

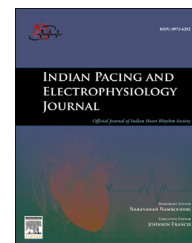
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Acute transient non-physiological over-sensing in the ventricle with a DF4 lead

Kevin Kit Ng^a, Paul A. Gould^{b,*}^a Princess Alexandra Hospital, Department of Cardiology, Queensland, Australia^b Princess Alexandra Hospital, Department of Cardiology, University of Queensland, Department of Medicine, Brisbane, Australia

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ABSTRACT

The DF-4 is a new defibrillator lead technology. We present two cases of non-physiological transient ventricular over-sensing in patients who underwent implantation of an ICD for secondary prevention. Case 1 had ventricular over-sensing during pacing threshold evaluation post defibrillation testing while Case 2 had the lead integrity alert triggered immediately post discharge with transient over-sensing. No lead-connector issues were found. Case 1 was likely due to improper venting of the header and trapped air. Case 2 was hypothesized to be due to intermittent header pin non-contact secondary to blood in the header. These cases reveal that DF-4 leads are subject to both reported and potentially novel causes of transient acute ventricular over-sensing.

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The DF-4 connector is a novel defibrillator lead connection to the generator and is becoming an industry standard. No long-term data exist as to its safety and efficacy. We describe two cases of non-physiological ventricular over-sensing in the new DF-4 connector system.

Case 1

A 55-year-old male underwent implantation of a secondary prevention dual chamber Boston Scientific Incepta implantable cardioverter-defibrillator (ICD). A dual coil DF-4 lead (Endotak Reliance LLHH 64 cm) was positioned at the right ventricular apex (RVA) with normal intracardiac electrograms (EGM). Parameters were satisfactory (R-wave

sensing of 7.9 mV, impedance of 960 Ω , threshold of 0.6 V @ 0.5 ms, and a high voltage impedance of 39 Ω) and defibrillation threshold testing (DFT) was acceptable. Baseline sensing was set at 0.5 mV. Subsequent to defibrillation testing, unusual low amplitude and medium frequency signals were observed on the ventricular EGM (Fig. 1) and detected on the marker channel during pacing threshold testing (Fig. 2) which were clearly not related to T-wave over-sensing.

Fluoroscopic review of set-screw positioning was unremarkable and manipulation of the device did not influence the signals. No further intervention was performed at that stage and pacing threshold testing the next day demonstrated no over sensing recurrence and he proceeded to have an event free six-week follow-up.

* Corresponding author. Tel.: +61 7 3176 2111; fax: +61 7 3176 7630.

E-mail address: paul.gould2@health.qld.gov.au (P.A. Gould).

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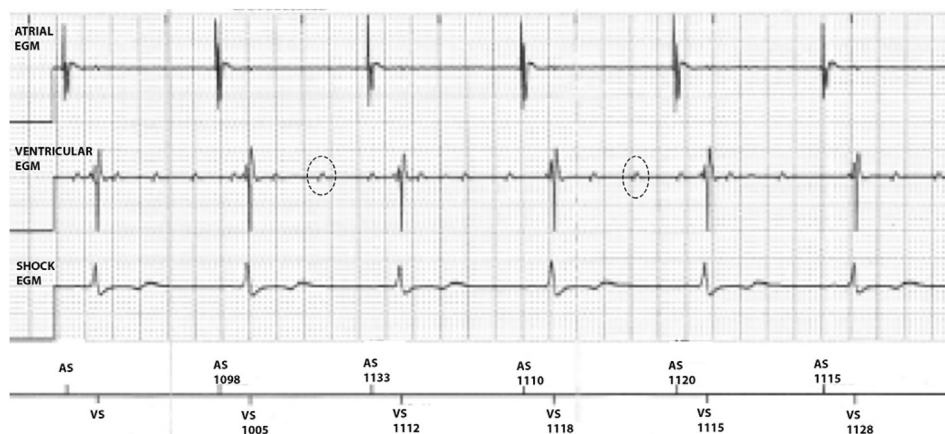


Fig. 1 – EGM post DFT revealing low amplitude signals seen on the ventricular channel (circled) but not sensed by the device (as evidenced by absent sensed ventricular beats – VS, on the marker channel corresponding to the artefacts). EGM channels for both upper and lower panels: First line = Atrial EGM, Second line = Ventricular EGM, Third line = Shock EGM (distal coil to can), Fourth line: Atrial and ventricular pace/sense marker channel. AS = Atrial sensed beat, VS = Ventricular sensed beat.



Fig. 2 – EGM post DFT threshold testing showing ventricular over-sensing of the artefact during pacing threshold testing (denoted by rectangular box showing that the artefacts are now being sensed by the device as VS, on the marker channel). EGM channels for both upper and lower panels: First line = Atrial EGM, Second line = Ventricular EGM, Third line = Shock EGM (distal coil to can), Fourth line = Atrial and ventricular pace/sense marker channel. Fifth line = Pacing output. AS = Atrial Sensed Beat, VS = Ventricular Sensed Beat, VP = Ventricular Paced Beat.

Case 2

A 42-year-old female underwent implantation of a secondary prevention dual chamber Medtronic Maximo II DF-4 ICD with a dual coil (Sprint Quattro Secure 6947M 64 cm) ventricular lead at the RVA. After multiple attempts at positioning the lead, the best R-wave sensing obtained was only 6.8 mV, while other pacing parameters were satisfactory (V-lead impedance of 684, V-lead threshold of 0.5 V @ 0.5 ms, high threshold impedance of 42 Ω and a DFT test of <25 J). R wave baseline sensitivity was set at 0.5 mV. At discharge, a small hematoma was managed conservatively with

pressure bandaging. She represented one day after with lead integrity alerts due to high ventricular impedance (>3000). Device interrogation revealed ventricular over-sensing (Fig. 3).

Chest X-ray demonstrated the pin beyond the set-screw (Fig. 4).

During pocket revision, whilst the lead was still connected, only tapping the header reproduced similar “noise”, while traction of the lead and movement of the generator were unremarkable. A moderate hematoma was evacuated and lead testing unconnected to the header was also unexceptional. The header contained a significant amount of blood. Interrogation after the header was cleaned and reconnected

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