

Diagnostic Evaluation of Acute Right Heart Failure After Prosthesis Cementing in Total Hip Arthroplasty

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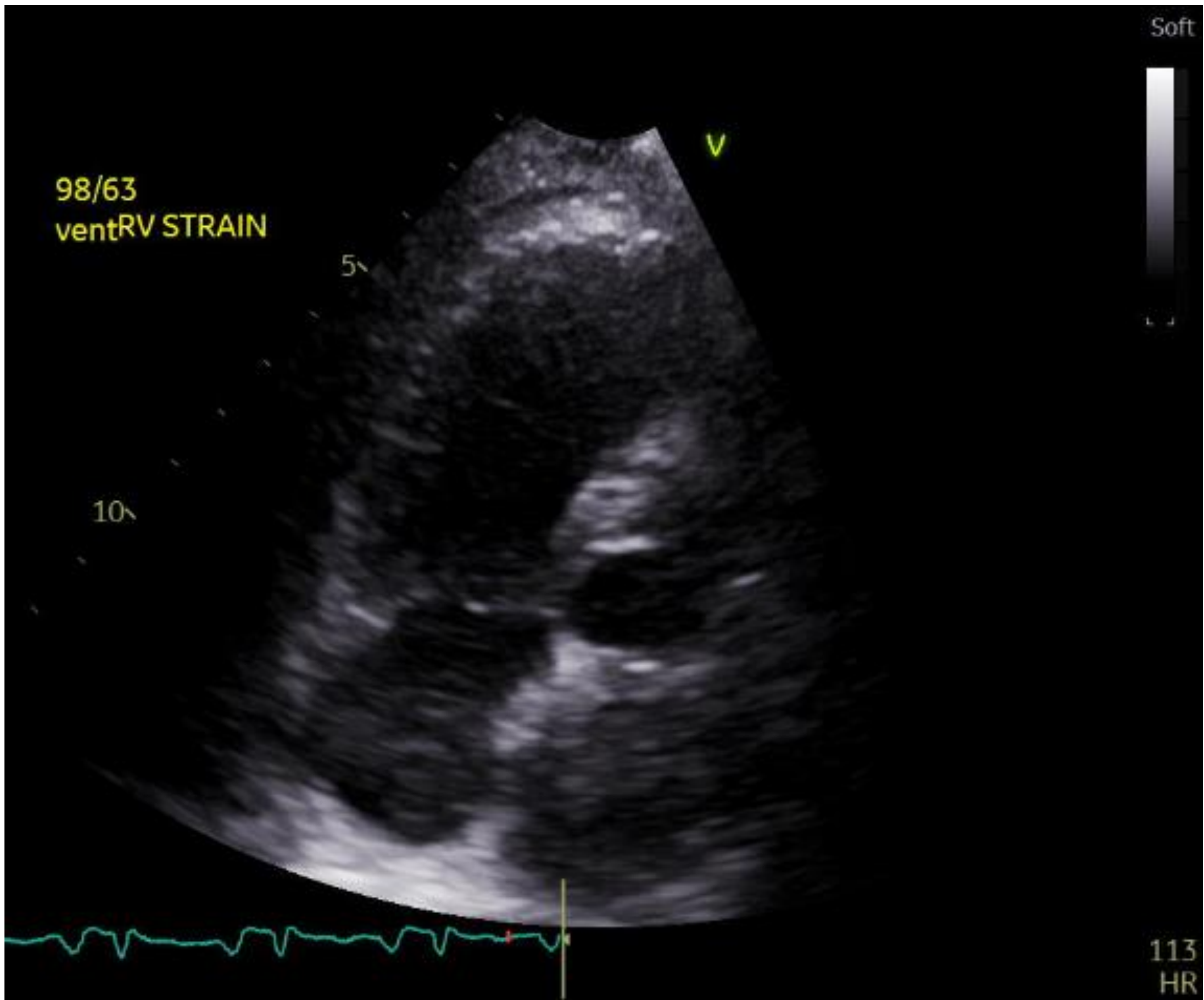
Introduction

Embolic phenomena, such as pulmonary embolism (PE), fat embolism syndrome (FES) and bone cement implantation syndrome (BCIS), can lead to acute right ventricular (RV) failure during orthopedic procedures, particularly in total hip arthroplasty (THA) involving bone cement. These events often cause hemodynamic instability, requiring prompt diagnosis and intervention. Focus-assessed transthoracic echocardiography (FATE) provides a non-invasive evaluation of gross cardiac function, aiding in the assessment of these pathologies.

Case Report

An adult female admitted for pathologic hip fracture due to metastatic carcinoma underwent left-sided THA. During bone cement application, she developed hypotension, tachycardia, and a drop in end-tidal CO2 that was stabilized with fluid resuscitation and vasoactive agents. By the end of surgery, the patient remained sinus tachycardic, but normotensive and was extubated. In the post-anesthesia care unit, she experienced respiratory distress, tachypnea, and hypotension requiring re-intubation. The hypotension was not responsive to fluid resuscitation or additional vasoactive agents. A FATE revealed RV dilation and dysfunction with apical hyperdynamic motion, leading to the diagnosis of acute, isolated RV failure.

Hemodynamics improved following the administration of inotropic support and pulmonary vasodilators. Additional diagnostic work-up confirmed a small PE. The patient had full cardiac recovery by post-operative day 7.



FATE Exam

- Quick, reliable, non-invasive and widely accessible point-of-care tool
- Consists of 5 standard views: subcostal, apical four-chamber, parasternal long-axis, parasternal short-axis, and pleura scanning
- Ability to assess biventricular size and function, volume status, pericardial effusion or trauma-related fluid collections

Embolic Events and Acute RV Failure

PE	• Large emboli in pulmonary vessels can lead to obstruction • Pulmonary Angiography: Gold standard for diagnosing PE, but not feasible for unstable patients • FATE: indirect evidence of PE - Tricuspid regurgitation, RV dilation and dysfunction, McConnell’s sign (Apical hyperdynamic motion with severely hypokinetic RV segments)
FES	•Fat globule deposition in pulmonary vasculature can lead to increased pulmonary vasculature resistance •Clinical Diagnosis: hypoxemia, neurologic abnormalities and petechial rash.
BCIS	•Dissemination of methyl methacrylate from cementing can lead to an anaphylactic reaction •Clinical diagnosis: related to proximity of cementing •Transesophageal echocardiogram: Detection of intraoperative RV failure during hip arthroplasty – more invasive and technically challenging

References

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