ABSTRACT. The new DF-4 implantable defibrillator connector reduces the size of the device and facilitates lead connection to the device header. However, lack of connectivity of the DF-4 connector limits the possibility of additional shock coils in the event of high defibrillation energy requirements. This report describes the use of a new adaptor to overcome the problem of inadequate defibrillation safety margin in a patient implanted with a DF-4 implantable defibrillator connector.

KEYWORDS. defibrillation threshold, implantable cardioverter-defibrillator.
The patient was readmitted about 4 weeks following initial implantation for defibrillation testing and the addition of a shock coil if required. Prior to system revision, repeat defibrillation testing (RV coil-can) was again unsuccessful at full output. Therefore, a shock coil (Medtronic 6937) was implanted in the azygous vein and connected to the device using a specialized Y-adaptor (Medtronic 5019 HV splitter). The adaptor has a DF-4 connector at one end that connects to the device DF-4 header, and two separate connections at the other end—one for the DF-4 (Medtronic 6937M) lead; and the other for the additional shock coil via a conventional DF-1 connection (Figure 1a–c). The connection for the DF-4 lead excludes the SVC coil (note only three conductors in the adaptor). The HV impedances were 55 and 45 ohms for the azygous and RV coils respectively. Defibrillation testing with the induction of VF by shock-on-T was successful at 25 J.

Discussion

This is the first report to describe the use of an adaptor specifically to overcome the lack of connectivity for the DF-4 connector to overcome the problem with high defibrillation energy requirements. The DF-4 connector offers a number of advantages, including a reduction in the risk of incorrect device connection and the bulk of the device. Unfortunately, these advantages are achieved at the expense of additional connectivity. In this case, high defibrillation energy requirement was confirmed on repeated testing, in the absence of potentially reversible causes, with and without the SVC coil and despite a satisfactory RV lead position. The ICD (Medtronic) did not offer the possibility of programming different pulse widths. On this basis, the implantation of an additional coil (e.g., in azygous vein) is generally recommended.

Defibrillator coils in the SVC may be associated with increased risks of venous stenosis and complications in the event of system extraction. A single-coil lead would be preferable in this case to minimize transvenous hardware; particularly as the SVC coil position was unfavorable and ineffective. Unfortunately, the DF-4 leads available at the time of implantation were dual-coil leads. Of note, the addition of a separate shock coil would have required the DF-4 adaptor (HV splitter) described in this case even with the use of a single coil DF-4 lead.

Figure 1: (a) Additional coil in the azygous vein connected via the new adaptor to the DF-4 header. (b) Magnified view over the device. One end of the adaptor is connected to the DF-4 header. The other end is separated into a DF-4 connector which excludes the superior vena cava coil and a DF-1 connector for the additional shock coil in the azygous vein. (c) The high-voltage splitter (DF-4 adaptor) measures 27 cm, with one end connected to the DF-4 header and the other end open to a DF-1 shock coil and the existing DF-4 lead.
In a similar case reported by Cogert and colleagues,9 persistent failure to defibrillate necessitated the replacement of the DF-4 device and lead with a DF-1 device and lead, undoubtedly at significant expense. This case demonstrates the feasibility of using an adaptor specifically designed for additional DF-1 connectivity to overcome high defibrillation energy requirements, albeit at the cost of additional bulk to the defibrillator system. Finally, this adaptor does not overcome the other limitation of additional pace/sense lead, if required.

References