

# Melphalan-induced cardiotoxicity: ventricular arrhythmias

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## DESCRIPTION

A 61-year-old man, with multiple myeloma (IgA lambda), was planned for autologous stem cell transplantation (ASCT). He also suffered a left thalamic haemorrhagic stroke in 1998 secondary to

aneurysmal bleed. Following melphalan infusion of 200 mg at 45 mL/min, he developed acute onset rhythm abnormalities (intermittent ventricular ectopic and ventricular tachycardia). The patient's premelphalan evaluation was unremarkable with



**Figure 1** (A) Normal ECG before starting melphalan infusion. (B) ECG after 200 mg of melphalan infusion, showing acute onset ventricular rhythm with atrio-ventricular (AV) dissociation. Subsequent ECG showing dynamic ventricular rhythm at (C) 4 hours (D) 8 hours and (E) 12 hours postinitiation of melphalan infusion. (F) Normalisation of rhythm after 18 hours postinitiation of melphalan infusion.



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## Images in...

normal ECG (1A), ejection fraction (55%) and renal/hepatic function. He was evaluated by sequential 2D echocardiography and troponin I (immediately, 2, 4, 12 and 24 hours) which were normal excluding acute STEMI. These rhythm abnormalities were dynamic probably secondary to the plasma melphalan concentrations and normalised by 18 h postinfusion (figure 1B–F). There has been no recurrence of these rhythm abnormalities thereafter. He was transplanted with abbreviated melphalan conditioning.

Cardiac toxicity in the form of atrial fibrillation (AF, 6.6–11%) and supraventricular tachycardia are common after high dose melphalan.<sup>1</sup> Melphalan is considered the most arrhythmogenic chemotherapeutic agent used in ASCT.<sup>1</sup> Increased age (>60 years), higher baseline creatinine, larger left atrium size and previous cardiac comorbidities are noted risk factors for

upraventricular tachycardia (SVT), of which our patient only had age as a risk factor.<sup>1 2</sup> Other conditioning drugs in ASCT with similar cardiotoxicity include cyclophosphamide, anthracyclines and fludarabine. The presence of amyloidosis in multiple myeloma (MM) increases the risk of arrhythmias during ASCT conditioning. Investigators used amifostine to counter cardiac toxicity of increased dose melphalan (~280 mg/m<sup>2</sup>).<sup>3</sup> We present this case due to the rarity of ventricular arrhythmias secondary to melphalan and reversal of normal rhythm chronologically coinciding with excretion  $t_{1/2}$  of the drug.

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**Contributors** UY, SG, AK and PM involved in the management of the patient. UY involved in the manuscript preparation. All authors vetted the submitted manuscript.

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## Learning points

- ▶ Monitoring for cardiac toxicity in patients receiving high-dose melphalan is mandatory.
- ▶ Melphalan should be infused with constant monitoring of rhythm, heart rate, blood pressure and oxygen saturation until four times of the excretion  $t_{1/2}$  of the drug.
- ▶ Patients should be screened for the risk factors for SVT in all patients planned for high-dose melphalan therapy.

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