Complications of Left Ventricular Assist Device Chronic Support.

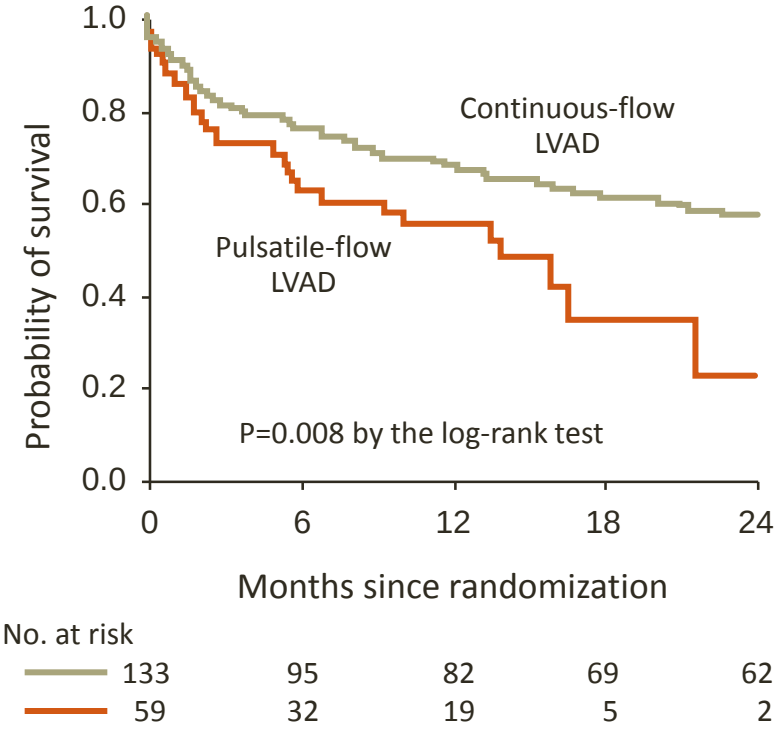
Dr. Tal Hasin

RMC, Beilinson, Petach-Tiqva, Israel

- No disclosures

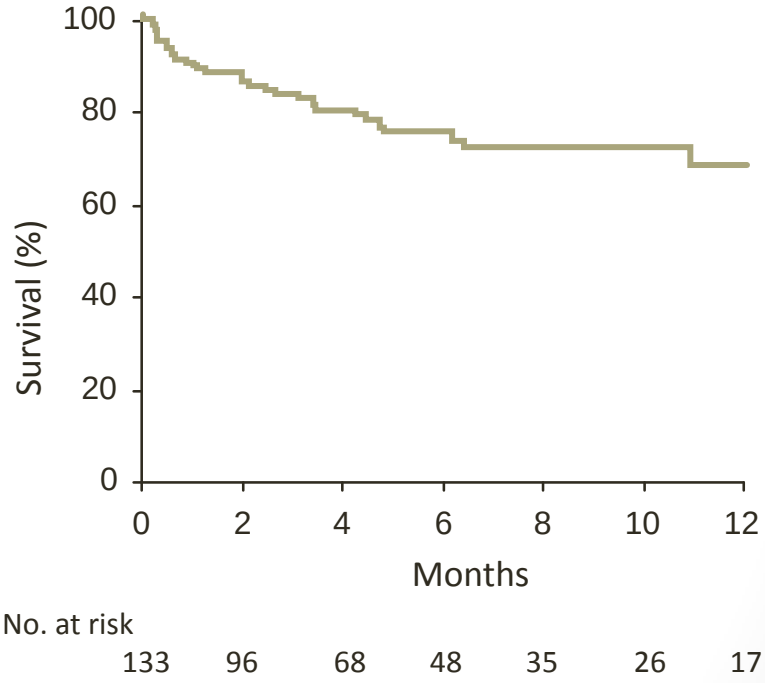
Survival with LVAD

Destination



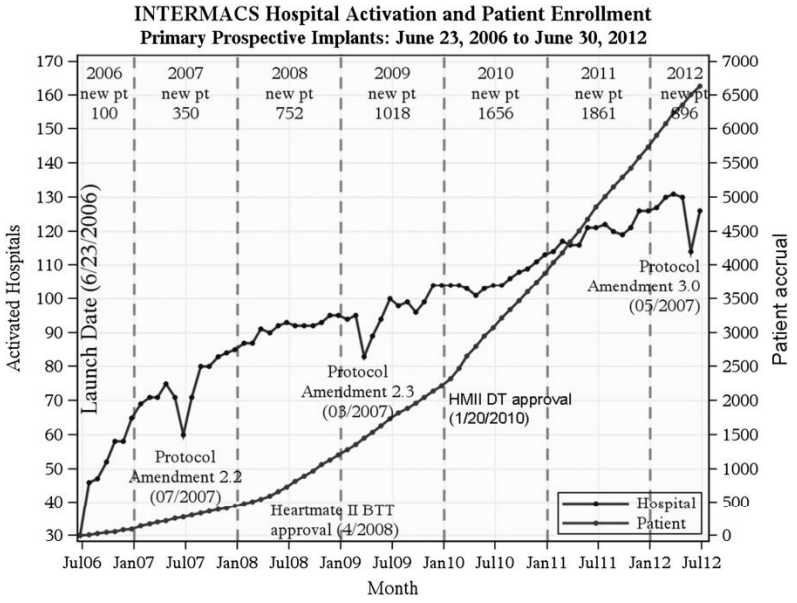
Slaughter, N Engl J Med 361:23, 2009

