Cardiac involvement in a patient with mitochondrial myopathy, encephalopathy, lactic acidosis and stroke (MELAS)

Shaun Khanna, Kartheek Garikapati, Aditya Bhat, Henry Chen, Winny Varikatt, Ajita Kanthan, Gary Gan

Department of Cardiology Blacktown Hospital, Sydney NSW ; Western Sydney University

Clinical History

A 61 year old female has presented to our facility over a ten year period on numerous occasions and has been investigated thoroughly in both the inpatient and outpatient setting. She was diagnosed with mitochondrial myopathy, encephalopathy, lactic acidosis and stroke (MELAS) syndrome in 2015 after a 6-7 year period of a constellation of symptoms including muscle weakness, ataxia, fatigue, headaches and sensorineural hearing loss.

Her other past medical history included hypertrophic cardiomyopathy, chronic kidney disease and recurrent bowel obstruction. Her hypertrophic cardiomyopathy without outlet obstruction was diagnosed in 2002 after presenting to hospital with flash pulmonary oedema. Her echocardiogram at that time showed interventricular septum diameter (IVSd) of 18mm with no systolic anterior motion of the mitral valve or outflow tract obstruction. Her most recent electrocardiogram had findings suggestive of left ventricular hypertrophy with a strain pattern. **See Figure 1.** Her most recent transthoracic echocardiogram showed an IVDd of 19mm with mildly impaired systolic function. **See Figure 2.** She also had an AICD inserted in 2007 for recurrent episodes of arrhythmogenic syncope. This was associated with documented episodes of recurrent VT at 146/min lasting several minutes.

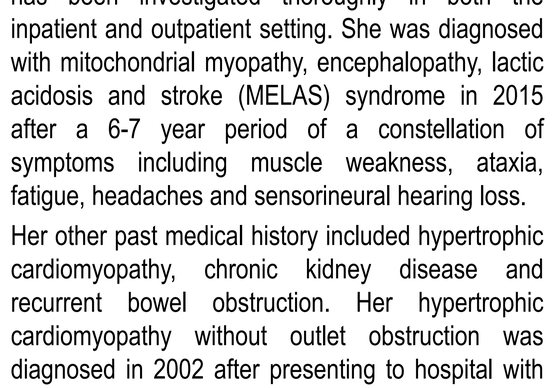
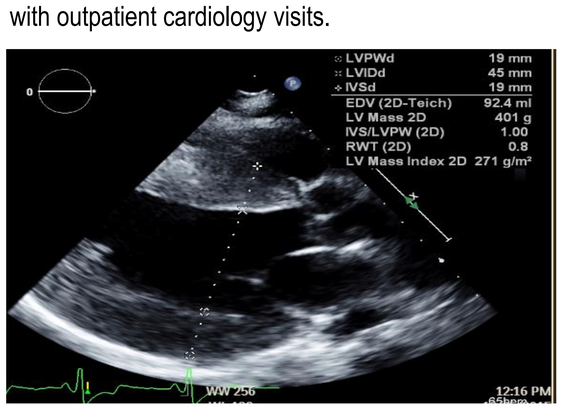


Figure 1: Electrocardiogram

Over the last two years she had become more symptomatic and there were concerns that her HCM was worsening, and so a cardiac biopsy was arranged. She underwent a right ventricular biopsy which showed intriguing results. The tissue histopathology slides showed hypertrophied myocytes with diffuse vacuolisation but no evidence of myocyte disarray, consistent with mitochondrial cardiomyopathy. **See Figure 3.** Furthermore, during the time of her diagnosis of MELAS, she underwent genetic testing with her cardiologist to better investigate her HCM and the results did not yield any significant genetic mutations. Her current medical therapy for her HCM consists of bisoprolol 2.5mg daily with regular AICD checks and close monitoring with outpatient cardiology visits.



•Figure 2A + 2B: Parasternal Long and Short Axis views showing marked left ventricular hypertrophy

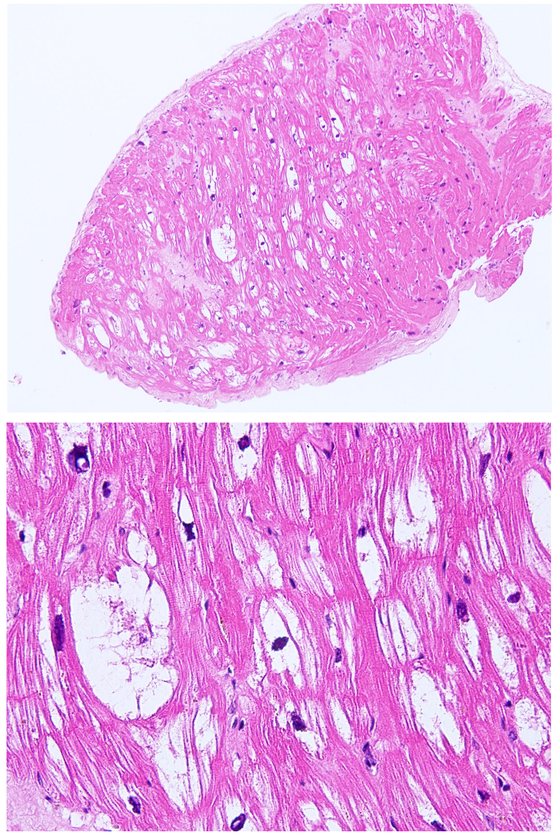


Figure 3: RV Biopsy histology showing myocyte hypertrophy with distinct myocyte vacuolization with no evidence of myocyte disarray.

Discussion

This is an rare and interesting case that describes cardiac involvement in a patient with a rare neuro-metabolic disorder. We explore a link that is minimally described in current literature. Mitochondrial disorders are genetic disorders that result in dysfunction in the energy metabolism pathway. The prevalence of mitochondrial disease is estimated at 9 – 16 per 100,000 with the most common type being MELAS. [1] A prospective study assessed LV hypertrophy by 2D echocardiography found that it is present in 25% of patients, similarly, *Fayssoil et al* has shown cardiac manifestations to be present in 38% of MELAS patients. [2-3] Studies have also shown that cardiac involvement possibly stems from mitochondrial dysfunction with hypertrophy that presents in the early remodelling stage, with progression to dilated cardiomyopathy in the late stages. [4] Further exclusive studies in these patients have established cardiac involvement is progressive in nature. Our histopathology finding of absence of myocyte disarray is atypical for HCM but interestingly, the finding of myocyte vacuolization is largely consistent with mitochondrial cardiomyopathy. [5] Although directed metabolic therapy in these patients requires further research, management of mitochondrial cardiomyopathy should follow heart failure practice guidelines.

Conclusion

This case presents a patient with mitochondrial cardiomyopathy that has possibly presented itself initially as a phenocopy of HCM. This link has already been hypothesised in our patient and she is currently being monitored for further progression of her cardiomyopathy. The patient's symptoms are currently well controlled and continues to have scheduled outpatient follow-ups with her cardiologist, geneticist and neurologist.

References

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Contact information

Shaun Khanna
MBBS, M.Med (Adv)*
In Progress
Blacktown Hospital, NSW Australia
T: +61 401852696
E: shaun.khanna@health.nsw.gov.au