Steady Eddy: Case Study of Patient on Temporary Device

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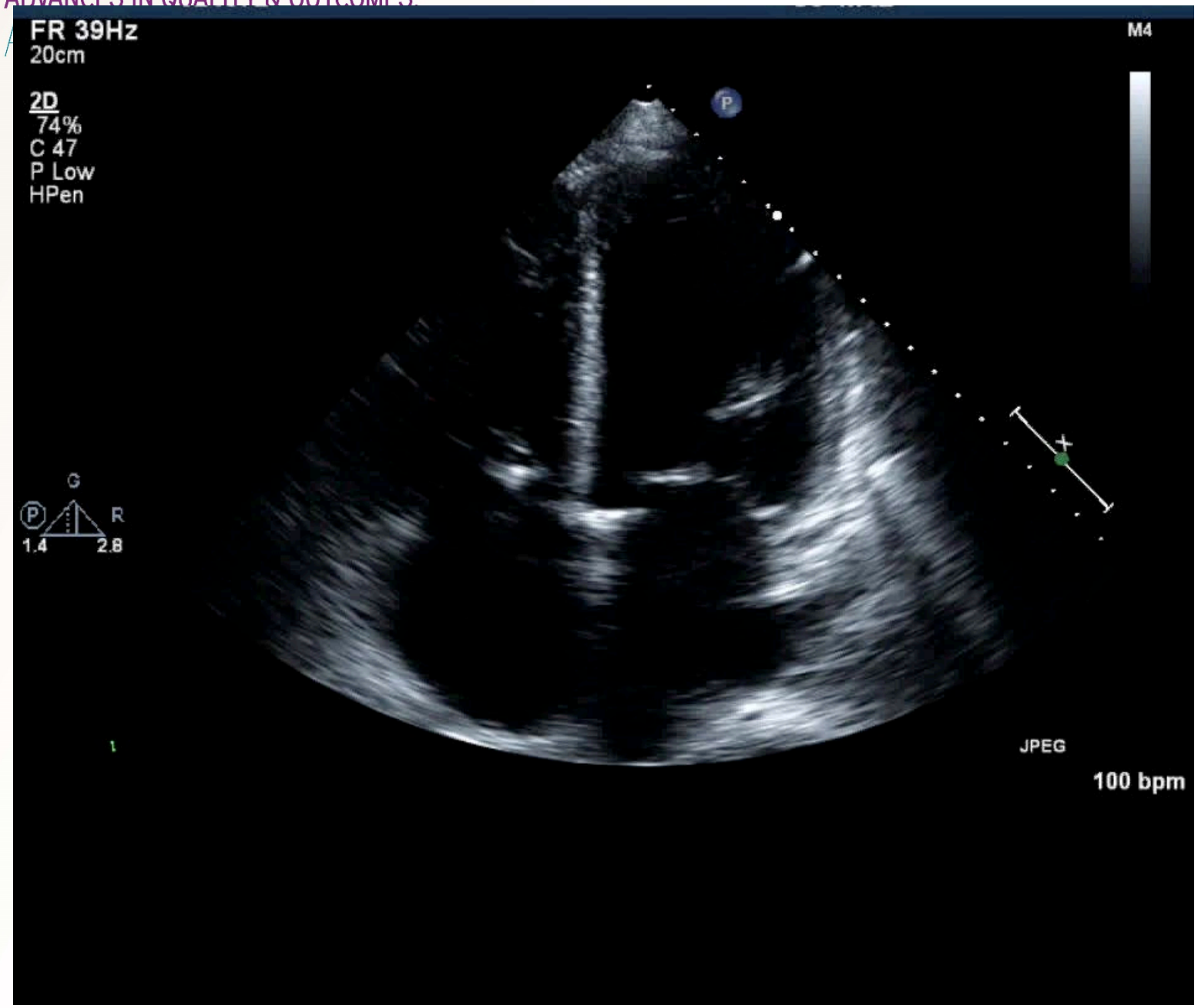
Disclosures

- Co-PI, MOMENTUM 3 Trial, Abbott Laboratories

Cardiogenic Shock

- 35 Year Old Male
  - 6 week history of progressive SOB
  - No Past Medical History
  - Admitted to MICU when could no longer walk more than 10 feet
  - Exam: Vitals 80/65, HR 120,
    - Cold, Clammy extremities.
    - 3/6 Systolic Murmur


