What is hTEE™

hTEE is a process that fulfills the key criteria for effective hemodynamic management. Direct visualization of cardiac size and function is continuously available for easy and accurate assessment of hemodynamic status. The ImaCor ClariTEE, an hTEE device, is a miniaturized TEE probe that can lay in-dwelling for 72 hours providing rapid and reproducible images.
Value proposition for hTEE assessment of cardiac patients:

Hemodynamic management of the unstable patient post cardiac surgery can be very complex. In addition to maintaining cardiac filling and function by volume and pressor management, diagnosis and treatment of obstructions, pulmonary embolism and tamponade can also present a severe challenge. Hemodynamic trans-esophageal (hTEE) management (using the miniaturized ImCor ClariTEE® probe) can be used effectively for the diagnosis and management of effusion and tamponade post cardiac surgery.

In the critical care setting, TTE or conventional TEE are unable to provide:

- Easy and rapid assessment of hemodynamic function
- Continuously available direct visualization

Even in the event that a window is available and baseline images are obtained, subsequent exams evaluating cardiac function over time and response to interventions may not be available.

Catheter or pressure-based methods of assessing fluid responsiveness only provide part of the picture

CATHETER OR PRESSURE-BASED METHODS:

- Fail to predict hemodynamic or volume status effectively
- Provide indirect information and are difficult to interpret
- Rely on assumed pressure-volume relationships
- Do not predict hemodynamic response to a fluid challenge

References:


Klabunde RE. Regulation of Stroke Volume. 18 December 2000 (www.cvphysiology.com/Cardiac%20Function/CF002.htm)
The hTEE way:
The right information at the right time.
Direct visualization information is continuously available to decide direction and assess response.
hTEE identifies specific causes of hemodynamic instability

hTEE:
- Provides direct visualization of cardiac filling and function
- Identifies specific causes of hemodynamic instability
- Can be used to directly assess fluid responsiveness

Cardiac output = HR x SV

Heart Rate

Stroke Volume

Pre-load

After-load

Contractility

• Accurate information
• Appropriate management
• Optimal outcomes

References:

Cook CH, Praba AC, Beery PR, Martin LC. Transthoracic echocardiography is not cost-effective in critically ill surgical patients. J Trauma. 2002 Feb;52(2):280-4
Case 1. TEE detects tamponade CABG not visible on TTE, Michael Wall, MD, Barnes-Jewish Hospital, St. Louis, MO. (1)

Before:
An 86-year-old male was tachycardic and hypotensive post-CABG while on Levophed (BP 80-110, SVO2 32% and CVP 25)

Diagnosis and management with miniaturized TEE probe:
Visualization with ClariTEE probe revealed a large blood clot pressing on the right atrium not visible under TTE. The physician diagnosed localized tamponade as the cause of hemodynamic instability.

After:
The right atrium filled normally, Levophed was discontinued, and the patient was hemodynamically stable (BP 140-150, HR: 70 and CVP 8).

Case 2. TEE guides medical management of cardiac effusion, avoids surgery, Chad Wagner, MD, Vanderbilt, Nashville, TN. (2)

Before:

Diagnosis and management with miniaturized TEE probe:
TEE detected posterior and lateral pericardial effusion with inadequate LVEDA despite high filling pressures. Volume resuscitation continued. TEE revealed increase in potential fluid. Hemodynamic status began to stabilize. Effusion managed medically, not surgically.

After:
Episodic TEE assessment demonstrated continued resolution of effusion, increased LVEDA and improved hemodynamics (BP 115/65, CI 2.6, PAP 40/22). Vasoactive infusions were weaned and patient extubated, transferred to intermediate care.

Case 3. Pro-active TEE detects tamponade in hemodynamically stable patient with “tight chest,” helps manage rapid pressor weaning, Jiri Horak, MD, Hospital of the University of Pennsylvania, Philadelphia, PA.

Before:
80-year-old male, MVR. Post-operative complications anticipated due to bleeding. ClariTEE probe placed proactively upon arrival in CTSICU in hemodynamically stable patient.

Diagnosis and management with miniaturized TEE probe:
Although the patient was hemodynamically stable and responding appropriately to fluid, TEE revealed a large thrombus behind the RA. After the thrombus was surgically removed, direct visualization of LV filling and function helped manage rapid weaning from pressors.

After:
Patient hemodynamically stable, pressors rapidly weaned.
hTEE fulfills the key properties of an ideal hemodynamic monitoring system

hTEE identifies causes of hemodynamic instability and guides patient management decision-making, ensuring enhanced quality of care and optimal use of resources. A consensus group of 16 clinical experts determined that the ideal hemodynamic monitoring system should be comprised of ten key properties. hTEE satisfies them all.

References: