

## Case Study: AMI Cardiogenic Shock

### Patient Data

**Indication for Use:** Acute Myocardial Infarction  
Cardiogenic Shock  
**Type of Support:** Bi-VAD AB5000 Ventricles  
**Age:** 53      **Sex:** Male  
**Weight:** 98 kg      **Height:** 76.3 inches      **BSA:** 2.11m<sup>2</sup>

### Surgical Data

**Surgical Procedure:** CABG x 5  
Bi-VAD AB5000 implantation  
**CPB Time:** 275 minutes  
**Cross Clamp Time:** 110 minutes  
**LVAD Cannulation:** 36 Fr intra-atrial groove  
10mm Hemashield<sup>®</sup> graft to aorta  
**RVAD Cannulation:** 36 Fr right appendage  
10mm Hemashield<sup>®</sup> graft to pulmonary artery

### Patient Hemodynamics

	Pre-Implant	On-Support	Explant (PO Day #10)
<b>CI:</b>	<1.8	>2.5	2.5
<b>EF:</b>	<20%		>35%
<b>MAP:</b>	60	83	93
<b>CVP:</b>	21	0-12	15

**Creatinine:** 0.8 to 1.6 mg/dl  
**Bilirubin:** 0.9 to 1.5 mg/dl  
**Pulmonary:** Remained on ventilator during support due to smoking history

### Inotropic Support

**Pre-Implant:** Dopamine and Nitroglycerin  
**On-Support:** None  
**Post-Support:** Milrinone

### Anticoagulation

Hemostasis achieved with a full Protamine dose in the OR.

### Blood products received in the OR:

PRBCs – 4 units  
Platelets – 5 units  
FFP – 5 units

### Blood products Post-op:

PRBCs – 12 units  
FFP – 2 units

Hematocrit maintained at >30%

Heparin therapy started within 24 hours of implant at 1500 u/hr. aPTT maintained between 60 – 80 seconds per recommendation.

### Implanting Surgeon:

Dr. Jack Crumbley, Medical University of South Carolina;  
Charleston, South Carolina

**Clinical Consultant:** Barbara Battle

### History

On December 22, 2003, Mr. Fincher was admitted to Grand Strand Regional with complaints of chest pain and shortness of breath. A cardiac catheterization was performed and revealed an ejection fraction (EF) of less than 20% with an inferior wall myocardial infarction; multi-vessel coronary artery disease involving a totally occluded circumflex, left anterior descending and right coronary arteries. Stenoses were also found in the left main and diagonal arteries. His past medical history included hypertension, diabetes and smoking. He was classified as IIIB from the New York Heart Association (NYHA).

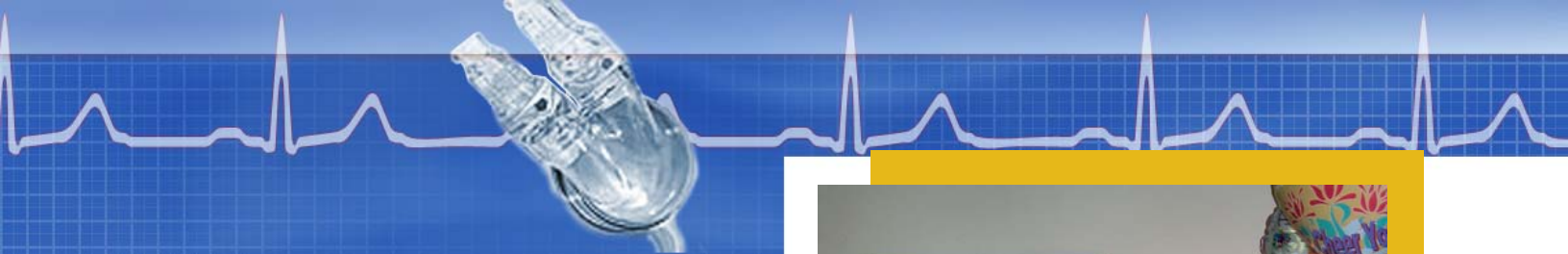
Mr. Fincher was considered a high risk surgical candidate and an intra-aortic balloon pump (IABP) was inserted. He was transferred to the Medical University of South Carolina (MUSC) in Charleston, South Carolina on Christmas eve.

On admission to MUSC, the patient was hemodynamically stable despite a cardiac index of 1.8 L/minute/m<sup>2</sup>. Dr. Jack Crumbley posted the patient for a Coronary Artery Bypass grafting (CABG) procedure with possible VAD insertion.

### Operative Summary

Mr. Fincher was taken to the operating room on December 26, 2003, for a CABG x 5. After several attempts were made to wean from cardiopulmonary bypass (CPB), bi-ventricular support (Bi-VAD) was initiated with AB5000<sup>™</sup> Ventricles. Total time on CPB was 275 minutes with a cross-clamp time of 110 minutes.