FR 39Hz
20cm
2D
74%
C 47
P Low
HPen
M4
G
P
R
1.4
2.8
JPEG
100 bpm

Clinical Course

- Admission to Cardiac ICU
  - Vitals: HR 110-120, BP 80-09/60
  - Labs: Lactate 4.0, Creatinine 1.6, AST/ALT 1300/1700
  - Right Heart Cath: RA 21, PA 63/37, PCWP 30, CO 2.8, CI 1.5
  - Urine Output 10 cc/hr.
  - Started on Dobutamine (7.5 ug/kg/min) and Milrinone (.375 mcg/kg/min)

Question -ARS

- This patient is in cardiogenic shock
  - True
  - False

Question

- Optimal Treatment at this point in his course is:
  - A.) Continue current therapy - inotropes and hope for recovery
  - B.) Temporary Mechanical Circulatory Support
  - C.) Emergent Placement of a Durable LVAD
  - D.) Palliative Care

Temporary Support Devices - IABP

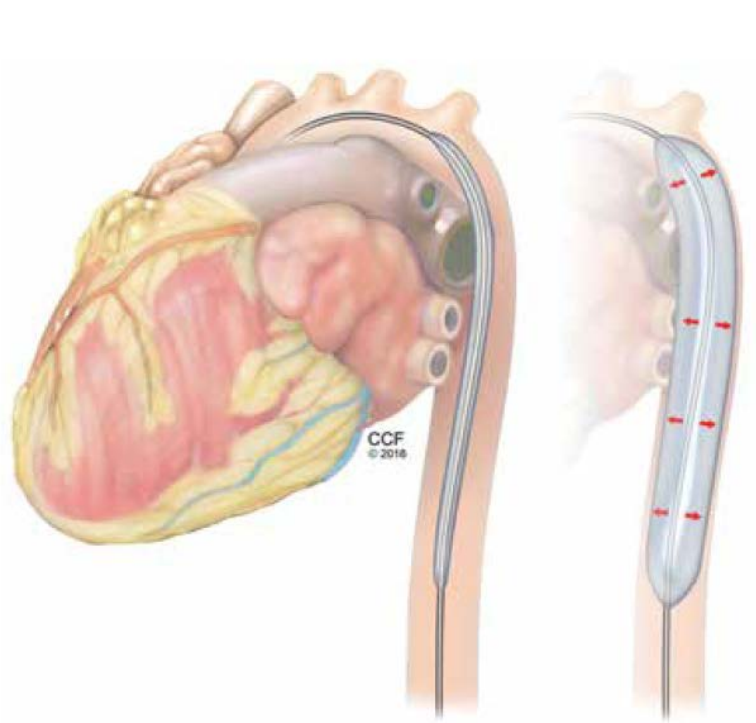


FIGURE 2. An intra-aortic balloon pump (IABP) deflates at the beginning of systole (left) and inflates at the beginning of diastole (right), increasing coronary perfusion and reducing left ventricular afterload.

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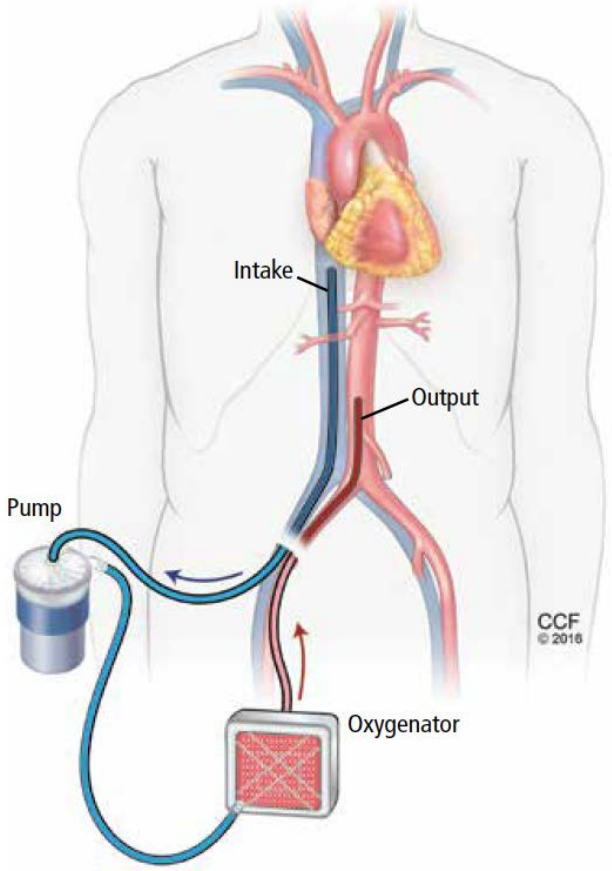
Temporary Support Devices – VA ECMO



