Hemodynamic Transesophageal Echocardiography(HTEE) for Fluid Management During Sepsis: A Case of Bowel Perforation after Aortic Valve and Root Replacement for a Patient with Sweet Syndrome

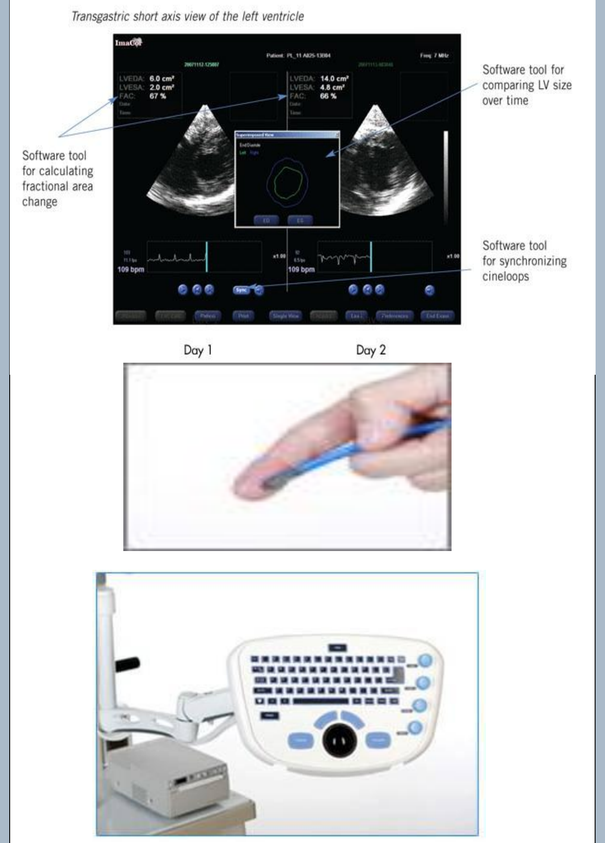
Columbia University College of Physicians and Surgeons

Insung Chung, MD, Robert N. Sladen, MD, FCCM
Columbia University College of Physicians and Surgeons
Department of Anesthesiology, Critical Care Division

Introduction

In septic shock, assessment of intravascular volume by standard monitors can be difficult, especially when patients are on high dose vasopressor therapy. Transesophageal echocardiography (TEE) can be a useful means of evaluating ventricular filling and directing hemodynamic management.

Imacor ClariTEE and Zura System



New York Presbyterian Columbia University Medical Center
Department of Anesthesiology, Critical Care Division
PH 527-B College of Physicians & Surgeons of Columbia University 630 West 168th St, New York, NY 10032
Phone: 212-305-8633
Fax: 212-305-8287
Email:inc9013@nyp.org

Case

- The patient was a 63-yr old woman with morbid obesity, hydradenitis suppurativa, non-insulin dependent diabetes, hypertension, coronary artery disease (80% LAD) and severe aortic stenosis. In 2009 she underwent a tissue aortic valve replacement (AVR) and coronary artery bypass graft (CABG).

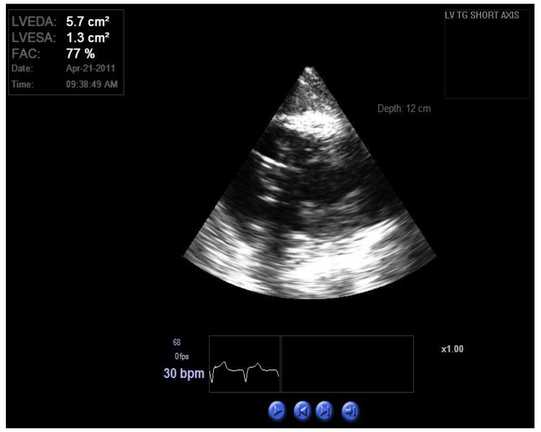
- A few weeks after discharge, she developed erythematous plaques, fever, and leukocytosis. A diagnosis of Sweet syndrome (febrile neutrophilic dermatosis) was made and she was treated by an outpatient dermatologist.

