Rogers et al. (1) describe in this issue of the Journal the largest report of functional capacity and quality of life to date in patients implanted with a continuous flow left ventricular assist device (LVAD). Patients were implanted for 2 indications: bridge to transplant (BTT) (n = 281) and destination therapy (DT) (n = 374). The authors conclude that both mortality reduction, improved quality of life (QOL), and functional capacity were achieved with a continuous flow LVAD. Progressive improvement in survival has been observed over the last decade with the use of a continuous flow LVAD (2,3). The continuous flow LVAD is smaller, quieter, and more durable (3). Now reported are improvements in QOL measures and functional capacity that are unparalleled. Table 1 compares functional capacity and QOL measures in patients with advanced heart failure and shows the magnitude of change associated with a continuous flow LVAD. It appears that improved survival with LVAD compared with medical therapy was not enough to convince clinicians and patients to accept LVAD therapy in the past. Now, however, the combination of improved survival and improved QOL has resulted in wide acceptance of continuous flow LVAD and rapid growth in their use. The adoption of this therapy is depicted by the rapid enrollment of the clinical trials and the demand for the device in the continued access protocols which resulted in a cohort of 655 patients in this report. Figure 1 shows the growth in the axial flow pumps in the past 2 years.

It is important to acknowledge that the patients implanted for the DT indication were deemed “ineligible for transplant.” The patients were elderly with advanced heart failure and no other options. We have reported a 6-month mortality rate of almost 50% in patients treated with chronic inotropic therapy with advanced heart failure (4). Based on the grave prognosis, we have recommended that inotropic-dependent patients deemed not suitable for cardiac transplantation be referred for LVAD or, alternatively, hospice if not candidates. Now there is a therapy (in addition to cardiac transplantation) to offer patients that can reliably extend life and, importantly, improve QOL. For the first time, LVAD therapy has realized the expectation and growth that was anticipated over 20 years ago. This is timely as the number of cardiac transplants per year has remained unchanged for the past decade, yet the demand and patient waiting list is large. Transplantation cannot meet the demand, and the proliferation of LVAD is occurring as technology and outcomes have improved. The waiting list mortality for cardiac transplantation is approximately 12% (5). A parallel observation has been the increased percentage of patients supported with BTT LVAD prior to cardiac transplantation and is now 35% to 40% in the U.S. Improved outcomes for BTT have led to improved physician confidence and a lower threshold to implant LVAD for patients awaiting cardiac transplantation. A spot on the transplant waiting list is the opportunity to wait for an organ, but it does not treat the disease, and QOL remains poor while waiting for an organ. Further, it has been shown that implanting LVAD for BTT in patients before a “crash and burn” status (INTERMACs level 1) results in better survival (6). So improved LVAD technology has resulted in growth in both the BTT and DT areas and is truly a “lifesaving” device for those waiting for transplant and those ineligible for cardiac transplant.

Finally, it is important to acknowledge that the QOL measures used in this report assess the heart failure domain. Current-generation continuous flow LVADs still have percutaneous drive lines and external power supplies. Swimming and bathing is prohibited, and physical activities are restricted; the driveline must be immobilized and protected from trauma. Strokes, infections, and mechanical malfunctions can be devastating. Although these limitations are improving with the continuous flow pumps compared with the pulsatile pump, further refinements will result in improved overall patient acceptance and QOL in all domains (3). The combination of improved quantity and quality of
life has ushered in a transition in care for advanced heart failure with LVAD.

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REFERENCES


Key Words: HeartMate II • ventricular assist devices • quality of life • functional status • continuous flow.

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2010 HeartMate II LVAD</th>
<th>2002 CRT*</th>
<th>2001 HeartMate LVAD XVE†</th>
<th>2001 HeartMate Medical Arm</th>
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</thead>
<tbody>
<tr>
<td>MLHF (change in score)</td>
<td>–42</td>
<td>–18</td>
<td>–34</td>
<td>–17</td>
</tr>
<tr>
<td>KCQ (change in score)</td>
<td>+41</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>6 min walk test, m</td>
<td>+156</td>
<td>–39</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NYHA class</td>
<td>80% I, II</td>
<td>52% up 1 class</td>
<td>100% class II</td>
<td>100% class IV</td>
</tr>
</tbody>
</table>

*Abraham et al. (7); †Rose et al. (8).

CRT = cardiac resynchronization therapy; KCQ = Kansas City Cardiomyopathy Questionnaire; LVAD = left ventricular assist device; MLHF = Minnesota Living With Heart Failure; NA = not available; NYHA = New York Heart Association.