

SQA21

Introduction

A referral from the obstetric team for an unexpectedly unwell breathless patient with on the maternity ward on a Friday evening comes with a degree of trepidation. Considerations about maternal altered ‘normal’ physiology, usually a well and active patient, the most appropriate diagnostic process, a time of heightened emotional engagement for the mother, family and if delivered, care for the baby all feed into the situation. Organisationally, it may be that there are fewer specialist resources immediately to hand in the out-of-hours period.

Point-of-care Ultrasound is a tool to extend the clinical examination and is becoming more available as training and equipment access expands within relevant specialties and indeed is now mandatory in some training programmes. The Focused Ultrasound Intensive Care FUSIC framework, which encompasses attainable entry-level heart, lung, abdominal and vascular scanning competence, can aid the clinician in diagnostic skills, organ support decisions and treatment. In the maternity setting, ultrasound is a useful and non-ionising diagnostic tool and therefore can offer a positive diagnosis, before the potential need to proceed to ionising (particularly CT) radiation.



Case History

In our hospital, the medical team manage HDU within a combined ICU and HDU Unit. A 27-year-old lady was referred to the medical team urgently to assist with the diagnosis and management of an 8-day post-partum mother who had been admitted complaining of severe breathlessness and ankle swelling, worse since delivery. She had no cardiovascular history other than hypertension during the third trimester of pregnancy with no proteinuria, managed with labetalol and nifedipine. She had already had a CTPA organised by the Obstetric team prior to medical referral which showed no PE. The medical consultant oncall reviewed the patient in maternity – they happened to also work ICU sessions and was newly trained in Focused Intensive Care Echocardiography (FICE) - the predecessor qualification to ‘FUSIC Heart’.

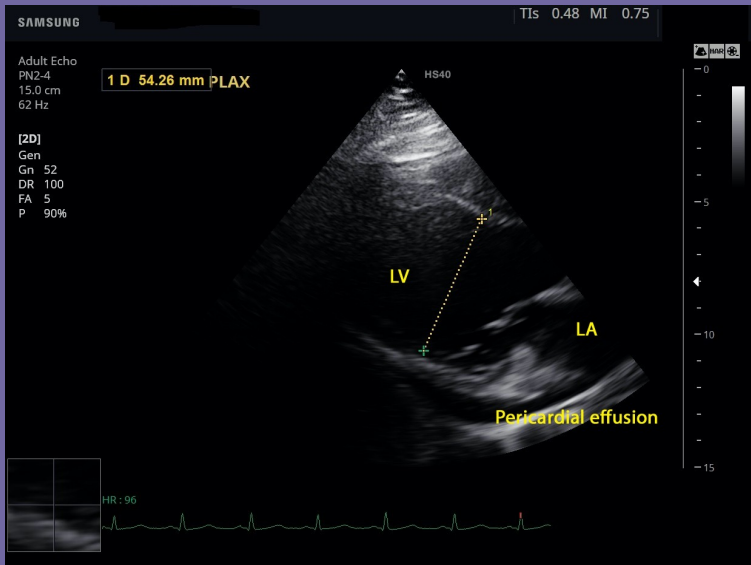
On assessment she was hypertensive and tachycardic at 154/110 mmHg and 106/min respectively, on no oxygen but severely breathless on minimal exertion. Clinical examination showed the Jugular Venous Pressure to be elevated at 6-7cm and peripheral oedema present to the level of the hips. She had reduced air entry at both bases on chest auscultation but no crepitations were heard. Heart sounds were normal.

The ECG showed sinus tachycardia without ischaemia and a normal QRS morphology. A FICE echocardiogram was performed at the bedside, showing a dilated Left Ventricle (LV) diameter at 5.4 cm in diastole (LVIDD) (normal up to 5.1cm for females) but visually severe LV systolic dysfunction with a 1.7cm circumferential pericardial effusion.

