hTEE-guided management of a patient with severe right ventricular dysfunction and hypotension

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Background

This case illustrates the role of transesophageal echocardiography guided hemodynamic management (hTEE™) with a miniaturized probe (ClariTEE®, ImaCor, Inc., Garden City, NY, USA), developed to remain indwelling and provide hemodynamic management and assessment in critical care. A 72-year-old male presented with an acute right-sided hemothorax. The patient underwent lung decortication, resulting in a thoracotomy due to recurrent bleeding. The patient became hemodynamically unstable despite aggressive fluid resuscitation and vasopressor therapy and subsequently developed persistent hypotension. Imaging with hTEE revealed severe right ventricular (RV) dysfunction and dilation as well as mild LV dysfunction, managed initially with volume, right-side inotropes and inhaled nitric oxide, and later with guided weaning of inotropic support.

Case Presentation

A 72-year-old male with a history of recurrent pneumonia, CHF, HTN, and atrial fibrillation presented with an acute right-sided hemothorax. The patient underwent lung decortication resulting in a thoracotomy due to recurrent bleeding. The patient then developed hypotension intraoperatively, requiring aggressive fluid and vasopressor support. Despite aggressive fluid resuscitation and vasopressor therapy, the patient developed persistent hypotension; the mean arterial blood pressure was 50 mmHg. In addition, the urine output was <20 cc/hr and fluid balance was positive > 7 L/48 hrs. Increasing the CVP from 12-15-20 mmHg did not stimulate urine production and ventilator pressures remained elevated.

A transthoracic echocardiogram was performed, which demonstrated abnormal biventricular function and significant pulmonary hypertension. However, conventional echocardiography provides instantaneous, not continuous, information on function and filling pressures. Right heart catheterization was recommended to better assess intracardiac pressures. However, due to the instability of the patient, this procedure could not be performed. With right heart catheterization contraindicated, the ImaCor ClariTEE®, (an indwelling ultrasound probe,) was introduced to monitor ventricular function and fluid responsiveness.

ImaCor hTEE demonstrated severe RV dysfunction and dilation with mild LV dysfunction. The use of right-side inotropes and inhaled vascular dilators (nitric oxide) as well as additional volume, based on these findings, resulted in the resolution of the oliguria.

Continued weaning of inotropic support on the basis of the ImaCor hTEE imaging resulted in further improvement of right ventricular function and patient stability.

Discussion

Transesophageal echocardiography (TEE) has long been accepted as the "gold standard" in the cardiac operating room, permitting direct visualization of cardiac filling and function.[1] In addition, TEE has the unique ability to identify specific causes of hemodynamic instability, resulting in improved management of the critically ill patient.[2] These advantages have led to more widespread use of TEE for hemodynamic assessment in intensive care.[1-3]

Major disadvantages of TEE include that it is not readily available in the acute setting and it is not practical for ongoing assessment of cardiac function and physiology. This case underscores the importance of hTEE to not only reveal structural abnormalities as the major cause for hemodynamic instability, but to continuously assess function and physiology in the post-op patient.

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Conclusion

In summary, excessive fluids in thoracic cases commonly result in hypoxia requiring prolonged intubation and are to be avoided in the post-op management. Management of the hypotension and fluid balance may be a challenge without the use of right heart catheterization. hTEE assessment with the ImaCor TEE probe provided rapid, ongoing visualization of ventricular function and guided therapy in a post-op patient with hypotension.

References

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