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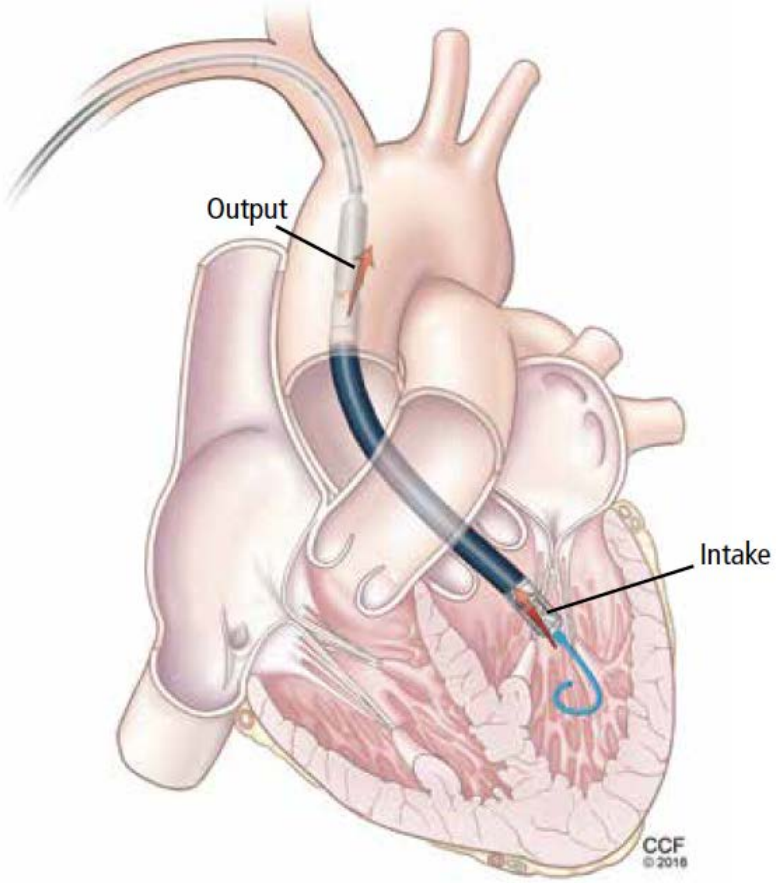
Temporary Support Devices – Impella



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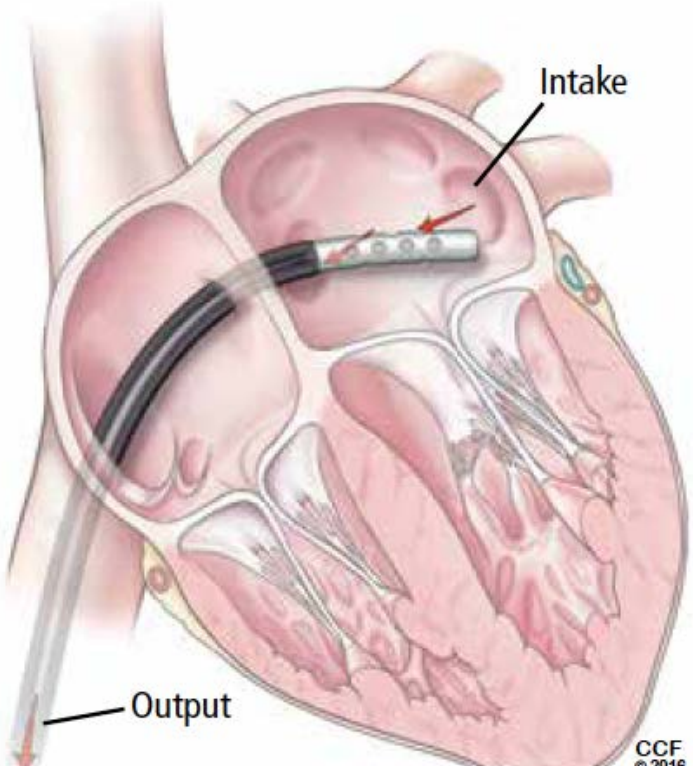
Temporary Support Devices – Tandem Heart



