Patient Survival and Therapeutic Outcomes in the UK Bridge to Heart Transplant Ventricular Assist Device Population

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Objective

To examine medium-term patient survival and therapeutic outcomes in a population of UK adult patients supported with an implantable left ventricular assist device (LVAD) as a bridge to heart transplantation.

Background

- Heart transplantation is the best treatment option for selected patients with advanced heart failure, but in the UK the supply of donor hearts is not sufficient for the number of patients on the transplant waiting list.
- Due to this shortfall, the use of LVADs has increased and the introduction of smaller, continuous flow pumps means patients can be supported for years while they are bridged to transplant (BTT).

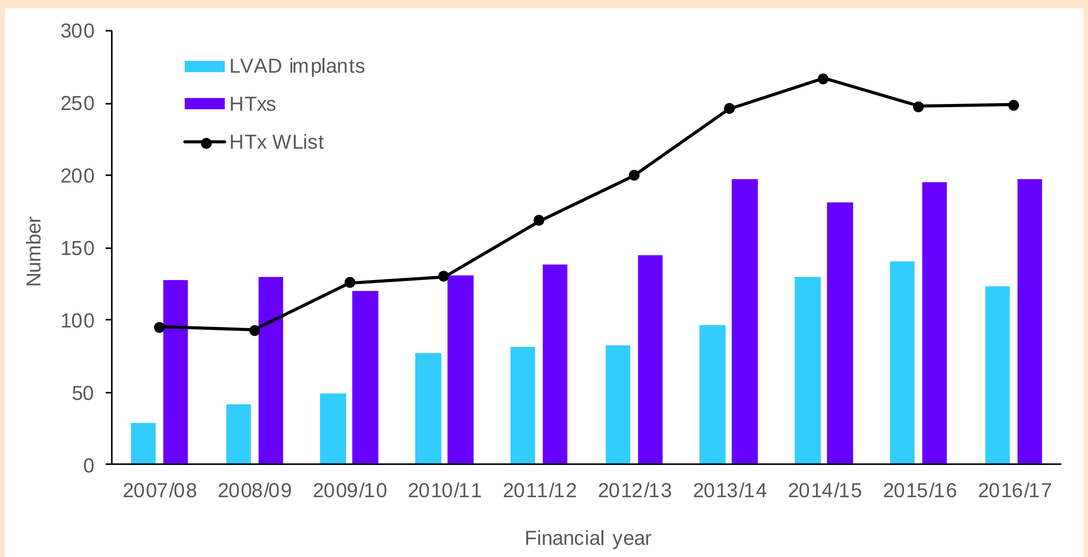

Figure 1: Trends in number of LVAD implants and heart transplants (HTxs) per year in the UK and number of patients on the HTx waiting list at 31 March each year

- In the UK, LVAD therapy for BTT is commissioned by the NHS at six adult centres, and patients experiencing serious LVAD-related complications can be registered to receive an urgent HTx.
- The UK VAD Database was interrogated to assess the outcomes of patients receiving LVADs for BTT. The two main devices used during the study period were HeartMate II (HMII) and the HeartWare (HVAD) which were compared, as a secondary study aim.

Data and methods

342 patients who received a HMII or HVAD between January 2007 and December 2013 were analysed. Primary outcomes were urgent heart transplant listing, transplantation and death. Secondary outcomes were neurological complications and pump thrombosis. Competing risks methodology and the Kaplan-Meier method were used. Comparisons were made between device types and INTERMACS profiles using Gray's test and the log-rank test.

Cohort description

January 2007 – December 2013

		HMII (N=112)	HVAD (N=230)	p-value
Age	Median (IQR)	47 (33, 56)	49 (39, 57)	0.1
Sex	Male	93 (83%)	191 (83%)	0.9
Primary disease	Dilated cardiomyopathy	73 (65%)	132 (57%)	0.09
	Ischaemic heart disease	30 (27%)	75 (33%)	
INTERMACS patient profile	1. Critical cardiogenic shock	19 (17%)	35 (15%)	0.9
	2. Progressive decline	45 (40%)	90 (39%)	
	3. Stable but inotrope dependent	29 (26%)	59 (26%)	
	4. Recurrent advanced heart failure	16 (14%)	40 (17%)	

Results

The median duration of support was 534 days (IQR 193, 1262), with 31 (9%) patients requiring a device replacement due to pump thrombosis or device malfunction.