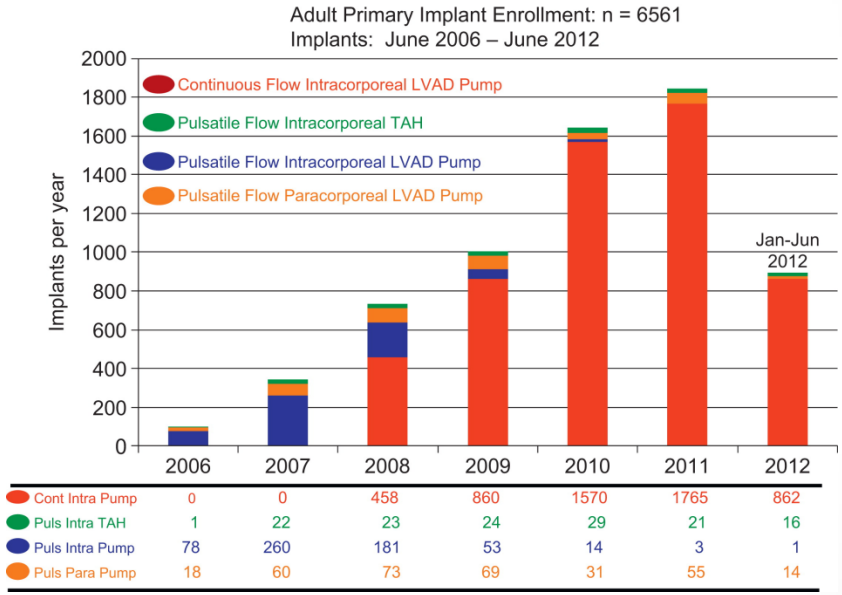
Bridge to transplant



Miller, N Engl J Med 357:9, 2007

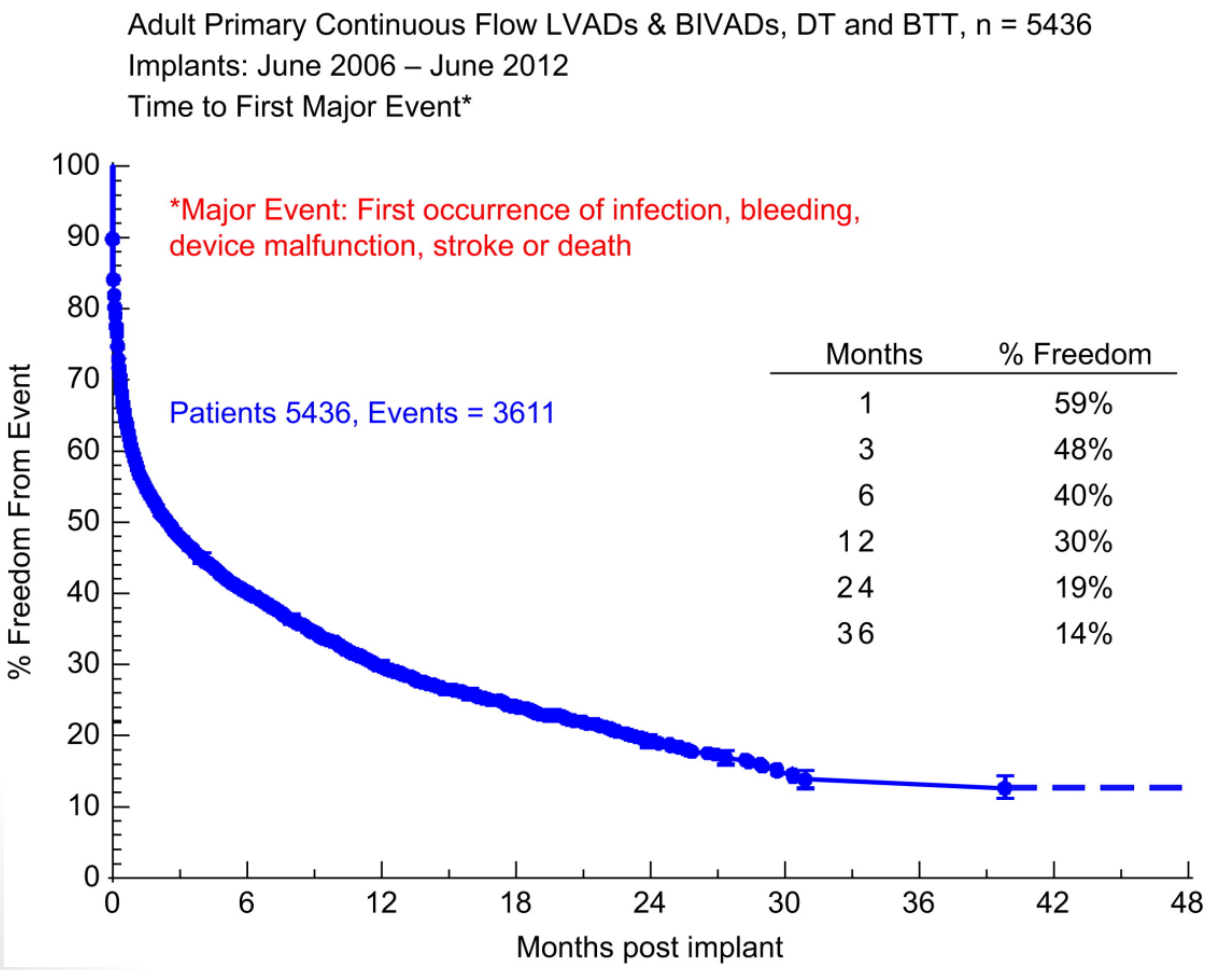
LVAD in the Treatment of Heart Failure





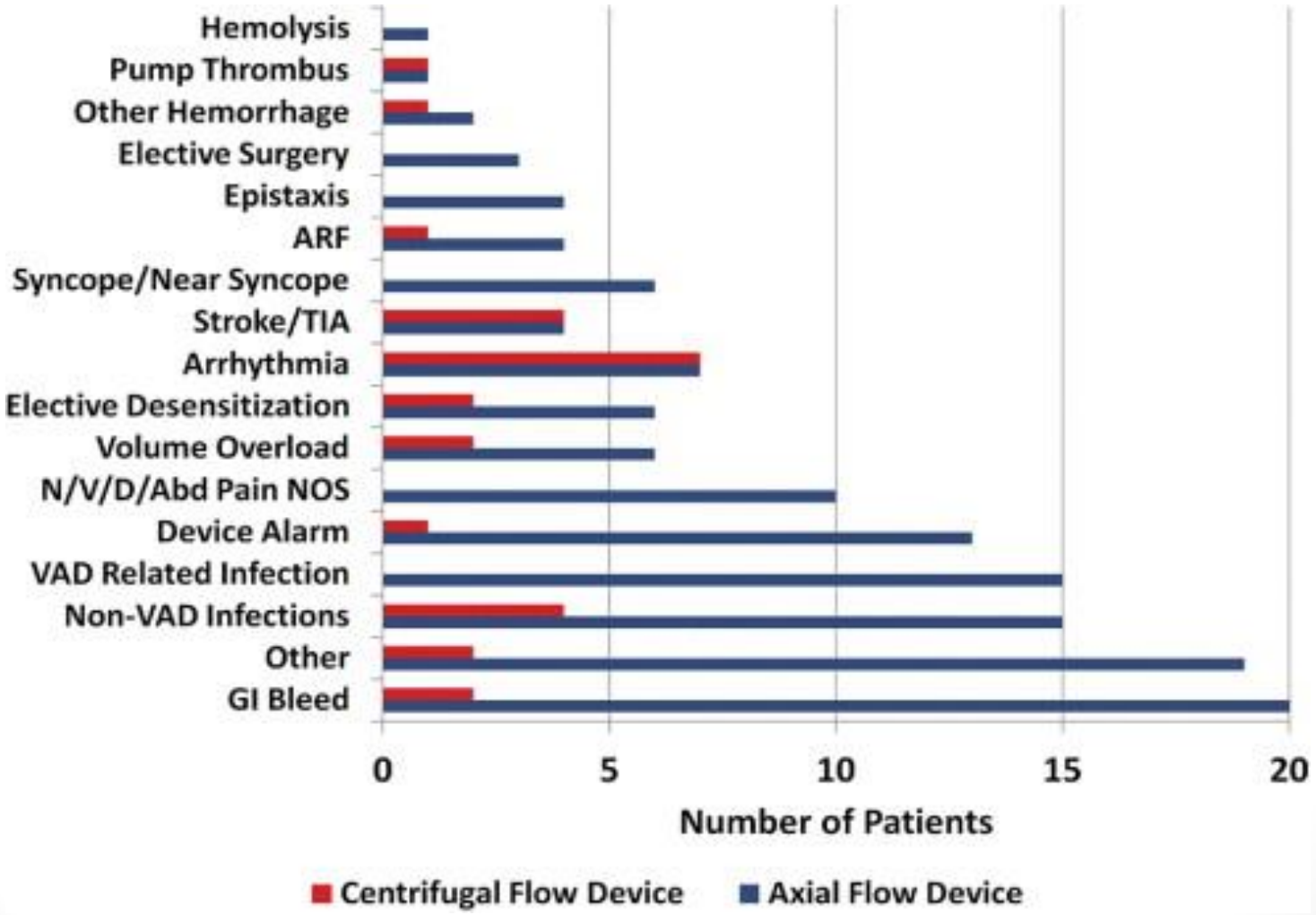
Kirklin, JHLT 32; 2, 2013

Despite an overall improved survival and QOL, most LVAD patients will have an adverse event