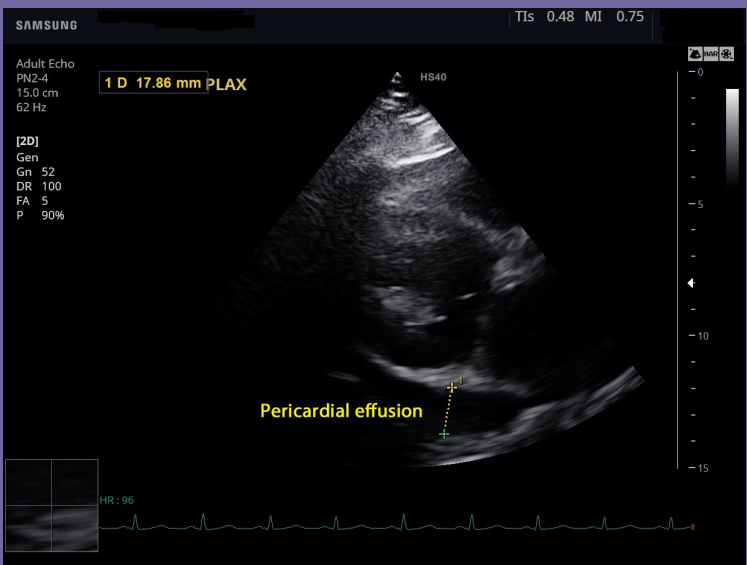
This allowed a positive preliminary diagnosis to be made of Peripartum Cardiomyopathy and commencement of loop diuretic therapy.

A Medical High Dependency bed was requested as agreed with the Obstetric team as the most suitable place to manage this medically unwell maternity patient with shared care pending Cardiology takeover. A formal echocardiogram confirmed the diagnosis the following weekday with a severely dilated LV at 5.9cm, normal wall thickness but globally reduced systolic function with an estimated Ejection Fraction of 40%. The right heart was normal.

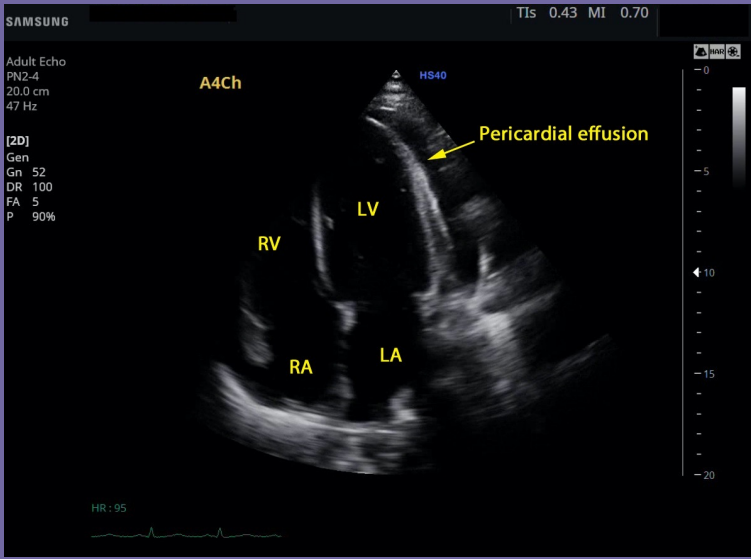
She diuresed well and symptomatically greatly improved her exercise tolerance quickly. She stayed 48 hours in HDU and was discharged with Cardiology follow-up 2 days later, having started an ACE inhibitor, Ivabradine and continued diuretic therapy. Six months later, a repeat echocardiogram showed improved LV function >50% and as required diuretic use only.



