Use of Focused Intensive Care Echo in the diagnosis of Primary Cardiac Angiosarcoma

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Abstract

Focused Intensive Care Echo (FICE) is recommended in critically unwell patients to assess haemodynamic status and aid decision making. In certain circumstances, FICE can also be used as a diagnostic tool. We present a case where FICE identified a large left atrial mass in an intensive care patient with acute hypoxia and thromboembolic sequelae. This case demonstrates the importance of FICE in aiding diagnosis in complex patients where initial investigations are non-diagnostic. FICE is an essential skill for critical care physicians, and bedside echocardiography should be a standard investigation for all critical care patients.

Background

The incidence of primary cardiac tumours is less than 1%[1], and Angiosarcoma is the most common malignant primary cardiac tumour in adults[1]. Angiosarcoma can present with signs of heart failure, constitutional symptoms such as weight loss and systemic embolic events[2]. Echocardiography is crucial for diagnosis of these tumours[2,3].

Traditionally it has always been considered that transthoracic echocardiography (TTE) by a fully accredited practitioner is required to pick up rare cardiac tumours. Whilst it is true that a full TTE allows detailed characterisation of these tumours, the initial identification of an abnormal cardiac mass can be achieved with a basic focused echocardiography tool such as Focused Intensive Care Echo (FICE). The FICE training programme was designed by the Intensive Care Society in collaboration with the British Society of Echocardiography (BSE)[4] and is designed to give real-time assessment of haemodynamics, cardiac function and filling. However, if FICE practitioners develop a high level of scanning ability other pathology can also be identified. Ultimately this means that FICE should be regarded as a non-invasive diagnostic tool which should be available to all critical care clinicians as it can influence patient management significantly.

Case Presentation

A 55 year old female presented to the Emergency Department having woken up acutely short of breath. Prior to admission she had been under investigation for chronic diarrhoea, weight loss and lethargy. She had no prior cardiac history. Plain chest radiograph demonstrated bilateral pulmonary infiltrates and arterial blood gas analysis showed type 1 respiratory failure. The initial working diagnosis was of atypical pneumonia, and endo-tracheal intubation was performed due to worsening hypoxaemia. During transfer to critical care the patient was noted to be dysrhythmic on electrocardiograph (ECG) monitoring.

Over the next 24 hours, the patient's respiratory function improved however, she was found to have new right hemiparesis and a computed tomography (CT) brain scan diagnosed an acute ischaemic infarction in the left parietal lobe. Aspirin was started and the patient was extubated. Following extubation her respiratory function began to deteriorate again, and the atypical pneumonia screen was negative. Pulmonary oedema was

therefore considered as a possible diagnosis and so a FICE scan was performed at the bedside. This revealed a large mass in the left atrium which prompted a CT chest, abdomen and pelvis and trans-oesophageal echocardiography (TOE) as part of the pre-operative patient work-up for cardiothoracic surgery.

The FICE scan demonstrated a large left atrial mass extending into the left ventricle through the mitral valve (Figures a and b). This was best appreciated on the apical four chamber view as demonstrated in Figure a. Further imaging performed by a specialist transoesophageal echocardiographer confirmed a 10cm x 3cm cystic mass (Figure c) resulting in functional mitral stenosis (Figure d) and acute pulmonary oedema. Coronary angiography showed no vessel disease, and the patient was immediately taken to theatre for excision of the mass. The post-operative recovery period was uncomplicated, and the patient was extubated and went on to rehabilitate. Histological analysis showed the tumour was a cardiac angiosarcoma.

The parietal lobe stroke was presumed to be an embolic event secondary to the left atrial tumour. Debris from the left pulmonary vein removed during surgery had the appearance of reactive blood clot. Magnetic Resonance Imaging (MRI) of the brain following surgery showed areas of diffusion restriction in left middle cerebral and posterior cerebral artery territories suggestive of embolic phenomena not visualised on CT scanning.

Discussion

The advantages of using FICE routinely in the intensive care unit are well recognised and are highlighted by this case. In this instance information gleaned directly from the FICE scan led to diagnosis and definitive treatment, potentially avoiding a delay in diagnosis and further life-threatening embolic events. Left atrial tumours have high embolic potential[5] and embolisation to the cerebral arteries is common. Emboli are also often found in the pulmonary artery and peripheral vasculature[6].

Although the remit of FICE is to make a basic assessment of cardiac function, significant cardiac pathology can be identified by the competent practitioner. Echocardiography is playing an increasing role in the management of critical care patients and given the finite availability of BSE accredited practitioners, FICE plays an important role in bridging this clinical service gap.

In a single centre study of the use of FICE in critical care, 68% of FICE scans showed previously unknown findings[7], illustrating its value in clinical decision making. In the majority of cases this was left ventricular dysfunction or hypovolaemia. Identifying these common critical care issues is what the FICE protocol was designed for, yet in the process of training to identify these common issues practitioners can also develop their understanding of cardiac anatomy to a point that recognition of more complex pathology can be achieved accurately enough to trigger additional investigation. This is an area of FICE accreditation which has not been fully explored - likely because of concerns about encroaching on the remit of those with advanced skills in TTE and more importantly concerns that FICE images will be used to incorrectly diagnose conditions beyond the scope of the protocol. Of course, those carrying out FICE scans need to understand its limitations and obtain more specialist investigations if concerned about scan findings in a patient. Importantly, the use of FICE is not in replacing formal echocardiography but to ascertain some basic information or as a bridge to formal echocardiography.

The case we have reported here also highlights the argument for carrying out a FICE scan on every critical care patient as part of their admission investigations. Had this lady had a scan on admission, she potentially would have had her operation 24 hours earlier. Thus, routine FICE scans on admission could have a direct and positive impact upon time to definitive management for complex patients. Indirectly this can reduce time to extubation and discharge from intensive care, which as we know affects mortality and morbidity in critical care patients. This is in addition to reducing pressure on other limited clinical resources. The flipside to routine FICE scanning is increased incidental findings potentially leading to over-investigation.

Internationally it is accepted that 'basic' level echocardiography is a skill which all critical care practitioners should possess[8]. FICE accreditation is an accessible means of achieving this aim. FICE already appeals to critical care trainees as they can achieve the accreditation in a relatively short timeframe. FICE scans offer

wider benefits for patient care and management of clinical resources. Routine FICE scans for all critical care admissions would also offer a greater number of training opportunities in echocardiography for critical care practitioners. More crucially, routine FICE scans on admission would increase diagnostic yield particularly in more complex patients as this case demonstrates.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Written and informed consent obtained for the publication of this case report and accompanying images. A copy of the written consent form is available for review.

Availability of data and materials

Not applicable

Competing Interests

The authors declare that they have no competing interests

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Author's contributions

JM and LA designed the report and completed the manuscript. JM, GW and AR performed imaging. GW, AR and LA revised the manuscript. All authors read and approved the final manuscript.

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Figures

Figure a) Focused Intensive Care Echo: Apical Four Chamber view. Red arrow shows left atrial mass prolapsing through mitral valve.

Figure b) Focused Intensive Care Echo: Parasternal Short Axis view. Red arrow indicates left atrial mass at level of papillary muscles.

Figure c) Transoesophageal Echo: Mid-oesophageal Four Chamber view. Red arrow shows left atrial mass.

Figure d) Transoesophageal Echo with Doppler illustrating functional mitral stenosis due to the left atrial mass. The mitral valve area measures approx. 1.6cm^2.