

Trankle C et al. Left Ventricular Assist Device Outflow Graft Compression: Incidence, Clinical Associations and Potential Etiologies. *Journal of Cardiac Failure*

STUDY HIGHLIGHTS

Hypothesis: Biodebris in LVAD bend relief → external outflow graft compression

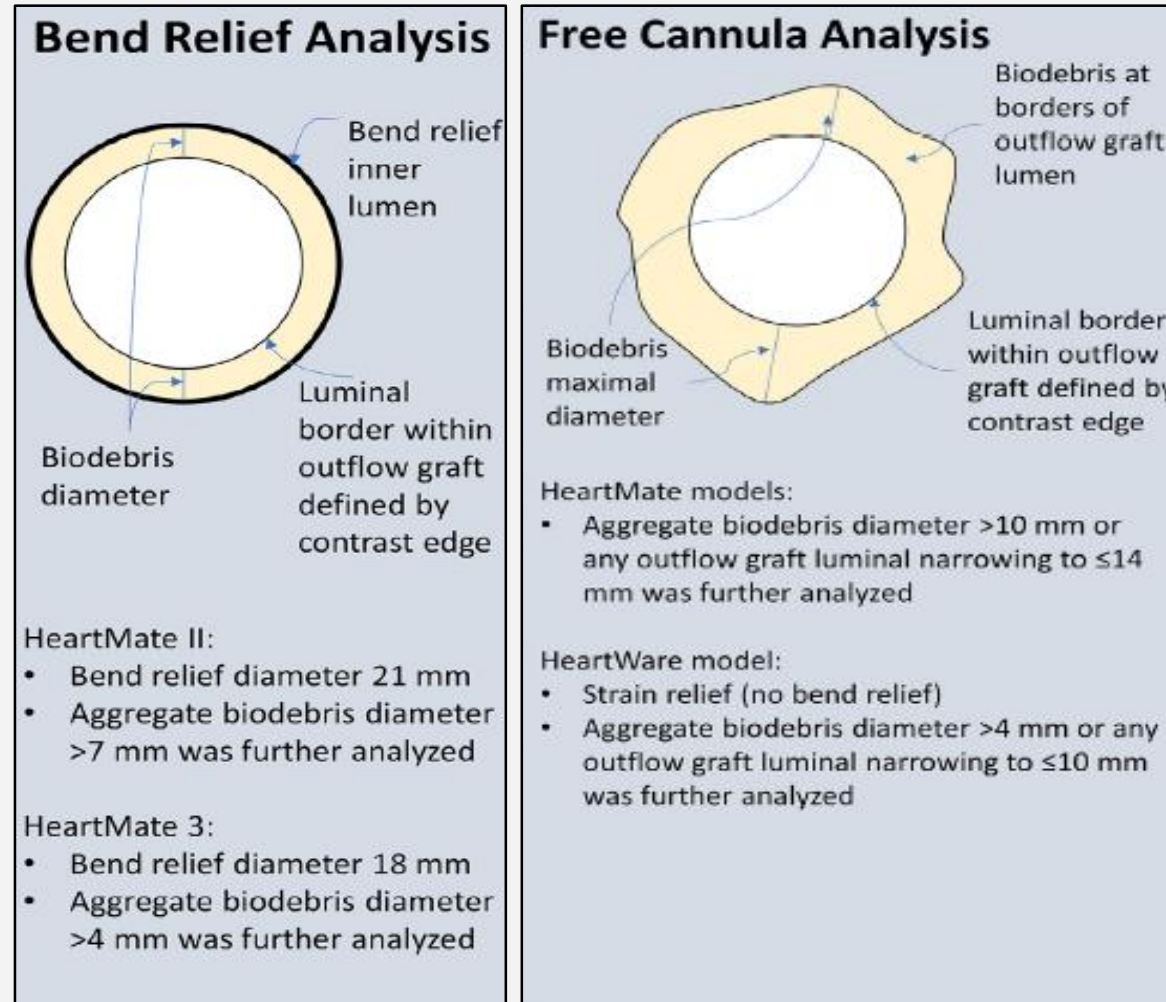
Design:

- Retrospective, single center
- Inc: LVAD + chest CTA (09-17)
- Measured degree of biodebris
- Different imaging criteria for HM2, HM3, HVAD

