‘Life-saving’ inappropriate ICD shock

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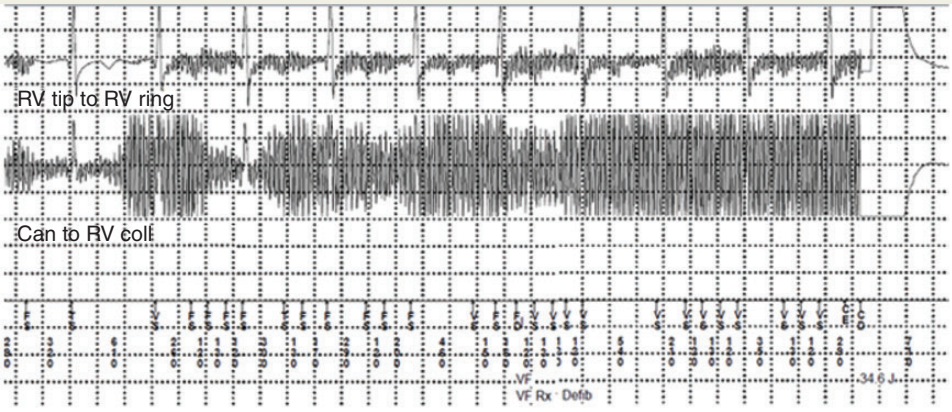
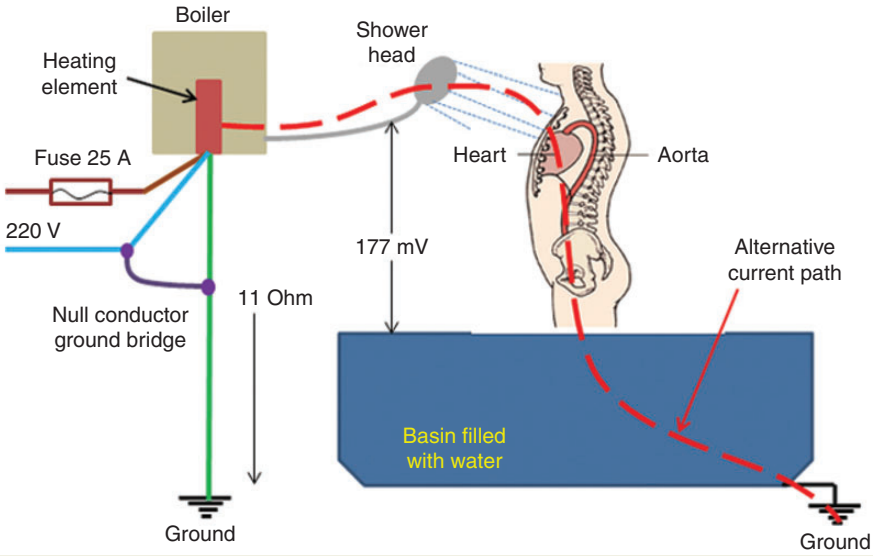
A dual-chamber ICD (Medtronic Maximo II DR) was implanted for secondary prevention in an 81-year-old female patient with ischaemic cardiomyopathy. The VT zone was programmed at the rate of 167 ppm and the VF zone at the rate of 207 ppm. Two bursts, one ramp, and four shocks (16J + 4 × 35J) were the VT therapy and six maximum energy shocks with ATP during charging were the VF therapy. A day after the discharge, during the first showering after the implantation, she received a shock therapy while standing in the basin. The ICD interrogation revealed that a bodily conduction of mains electric current was the cause of the shock. Similar previously stored episodes were detected by the ICD as unsustained VFs. The intracardiac EGMs exhibit typical waveforms (with AR and FS markers) for oversensing of the 50 Hz potential. The FD marker designates the VF detection.

The electric power distribution company conducted an analysis of the electric installation built 90 years ago. Progressive insulation failure of the water heating element caused the increase in the potential on a metal housing of the hot water supply boiler. Therefore, the potential (AC 50 Hz) between the shower head and the sink hole was measured having amplitude of 177 mV RMS. The drain installation made of the lead tubes was an alternative low-resistance ground path. At the beginning of last century, household protection was done only by a fuse whereby the null conductor was bridged to the ground. In the present case of electrical insulation fault, a current of up to 25 A—the maximum rating of the fuse—is allowed to flow through a user before the circuit is interrupted. The measured ground resistance of 11 Ohm is inappropriately high for sufficient protection in this circuit. The alternative current path would be capable of inducing lethal VF in any user of the bathroom. It could also happen with some other household appliance having a conductive metal housing. That was an unknown serious hazard to all of the in-house tenants that could cause a fatal accident. Therefore, the renovation of the electric installation was urgently completed. The residual current circuit breakers were installed. Those installed in the bathrooms





interrupt the mains power in the case of an alternative current path having an amplitude greater than 0.03 A. This case shows how an inappropriate shock can be potentially 'life-saving', as a general warning signal discovering an unknown hazardous environment.

References

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