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Risk Assessment and Comparative Effectiveness of Left Ventricular Assist Device and Medical Management in Ambulatory Heart Failure Patients

The ROADMAP Study 2-Year Results

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ABSTRACT

OBJECTIVES The authors sought to provide the pre-specified primary endpoint of the ROADMAP (Risk Assessment and Comparative Effectiveness of Left Ventricular Assist Device and Medical Management in Ambulatory Heart Failure Patients) trial at 2 years.

BACKGROUND The ROADMAP trial was a prospective nonrandomized observational study of 200 patients (97 with a left ventricular assist device [LVAD], 103 on optimal medical management [OMM]) that showed that survival with improved functional status at 1 year was better with LVADs compared with OMM in a patient population of ambulatory New York Heart Association functional class IIIb/IV patients.

METHODS The primary composite endpoint was survival on original therapy with improvement in 6-min walk distance ≥75 m.

RESULTS Patients receiving LVAD versus OMM had lower baseline health-related quality of life, reduced Seattle Heart Failure Model 1-year survival (78% vs. 84%; $p = 0.012$) predominantly INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) profile 4 (65% vs. 34%; $p < 0.001$) versus profiles 5 to 7. More LVAD patients met the primary endpoint at 2 years: 30% LVAD versus 12% OMM (odds ratio 3.2 [95% confidence interval 1.3 to 7.7]; $p = 0.012$). Survival as treated on original therapy at 2 years was greater for LVAD versus OMM ($70 \pm 5\%$ vs. $41 \pm 5\%$; $p < 0.001$), but there was no difference in intent-to-treat survival ($70 \pm 5\%$ vs. $63 \pm 5\%$; $p = 0.307$). In the OMM arm, 23 of 103 (22%) received delayed LVADs (18 within 12 months; 5 from 12 to 24 months). LVAD adverse events declined after year 1 for bleeding (primarily gastrointestinal) and arrhythmias.

CONCLUSIONS Survival on original therapy with improvement in 6-min walk distance was superior with LVAD compared with OMM at 2 years. Reduction in key adverse events beyond 1 year was observed in the LVAD group. The ROADMAP trial provides risk-benefit information to guide patient- and physician-shared decision making for elective LVAD therapy as a treatment for heart failure. (Risk Assessment and Comparative Effectiveness of Left Ventricular Assist Device and Medical Management in Ambulatory Heart Failure Patients [ROADMAP]; NCT01452802). (J Am Coll Cardiol HF 2017;■:■–■)

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ABBREVIATIONS AND ACRONYMS

6MWD = 6-min walk distance

AE = adverse event

eppy = events per patient-year

EQ-5D = EuroQol 5 dimensions questionnaire

GI = gastrointestinal

HF = heart failure

HRQoL = health-related quality of life

HTx = heart transplantation

LVAD = left ventricular assist device

NYHA = New York Heart Association

OMM = optimal medical management

PHQ-9 = Patient Health Questionnaire

QoL = quality of life

VAS = visual analog scale

The ROADMAP (Risk Assessment and Comparative Effectiveness of Left Ventricular Assist Device and Medical Management in Ambulatory Heart Failure Patients) study's 1-year results showed that survival with improved functional status at 1 year was better with left ventricular assist devices (LVADs) compared with optimal medical management (OMM) in a patient population of ambulatory New York Heart Association (NYHA) functional class IIIB/IV patients who were not dependent on intravenous inotropic support (1). Survival was similar in both groups in the intention-to-treat analysis. However, as-treated event-free actuarial survival over a 1-year period was significantly better with LVAD than OMM (80 ± 4% vs. 63 ± 5%). Differences in the primary endpoint between LVAD and OMM were primarily due to the use of delayed LVADs in the OMM group. Factors beyond survival seem paramount to decision making surrounding LVAD implantation in this ambulatory patient population. At 1-year follow-up, patients in the OMM group avoided LVAD surgery and LVAD-associated adverse events (AEs); however, patients observed on OMM did not achieve the primary benefits of functional improvements and patient-reported health-related quality of life (HRQoL) with LVAD support. To better understand the long-term benefits and risks of LVAD compared with OMM, we now provide the pre-specified primary endpoint and other important study results after 2 years of follow-up.

METHODS

STUDY DESIGN. The ROADMAP study was a prospective, multicenter (N = 41), nonrandomized, controlled, observational study to evaluate the effectiveness of LVAD versus OMM (2). Enrollment began in October 2011 with patients being followed for up to 2 years. The primary composite endpoint was survival with improvement in 6-min walk distance (6MWD) ≥75 m at 1 year, which has been previously published (1). This report focuses on the primary endpoint at 2 years and secondary study endpoints, which include actuarial survival, HRQoL, depression, functional status, and AEs, after 2 years of follow-up.

STUDY SUBJECTS. In addition to meeting U.S. Food and Drug Administration–approved indications for HeartMate II LVAD (Thoratec, [now Abbott] Pleasanton, California) destination therapy, entrance criteria included NYHA functional class IIIB/IV, at least 1 hospitalization for heart failure (HF) (or 2 unscheduled emergency department/infusion clinic visits) in the last 1 year, and 6MWD <300 m. Subjects were excluded if there was inotrope use within 30 days before enrollment. Of the 200 patients enrolled, 97 selected LVAD therapy and 103 remained on medical management in the OMM arm. Patients in the OMM cohort could receive a delayed LVAD at any point during the study period.

BASELINE AND FOLLOW-UP ASSESSMENTS. Baseline assessments included demographic characteristics, medical history, NYHA functional class, INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) profile, 6MWD, serum chemistry, hematologic data, and medications. Patients also completed a HRQoL survey, the EuroQol 5 dimensions, 5-level questionnaire (EQ-5D-5L) including the visual analog scale (VAS), and a depression screening questionnaire, the Patient Health Questionnaire (PHQ-9). A summary of baseline patient characteristics has been previously published (1). Clinical follow-up took place every 6 months for up to 2 years and included assessment of HRQol, depression, functional status, and laboratory parameters. Prevalence, incidence, causes of rehospitalizations, and causes of death were documented by study sites, but not adjudicated. AEs were

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