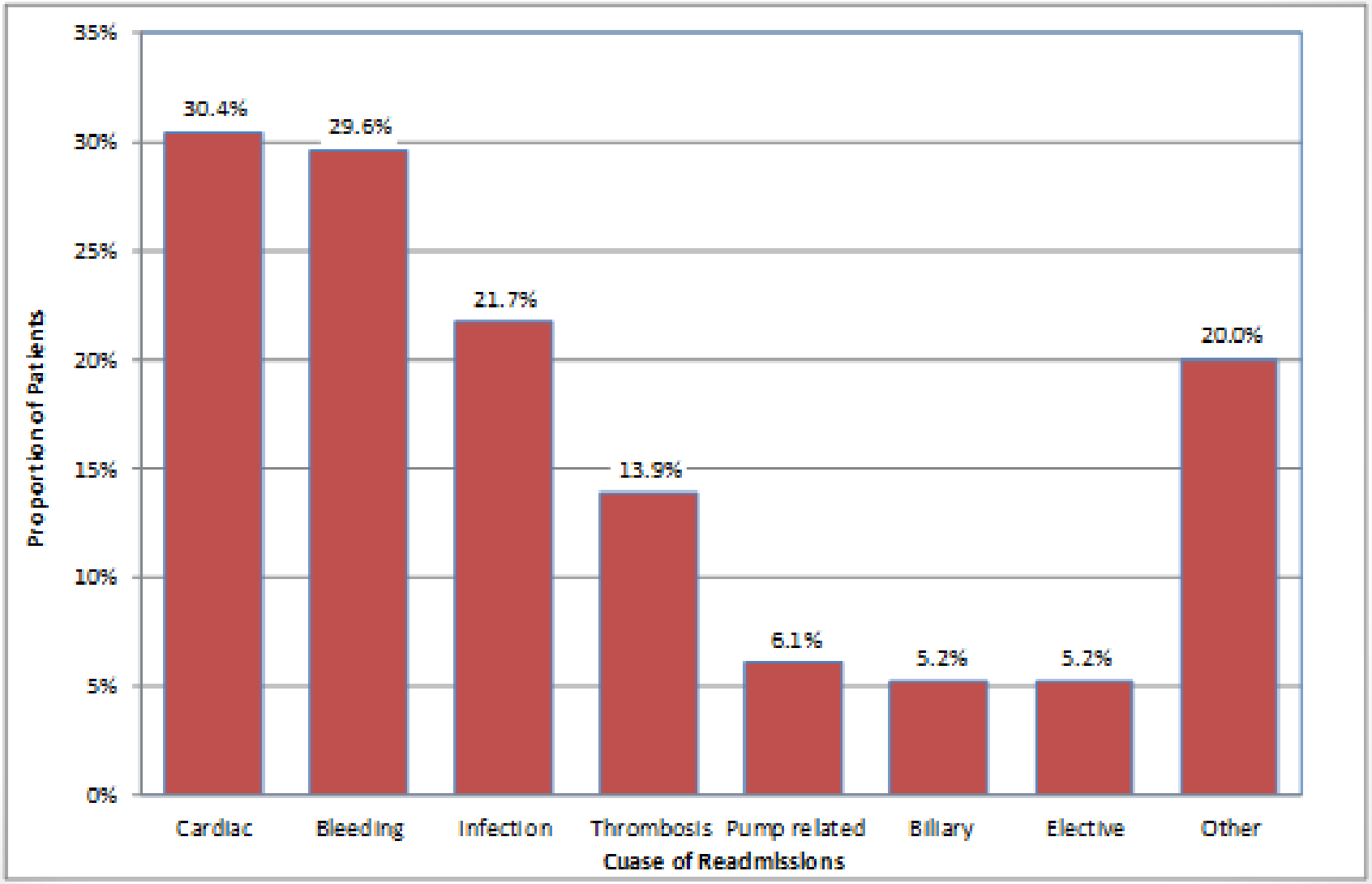
Kirklin, JHLT 32; 2, 2013

Causes for Readmissions after LVAD



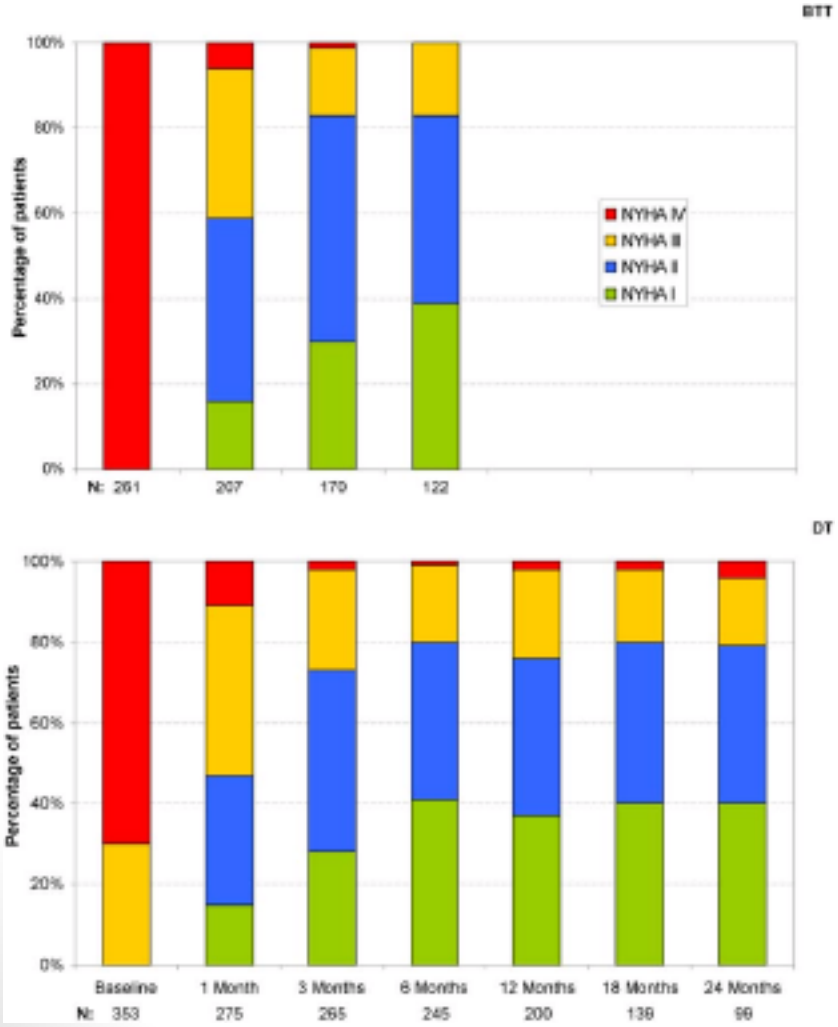
Forest, The Annals of Thoracic Surgery 95; 4, 2013

