Clinical Outcomes of Ventricular Assist Devices as a Bridge to Transplant

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Overview

- Heart Failure and Ventricular Assist Devices
- Comparing methods of bridge to transplant
- LVAD versus medically managed patients and their outcomes
While the number of donor hearts remains relatively stable, the number of patients currently in heart failure continues to grow.

Left Ventricular Assist Devices (LVAD) have become the popular choice for patients who can no longer be supported with medical therapy while waiting for a cardiac transplant.

Continuous flow LVADs dominate with more than 2,000 devices implanted per year and about 80% survival at 1 year and 70% at 2 years.
Heart Failure and Ventricular Assist Devices

Figure 4 Primary adult implants in the INTERMACS registry by year of implant. LVAD, left ventricular assist device; TAH, total artificial heart.

Figure 6 Competing outcomes depiction for bridge-to-transplant (BTT) patients listed at the time of implant. The sum of the proportion of patients reaching the indicated end-points equals 1.0 for any time-point.

Many studies have looked at the effect of LVADs on post-transplant survival with conflicting results.

Purpose of this study is to analyze the morbidity and mortality of patients BTT with LVAD versus patients medically managed before transplant.

Hypothesis: A left ventricular assist device will improve post-transplant clinical outcomes when compared to inotropic medical support for bridge to transplant treatment.
Materials/Methods

- Online search using Pubmed and UpToDate
- Meta-analysis comparing the effect of LVADs on patients’ post-cardiac transplant outcomes
- Exclusion criteria
Materials/Methods

Limitations

- Different LVAD models
- Papers use data from different time periods
- Different methods of data collection
- Post-operative care variations
Results

- No statistical difference was found between patients bridged to transplant with LVAD compared to inotropic therapy in regards to rates of infection, rejection, 1-year survival, and 5-year survival

- P-value of <0.05 was considered significant
259 patients; 173 continuous intravenous inotropes, 86 implantable LVADs

Short-term and long-term survival was statistically similar

1-year survival: 88.1% inotropes vs 84.9% LVAD
5-year survival: 76.1% inotropes vs 72.7% LVAD

No significant differences between two groups in terms of rejection (p-value= 0.12) or infection (p-value= 0.11) in first year

Pal et al. (2009)
Sasaki et al. (2009)

- 180 patients; 31 implantable LVADs, 149 supported with inotropes
- 1-year survival: 97% LVAD vs 91% inotropes
- 5-year survival: 86% LVAD vs 83% inotropes
- No significant difference between the LVAD group (31%) and the inotrope group (38%) in freedom from infection (p= 0.67)
- Acute rejection was found to be 73% in the LVAD group and 59% in the inotrope group (p= 0.18)
Jaski et al. (2001)

- 5,880 patients; 502 LVADs, 2,514 inotropes
- No significant difference in long term survival (p-value=0.09)
- 1-year survival: 82% LVAD vs 85% inotropes
- 5-year survival: 72% LVAD vs 71% inotropes
- Only study to show lower occurrence of infection in the LVAD group when compared to the medically managed group
- No significant difference between the two groups in overall freedom from rejection (p-value= 0.08)
Discussion

- Papers included in this study each provided evidence that LVAD support leads to similar if not improved post-transplant outcomes.
- LVAD models used in these papers include extracorporeal, intracorporeal, continuous-flow, and pulsatile-flow devices.
- Most studies agree that the use of implantable LVADs results in similar if not improved post-transplant outcomes.
- Typically extracorporeal LVADs are used in sicker patients with a higher risk for adverse events.
Discussion

• Continuous flow LVADs provide adequate circulatory support and end-organ perfusion, and can significantly improve pre-transplant hemodynamics

• Pulmonary hypertension is considered a risk factor for complications post-transplant
  – Benefit of decreased pulmonary hypertension further supports the use of continuous flow LVAD for bridge to transplant

• Duration of continuous flow mechanical support could have an effect on post-transplant function
Discussion

- LVAD support as bridge to transplant necessitates a previous cardiac surgery prior to transplantation.
- When patients fail to wean off bypass following transplantation, ECMO has become the popular choice to allow the patient to recover.
  - Causes of this acute failure include right ventricular failure, primary graft failure, acute rejection, or sepsis.
- LVAD will likely remain the most popular option for bridge to transplant therapy.
  - Debates still remain regarding patient management, optimal timing of implantation, and how duration of support affects post-transplant outcomes.
Conclusion

- Observations made indicate that LVAD patients are not at a greater risk for mortality, infection, or rejection post-transplant compared to those treated with inotropes.
- Since there were many limitations present and conflicting studies have been published, it would be beneficial to conduct an ideal study on this topic.
- An ideal study would compare post-transplant outcomes such as infection, rejection, renal function, bleeding and transfusion needs, and mortality rates.
Take Home Points

• LVAD treatment as a bridge to transplant therapy provides similar post-transplant outcomes when compared to inotropic therapy

• Based on the data presented and advancements in LVAD technology, LVADs will likely remain a popular choice for bridge to transplant treatment

• An ideal study done on the effects of newer LVAD models on post-transplant outcomes would most likely further solidify the use of LVADs as a reliable bridge to transplant
Questions?