

Successful Treatment of Ulcerative Colitis–Related Fulminant Myocarditis Using Extracorporeal Life Support

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ABSTRACT

Myocarditis is a known extraintestinal manifestation of inflammatory bowel diseases, but it rarely leads to acute cardiac pump failure. We report a case of fulminant myocarditis associated with ulcerative colitis treated successfully with an extracorporeal membrane oxygenator.

INTRODUCTION

Inflammatory bowel diseases (IBDs) are associated with extraintestinal manifestations involving almost every organ system in the body. Cardiac disease is an infrequent extraintestinal manifestation of IBDs; the most common are pericarditis (70%) and myocarditis (10%) [Abid 1990; Dubowitz 2001]. The use of a mechanical ventricular support device for fulminant myocarditis (FM) with severe ventricular failure is well established [Wilmot 2011].

CASE REPORT

After a recent trip abroad, a 31-year-old man presented with a sudden onset of chest pain and breathlessness and collapsed at his residence. His history was significant for ulcerative colitis diagnosed at the age of 17, which was unresponsive to medical therapy and required a panproctocolectomy at the age of 23 years. Even after surgery, the patient experienced several exacerbations that were treated with steroids. The last occurred 2 weeks before the current illness.

On the patient's arrival, we noted a systolic blood pressure of 50 mm Hg, sinus tachycardia (120 beats/minute), tachypnea, and a lactate concentration of 12 mmol/L. An electrocardiogram showed ST elevation in the chest leads, and his cardiac enzymes were increased significantly. A coronary angiography examination showed normal vessels and poor biventricular function, which prompted an endomyocardial

biopsy. An echocardiogram showed large left and right ventricles with severe global dysfunction (ejection fraction, 10%; tricuspid annular plane systolic excursion, 5 mm). A chest x-ray showed a bilateral pleural effusion. The patient's urine output decreased, and his creatinine concentration began increasing. He developed complete heart block and required pacing through temporary wires. He was awake and fully conscious. In addition to high doses of adrenaline, noradrenaline, and milrinone, an intra-aortic balloon pump was inserted. His condition continued to deteriorate, however, with a worsening of renal and liver function markers (creatinine, 285 mmol/L; bilirubin, 78 mmol/L) over the next 24 hours. A venoarterial extracorporeal membrane oxygenator (ECMO) was inserted through right femoral vessels via a 19F arterial and 33F venous cannula with a Levitronix CentriMag pump (Levitronix, Waltham, MA, USA) and a Medos Hilite 7000 LT oxygenator (Medos, Stolberg, Germany) with a flow rate of 4.5 to 5.5 L/minute. A 10F arterial sheath was introduced into the right femoral artery for distal limb perfusion that could supply a flow rate of 0.6–0.8 L/minute. The procedure was carried out with the patient under local anesthesia with conscious sedation with fentanyl administered in the intensive therapy unit. In view of the acute renal failure, continuous venovenous hemodiafiltration) was started. An endomyocardial biopsy showed multiple foci of myocyte necrosis with patchy lymphoid infiltrate indicating lymphocytic myocarditis.

The patient's condition began improving within 12 hours of ECMO implantation. He began producing urine, and we weaned the patient off inotropes. The serum creatinine returned to normal in 24 hours; liver enzymes required 3 days to normalize. The hemofilter was stopped on day 3, when the patient was able to produce 2 L of urine. The mixed venous saturation was improved and stayed above 70%. His arterial-pressure trace showed signs of a return of cardiac function, which was confirmed by echocardiogram on the fifth day. The echocardiogram showed a left ventricle of normal size with mild impairment in function (ejection fraction, 58%). This finding prompted gradual weaning of ECMO. The fraction of inspired oxygen (FiO₂) in ECMO was reduced to 50%, which was followed reducing gas flow to 2 L/minute. The arterial PaO₂, PaCO₂, the lactate concentration, and mixed venous saturation were monitored every 2 to 3 hours during weaning,

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and the values of these parameters remained well above the normal range. The pump flow in the ECMO was reduced by 1 L every 6 hours and was maintained at 2 to 2.5 L/minute for 12 hours. The patient was given a loading dose of levosimendan, and an intra-aortic balloon pump was maintained at 1:1 with full augmentation. Another echocardiogram revealed similar findings. In view of the good cardiac function detected in the echocardiogram and acceptable levels of PaO_2 , PaCO_2 , lactate, and mixed venous saturation with minimal flows in the ECMO, we decided to remove it. The cannulas were removed, and bleeding was controlled with deep silk sutures over the cannula insertion site. A FemoStop mechanical pressure device (RADI Medical Systems, Uppsala, Sweden) provided continuous pressure over the groin, and the pressure was reduced gradually over 12 hours. The patient was awake, conscious, and oriented to time and place throughout ECMO therapy. The intra-aortic balloon pump was weaned and removed after 24 hours.

DISCUSSION

Extraintestinal manifestations are common complications of IBDs. Patients with IBDs have an increased risk of myocarditis, but its incidence is low [Sørensen 1997]. In the course of IBD, myocarditis may occur as an extraintestinal manifestation or as a complication of therapy with mesalamine [Stelts 200]. Our patient was on mesalamine therapy until he underwent total proctocolectomy, so the myocarditis could be due to an extraintestinal manifestation. Giant cell myocarditis has been associated with ulcerative colitis in cases that have been reported thus far; however, the patient in the present case seemed to have the appearance of lymphocytic myocarditis [McKeon 1986; Nakamura 2006].

FM is characterized clinically by a distinct onset of cardiac symptoms in otherwise healthy young patients. These symptoms rapidly lead to severe ventricular dysfunction and cardiogenic shock. Mortality rates of up to 30% have been reported for FM [Dec 1985]. Myopericarditis may produce an array of symptoms, ranging from shortness of breath to chest pain. They may resolve without specific therapy, or they may evolve rapidly and progress to cardiogenic shock and death [Cooper 2009]. In the present case, the patient presented with chest pain and shortness of breath that rapidly progressed to cardiogenic shock.

Mechanical circulatory support is a well-established therapy for the treatment of FM with ventricular failure [Wilmot 2011]. This support can be provided by ECMO or short-term use of a ventricular assist device (VAD). Patients with the acute forms of myocarditis can be expected to be on circulatory support for a long time, so short-term use of a VAD is more appropriate. A patient with FM is expected to recover within a short time, however, and the device is indicated as a bridge to recovery; hence, the use of an ECMO seems logical [Wilmot 2011]. ECMO has the advantage of the capability to

be placed via peripheral access, thereby avoiding a sternotomy and the potential of reexploration for bleeding and tamponade, which are inherent risks of VAD implantation. Furthermore, an ECMO can be used at the bedside and sometimes during cardiac arrest with ongoing cardiopulmonary resuscitation [Mohite 2011]. In the present case, FM led to severe ventricular failure, and an ECMO was placed at the bedside through the right groin. Our strategy of ECMO therapy in FM is to allow the heart to recover over a period of 7 to 10 days. Serial echocardiograms should be performed every 2 to 3 days to assess cardiac function. If the heart does not recover during this period and the functions of other end-organs (kidneys, liver, lungs, and brain) are preserved or recover with ECMO, the use of an ECMO should be converted to a VAD.

CONCLUSION

FM related to ulcerative colitis is a rare condition that may lead to rapidly progressing heart failure. Patients not responding to maximum inotropic support and an intra-aortic balloon pump should be considered for extracorporeal life support. A peripherally inserted venoarterial ECMO is an efficient short-term circulatory support that can be done at the bedside in a conscious patient.

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