Urgent listing:

81 patients (24%) were registered for an urgent HTx due to life-threatening infection, pump thrombosis or mechanical failure. The median time to urgent listing was 502 days. There was no difference between device types or INTERMACS profiles in the incidence of urgent listing.

Incidence of transplant:

85 patients (25%) received a HTx, including 63 (78%) from the urgent list and 22 (8%) from the non-urgent list. The incidence of HTx at 3 years was 20% and was no different between devices.

Death on LVAD support:

156 patients (46%) died on support with the most common cause being cerebrovascular accident (including ischaemic and haemorrhagic strokes). The incidence of death on support at 3 years was 41% with no difference between devices or INTERMACS profile.

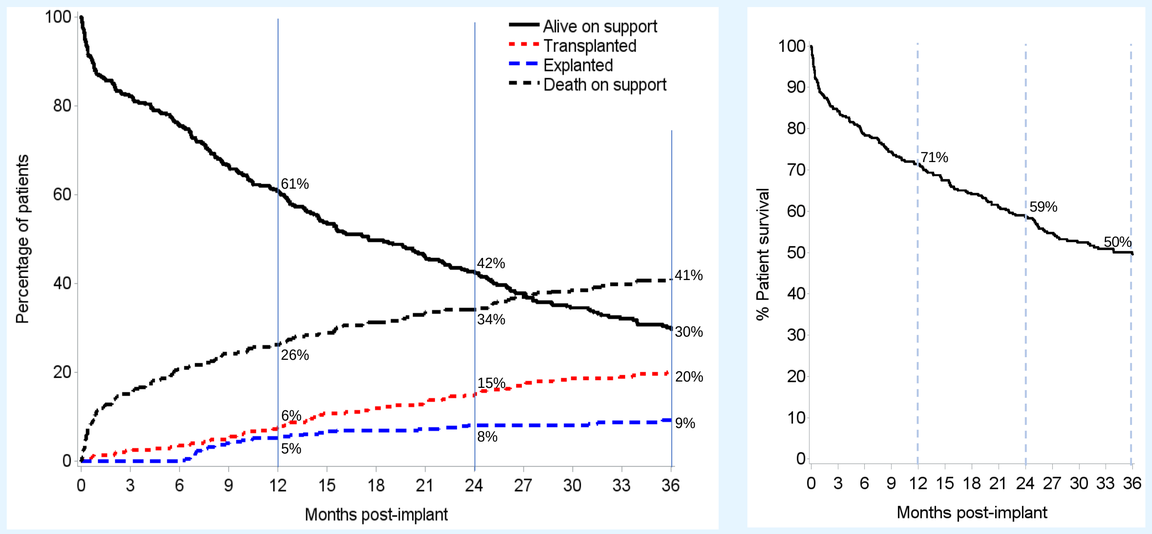

Figure 2: Cumulative incidence of HTx, death on support and explant (left) and Kaplan-Meier survival curve of time to death after implant including post-transplant/explant (right)

Overall patient survival:

The 3 year survival rate from the point of implant was 50%, with no difference between devices. However, survival free of urgent listing or pump exchange was 34% due to the incidence of serious complications.

Neurological complications:

103 patients (30%) experienced neurological events including transient ischaemic attacks, strokes and seizures.

Key messages

- LVAD implantation is an effective treatment for patients with truly end stage heart failure with a 30 day survival rate of 89%, allowing some patients to be bridged towards a future heart transplant.
- The scarcity of suitable donor hearts and current organ allocation policy results in most patients remaining on long term support, with a median duration of nearly 18 months, and a significant adverse event rate leading to a 3-year survival rate of 50%.
- Improvements in LVAD technology and increased access to donor hearts for transplantation are needed to improve the effectiveness of the bridge to transplant strategy.

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