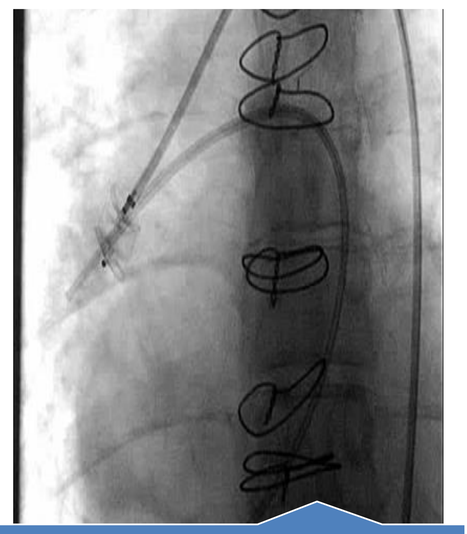
## Figures



a.Angiogram of left ventricular outflow graft demonstrating no significant stenosis at the outflow anastomosis site.




a.Left ventricular assist device (Heartware HVAD Medtronic) waveform during balloon occlusion of the outflow graft resulting in further reduction in waveform pulsatility and flow.



a.Angiogram demonstrates graft occlusion and absence of retrograde flow and anterograde flow.

## Discussion

- In patients who are symptomatic presenting with low flow alarms, LVAD speed optimization should first be attempted while determining the various complications leading to low flow
- If determined to have pump failure, the standard of care involves pump exchange via surgical explantation
- There is little established criteria for device explant with myocardial recovery as seen in our patient.
- For individuals who show evidence of myocardial recovery and are considered high surgical risk, transcatheter interventions are efficacious

## Conclusion

- Surgical explant remains the gold standard, however alternatives must be explored in high-risk patients who can't tolerate surgery

- This case demonstrates feasibility of percutaneous LVAD decommissioning in patients with myocardial recovery or device-related complications not amenable to surgical explant