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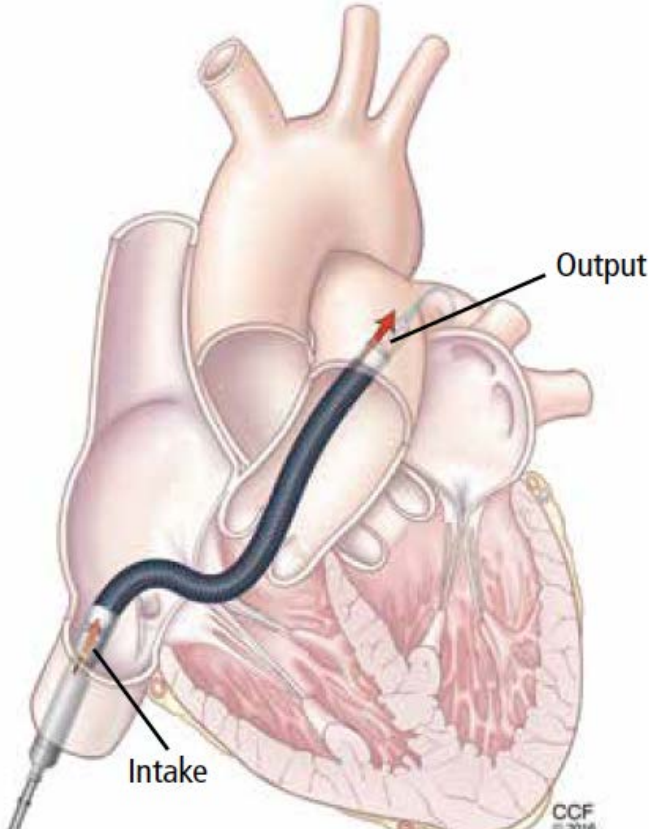
Temporary Support Device - RP Impella



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Patient Course

- Patient underwent Temporary Mechanical Circulatory Support with VA ECMO
- Cardiac Transplant Evaluation initiated
- Transplanted Successfully on Hospital Day 8

MECHANICAL CIRCULATORY SUPPORT

INTERMACS Profiles of Advanced Heart Failure: The Current Picture

Lynne Warner Stevenson, MD,[a] Francis D. Pagani, MD,[b] James B. Young, MD,[c] Mariell Jessup, MD,[d] Leslie Miller, MD,[e] Robert L. Kormos, MD,[f] David C. Naftel, PhD,[g] Karen Ulisney, MSN, CRNP,[h] Patrice Desvigne-Nickens, MD,[h] and James K. Kirklin, MD[g]

Background: The current classification of patients with New York Heart Association Class IV symptoms does not offer adequate description to allow optimal selection of patients for the current options of medical and pacing therapies, cardiac transplantation and mechanical circulatory support.

Methods: Seven clinical profiles and an arrhythmia modifier were developed and implemented into the first year of data collection for the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS). The INTERMACS Coordinators' Council provided ongoing feedback regarding the characterization of patients receiving implantable devices.

Results: The definition of 7 clinical profiles revealed that 80% of current devices are being used in the 2 profiles with the highest levels of clinical compromise. The INTERMACS Coordinators' Council helped to identify gaps in the characterization of hospitalized patients on temporary assist devices and of homebound patients with resting symptoms, which has led to revised definitions of Profile 3 and 4 and the addition of 2 new modifiers, for temporary circulatory support devices in the hospital, and for frequent rehospitalization of patients at home.