Causes for Readmissions after LVAD



Hasin, JACC 15;61(2), 2013

HF with LVAD



	Readmissions (BTT, DT)	Patients (BTT, DT)
Cardiac readmissions	50 (11, 39)	35 (7, 28)
Heart failure	21 (6, 15)	19 (4, 15)
Arrhythmia	27 (5, 22)	19 (4, 15)
Ventricular arrhythmia	24 (4, 20)	17 (3, 14)
Chest pain	2	2

Rogers, JACC 55;17, 2010

Arrhythmias

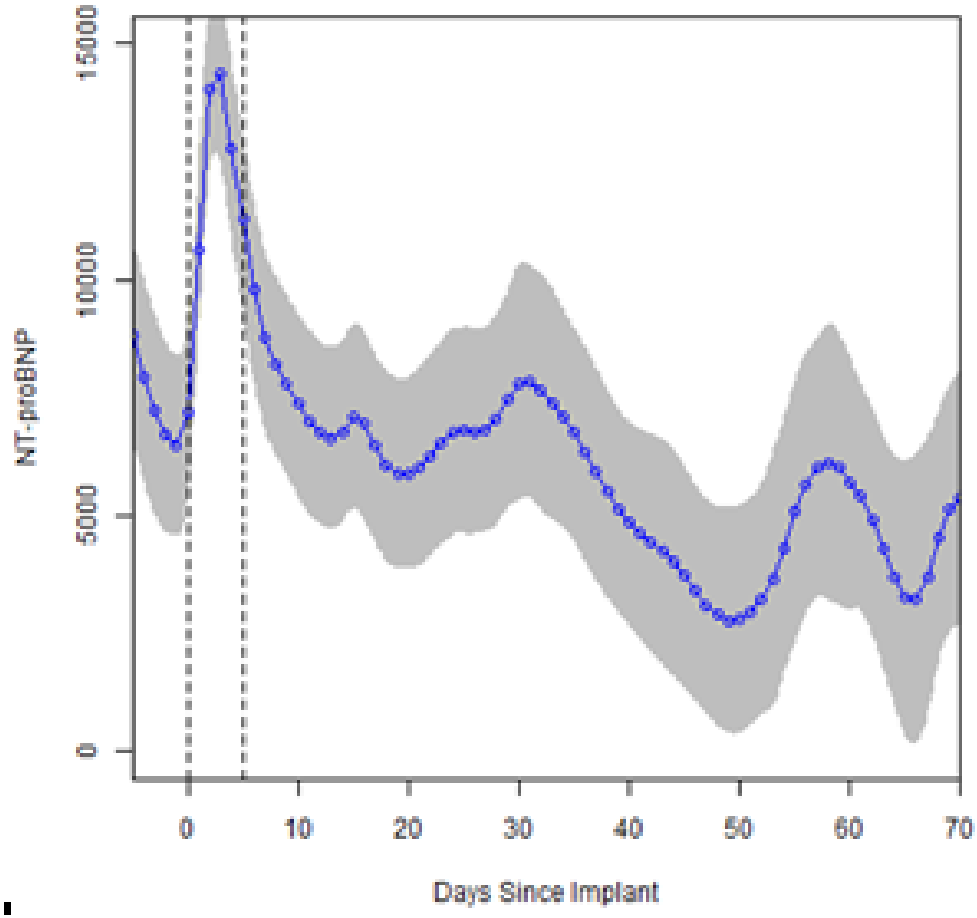
- Ventricular arrhythmias
- Etiology: scar, cannula, electrolytes, ischemia
- Clinical: well tolerated; RV dysfunction
- Treatment: ICD for all?, medications, pump adjustment, ablation (post-op, intra-op)

Heart Failure with LVAD

- RV dysfunction
- Fluid overload (renal dysfunction)
- Pump problems (thrombosis, cannula obstruction, graft kink)
- Pump speed adjustment
- Aortic regurgitation

Resolution of the HF syndrome may take time

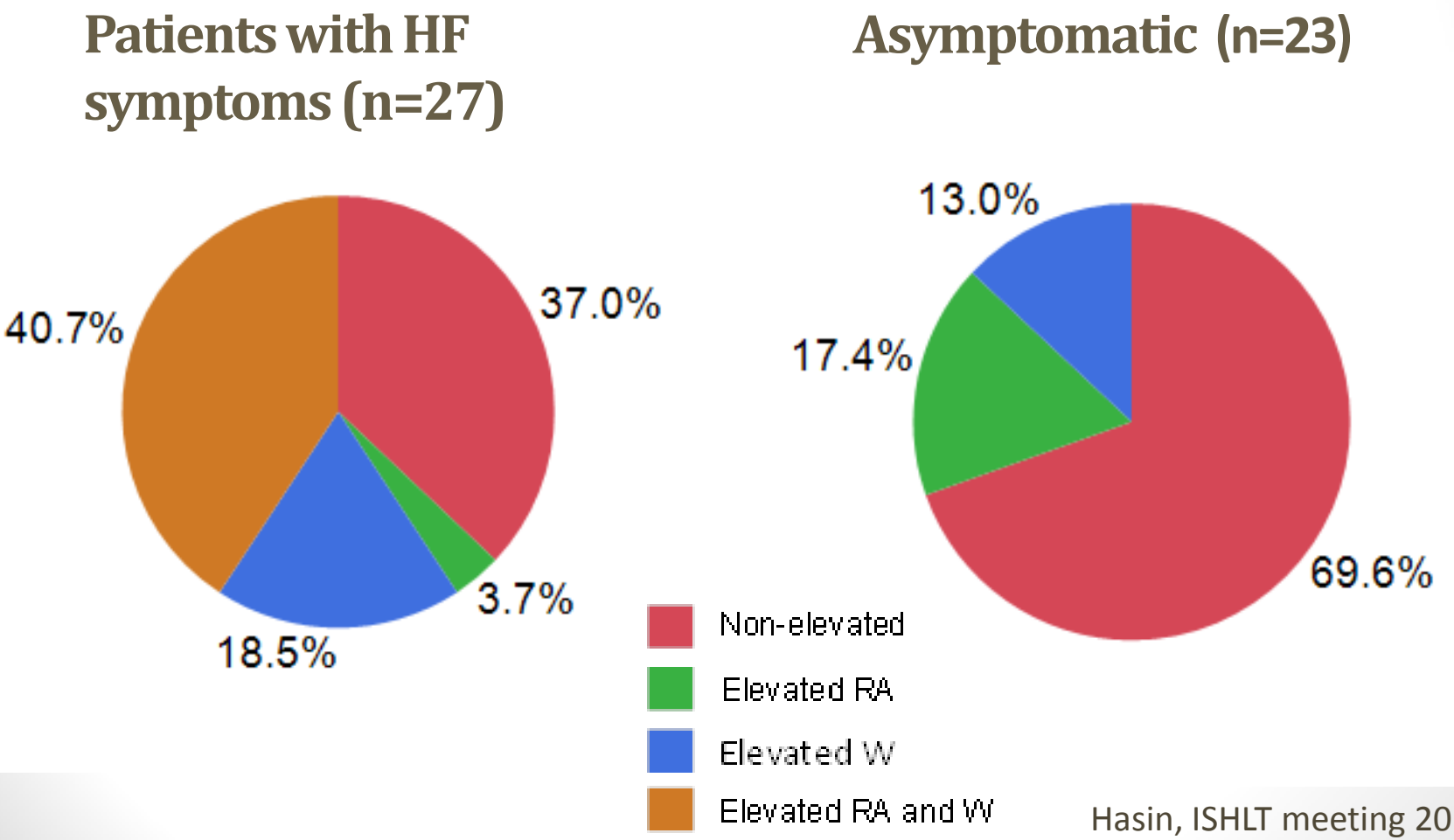
- Post-opertative NTproBNP trends among 72 LVAD recipients.



