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Pulmonary Artery Banding to Optimize Ventricular Interaction after Lvad Explant Following Myocardial Recovery

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Introduction: Myocardial recovery following left ventricular assist device (LVAD) implant is uncommon but has been reported in children with dilated cardiomyopathy (DCM). However, there is a risk for recurrence of heart failure (HF) after LVAD explant. Pulmonary artery (PA) banding has been reported as a HF treatment strategy to alter ventriculo-ventricular (VV) interaction in DCM. We report a case of PA banding at the time of LVAD explant in a child with DCM.

Case Report: A term infant female, presented at 3 months of age with HF due to DCM. Her echocardiogram showed severely dilated and reduced LV function with preserved right ventricular (RV) function. Genetic testing revealed a likely pathogenic mutation of GAA c.1375G>C (p. Asp459His). Due to worsening HF, she underwent 10ml Berlin Heart EXCOR LVAD implant as a bridge to heart transplantation. She continued with anti heart failure medications along with LVAD support. Over the next few months, her LV function gradually recovered, but there was persistent mid/basal septal dyskinesia. After reassuring echocardiographic wean studies and invasive hemodynamic assessment, she underwent LVAD explant after 6 months support. Due to the dyskinetic septum and pathogenic genetic mutation, a PA band was applied at time of explant to augment VV interactions and prevent progressive LV dilation and dysfunction. She was discharged from hospital and is currently asymptomatic 18 months post explant and PA banding, although septal dyskinesia persists. At last, follow up, her echocardiogram revealed good biventricular systolic function and a PA band gradient of almost 30mmHg.

Summary: Myocardial function can recover following LVAD support and HF medications. In this case, the addition of PA banding was used to optimize VV interaction after LVAD explant and to prevent further LV dilation while in remission of HF.

(LV end diastolic z score (LVEDD Z score) and NT ProBNP trend from Pre LVAD implant to Post LVAD explant)

(820)

Percutaneous Removal of Pulmonary Emboli in a Patient with Right Ventricular Failure after LVAD Implantation

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Introduction: Congestive heart failure is a major risk factor for developing pulmonary embolism, especially in young adults. The presence of pulmonary embolus (PE) significantly increases the risk of postoperative right ventricular (RV) failure in patients undergoing left ventricle assist device (LVAD) implantation. We present a case in which successful percutaneous removal of PE allowed weaning from RV supporting treatment after LVAD implantation.

Case Report: A 39-year-old man with dilated cardiomyopathy due to cardiac sarcoidosis, with severely impaired left and mildly reduced RV function, was admitted to our hospital in stable condition to undergo a scheduled prophylactic ICD implantation. During the course of the admission his clinical status deteriorated with signs of volume overload and systemic hypoperfusion. He received inotropes and intravenous diuretics. He was considered for LVAD implantation for which additional tests were performed. CT angiography showed central and (sub)segmental PE in the right pulmonary artery with lung infarction. His clinical status deteriorated further and he underwent urgent LVAD implantation. During surgery the patient received milrinon and nitric oxide ventilation resulting in low pulmonary arterial pressures (systolic 30 mmHg) and pulmonary vascular resistance (PVR) of 1,1 WU. There were no signs of right ventricular failure and concomitant embolectomy was deemed unnecessary. On the 3rd postoperative day tapering of NO ventilation led to RV failure with an increase in pulmonary pressures and PVR, dilation of RV and decrease in LVAD flow. CT scan showed an unchanged aspect of the pulmonary emboli. Percutaneous removal using the FlowTriever device was performed. This resulted in an immediate decrease of PVR, allowing subsequent weaning from NO ventilation and inotropes. In the following days, the patient underwent twice re-thoracotomy due to bleeding complications, without signs of RV failure at the time. He was discharged on day 50 and did not suffer from RV failure afterwards.

Summary: Percutaneous removal of pulmonary emboli with the FlowTriever device after LVAD implantation was successfully performed in our patient. This procedure can be a feasible option in patients with postoperative RV failure due to pulmonary embolism, who did not undergo concomitant embolectomy at the time of LVAD implantation.

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Biopsy-Proven Fulminant Myocarditis Requiring Mechanical Circulatory Support Following Third Dose of COVID-19 MRNA Vaccination

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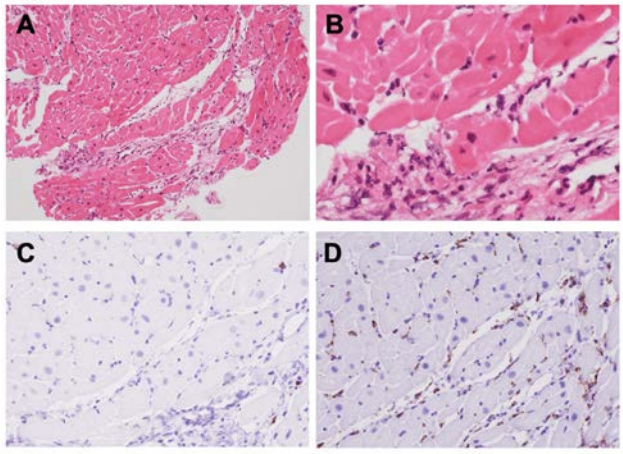
Introduction: Myocarditis has been recognized as a rare complication of coronavirus disease 2019 (COVID-19) messenger RNA (mRNA) vaccinations. The frequency of the event was reported 2-3 cases per million vaccinations. Clinical courses remain variable, ranging from asymptomatic to severe heart failure requires mechanical circulatory supports (MCS). Here we report a case of fulminant myocarditis requiring MCS following COVID-19 mRNA vaccination.

