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Surgical Specialization and Standardization of Care Improves Outcomes in Mechanical Circulatory Support: A Single Center Experience

Donald D. Chang

M. Giraldo-Grueso

S. Desai

K. Marz

A. Bansal

See next page for additional authors

Authors

Donald D. Chang, M. Giraldo-Grueso, S. Desai, K. Marz, A. Bansal, K. Webre, and P. Parrino

successfully weaned from t-RVAD and discharged home. Mean hospital stay was 62 days, with 27 days on ICU. Full mobilization was possible in 50% of patients, with all patients being at least mobilized to the edge of the bed. Exchange of the ProtekDuo® was performed in 2 cases for canula thrombosis and dislocation, respectively. All female patients died during their initial hospital stay.

Conclusion: Right heart failure affects a heterogenous patient cohort as demonstrated by our analysis. Groin-free percutaneous implantation of the ProtekDuo® dual lumen cannula allows full mobilization, non-surgical explantation and easy addition of an oxygenator in a clinical setting.

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Causes and Management of Extracorporeal Membrane Oxygenation Circuit Failure

G. Makdisi,[1] T. Tribble,[2] and I. Wang.[3] [1]Albany College of Medicine, Albany, NY; [2]University of Kentucky, Lexington, KY; and the [3]Memorial Healthcare System, Hollywood, FL.

Purpose: Extracorporeal membrane oxygenation (ECMO) circuit failure is a well known complication of ECMO support. Little is documented in the literature.

Methods: Retrospective review of all patients underwent ECMO support and experienced circuit failure events in our two institutions between Jan 2012 and Dec 2018.

Results: Seven hundred forty-six patients were supported by ECMO, among these 400 venovenous ECMO (VV-ECMO), 289 patients treated with venoarterial ECMO (VA-ECMO) and 57 with VA-ECMO for ECPR. The mean support time was 161.9±2.13hours (ranged from 5 -1493 hours). Overall, 539 (72.3%) patients were separated of ECMO, among these 434 (58.2%) patients were discharged from the hospital. Eighty (10.7%) circuits needed total or partial circuit change, the total circuit was changes in 46 patients, among these 34 cases due to clotting, 5 circuits were changed due to circuit compatibility of patients transferred of outside hospital. Four circuits were changed due to large air in the circuit not amenable to simple suctioning maneuvers, 2 due to circuit tube fracture and one had mechanical pump failure. Major clotting needed total or partial circuit change occurred in 68 circuits, amongst these circuit was changed in 34 patients, Oxygenator only was changed in 30 circuits. the bladder only was changed in 4 circuits due to clotting. 46 (67.4%) major clotting needed circuit change occurred after 2 weeks of support, 17 occurred during the second week, and only 5 occurred in the first week. Air in the circuit was encountered in 13 cases, majority (9 cases) was amenable to simple suctioning maneuvers.

Conclusion: ECMO circuit failure occurs frequently. Major clotting needing partial or total circuit change are the most common complications, followed by air in the circuit, followed by circuit incompatibility in transferred patients. While majority of circuit clotting occur after 2 weeks, it rarely occurs in the first week.

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Status 2 Listing Strategies for Heart Transplantation: IABP or Impella?

S. Pahwa, J.R. Trivedi and M. Slaughter. Cardiovascular and Thoracic Surgery, University of Louisville, Louisville, KY.

Purpose: The use of temporary mechanical circulatory support, IABP and Impella, for UNOS Status 2 patients has increased since the new policy implementation. The aim of the study was to evaluate overall listing transplant trends and outcomes of status 2 patients

Methods: We evaluated the UNOS database from October 2018 to March 2021 for adult heart patients listed (n=10957) and transplanted (n=7025) based on their priority status. We analyzed the characteristics and outcomes of patients listed under Status 2 classifying them in two groups: with IABP or percutaneous mechanical circulatory support (pMCS) using descriptive, univariate and survival statistics

Results: During the study period 3687 patients were listed (3505 (95%) transplanted) as Status 2 of which 1823 (52%) were original Status 2 while the remainder (1682, 48%) were upgraded (21% status 4). Of Status 2 patients, 2033 (55%) had IABP and 423 (11%) had pMCS. The median age (57 v. 57) and BMI (26 v. 27) were comparable between the groups. The IABP patients had higher cardiac index (1.64 v. 1.6, p=0.08) and albumin (3.6 v. 3.2, p<.01), lower creatinine (1.2 v. 1.3, p<.01) and bilirubin (0.9 v. 1.1, p<.01) at time of device placement. Patients with pMCS were more likely male (87% v. 75%, p<.01) and on inotropes (82% v. 72%, p<.01) with dobutamine (28% v. 36%, p<.01) and epinephrine (2% v. 15%, p<.01). The 14 day transplant rate was better in IABP group (80% v. 73%) while post-transplant survival was comparable at 1 year (92% v. 88%, p=0.09). 72% of all IABPs were placed at IABP predominant centers (>80% Status 2 devices IABP) while 15% pMCS were implanted at pMCS predominant centers (p<.01)