While on CPB, a 36 French malleable cannula was placed via the inter-atrial groove with a 10mm Hemashield<sup>®</sup> graft attached to the aorta for left side support. The right side was cannulated with a 36 Fr malleable cannula to the right atrial appendage and a graft attached to the pulmonary artery. The patient's sternum was closed and heparin was completely reversed with a full dose of protamine; the IABP was discontinued in the OR and vasoactive drips were weaned. Patient received four units of packed red blood cells (PRBC), five units of platelets and five units of Fresh Frozen Plasma (FFP). Pump outputs were stable at around 5.0 L/minute. The patient was transferred to the Cardiothoracic Intensive Care Unit (CTICU).



## ***Post-Operative***

### ***Post-Operative (PO) day #2:***

The patient was stable on Bi-VAD support with flows at 5.0-5.6 L/minute (index  $>2.3$  L/min/m<sup>2</sup>). Chest tube drainage was 10-15 cc/hour, with an Activated Clotting Time (ACT) of 129 so heparin was started per hospital protocol at 1500 units/hour. TPN was started.

### ***PO day #3:***

The patient remained stable, but sedated. There was no evidence of renal insufficiency with serum creatinine level at 1.0 mg/dl. Urine output was 75-100 cc/hr. A heparin drip was maintained at 1500 u/hr with an ACT 192; well within therapeutic range of 180-200. Patient worked up for cardiac transplantation.

### ***PO day #4:***

The patient remained hemodynamically stable with BiVAD flows of 5.0-6.0 L/minute (index  $>2.3$  L/min/m<sup>2</sup>). Heparin was adjusted to maintain aPTT within the therapeutic range of 60-80 seconds. A weaning trial was performed. The right side showed no signs of recovery and only minimal recovery on the left. The patient was continued on full support with no changes to his vital signs.

### ***PO day #10:***

On January 5, 2004, patient was taken to the OR to evacuate a clot from his chest. Before opening the sternum, flows on the AB5000 Console were reduced to 2 L/min. and the patient remained stable hemodynamically. A 600cc clot was removed from his chest and native heart function was determined to be adequate.

The AB5000™ Ventracles were successfully explanted.

### ***PO day #12:***

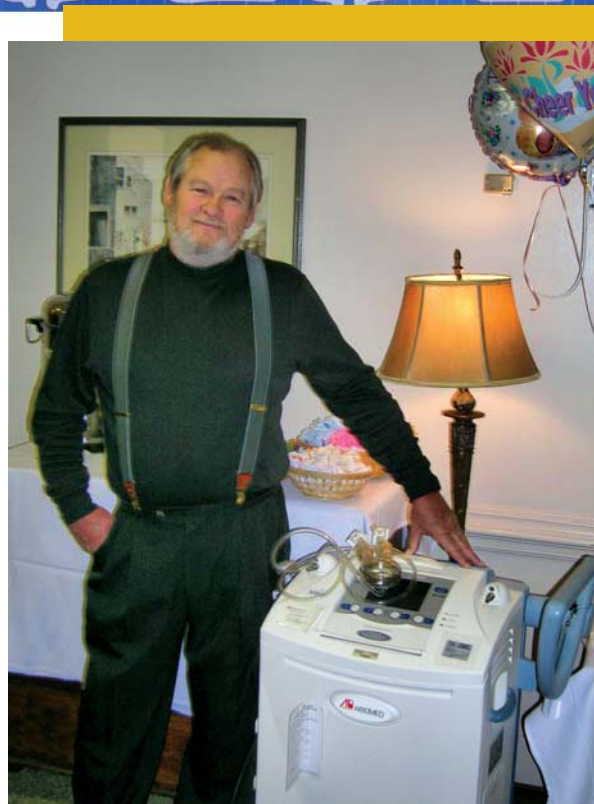
The patient remained stable and responsive, on ventilator support due to smoking history.

### ***PO day #25:***

The patient received an Automatic Implantable Cardioverter-Defibrillator (AICD) because of episodes of ventricular tachycardia.

### ***PO day #26:***

The patient ambulated in the hall with his wife at his side. The left ventricular ejection fraction by echocardiogram was 35%.



*Mr. Thomas Fincher stands with the AB5000™ Console at a party celebrating his recovery at MUSC.*

### ***PO day #28:***

The patient discharged to home.

On February 27, 2006, Mr. Fincher and four other survivors were honored at MUSC with a Celebration of Life ceremony. This ceremony represented the largest gathering of survivors and family members in the history of Abiomed. He was accompanied by his wife and was looking and feeling great. He had lost 40 LBS and had stopped smoking.

***“He came back better than ever. I feel like we’re 16 again,” says Mrs. Fincher.***