



Incidence of Pump Failure and Replacement in Continuous Flow Left Ventricular Assist Devices

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I have no relevant disclosures

Background

- The use of left ventricular assist devices has increased dramatically over the past 5 years due to the success of the newest generation of devices.
- Both the mechanical reliability and patient-pump compatibility are important to patient survival.
- Previous generations of pumps revealed that no LVAD is perfect.
- With increasing wait times for bridge to transplant patients and longer durations of support for destination patients, reliability is even more important.

Purpose

- Our objective was to determine the all cause rate and etiology of pump failure necessitating pump change in continuous flow left ventricular assist devices.

Methods

- A retrospective single center analysis was conducted on all continuous flow LVADS implanted between June 2006 and September 2012.
- The choice of LVAD type was made by an interdisciplinary team after patient consultation.
- No patients were excluded.
- Pump thrombus was suspected by high plasma hemoglobin/LHD and power increases.
- Also analyzed were patients that had all anticoagulation stopped for at least 4 continuous weeks compared to patients with no or minimal anticoagulation cessation.

Methods

- 123 patients had a continuous flow LVAD placed.
- 107 Heartmate II, and 16 Heartware.
- In the Heartmate II group 41 patients were BTT and 66 patients were DT.
- In the Heartware group 14 patients were BTT and 2 patients were DT.

Long-Term Continuous Flow LVADS (N= 123)

Age (years)	28-77 (60±11)
Sex f/m	23/100
BMI	17-54 (29±7)
ICM	79 (64%)
Previous sternotomy	59 (48%)
VO2 max (n=22)	5-24 (11±4)
INTERMACS 1 or 2	91 (74%)

Long-Term Continuous Flow LVADS (N= 123)

HMII/HW	107/16
Duration of support (days)	1-1414 (349±348)
Cumulative experience	116.8 pat.years
Median (days)	225
Sub-therapeutic or No antithrombotic agents > 4 weeks	22 patients

Results

- During the study period, 21/123 patients (17%) were identified as having a pump failure needing pump exchange.
- A pump failure rate of 0.18 events per patient year.
- 3 of the 21 did not undergo pump change and expired.
- In patients with suspected pump thrombus, thrombus was confirmed in all at pump explantation.
- Of the 18 who underwent pump exchange there were no operative mortalities.

Long-Term CF LVADS (N= 123)

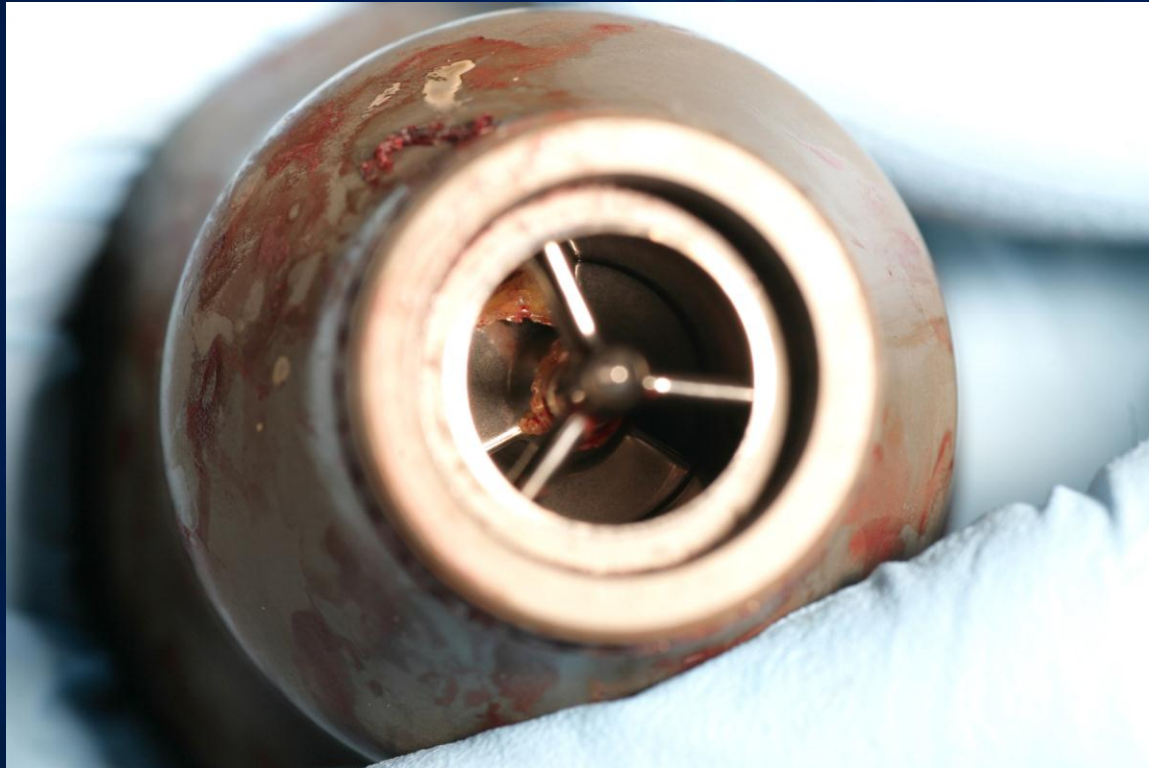
Pump change/failure

Reason	n	%	event.pt/year
➤ Percut. lead fracture	8	6.5	0.069
➤ Inflow cannula malposition	3	2.4	0.026
➤ Pump thrombosis	7	5.7	0.06
➤ Pump thrombosis associated with infection or sepsis	3	2.4	0.026