Results: n = 110

- **Significant biodebris + graft narrowing**
 - **15/93 HeartMate** devices
 - **0/17 HVAD**
- Outflow graft kinking
 - **4/93 HeartMate** device
 - **0/17 HVAD**

CENTRAL FIGURE



REVIEWER'S COMMENTS

Biodebris build up = under-recognized. ?? implications for HeartMate devices

(HVAD: no fully encasing bend relief)

Limitations:

- Mostly HM2 (n=89)
- 5 CTAs excluded for poor quality → unclear criteria
- Selection bias; why did patients have CTAs?
- Different LVAD device designs → difficult to compare LVAD types

Freya S et al. Noninvasive Assessment of Hemodynamic Status in HeartWare Left Ventricular Assist Device Patients: Validation of an Echocardiographic Approach. *JACC: Cardiovascular Imaging*

STUDY HIGHLIGHTS

Objective:

Validate **echo-based HVAD protocol** for **estimating hemodynamic status**

Methods:

- 35 HVAD patients (2014-2017)
- Correlated echo estimates with RHC

Results:

- **Strong correlations between estimated and invasive pressures**
 - ✓ RA (r = 0.839); LA (r = 0.889)
- Accurate for finding high pressures
 - ✓ RA (AUC = 0.94); LA (AUC = 0.91)
- High RAP correlated with:
 - ✓ High LAP
 - ✓ Death/hospitalization at 180d
- **Hemodynamic profiles correlate with clinical risk**

CENTRAL FIGURE: HVAD protocol

FIGURE 1 Doppler Echocardiographic Protocol for Noninvasive Assessment of Right Atrial Pressure and Wedge Pressure

A
$$eRAP = (eRAP_{IVC} + eRAP_{HVFF} + eRAP_{right\ E/e'})/3^*$$

* or mean of available values

	eRAP _{IVC}	eRAP _{HVFF}	eRAP _{right E/e'}
20 mm Hg	IVC > 21 mm without collapse	V _s < V _D and HVFF < 45% or V _s reverse	> 8
15 mm Hg	IVC > 21 mm with < 50% collapse	V _s < V _D and HVFF < 55%	> 6
10 mm Hg	IVC > 21 mm with > 50% collapse OR IVC ≤ 21 mm with < 50% collapse	V _s < V _D and HVFF < 55%	> 4
5 mm Hg	IVC ≤ 21 mm with ≥ 50% collapse	V _s > V _D	≤ 4

B
$$eLAP_2 = (eLAP_{E/A} + eLAP_{MDI} + eLAP_{septal\ E/e'} + eLAP_{MR})/4^*$$

* or mean of available values

	eLAP _{E/A}	eLAP _{MDI}	eLAP _{septal E/e'}	eLAP _{MR}
20 mm Hg	Restrictive (DT < 125 ms)	< 1.5	≥ 20	4+/4+
15 mm Hg	Restrictive (DT 125-160 ms)	< 2	≥ 15	3+/4+
10 mm Hg	Pseudonormal	> 2	≥ 8	2+/4+
5 mm Hg	Impaired relaxation	> 3	< 8	1+/4+

Selected terms: eRAP, estimated right atrial pressure; HVFF, hepatic venous systolic filling fraction; eLAP, estimated left atrial pressure; MDI, mitral deceleration index

REVIEWER'S COMMENTS

First prospective study of non-invasive hemodynamic evaluation in HVADs

LVAD echo imaging quality often limited → use of Doppler techniques may be of value

Normal RA and LA filling pressures linked with better outcomes

Limitations:

- Single center
- Small derivation cohort, n=5
- Small validation cohort, n=35
- Generalizability limited (experience in image acquisition variable)

Truby LK et al. Impact of Bridge to Transplantation With Continuous-Flow Left Ventricular Assist Devices on Post-Transplantation Mortality. *Circulation*.

