Cardioverter-defibrillator box damage secondary to lead insulation defect

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A 39-year-old Caucasian female with hypertrophic obstructive cardiomyopathy and with history of syncope and other high-risk features for sudden cardiac death underwent implantation of St Jude Photon DR dual chamber cardioverter-defibrillator (ICD). Two years later she was found to be in atrial fibrillation and anticoagulated with warfarin. Three years after the ICD was implanted, it delivered an inappropriate single shock and was found to be in hardware reset mode with no defibrillator capacity. The device was explanted and sent to St Jude Medical for investigation. A new Medtronic Intrinsic ICD was implanted uneventfully and lead tested at device change. Defibrillation thresholds were deferred as she was in atrial fibrillation and not adequately anticoagulated. Few days later she collapsed and died. Device interrogation revealed ventricular tachycardia degenerated into ventricular fibrillation and several unsuccessful shocks delivered.

Investigation of St Jude’s device revealed a dent and an arc mark on the device box and Spectrography revealed the presence of lead material. It is believed that insulation of the high voltage lead was damaged and caused the lead to arc to the box during the high voltage therapy resulting in the damage to the box (dent and arc) and failure of energy delivery to heart. No defibrillator output was traced to shorted transistor. The battery longevity was normal.

So two ICDs from different manufacturers are damaged due to lead insulation defect. Along with other parameters, ICD boxes should be inspected for any obvious damage during box change.

Figure 1  Dent (top) and arc mark (bottom) on the Medtronic device box during post-mortem examination.