Hasin, IHS meeting 2012

It's not always just the RV

- Elevated (>15mmHg) filling pressures among patients on LVAD support



Hasin, ISHLT meeting 2013

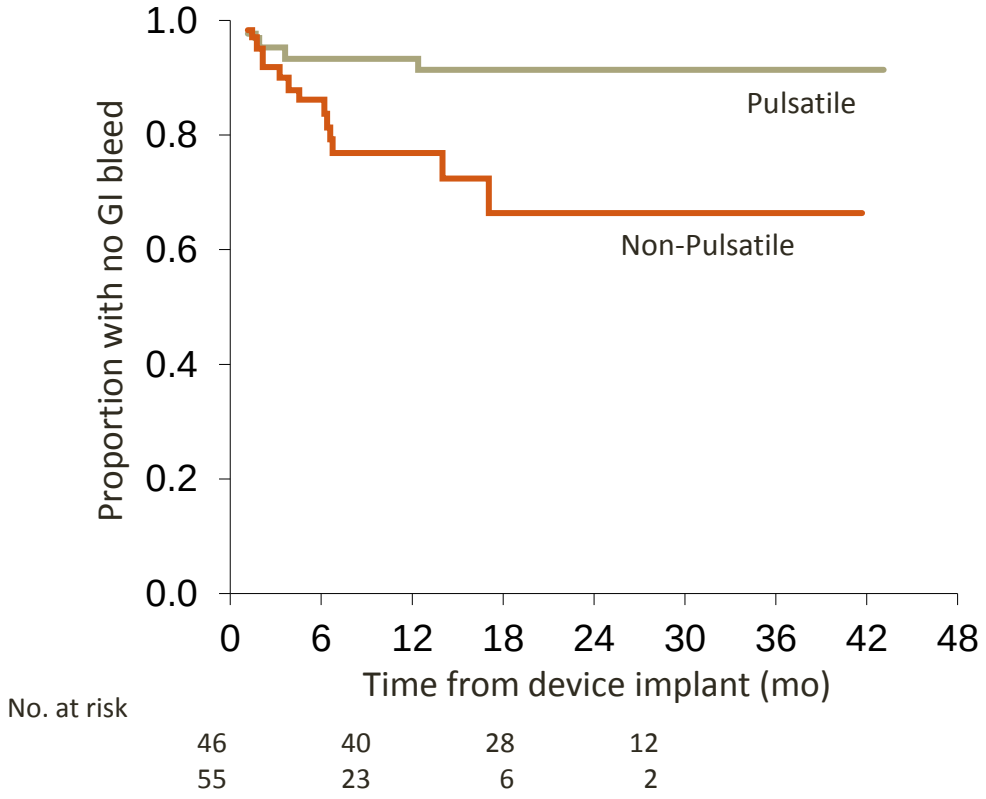
Bleeding

- Most late bleeds are GI, 57% UGI (erosions, ulcers, angiodysplasia)
- Risk factors include previous GI bleed, high INR, low platelets
- Re-bleeding is common (50%), usually from same site
- Hydes syndrome may partly explain the pathophysiology

Aggarwal, Annals of Thoracic Surgery 93; 5, 2012

Bleeding

- GI bleed usually will occur within the first 6 months



Crow, The Journal of Thoracic and Cardiovascular Surgery , 137; 1, 2009

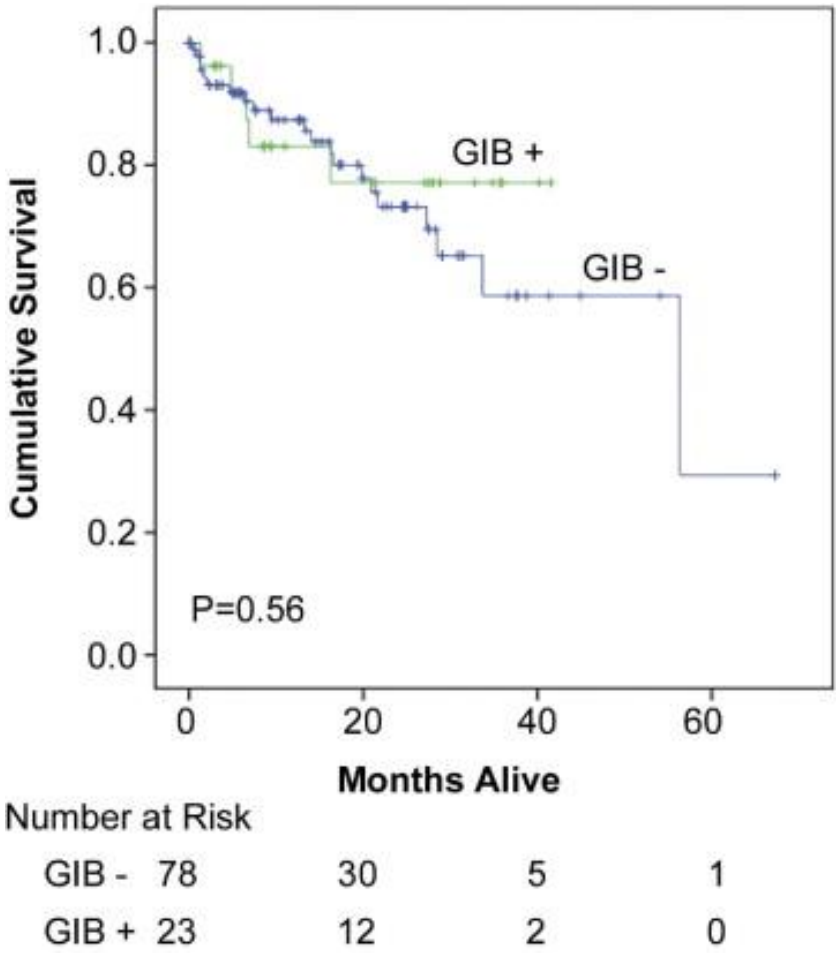
GI Bleeding- Treatment

- Stopping anticoagulation
- Endoscopy (upper, lower), double balloon, capsule.
- Treatment: local, anti-acid (?Danazol, ?Octreotide)

