

Left Ventricular Assist Devices in The Elderly: Marching Forward With Cautions

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Abstract

Congestive heart failure is highly prevalent in the elderly population and left ventricular assist device has been increasingly used in this population. LVAD therapy is more costly than medical treatment but it increases the survival and quality of life of the elderly patients with low disease acuity. Therefore careful selection of candidates and implementation of LVAD therapy earlier in the course of the disease is crucial to improve outcomes. With the technical advances and improvement in clinical management, the financial burden of LVAD therapy in the elderly will become less, making this therapy more economically feasible.

Title: Left Ventricular Assist Devices in The Elderly: Marching Forward With Cautions

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Abstract:

Congestive heart failure is highly prevalent in the elderly population and left ventricular assist device has been increasingly used in this population. LVAD therapy is more costly than medical treatment but it increases the survival and quality of life of the elderly patients with low disease acuity. Therefore careful

selection of candidates and implementation of LVAD therapy earlier in the course of the disease is crucial to improve outcomes. With the technical advances and improvement in clinical management, the financial burden of LVAD therapy in the elderly will become less, making this therapy more economically feasible.

Management of elderly patients with end stage heart failure remains a challenge for clinicians. While “seventy” has become the new “fifty” from a mindset, it does not always translate from a physiologic standpoint. Over the past decade, healthcare providers have applied advanced therapies including left ventricular assist devices (LVAD) to treat these patients with the goal to improve both survival and quality of life. Although, the number of LVAD implants in the U.S.A for patients above 65 increased from 2000 to 2014¹, the case volume has since remained relatively stagnant.² Despite this, elderly patients still constitute a significant portion of LVAD recipients, with 30% and 5% of patients who are older than 65 and 75 years of age, respectively.² It is important to understand whether application of LVAD therapies in the elderly translates into outcomes similar to that of younger patients, whether it improves survival and quality of life, and whether it is cost-effective.

In this issue of the Journal of Cardiac Surgery, Brozzi et al., reviewed long-term outcomes of 43 elderly patients (age >65 years) who received continuous-flow (CF) LVADs with 84% received a Heartmate 2 (Abbott Laboratories; Abbott Park, IL, USA) and 16%, a Heartware HVAD (Medtronic Inc., Minneapolis, MN, USA) from a single center over a 6-year period. The average age was 71.5 years, and most patients were in a non-ambulatory state: 14% were in the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) profile 1 and 70%, profile 2. Except for the INTERMACS profile 1 patients, those in profiles 2 and 3 had remarkably low hospital mortality (50%, 10% and 0% hospital mortalities for profiles 1,2,3, respectively). Major complications, including gastrointestinal bleeding (24%), driveline infection (13%), and stroke (8%), were similar to what reported in the literature.³ The actuarial survival rates of these patients were 70%, 48%, and 25% at 1, 2, and 3 years, respectively. With the reported survival rates for patients with destination LVAD averaging 79%, 69%, and 59% at 1, 2, and 3 years, respectively⁴, the authors conclude that elderly CF LVAD recipients had comparable outcomes with younger patients and that CF LVAD provides an effective treatment in the elderly. Of note is the fact that their series consisted of only Heartmate II, and Heartware HVAD, which have a low performance profile than the Heartmate 3, a newer generation CF LVAD.⁴

It is well-recognized that aging is a risk factor for mortality in LVAD recipients. Using the National Inpatient Sample database, Lindvall et al., showed that elderly LVAD recipients (age [?] 65 years) had a 48.2% hospital mortality if they had one or more of the following pre-LVAD therapies: cardiac surgery, ECMO, prolonged mechanical ventilation, or hemodialysis, while in younger (<65 years) patients the hospital mortality rate was 29.4%.⁵ In another study, using the INTERMACS database to compare the outcomes of elderly (age [?] 70 years) versus younger (age < 70) recipients of CF-LVAD implanted between June 2006 and April 2012, Atluri et al., reported that elderly patients had worse survival at 2 years than the younger ones (71% vs 63%, $p < 0.001$). However, the short and midterm survival rates (93% and 75% at 1 and 12 months, respectively) were very acceptable for the older cohort. These authors argue that age should not be a contraindication for LVAD implant. Data from Brozzi’s group, which include elderly patients with higher disease acuity but similar 1-year survival, support that sentiment. Furthermore, studies also showed that in ambulatory patients of all ages, LVAD therapy for patients with INTERMACS profiles 4 and 5 were associated with improved survival compared to medical therapy.⁶

Data from Brozzi’s group and others⁶ support the importance of pre-implant status in determining the hospital mortality of these elderly patients: the less moribund, the better the survival. Therefore, early referral to advanced heart failure and VAD centers is crucial. It allows the patients adequate time to discuss the quality of life issues, review the end of life decisions, and participate in physical rehabilitation and medical optimization before LVAD placement.

With regard to mortality, combined existing data suggest that CF-LVAD in the elderly should be utilized for patients with INTERMACS profiles [?] 3, given that they would derive greater benefit from this form of advanced therapy than those with more severe disease acuity.

While survival is important, there are several unaddressed metrics in the current study that may further improve our understanding of the value of LVAD therapy in the elderly. Information on functional status, quality of life metrics, postoperative hospitalization days, discharge status, and days outside of the hospital is essential to determine the quality of life (QOL) benefits of LVAD therapy. Although existing data suggests that LVAD improves both survival and quality of life in the elderly⁷, a significant number of these patients were discharged to a rehabilitation facility or nursing home: 37% and 52% LVAD recipients with ages of 65-74, and [?]75 years, respectively.² Therefore, close attention to age-related changes before and after LVAD implantation are essential. Discussion of risks, outcomes and shared decision making among a multidisciplinary VAD team that includes palliative care service is crucial to help patients make the appropriate decision from a life goals standpoint.⁸⁻¹⁰

LVAD implantation in the elderly not only improves survival and quality of life, but it also significantly increases the lifetime cost compared to medical management. This is primarily due to the upfront cost of the device along with the implantation procedures, subsequent readmissions, and follow-up care.¹¹⁻¹⁴ Whether this cost is greater in elderly patients needs further analysis.

In conclusion, collective existing data indicate that although LVAD therapy comes with a higher cost than medical therapy, it increases the survival and quality of life of the elderly, and that evaluation for, and implementation of LVAD therapy earlier in the course of the disease is crucial to improve outcomes. We are hopeful that with the technical advances and improvement in clinical management of elderly VAD recipients, the financial burden of LVAD therapy will become less, making this therapy more feasible from an economic standpoint.

Author contributions:

Concept/design: PCP, BS, SMP; Literature Review/Data analysis/interpretation: PCP; SMP, BA Drafting article: PCP; Critical revision of article: SMP, BS; Approval of article: PCP, BA, SMP.

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