STUDY HIGHLIGHTS

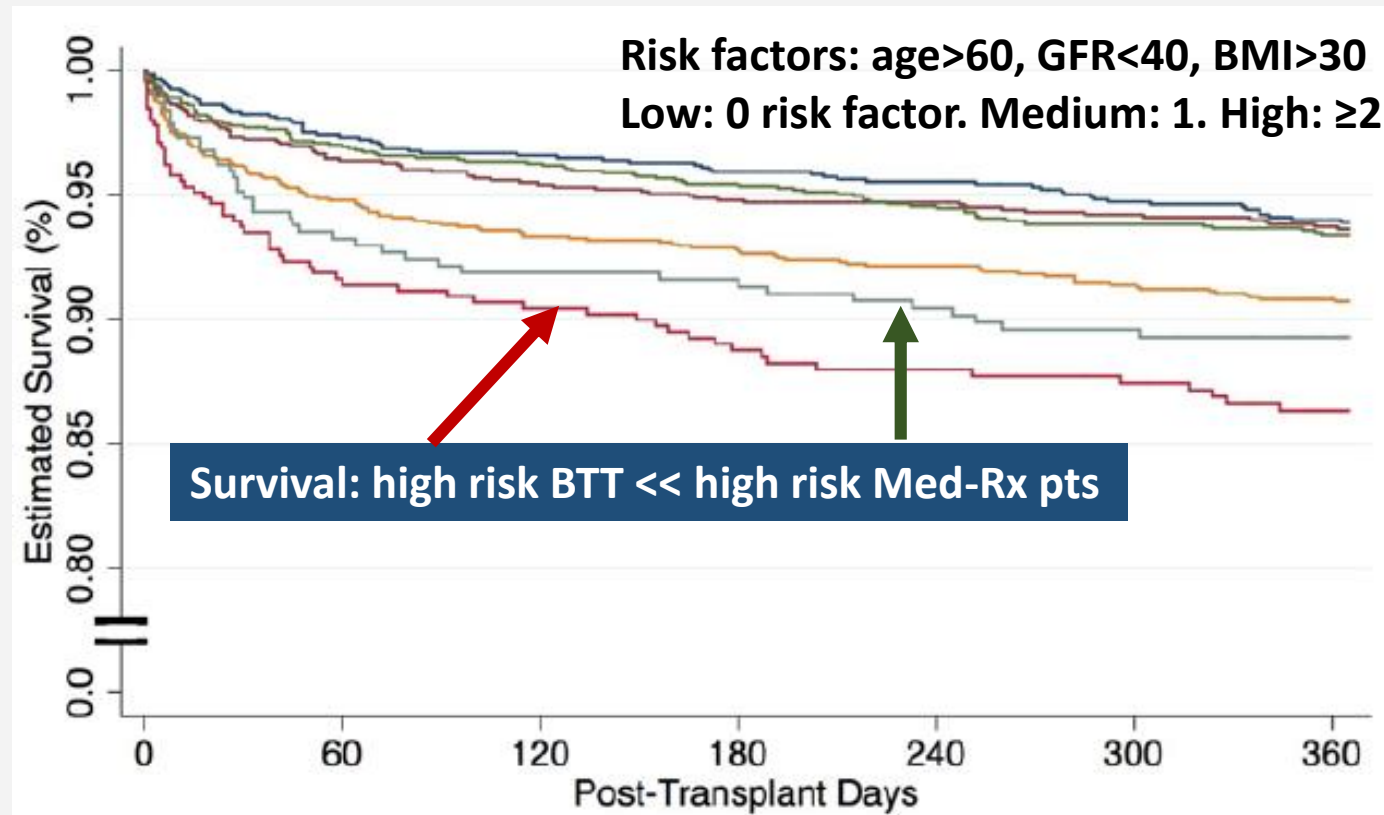
Background:

- ↑ # of BTT-LVAD to OHT
- BTT-LVAD may assoc. w/ ↓ post-OHT outcomes (small studies)
- No difference in listing status between BTT-LVAD vs. Med-Rx patients

Design:

- UNOS database query
- Compare **outcomes** of BTT-LVAD vs. Med-Rx patients
- Propensity-matching analysis

CENTRAL FIGURE



Outcome: BTT-LVAD ≈ ↑↑ 1-yr post-OHT mortality (90.5% vs. 92.8%, log-rank p<0.0001). Most deaths ≈ CV cause (PGD)

REVIEWER'S COMMENTS

• **Values of study:**

- Large database
- Propensity matching
- Raised question: **should BTT-LVAD pts be listed differently vs. Med-Rx pts**

• **Main limitations:**

- Retrospective
- Registry based -> Inconsistent data collection (PGD not universally defined)
- No validation cohort

Li S et al. Accuracy of Doppler Blood Pressure Measurement in Continuous-Flow Left Ventricular Assist Device Patients.

