Revista Colombiana de Anestesiología
Colombian Journal of Anesthesiology
www.revcolanest.com.co

Editorial

# Rescue transesophageal echocardiography: Approach and future☆

## Ecocardiografía transesofágica de rescate: enfoque y futuro

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Rescue transesophgeal echocardiography (TEE) is used in the peri-operative setting and intensive care units mainly as a tool for diagnosing events that may potentially be addressed in patients with hemodynamic instability of unclear origin and with no contraindications for its use.

TEE is indicated in those cases in which the acoustic window in transthoracic echocardiography is poor or it is impossible to access the chest, in patients with undifferentiated shock but a high suspicion of cardiovascular origin, or in extreme hemodynamic collapse, namely cardiorespiratory arrest. It must be performed by trained personnel after making sure that there are no contraindications for the insertion of the transesophageal probe, or when the benefit is greater that the risks, considering that TEE-associated morbidity reported by various authors is between 0.2% and 1.2%.[1] There are no reports in the literature of the mortality rate associated with complications derived from the use of TEE.[1]

The usefulness and benefit of using TEE in different clinical settings is well proven in patients taken to cardiac surgery, but its application as a rescue tool in patients taken to non-cardiac surgery has been less studied.[2–4]

In 2013, the American Society of Echocardiographers (ASE) together with the Society of Cardiovascular Anesthesiologists (SCA) published an expert consensus recommending the use of TEE to assess hemodynamic instability in the peri-operative period, taking into consideration that hypovolemia is the most common cause in this context. The short-axis transgastric view at the level of the papillary muscles is recommended in order to establish the diagnosis and guide the therapy, using left ventricular diameter and tele-diastolic area as parameters.[5] Additionally, a section of the literature was included in 2015 regarding the use of this tool in the context of peri-operative medicine.[6]

On the other hand, several reports in the literature have contributed new evidence regarding the use of this tool in patients going into cardiac arrest during surgery.[6,7] TEE is useful for identifying the primary cause of cardiac arrest in 64–86% of the cases, helping to guide or reframe treatment for these patients.[6,7] Consequently, it can be said that this tool has a 93% sensitivity, a 50% specificity and a positive predictive value of 87% in general terms.[7] However, it is difficult to establish its mortality benefit given the absence of a comparator group, which would require a clinical trial.

The current guidelines for basic and detailed peri-operative echocardiographic assessment using the transesophageal approach propose 20–28 views, respectively.[5,8] However, given that patients have a life-threatening condition requiring prompt action, rescue TEE must be performed in the shortest time possible to avoid worsening of their hemodynamic function or a fatal outcome. There is no consensus regarding the number of views required during rescue TEE, but there are centers that have developed their own protocols. Generally, it

☆ Please cite this article as: Dawkins Arce F, Berrío-Valencia MI. Ecocardiografía transesofágica de rescate: enfoque y futuro. Rev Colomb Anestesiol. 2017;45:1–3.

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will depend on the experience of the echocardiographer, but the recommendation is to perform a scan focused on the diagnosis, always bearing in mind possible differential diagnoses, in such a way that the interpretation of the findings is consistent with the clinical manifestations, thus optimizing the echocardiographic assessment. Moreover, this tool can help assess the efficacy of the therapeutic measures, and once the patient is stable, a thorough examination can be performed.

Below are the 5 basic 2D echocardiography and color Doppler views that help confirm or rule out the most frequent causes of hemodynamic instability or circulatory collapse in the peri-operative period:

1. Mid oesophageal four/five chamber view.
2. Long axis mid oesophageal view.
3. Mid oesophageal right ventricular inlet and outlet view.
4. Mid transgastric papillary view.
5. Short axis aortic arch view (to rule out pulmonary embolism and aortic dissection).

The main diagnoses found are hypovolemia, low ejection fraction, dynamic obstruction of the left ventricular outflow tract, pulmonary embolism and myocardial ischemia,[9] enabling timely change in the treatment of the critically ill patient.

Rescue TEE is indicated in the following settings:

**Liver, kidney and lung transplantation.** In cases of suspected intra-cardiac thrombi, myocardial ischemia, cardiac tamponade, acute right ventricular failure and anterior systolic motion of the anterior mitral leaflet, conditions that have been described as causes of unexplained hemodynamic instability during liver transplant.[10]

**Major vascular surgery.** Besides the indications as rescue tool, TEE has been shown to be more sensitive than the catheter in the pulmonary artery for detecting alterations in systolic and diastolic function during thoracic or thoracoabdominal aortic clamping.[11,12] It has shown to be useful for assessing hemodynamic impact following caval clamping, using ventricular filling, regional alterations of contractility and systolic and diastolic function parameters.[11,12]

**Orthopedic (arthroplasty) and spine surgery.** Rescue tool in cases where there is a high suspicion of fat and cement embolism, leading to hypotension, hypoxemia or severe hemodynamic compromise.[5]

**Neurosurgery.** For the diagnosis and management of air embolism and color Doppler assessment of the atrial septum in order to identify the risk of paradoxic embolism associated with a patent foramen ovale.[5,13]

In conclusion, there is increasing evidence showing that echocardiography plays a role for patient monitoring in anesthesia, critical care and emergency medicine in critically ill patients in different clinical settings. Hence the need to begin to include formal training in the two modalities for basic peri-operative echocardiography: transthoracic and transoesophgeal echocardiography. As proposed by Rojas-Gómez,[14] scientific societies should create guidelines for acquiring skills,[14] but public and private universities, hospitals and the State, should create the means for simulation settings where those skills may be acquired.

## Funding

None.

## Conflict of interest

None.

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