Case Report: A 22-year-old male presented to the hospital with chest pain and fever 2 days after receiving the third dose of the COVID-19 mRNA vaccination. Electrocardiography showed tachycardia with ST-segment elevation. Inflammatory and myocardial injury markers were elevated, and echocardiography demonstrated slight left ventricular (LV) dysfunction. He was hospitalized for suspecting acute myocarditis. On the second day of hospitalization, he developed recurrent ventricular fibrillation with cardiogenic shock leading to need for venoarterial extracorporeal membrane oxygenation and intra-aortic balloon pumping. Echocardiography revealed severe LV systolic dysfunction. Catheter examinations showed normal coronary with elevated right and left sided filling pressures and decreased cardiac output. Endomyocardial biopsy (EMB) revealed moderate endomyocardial thickening, mild inflammation, increased interstitial fibrosis and cell infiltration with more macrophages (CD68+) (Figure) (awaiting the results of tenascin-C, angiotensin converting enzyme 2 and severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2] spike S protein). No viral genomes including SARS-CoV-2 were detected in the EMB specimens by polymerase chain reaction test. With advanced therapy, he was discharged on the 26th day without any cardiac dysfunction.

Summary: Histological evaluation is important for diagnosing myocarditis following COVID-19 vaccination to confirm type of inflammation and the absence of viral genomes.

Figure.



Endomyocardial biopsy revealed moderate endomyocardial thickening, mild inflammation, increased interstitial fibrosis (Hematoxylin and Eosin staining, (A): x10, (B): x40) with less CD3+cells(C) and more CD68+cells(D).

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Recurrent Pyogenic Granulomas Complicating a Driveline Site

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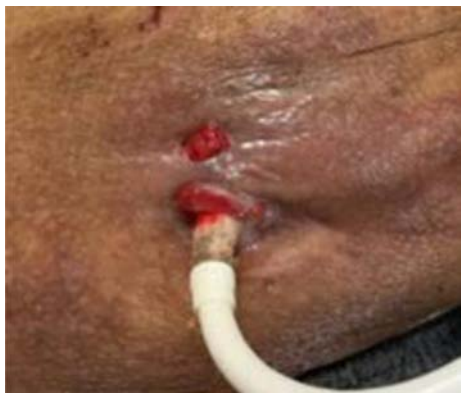
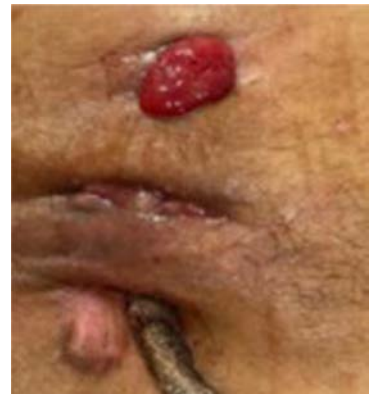
Introduction: Pyogenic granulomas (PG) are friable vascular growths that occur at sites of trauma. Treatment is usually necessary, and recurrence is common. The driveline site of a left ventricular assist device (LVAD) can serve as a site of chronic injury predisposing some patients to development of PG.

Case Report: A 60-year-old man with a HeartMate 3 LVAD developed polypoid lesions along his driveline that bled during dressing changes (Figure 1). A biopsy showed ulcerated granulation tissue, neovascularization and inflammation consistent with PG. He underwent numerous shave removals and cauterizations but continued to have recurrence of new PG's (Figure 2). The PG were complicated by E. coli infection requiring a prolonged course of antibiotics. Driveline repositioning was considered, but may cause new PG formation. Due to the recurrence of the lesions and the infectious complications, the patient was listed for heart transplant.

Summary: To our knowledge, this is the first reported case of recurrent PG complicating a driveline site. In susceptible patients, the driveline exit site can favor development of PG. This patient's PG are refractory to usual therapy, and we hope they resolve with cardiac transplantation and removal of the driveline as it leads to the risk of infection.





(823)

Survival of the Unfittest: The Longest Living LVAD-Supported Patient with DMD-Associated Cardiomyopathy

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Introduction: Duchenne muscular dystrophy (DMD) is a X-linked recessive neuromuscular disorder due to mutations in the DMD gene, leading to progressive loss of muscular function. Heart failure is the leading cause of death for DMD patients. There are little long-term data regarding advanced therapies in this population. We present a patient with DMD-associated cardiomyopathy who has survived for >9 years post-LVAD implantation.

Case Report: An 18-year-old male with DMD complicated by quadriparesis, cardiomyopathy, and moderate restrictive lung disease presented to UT Southwestern Medical Center with inotrope-dependent, end-stage heart failure in cardiogenic shock in 2013. Cardiac MRI showed severe bilateral chamber enlargement and dysfunction (LVEF 15%, RVEF 26%). While on milrinone 0.5mcg/kg/min, his intracardiac hemodynamics were evident for elevated ventricular-filling pressures and low cardiac index (Table 1).

He underwent an uncomplicated HeartWare LVAD implantation through median sternotomy, avoiding disruption of the diaphragm as occurs with other LVADs. His end-organ markers normalized, and he was weaned from inotropic support prior to discharge.

Since LVAD implantation, the patient has had an average of 3 hospitalizations per year, mostly for supratherapeutic INR, respiratory infections, and hypovolemia. He has had no driveline infections, stroke, pump thrombosis, or other associated LVAD complications. He only uses his ventilator at night to rest his diaphragm and does not require enteric feeding.

Summary: To the best of our knowledge, this report represents the longest time on durable LVAD support by a patient with DMD in the medical literature to date. Although cardiomyopathy is the leading cause of death in DMD patients, this no longer must be the case in appropriately selected patients for VAD therapy. As device technology and hemocompatibility continue to evolve, VAD therapy can offer a potential survival advantage in this patient population with minimal complications.