ESC Heart Failure.

STUDY HIGHLIGHTS

Purpose: BP measured by Doppler vs. A-line (gold standard).

Why: BP control \approx \downarrow CVA risk. Measure BP \approx challenging in CF-LVAD.

Design: N=154; HM2=994 vs. HVAD=939, combined=1933 observations)

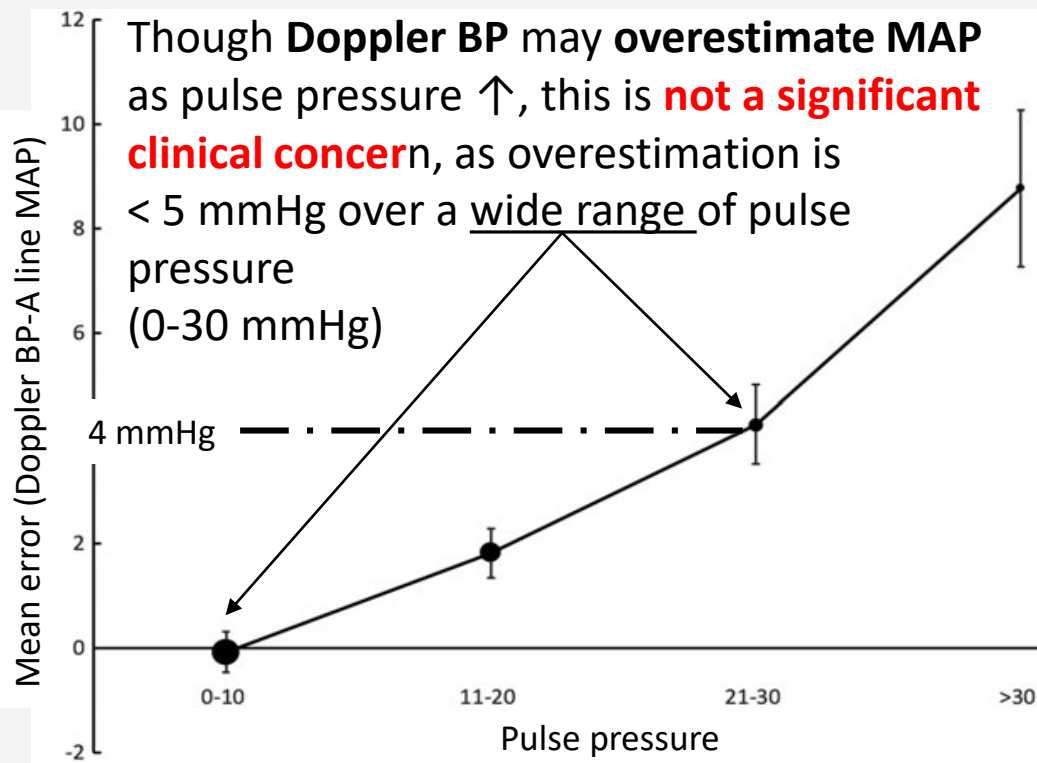
Results: A-line MAP vs. simultaneously measured Doppler opening pressure

- $r = 0.741, p < 0.0001$
- Mean Error = 2.4 [7.5]
- Median error = 1 [-2,5]

Correlation: HM2 better than HVAD

CENTRAL FIGURE

Doppler BP correlates better w/ A-line MAP (87% between ± 10 mmHg) than A-line systolic BP (64% between ± 10 mmHg)



REVIEWER'S COMMENTS

Largest study on this subject to date.

Doppler opening pressure may be the most accurate method for non-invasive BP measurement in CF-LVAD.

Future studies needed to show consistency in clinical practice.

Extrapolation limited due to:

- Single center design
- Selection bias
- No HM3 included.