Conclusion: Since the new policy, 50% of all transplants are performed with UNOS Status 2 of which 48% are after being upgraded and 66% have either an IABP or pMCS. Compared to IABP, patients requiring pMCS are more likely to be male, with end-organ dysfunction and higher requirement of inotropes which could be useful in choosing appropriate device. Center level variation exist in type of device used in favor of IABP

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Surgical Specialization and Standardization of Care Improves Outcomes in Mechanical Circulatory Support: A Single Center Experience

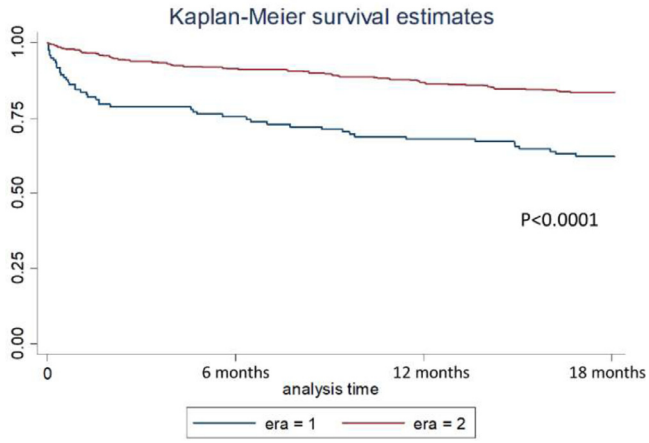
D.D. Chang,[1] M. Giraldo-Grueso,[2] S. Desai,[3] K. Marz,[4] A. Bansal,[5] K. Webre,[5] P. Parrino,[3] and A. Bansal.[5]. [1]Surgery, Henry Ford Health System, Detroit, MI; [2]General Surgery, Ochsner Clinic Foundation, New Orleans, LA; [3]Ochsner Clinic Foundation, New Orleans, LA; [4]Cardiology, Ochsner Clinic Foundation, New Orleans, LA; and the [5]Surgery, Ochsner Clinic Foundation, New Orleans, LA.

Purpose: Cardiac surgery continues to transform into areas of sub-specialization and expertise to reduce variability and have superior outcomes. We sought to analyze the impact of surgical sub-specialization and use of protocol and clinical pathways on outcomes with MCS at the time of LVAD implantation.

Methods: A single center retrospective analysis of long term durable MCS patients between 2004-2019 was performed. The analysis was conducted comparing management of patients before (Era 1: 2004-2011) vs. after (Era 2: 2012-2019) based on before and after introduction of MCS sub-specialization. Since 2012, multiple initiatives were introduced namely recruitment of specialized MCS/transplant surgeons, multidisciplinary team rounds, establishment of a shock team, development of clinical care pathways, electronic medical record order sets and clinical practice guidelines.

Results: A total of 542 patients were included. During Era 1, five cardiac surgeons implanted LVADs in 123 patients, while in Era 2, two MCS/transplant trained surgeons implanted LVADs in 419 patients. Era 2 included higher number of INTERMACS 1 and 2 profile patients (41% vs. 63%) reflecting higher-acuity patient population. With implementation of the sub-specialization services, 1-year survival improved from 70% to 90%. Median ICU stay decreased from 13 to 8 days and percent of patients discharged to home increased from 62% to 95%. Standardized protocols for management of high LDH, GI bleeding, and blood pressure management resulted in significant reduction in overall hospital length of stay. With introduction of clinical care pathways, the average time for workup from admission to LVAD implant decreased from 27.6 days to 8.5 days.

Conclusion: Introduction of surgical sub-specialization and standardization of care with the use of clinical pathways and protocols in managing patients with LVADs can help improve survival, reduce variability in medical care, and reduce ICU length of stay.



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Impact of Adverse Events on Health-Related Quality of Life After Left Ventricular Assist Device Implantation - An STS INTERMACS Analysis

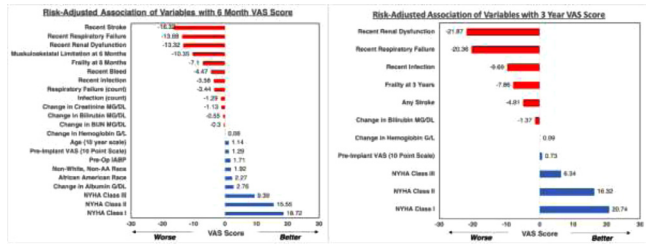
A. Kilic,[1] J. Kwon,[1] K. Grady,[2] B.A. Singletary,[3] A. Kilic,[4] M. Everitt,[5] J. Cleveland,[6] R.S. Cantor,[3] S. Blackmon,[7] K. Breathett,[8] S. McKellar,[9] M. Keebler,[10] J.K. Kirklin,[3] and J. Stehlik.[11] [1]Surgery, Medical University of South Carolina, Charleston, SC; [2]Northwestern University, Chicago, IL; [3]Kirklin Institute for Research In Surgical Outcomes, University of Alabama at Birmingham, Birmingham, AL; [4]Johns Hopkins University, Baltimore, MD; [5]University of Colorado, Aurora, CO; [6]Cardiothoracic Surgery, University of Colorado, Aurora, CO; [7]Mayo Clinic, Rochester, MN; [8]University of Arizona, Tucson, AZ; [9]Intermountain Medical Center, Murray, UT; [10]University of Pittsburgh, Pittsburgh, PA; and the [11]University of Utah, Salt Lake City, UT.