Conclusions: Patients considered for mechanical circulatory support can now be classified using the 7 profiles plus 3 modifiers developed through INTERMACS. Further understanding these profiles and their impact on outcome should help to better select patients and therapies in the advanced stages of disease. J Heart Lung Transplant 2009;28:535–41.

The Journal of Heart and Lung Transplantation
June 2009

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Established 1964

Table 2. INTERMACS Level of Limitation at Time of Implant

INTERMACS profile descriptions	Time frame for intervention
Profile 1: Critical cardiogenic shock	
Patients with life-threatening hypotension despite rapidly escalating inotropic support, critical organ hypoperfusion, often confirmed by worsening acidosis and/or lactate levels. "*Crash and burn.*"	Definitive intervention needed within hours.
Profile 2: Progressive decline	
Patient with declining function despite intravenous inotropic support, may be manifest by worsening renal function, nutritional depletion, inability to restore volume balance "*Sliding on inotropes.*" Also describes declining status in patients unable to tolerate inotropic therapy.	Definitive intervention needed within few days.
Profile 3: stable but inotrope dependent	
Patient with stable blood pressure, organ function, nutrition, and symptoms on continuous intravenous inotropic support (or a temporary circulatory support device or both), but demonstrating repeated failure to wean from support due to recurrent symptomatic hypotension or renal dysfunction "*Dependent stability.*"	Definitive intervention elective over a period of weeks to few months.
Profile 4: Resting symptoms	
Patient can be stabilized close to normal volume status but experiences daily symptoms of congestion at rest or during ADL. Doses of diuretics generally fluctuate at very high levels. More intensive management and surveillance strategies should be considered, which may in some cases reveal poor compliance that would compromise outcomes with any therapy. Some patients may shuttle between 4 and 5.	Definitive intervention elective over period of weeks to few months.
Profile 5: Exertion intolerant	
Comfortable at rest and with ADL but unable to engage in any other activity, living predominantly within the house. Patients are comfortable at rest without congestive symptoms, but may have underlying refractory elevated volume status, often with renal dysfunction. If underlying nutritional status and organ function are marginal, patient may be more at risk than INTERMACS 4, and require definitive intervention.	Variable urgency, depends upon maintenance of nutrition, organ function, and activity.
Profile 6: Exertion limited	
Patient without evidence of fluid overload is comfortable at rest, and with activities of daily living and minor activities outside the home but fatigues after the first few minutes of any meaningful activity. Attribution to cardiac limitation requires careful measurement of peak oxygen consumption, in some cases with hemodynamic monitoring to confirm severity of cardiac impairment. "*Walking wounded.*"	Variable, depends upon maintenance of nutrition, organ function, and activity level.
Profile 7: Advanced NYHA III	
A placeholder for more precise specification in future, this level includes patients who are without current or recent episodes of unstable fluid balance, living comfortably with meaningful activity limited to mild physical exertion.	Transplantation or circulatory support may not currently be indicated.
Modifiers for Profiles	Possible Profiles to Modify
TCS-Temporary Circulatory Support can modify only patients in hospital (other devices would be INTERMACS devices) Includes IABP, ECMO, TandemHeart, Levitronix ,BVS 5000 or AB5000, Impella.	1,2,3 in hospital.
A-Arrhythmia –can modify any profile. Recurrent ventricular tachyarrhythmias that have recently contributed substantially to clinical compromise. This includes frequent ICD shock or requirement for external defibrillator, usually more than twice weekly.	Any profile.
FF-Frequent Flyer – can modify only outpatients, designating a patient requiring frequent emergency visits or hospitalizations for diuretics, ultrafiltration, or temporary intravenous vasoactive therapy.	3 if at home, 4,5,6. A frequent flyer would rarely be profile 7.

INTERMACS 3 Definition - Coding

Profile 3: stable but inotrope dependent Patient with stable blood pressure, organ function, nutrition, and symptoms on continuous intravenous inotropic support (or a temporary circulatory support device or both), but demonstrating repeated failure to wean from support due to recurrent symptomatic hypotension or renal dysfunction "*Dependent stability*."	Definitive intervention elective over a period of weeks to few months.

Summary

- Stabilization of patients in cardiogenic shock with temporary mechanical circulatory support will increase
- Variety of devices now exist for stabilization/strategy to buy time and assess what is best for the patient