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Preliminary Single-center Experience with Left Anterior Mini-thoracotomy for Continuous-flow LVAD Implantation

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Purpose: Left ventricular assist devices (LVADs) improve survival in patients with end-stage heart failure. The HeartWare LVAD is a small rotational pump, which has been approved for bridge to transplantation. Implantation of these devices conventionally requires a median sternotomy and institution of cardiopulmonary bypass. An alternative approach for implantation of this device is through a left anterior mini-thoracotomy, which obviates the need for a full sternotomy. We reviewed a single-center experience with this technique for LVAD implantation.
Methods: This alternative surgical technique involves a left anterior mini-thoracotomy incision along the infra-pectoral fold. An upper mini-sternotomy or right 3rd intercostal space incision is also made for aortic exposure. Tunnels are created for the percutaneous driveline and for the outflow graft. A sewing ring is sutured to the apex of the left ventricle. The LV apex is cored and the pump positioned and secured.
Results: Between January and November 2013, 34 patients received a HeartWare left ventricular assist device at our institution. Eight out of the 34 were implanted with this technique. All patients were men between the ages of 16 and 68, in NYHA functional class IV. Three patients were INTERMACS I, 2 were INTERMACS II, 2 were INTERMACS III, and 1 was INTERMACS IV. Five patients had at least one prior sternotomy. Cardiopulmonary bypass was not required in 3 patients. The median packed red blood cell-transfusion requirement within 48 hours of surgery was 2.5 units (range 0-12 units), with 2 patients requiring no transfusion of PRBCs. Two patients died both of whom were INTERMACS I. One of them had refractory vasodilatory shock and the other had a large stroke post-cardioversion for atrial fibrillation.
Conclusion: Implantation of continuous-flow left ventricular assist devices via left anterior mini-thoracotomy is feasible and may be associated with less transfusion requirements compared to standard sternotomy. Further studies are needed to evaluate the safety and outcomes of this procedure and to characterize the subset of patients who would benefit from this alternative technique.

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Robotic Implantation of Left Ventricular Assist Devices: A New Era in Cardiac Surgery

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Purpose: The therapeutic value of Left Ventricular Assist Devices (LVAD) as either a bridge-to-transplant or destination therapy in heart failure patients is now well established. However, post-surgical complications are common, due in part to resternotomy. Robotic LVAD surgery is a novel technique that may circumvent the risks of reoperation. The objective of this study is to compare intra and post-operative outcomes in patients undergoing robotic vs. non robotic LVAD implantation.
Methods: Data included 23 patients undergoing VAD implantation (HeartWare VAD n=7, HeartMate II's n=8, Total Artificial Heart n=8) from 2011-2013 at University of Arizona Medical Center. Intra and post-operative outcomes of robotic versus non robotic and redo versus non-redo surgeries were compared.
Results: The robotic group spent significantly less time in the hospital (36.0 ±17.1 vs. 67.4±34.2; $p \leq 0.01$), less use of fresh frozen plasma intra operatively (2.2±1.0 vs. 4.0±2.9; $p \leq 0.04$), less use of cryoprecipitate (0±0 vs. 2.4±3.7; $p \leq 0.02$) and platelets (0±0 vs. 1.5±2.6; $p \leq 0.03$) post operatively than the non-robotic group. No significant difference was seen in length of ICU stay, operative death, 30 day mortality, discharge mortality, 30 day readmission, and total blood usage post operatively. Significant difference was seen between redo versus non-redo in terms of intra operative RBC's usage (3.5±1.0 vs. 1.7±2.1; $p \leq 0.03$) which is also below the STS reported national average use.
Conclusion: The results suggest significant reduction in resource utilization (i.e. less length of hospital stay, blood product use) following robotic versus traditional sternotomy for LVAD implantation. If validated by our ongoing experience with this procedure, robotic assistance may improve the safety and cost effectiveness of LVAD surgery and minimize blood product use in bridge-to-transplant patients.

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Can Avoiding Sternotomy Reduce Early Complications of Left Ventricular Assist Device Surgery? Observations from Routine Implantation of Heartmate II Left Ventricular Assist Device without Median Sternotomy

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Purpose: Several techniques for implanting left ventricular assist devices (LVADs) without median sternotomy have been described, but there are limited data on the safety and outcomes of such approaches. We report a single center experience with a 'less-invasive' non-sternotomy approach for implanting the Heartmate II (HMII) LVAD, with a view to ascertaining safety and feasibility of routine non-sternotomy approach and also identifying potential advantages of avoiding sternotomy for LVAD implantation.
Methods: Since 2010 a non-sternotomy approach has been the approach of choice for patients undergoing HMII implant in our center. Contraindications to non-sternotomy approach were prior surgery and need for concurrent heart valve surgery (such patients were approached via standard sternotomy). Surgical approach was via a left subcostal and a right mini-thoracotomy incision. The technique was applied to 40 consecutive patients over a 40 month period (M:F 32:8; age range 48-77yr; INTERMACS 1 or 2 n=18); their data are retrospectively analyzed.
Results: There were no conversions to full sternotomy. Median operative time was 290 minutes. Hospital mortality was 7.5% and median post-operative hospital stay was 19 days. One patient suffered a new perioperative stroke. One-year survival was 86 ± 6%. Notable observations included: 1) There was no use of right ventricular assist devices in this cohort; 2) Most patients (28 (70%)) did not have intraoperative blood transfusions. There were no reoperations for bleeding. 3) Majority of patients (32 (80%)) were extubated by post-operative day 1. Six (15%) had respiratory failure. 4) There were no wound, mediastinal, or pocket infections.
Conclusion: Despite relatively long operative times and 45% of patients in INTERMACS 1 or 2, 'less invasive' HMII implantation without median sternotomy was safely, effectively, and routinely applied, and may be associated with low incidence of bleeding, respiratory, surgical site infection, and right ventricular failure complications. Further study is required to clarify whether our observations can be replicated, and whether the increased adoption of non-sternotomy approaches will transform to reduced frequency of complications after LVAD surgery.

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Surgical LVAD Placement Significantly Reduces Mitral Regurgitation Burden: A Single Center Study

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Purpose: Left ventricular assist device (LVAD) recipients often have pre-operative mitral regurgitation (MR) due to altered geometry of the mitral apparatus. There is controversy surrounding the need and long-term benefits of intra-operative mitral repair (MVR) for severe MR at time of surgical LVAD placement. We postulated that LVAD implantation reverses severe MR without the need for routine MVR.
Methods: From April 2008 - January 2013, consecutive patients(pts) undergoing LVAD implantation at a single center were included in the study. Pts who underwent RVAD placement or died in the immediate post-operative period were excluded. Pre-operative and 3 month follow up trans-thoracic and trans-esophageal echocardiography studies were reviewed by two