- In April 2011, she developed fever, leukocytosis, erythematous plaques and dyspnea. Workup revealed an aortic root abscess with dehiscence, endocarditis with Staphylococcus epidermidis, and complete heart block (CHB) requiring transvenous pacing. The patient was transferred to Columbia University Medical Center, where she underwent an uncomplicated redo AVR and aortic root replacement. In the cardiothoracic intensive care unit (CTICU) her trachea was extubated on POD 1 and she was weaned off vasoactive agents on POD 2. She received a permanent pacemaker for persistent CHB on POD 4.

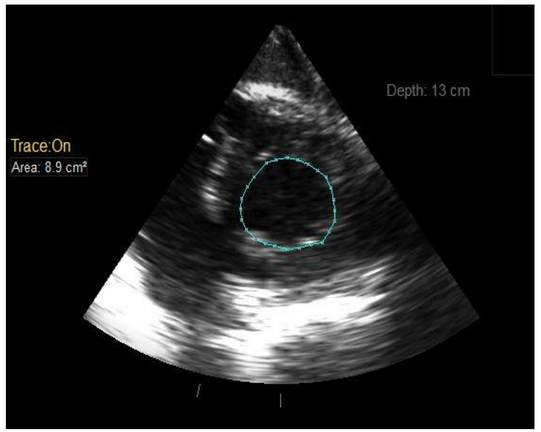
- On POD 5 the patient became acutely diaphoretic with diffuse abdominal pain. Workup suggested visceral perforation and she underwent emergent exploratory laparotomy that confirmed a duodenal perforation, which was repaired. The patient was readmitted to CTICU in septic shock, on high dose vasopressor infusions with norepinephrine (NE) 20mcg/min and arginine vasopressin (AVP) 6units/hr. CVP ranged from 16-18mmHg and MAPs ranged from 65-70mmHg.

- We placed a miniaturized TEE probe (ClariTEE TM, Imacor, NY) that revealed underfilled, hyperdynamic right and left ventricles indicative of severe intravascular hypovolemia. Aggressive volume resuscitation was guided by hemodynamic TEE monitoring, and the patient was rapidly weaned from vasopressor support..

Before Resuscitation



After Resuscitation



Discussion

- TEE is an established diagnostic component of cardiothoracic anesthesiology and surgery. In recent years its value in the ICU has become appreciated and its diagnostic and therapeutic accuracy established. [1-7] However, a standard TEE machine may not be readily available in the ICU, and the large probe cannot be left in a single patient for an appreciable length of time.

- The miniaturized HTEE probe is easily placed and can remain in situ for up to 72 hrs. HTEE provides rapid bedside imaging that can assess ventricular filling and guide fluid resuscitation. In our patient it revealed severe intravascular hypovolemia that was in essence “disguised” by high dose vasopressor therapy, which maintained “normal” filling pressures. This facilitated aggressive fluid administration and rapid weaning of unnecessary and potentially harmful vasopressor therapy. In septic shock, HTEE may also be helpful in the diagnosis and management of sepsis-induced myocardial depression.

References

1. Poelaert JI, Trouerbach J, De Buyzere M, Everaert J, Colardyn FA Evaluation of transesophageal echocardiography as a diagnostic and therapeutic aid in a critical care setting, *Chest* 1995;107;774-779
2. Vignon P, Mentec H,Terré S, Gastinne H, Guéret P, Lemaire F Diagnostic accuracy and therapeutic impact of transthoracic and transesophageal echocardiography in mechanically ventilated patients in the ICU, *Chest* 1994;106:1829-183
3. Beaulieu Y, Marik PE Bedside ultrasonography in the ICU, *Chest* 2005;128;1766-1781
4. Bernard PC , Vieillard-Baron A, Mebazaa A Echocardiography in the ICU: Time for widespread use, *Intensive Care Medicine*; (2005) 32:9–10
5. Beaulieu, Y . Specific skill set and goals of focused echocardiography for critical care clinicians. *Critical Care Medicine*, 2007;35: S144-S149
6. M. B. Jensen, E. Sloth, K. M. Larsen, M. B. Schmidt. Transthoracic echocardiography for cardiopulmonary monitoring in intensive care, *European Journal of Anesthesiology* 2004; 21: 700-707
7. Colreavy FB, Donovan K, Lee KY, Weekes J. Transesophageal echocardiography in critically ill patients. *Critical Care Medicine*, 2002; 30: 989-996