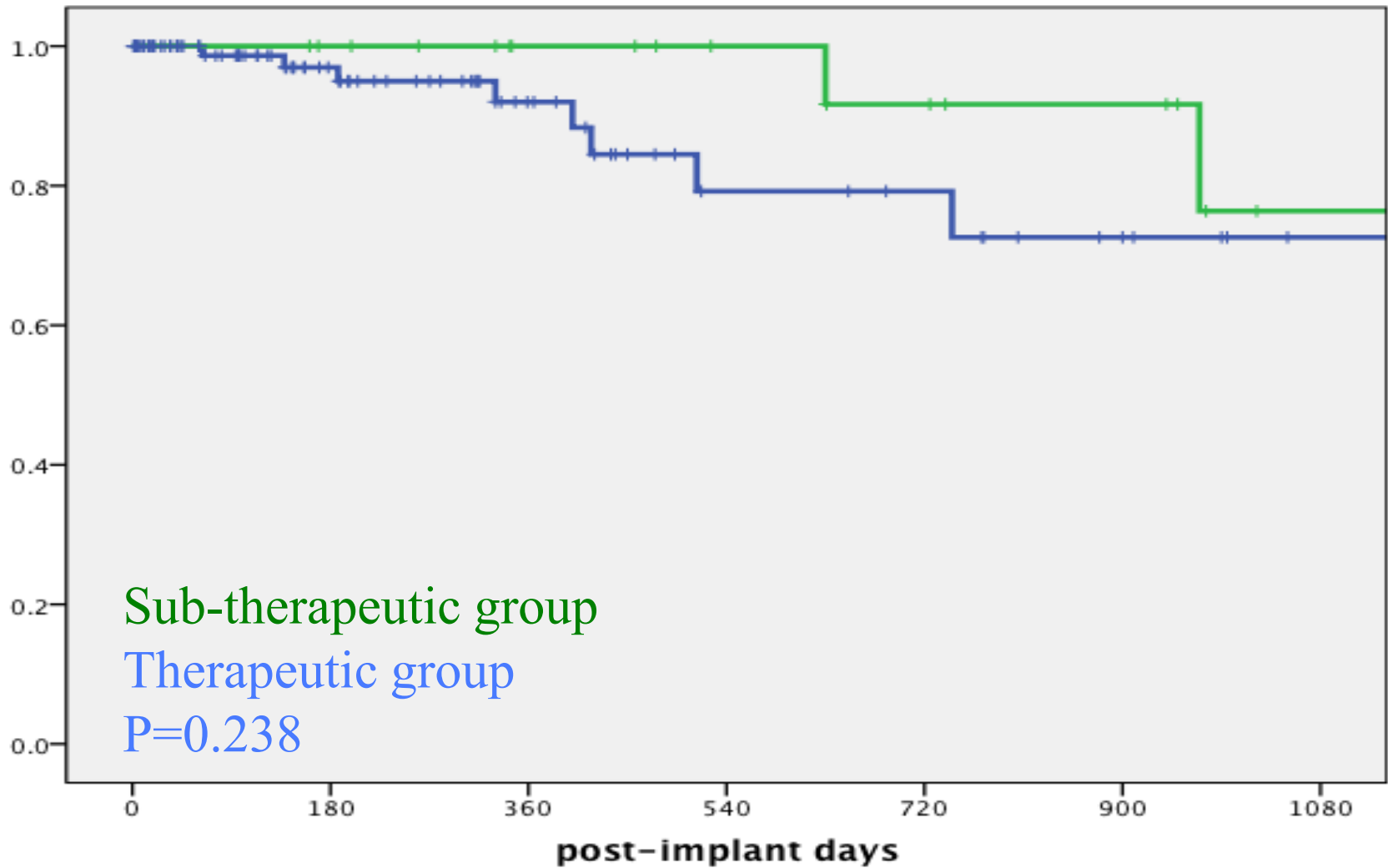
Mechanical Failure: Internal Lead Fracture



Pump Thrombus



Freedom from pump change and level of anticoagulation



Limitations

- Single center, retrospective study
- Relatively small number of Heartware patients
- Inherent variability of initiation and maintenance of anticoagulation.

Conclusions

- A significant number of patients, 17% in this series, on long term LVAD support will need a pump change.
- Driveline issues and pump thrombus are the most common reasons for exchange.
- Pump exchange can be performed with low mortality.
- We did not observe a correlation between long cessation of anticoagulation and pump thrombus.