Haemodialysis (HD) patients are at increased risk of vascular access complications with device therapy. We report a case of transvenous defibrillator lead extraction from the ipsilateral side as an HD fistula. The procedure was successfully performed using a hybrid approach, with extraction of the lead with a powered sheath, and surgical cut-down and closure of the subclavian vein defect.

**Case report**

A 70-year-old man was referred to our institution for consideration of device extraction. Previously, he had a myocardial infarction and following that suffered a cardiac arrest due to ventricular fibrillation. He subsequently underwent coronary bypass grafting and had a single-chamber implantable cardioverter defibrillator (Endotak C lead, Guidant, St Paul, MN, USA) implanted via the left subclavian vein 15 years ago. He had a history of end-stage renal failure due to proliferative glomerulonephritis, having had three previous renal transplants, the last failing 5 years ago. Since then, he had been undergoing haemodialysis (HD) and was currently dialysing through a surgically fashioned arteriovenous (AV) fistula on the right arm. He also had an AV fistula on the left arm, which although it had failed and was inadequate for dialysis, still had some flow through it.

He presented to his local hospital with fever and rigors. Blood cultures grew *Staphylococcus epidermidis*, which responded to a course of intravenous antibiotics. His symptoms initially settled, but recurred on cessation of antibiotic therapy. Over the next few months, he had a number of further episodes of fever and rigors requiring maintenance antibiotics. A transesophageal echocardiogram showed no evidence of intracardiac vegetations. Owing to concern regarding the high risk of device extraction, and a desire to avoid an unnecessary procedure, further testing, in the form of a white-cell scan, was performed. This showed low-level activity in the right ventricle around the defibrillator lead, consistent with a diagnosis of device-associated infection. The management options (surgical vs. transvenous lead extraction) were discussed with the patient, who expressed a preference for a transvenous approach.

The procedure was performed under general anaesthesia as a joint case with a cardiothoracic surgeon. From an infraclavicular incision, blunt dissection exposed a length of the subclavian vein covering the entry point of the infected defibrillator lead (Figure 1A). The lead was cut, a locking stylet (Liberator Universal locking stylet, Cook Vascular Incorporated, PA, USA) inserted down the inner lumen, and a 16 Fr powered sheath passed over the lead into the vessel in the standard fashion (Figure 1B). There was significant fibrosis and calcification along the intravascular course of the lead, and both laser (Spectranetics, Colorado Springs, CO, USA) and electrosurgical dissection (Cook Vascular Incorporated) sheaths were used to free the lead. The lead was completely extracted without complication. Once the lead had been removed, the outer laser sheath was left in the subclavian vein puncture site. Sutures were then applied to the vein around the sheath, such that as the sheath was withdrawn, the sutures were tightened to close the defect, thus achieving haemostasis. The patient recovered well following the procedure without evidence of significant haematoma or blood loss.

**Discussion**

Haemodialysis patients present some unique challenges to device implantation. One important issue is that of vascular complications, including subclavian stenosis and occlusion, as well as bleeding from the site of vascular access.\(^1\) To reduce complications, device implantation on the contralateral side to the fistula is usually advocated.\(^1\) However, in patients such as ours, fistula placement on the side of a pre-existing device may be unavoidable.

An important complication of transvenous lead extraction is bleeding from the entry site of the leads into the subclavian vein.\(^2\) This problem is likely to be exacerbated in patients with a high venous pressure, such as those with a fistula on the ipsilateral side as the leads. Although in our patient, the left-sided fistula had failed, as it still had flow through it, the subclavian venous pressure was likely to be significantly raised. In cases such as ours, where lead extraction is necessary, there are two therapeutic options—open surgical extraction or transvenous extraction. Owing to patient preference, as well as the risk associated with surgical extraction in a
patient with advanced cardiorenal disease, we performed transvenous extraction. However, because of the high risk of bleeding from the venous entry site, we adopted a hybrid approach, with transvenous extraction of the leads coupled with surgical closure of the subclavian vein defect.

Lead extraction has a number of potential complications, the risk of which will vary between patients. It may be that in cases where a specific risk can be identified, a tailored approach to lead extraction, where possible, may reduce procedural risk. To our knowledge, this is the first report of transvenous extraction of a lead placed on the same side as an HD fistula. In our case, this approach proved safe and effective, and we would advocate such an approach in similar clinical scenarios. Furthermore, it may be that in cases where there is concern regarding bleeding from the venous entry site, such as in patients with significantly raised central venous pressure or a coagulopathy, a similar approach, with surgical closure of the venous defect, may be helpful.

It should be noted that according to the 2009 Heart Rhythm Society Guidelines, device and lead extraction in the context of occult Gram-positive bacteraemia is a Class I indication. In our case, because of the other potential causes of sepsis in a patient undergoing dialysis, lead extraction was not performed on first presentation, although it could be argued that according to the guidelines, this may have been appropriate.

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**References**


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**Figure 1** (A) A cut-down has been performed in the left infraclavicular area exposing a length of the left subclavian vein (white dotted arrows). The position of the left clavicle is indicated by the white line. The defibrillator lead can be seen entering the vein medially (white arrow). (B) A laser sheath (white arrows) can be seen entering the vein over the indwelling lead. The position of the left clavicle is again indicated by the white line.