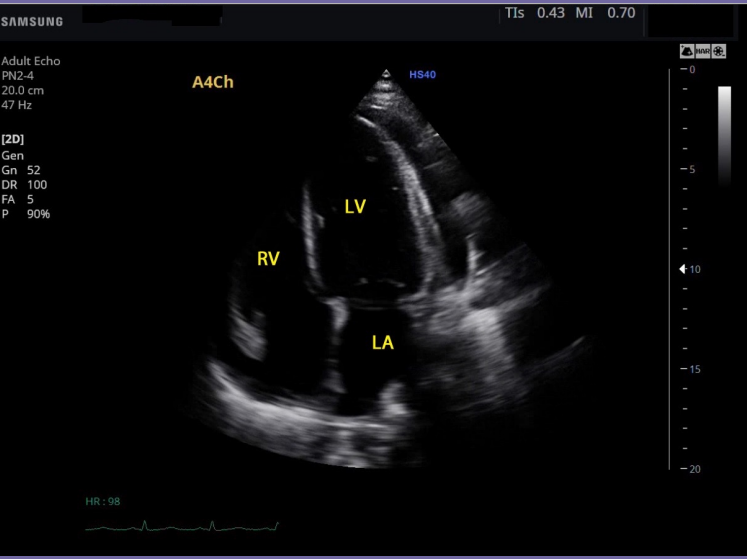
Parasternal Long Axis view showing dilated LVIDD



Parasternal Long Axis view of effusion (anterior and posterior)



Apical 4 Chamber diastole view



Apical 4 Chamber systole view

Figures 1-4: Two of the FICE/FUSIC views showing the dilated LV, circumferential pericardial effusion and visually reduced ejection fraction between diastolic and systolic views. Fractional shortening ejection fraction views in this case not taken.

Discussion

The last Confidential Enquiry into Maternal Deaths in 2018 showed that 23% of maternal deaths were due to cardiac disease, 14% from pneumonia or influenza and 11% from venous thromboembolism (VTE) (1). Improving awareness of these conditions’ impact lead to the ‘Three Peas in a Pod’ Poster published by the Medical Royal Colleges and Royal College of Obstetricians and Gynaecologists – this emphasised the increased risk of cardiac failure, need for CXR with antibiotic or antiviral treatment promptly and the risk of VTE (2).

Peripartum cardiomyopathy (PPCM) is a rare, often idiopathic but potentially life threatening and reversible cause of dilated cardiomyopathy that is amenable to cardiac and chest ultrasound diagnosis(3, 4). It develops in the last month of pregnancy or up to five months postpartum with LV systolic dysfunction <45% or fractional shortening <30% or both. Higher maternal age (over 30 years), pre-eclampsia and multiple gestation are risk factors. Data from the USA, South Africa and Nigeria indicate Black women are also predisposed to developing PPCM. Genetic, pituitary (prolactin), endothelial dysfunction and placental growth factors are thought to cause cardiomyocyte apoptosis in affected females.

Treatments involve all standard therapies for reduced ejection fraction heart failure but avoiding those with adverse fetal effects during pregnancy (for example ACE inhibitors). Multidisciplinary management is key, as is followup, particularly prior to any future planned pregnancy.

Conclusion

Sepsis, cardiac pathologies and VTE are significant causes of breathlessness in the pregnant and post-partum period.

Point-of-care ultrasound, including within the entry-level FUSIC/FICE framework is a valuable tool that can provide an early positive diagnosis of important differentials, potentially avoid CT ionising radiation.

References

1. Knight M BK, Tuffnell D, Shakespeare J, Kotnis R, Kenyon S, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers’ Care - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2016-18. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2020
2. Northridge R. Three Peas in a Pod: RCPSCG, RCOG; 2016 [Available from: <https://rcpsg.ac.uk/college/this-is-what-we-stand-for/policy/maternal-health>.
3. Bauersachs J, König T et al. Pathophysiology, diagnosis and management of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Study Group on peripartum cardiomyopathy. European journal of heart failure. 2019;21(7):827-43.
4. Honigberg MC, Givertz MM. Peripartum cardiomyopathy. BMJ. 2019;364:k5287.