Cikes M et al. Cardiac Implantable Electronic Devices with a Defibrillator Component (CEID-D) and All-Cause Mortality in Left Ventricular Assist Device Carriers: Results from the PCHF-VAD Registry. *European Journal of Heart Failure.*

STUDY HIGHLIGHTS

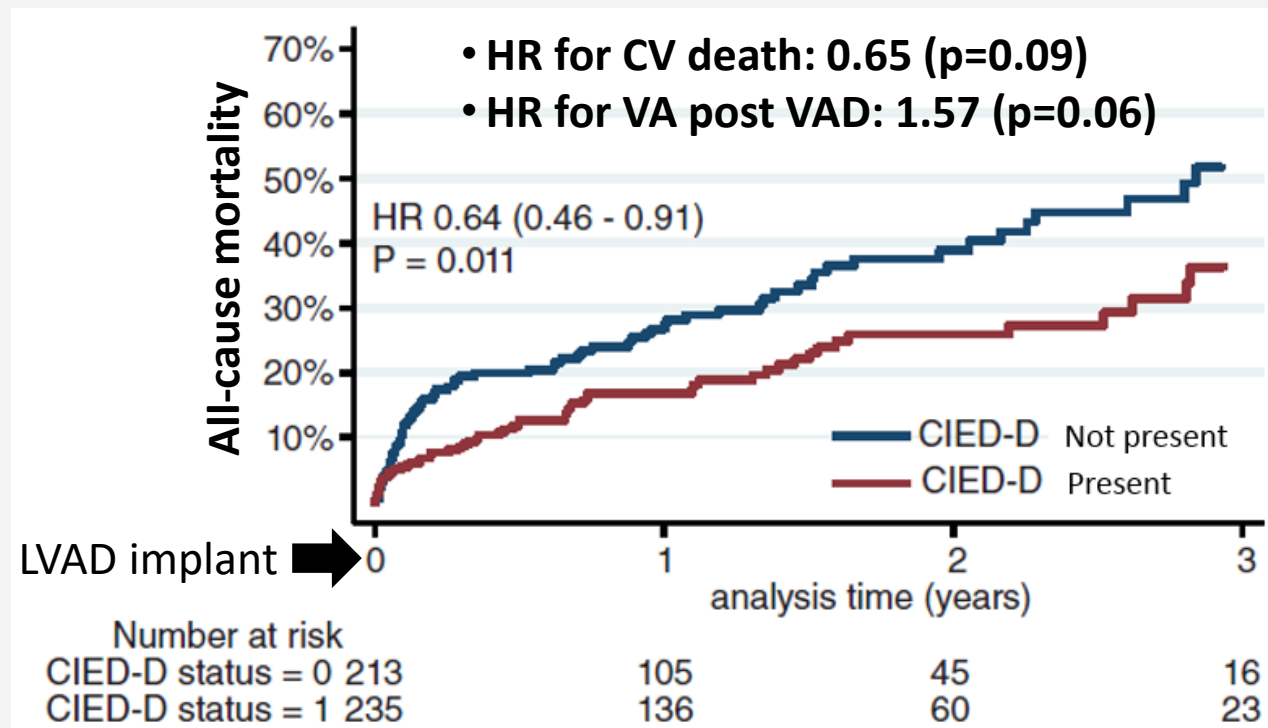
Purpose: compare outcomes of patients with & without ICD or CRT-D (CIED-D).

Why: prior studies conflicting, some suggested no mortality benefits w/ ICD in CF-LVAD patients.

Design: Time-varying analysis using data from multicenter PCHF-VAD registry: N=448 (CIED-D=208 vs. NO-CIED-D=240).

Results: Risk reduction of all-cause mortality w/ CIED-D: **39%** (Propensity score adjusted).

CENTRAL FIGURE



Other risk factors for all-cause death: ↑age, LVAD implant as redo surgery, ↑burden of ventricular arrhythmias (VA), pre-VAD vasopressor use.

REVIEWER'S COMMENTS

Extensive adjustments for potential confounders showing **mortality benefit of CIED-D post LVAD.**

Prospective randomized study needed.

Limitations:

- Retrospective registry-based study
- Lack of data on arrhythmias in controls (no-CIED-D)
- Disparities in CIED-D use in LVADs between Europe and USA limit extrapolation
- Association ≠ causality