Left ventricular assist devices: an evidence-based analysis
Ministry of Health and Long-Term Care, Medical Advisory Secretariat

Record Status
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Citation

Authors' objectives
This study aims to review the effectiveness and cost-effectiveness of left ventricular assist devices (LVADs), small pumps that assist the function of the heart when it fails to maintain adequate circulation.

Authors' conclusions
Safety and Effectiveness: There is evidence that when compared to optimal medical therapy, LVAD support significantly improved the survival rates of heart transplant candidates waiting for a suitable donor heart (71 per cent for LVAD and 36 per cent for medical therapy in one prospective comparative study). Pretransplant survival rates ranged from 58 per cent to 90 per cent with a median of 74 per cent. Patient's age greater than 60 years, and pre-existing conditions of respiratory failure associated with septicemia, ventilation and right heart were independent risk factors for mortality after LVAD implantation. LVAD support was shown to improve the physical functions and quality of life of patients waiting for a heart transplant. LVAD also enabled approximately 41 per cent to 49 per cent of patients to be discharged from hospitals and wait for a heart transplant at home. More than half of the patients discharged on LVAD support required re-hospitalization because of adverse events including device malfunction. Post-transplant survival rates for LVAD-bridged patients were similar to or better than the survival rates of patients bridged by medical therapy. LVAD support has been shown to be associated with serious adverse events, including: - device-related infection (median: 53 per cent, range: six per cent - 72 per cent) - bleeding (median 35 per cent, range 8.6 per cent - 48 per cent) - thromboembolism (5 per cent - 37 per cent) - neurologic disorders (seven per cent - 28 per cent) - right ventricular failure (11 per cent - 26 per cent) - organ dysfunction (five per cent - 50 per cent) - hemolysis (six per cent - 20 per cent) Bleeding tends to occur in the first few post-implant days and is rare thereafter. It is fatal in two per cent to seven per cent of patients. Infection and thromboembolism occurred throughout the duration of the implant, though their frequency tended to diminish with time. Although device malfunction has been identified as one of the major complications, fatalities directly attributable to the devices were low (one per cent) in short-term LVAD use. Most of the malfunctions were associated with the external components that could be replaced with back-up components. Device malfunction was the second most frequent cause of mortality in prolonged LVAD support. The experience of using LVAD as a bridge-to-recovery in patients suffering from acute heart failure is limited and the rates of successful weaning from the LVAD were low. Most of the bridged patients either died or required a heart transplant. The long-term effect of using LVAD as a permanent therapy for end-stage heart failure is still unknown. A 2001 randomized study showed that LVAD significantly increased the 1-year survival rate of patients who were not eligible for heart transplantation (51 per cent versus 25 per cent on medical therapy). However, this was associated with adverse events 2.35 times higher than that of medically treated patients. The two-year patient survival rate of LVAD support patients was reduced to 23 per cent, although it was still significantly higher compared to that of medically-supported patients (8 per cent). Patients in this study were not eligible for heart transplantation.

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