Pereira, Interactive CardioVascular and Thoracic Surgery 11 ;4, 2010

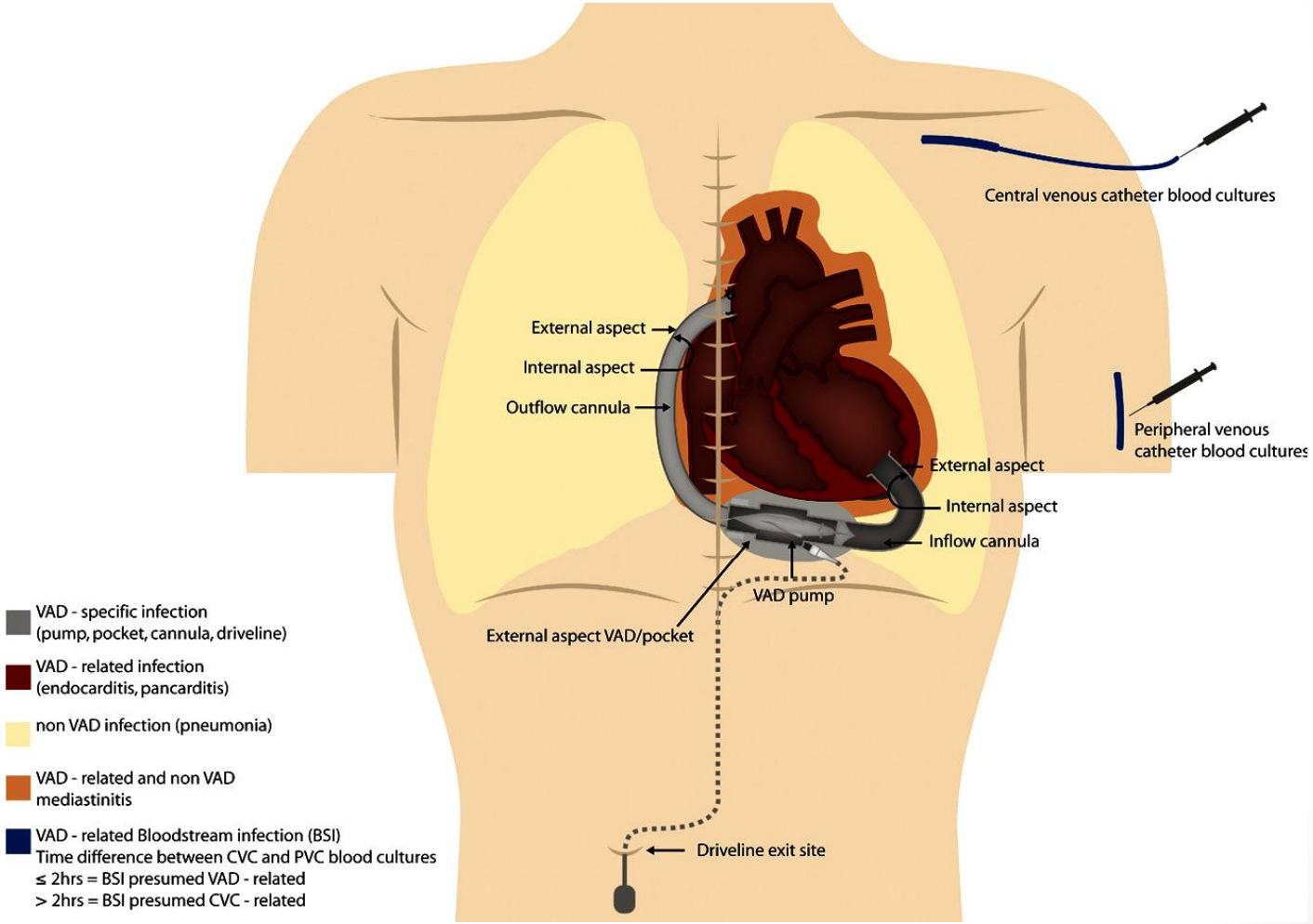
Bleeding

- All cause bleed was 5th cause of death (3%) in the HMII DT trial



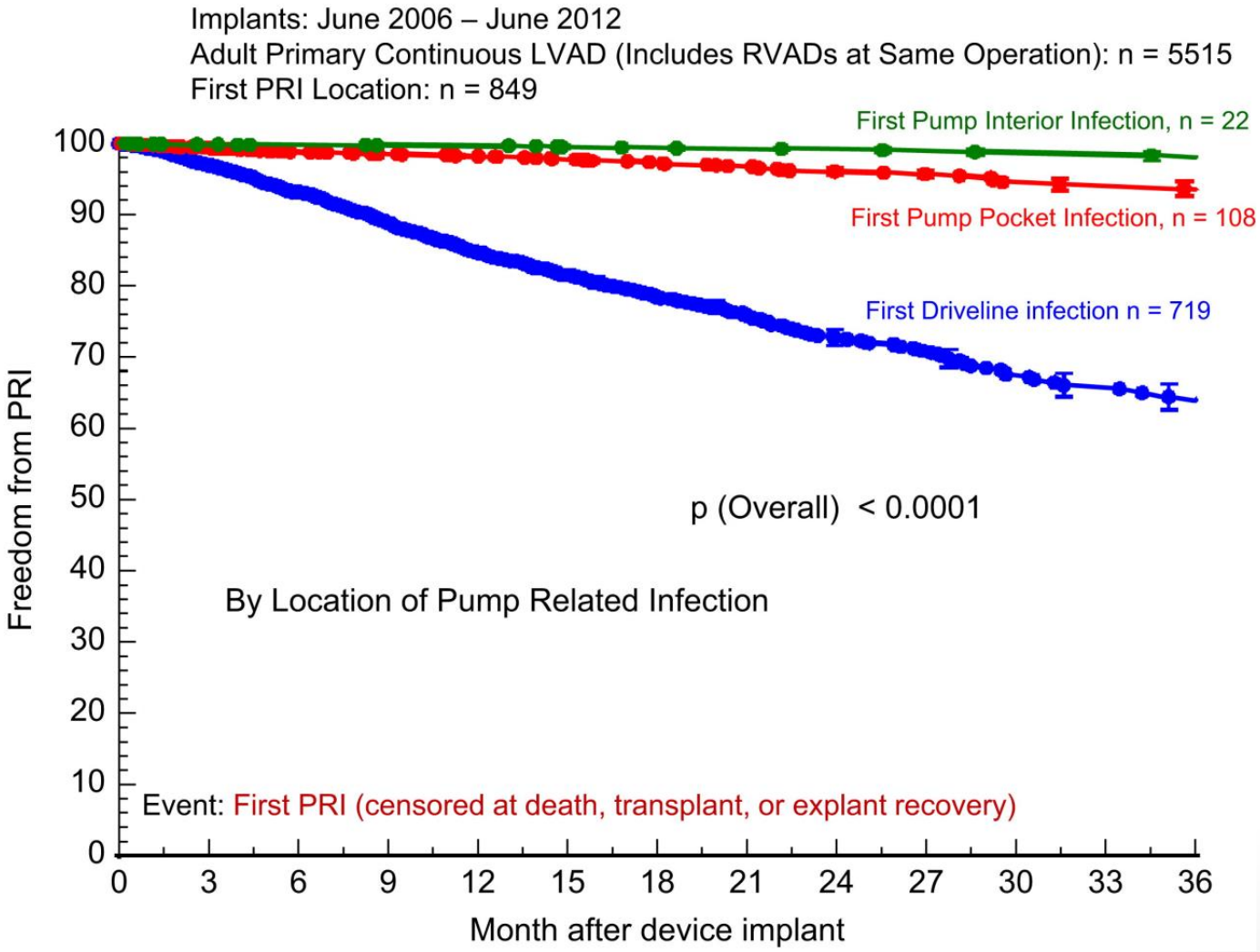
Aggarwal, Annals of Thoracic Surgery 93; 5, 2012