Purpose: Our aim was to quantify the impact of pre- and post-operative variables on health-related quality of life (HRQOL) after left ventricular assist device (LVAD) implantation.

Methods: Primary continuous flow durable LVAD implants, with or without concomitant valve surgery, between 2012-2019 in the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) were identified. Multivariable modeling using general linear models assessed the impact of baseline patient characteristics, operative factors including device type, and post-implant adverse events (AEs) on HRQOL as assessed by the EQ-5D Visual Analog Scale [(VAS, 0 (worst) to 100 (best health state)] at 6 months and 3 years post-LVAD. Recent AEs were defined as occurring within 60 days prior to follow-up.

Results: Of 22,230 primary LVAD implants, 9,888 patients were alive with complete VAS data at 6 months, and 2,170 were alive with complete VAS data at 3 years follow-up. Median VAS improved from 40 [IQR 10-60] pre-implant to 75 [IQR 60-85] at 6 months and 75 [IQR 60-85] at 3 years ($p<0.001$). Pre-implant variables, including baseline VAS, were weakly associated with HRQOL, while post-implant AEs had a large negative association. Lower NYHA class at follow-up had a large positive association with HRQOL both at 6 months and 3 years. Recent stroke, recent respiratory failure, and recent renal dysfunction were most strongly associated with impaired HRQOL at 6 months, while recent renal dysfunction, recent respiratory failure, and recent infection were most strongly associated at 3 years (**Figure**).

Conclusion: AEs following LVAD implantation are most strongly associated with impaired HRQOL in both the early and late follow-up periods. Understanding the impact of AEs on HRQOL may assist clinicians and patients in shared decision making regarding LVAD therapy eligibility and timing of implant. Continued efforts to reduce post-LVAD AE burden are warranted to not only improve survival but also HRQOL.



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Sexual Function, Quality of Life and Depression in Left Ventricular Assist Device Supported Patients

A. Jakstaite, P. Luedike, S. Wernhart, B. Schmack, N. Pizanis, A. Weymann, M. Kamler, A. Ruhparwar, T. Rassaf and M. Papathanasiou. University Hospital Essen, Essen, Germany.

Purpose: Left ventricular assist device (LVAD) therapy is associated with improved survival and quality of life (QoL) in advanced heart failure (HF) patients. Sexual dysfunction is common among HF patients and considered an important hamper to QoL. The aim of the study was the evaluation of prevalence of erectile dysfunction (ED) in LVAD recipients and its association with QoL and depression.

Methods: This is a prospective, single-center, cross-sectional study. We included male LVAD patients who were clinically stable after at least 3 months post-implantation. Erectile function was assessed with the International Index of Erectile Function (IIEF-5) with a score of ≤ 21 being confirmatory for ED. QoL and depression were estimated with the Kansas City Cardiomyopathy Questionnaire (KCCQ) and the Patient Health Questionnaire depression scale (PHQ-8), respectively. Association between binary variables was estimated by the x^2 test. Pearson's correlation was run to assess the relationship between IIEF-5, KCCQ, and PHQ-8 scores.

Results: We included 52 patients on continuous-flow LVAD. Mean age was 57 years and bridge to transplant was the therapeutic goal in 79% of patients. Median time on device support was 707 days. HeartMate III was the most common device type (69%) followed by HeartWare (31%). According to IIEF-5 assessment, 78% of all study patients had ED. Mean IIEF-5 score was 11.9 ± 8.8, KCCQ 79.7 ± 5.5 %, and PHQ-8 score 6.3 ± 5.7. There was no significant association between ED and common comorbidities (chronic kidney disease, diabetes, peripheral arterial disease, coronary artery disease, hypertension, atrial fibrillation, stroke). ED was not associated with the intake of beta blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, sacubitril/valsartan, aldosterone antagonists, sodium-glucose co-transporter 2 inhibitors, or phosphodiesterase-5 inhibitors (PDE5i). There was a statistically significant negative correlation between IIEF-5 score and depression severity scale ($r = -0.44$, $p < 0.014$) while no significant correlation between IIEF-5 and KCCQ score was observed ($r = 0.19$, $p = 0.25$).

Conclusion: ED is highly prevalent among LVAD recipients and is associated with severity of depressive symptoms. There is no association of ED with HF drugs and major comorbidities and PDE5i use is not associated with the prevalence of ED in this cohort.

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Complexities of Explanting Durable LVADs (Done at Outside Facilities) at the Time of Heart Transplant Surgery

D. Emerson, N. Patel, T. Singer-Englar, D. Megna, P. Catarino, D. Ramzy, J. Moriguchi, R. Cole, J. Chikwe, J.A. Kobashigawa and F. Esmailian. Smidt Heart Institute at Cedars-Sinai, Los Angeles, CA.

Purpose: Patients with severe heart disease may require hemodynamic support with a durable left ventricular assist device (LVAD) as a bridge to