Infections



Hannan, JHLT 30; 4, 2011

Driveline infections are more common and occur throughout support



Kirklin, JHLT 32; 2, 2013

Bloodstream infections

- Bloodstream infections in LVAD patients are associated with neurological complications

Kato, JHLT 31; 1, 2012

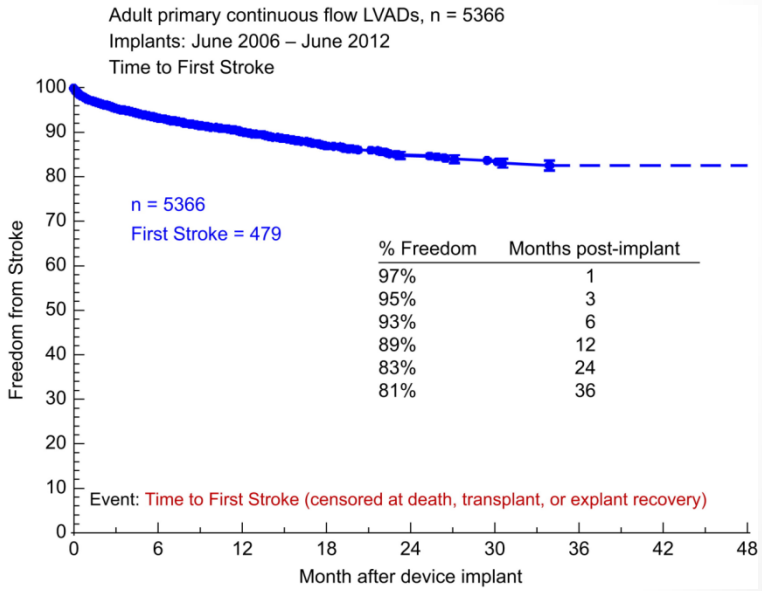
- Especially hemorrhagic stroke

Aggarwal, ASAIO J 58; 5, 2012

Neurological complications

ICH

CVA



Kirklin, JHLT 32; 2, 2013

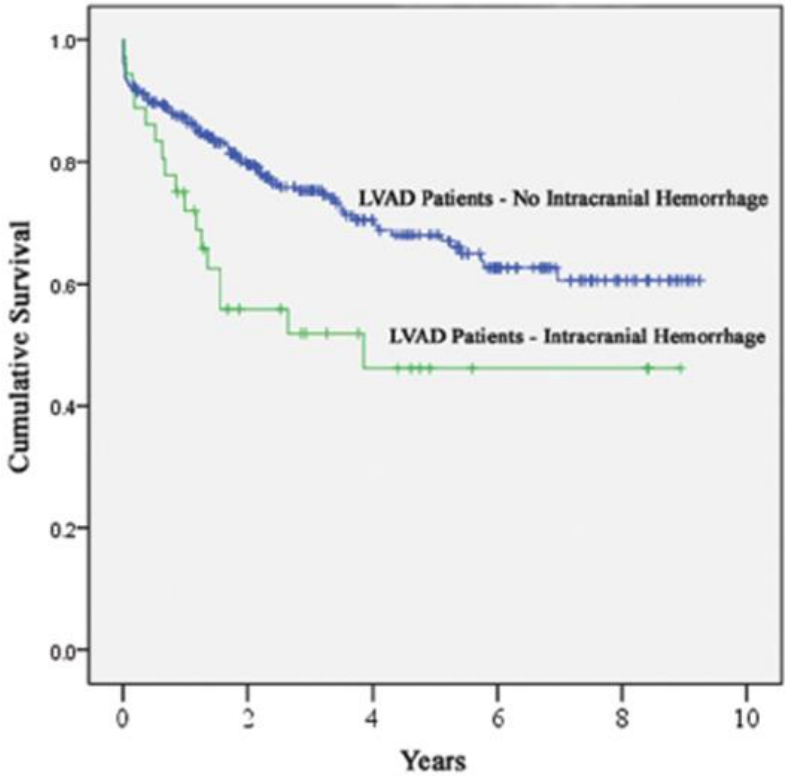
Neurological complications

		Readmissions (BTT, DT)	Patients (BTT, DT)
Major neurologic events		13 (3, 10)	13 (3, 10)
	CVA	6	6
	Intracranial bleed	7 (2 trauma)	7

- Leading cause of death (7% in HMII DT trial)

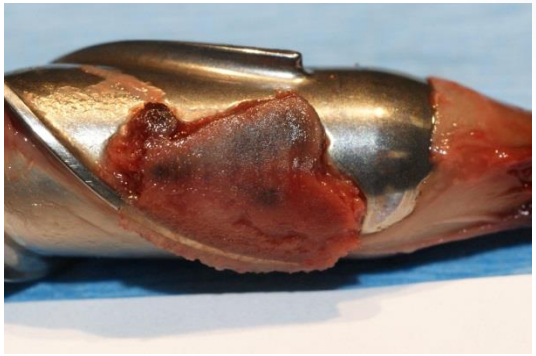
Intracranial Hemmorhage

- 36 ICH /330 LVADS. Traumatic 18/36, spontaneous intraparenchymal 17/36
- Intraparenchymal- worse prognosis
- GCS<11, no survival



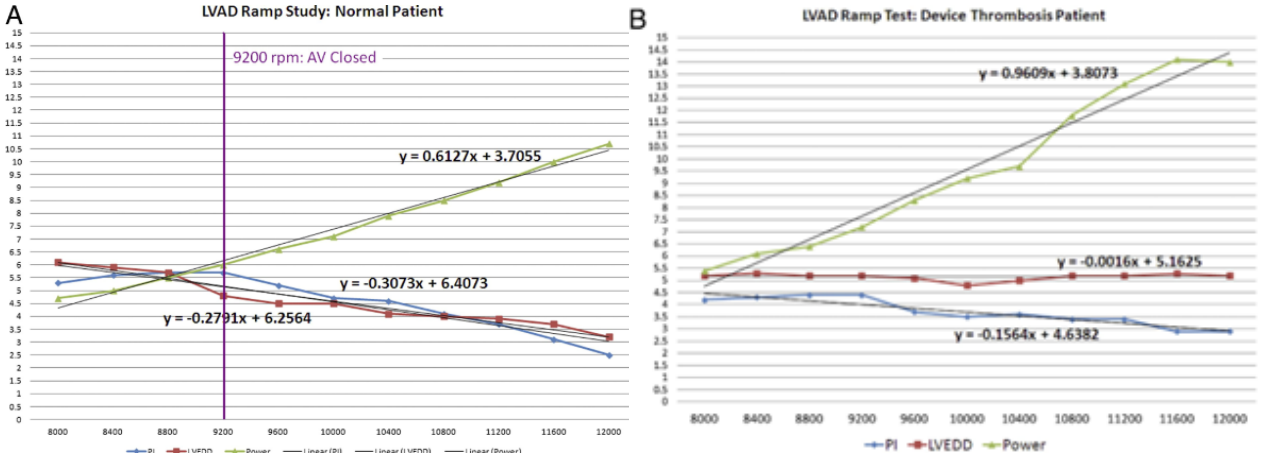
Wilson,J. Neurosurgery 32; 2, 2013

Thrombosis

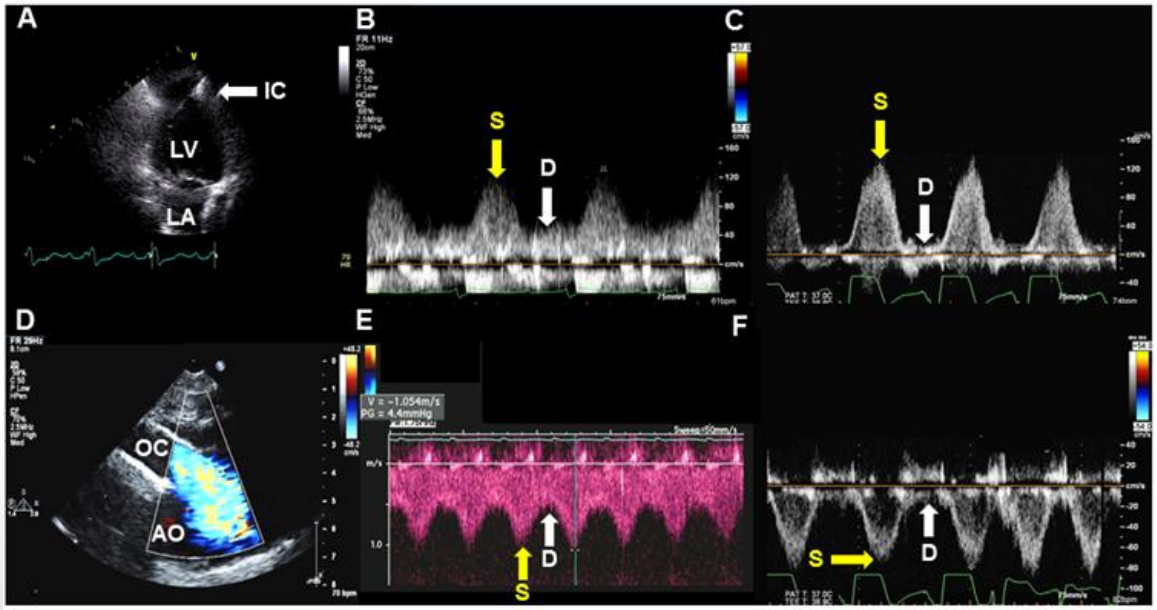


- Symptoms: HF, thrombo-emboli, hemolytic anemia
- Pump parameters: increased power
- Lab: Intravascular hemolysis (LDH, anemia, plasma free hemoglobin, hemoglobinuria, bilirubin)

LVAD Thrombosis, echocardiography



Uriel, JACC 60;18, 2012



Fine, JACC Imaging, accepted

Treatment

- Pump change-out

- Augment anticoagulation
- Add antiplatelet agent (clopidogrel, IIbIIIa inhibitor)
- Thrombolysis?
- Recurrences are common Pump change-out/ transplantation

Hasin, ASAIO J, accepted

Conclusions

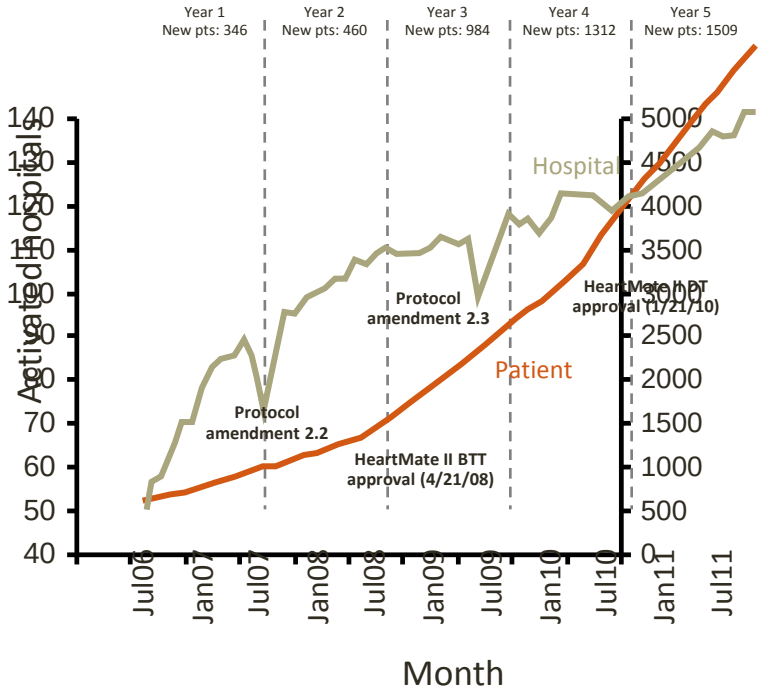
- Medical complications commonly occur in patients chronically supported by LVAD
- These are unique to this patient population
- The attending physician should be familiar with the diagnosis and treatment

Thank you

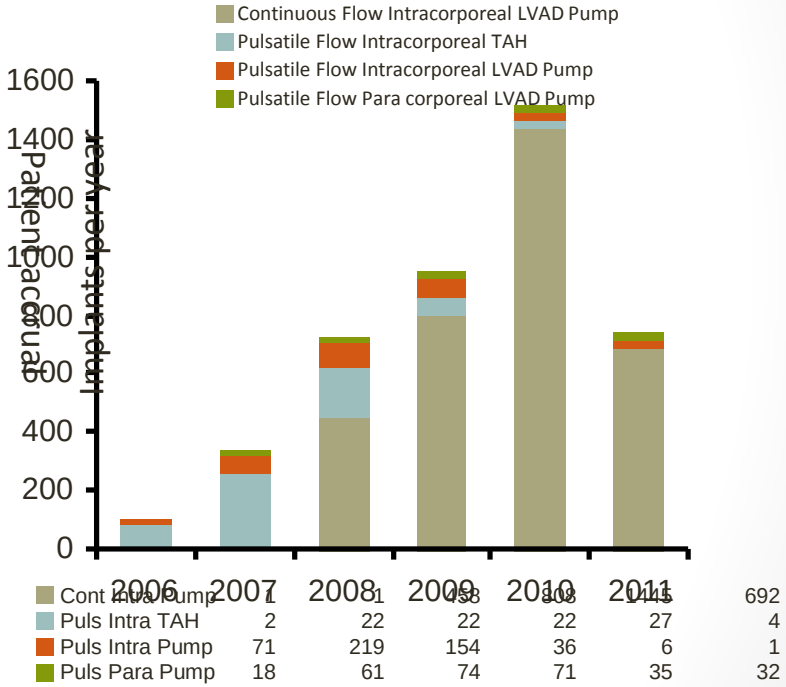
- hasintal@gmail.com

LVAD in the Treatment of Heart Failure

Hospital and Patient Accrual
June 2006-June 2011



Primary Implant Enrollment:
n=4366



(Jan-Jun)

Kirklin, JHLT : 31(2), 2012