Complex percutaneous extraction of a 15-year-old atrial lead dislodged into the subclavian vein

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Abstract

We present a case of a 50-year-old patient with DDD pacing failure who underwent atrial lead extraction. The lead was implanted 15 years ago, and 4 months ago it dislodged into the subclavian vein following a fracture. The lead was removed via the femoral vein approach using a Cook Medical device (Byrd Femoral Workstation, Dotter basket) and pigtail catheter.

Key words: percutaneous lead extraction, femoral vein approach.

Introduction

Percutaneous lead extraction is considered to be the most difficult procedure to perform in invasive electrocardiology. In very rare cases when the proximal end of the lead dislodges spontaneously into the venous system, the lead is removed via the femoral vein approach [1-6].

The femoral approach is a well-known strategy in lead extraction for intravascular lead and for extravascular lead as the first or alternative approach to venous entry site dilatation. In the present case, the fractured and dislodged atrial lead, which adhered to the upper portion of the lateral atrial wall, innominate and subclavian veins, was successfully removed.

Case report

This 50-year-old male was selected for transvenous removal of fractured atrial lead the proximal end of which adhered to the subclavian vein. Fifteen years ago the patient received a DDD pacemaker with two bipolar passive fixation leads due to tachy-brady syndrome. The Biotronik Synox SX 53-JBP lead was implanted in the right atrial appendage and Biotronik SX 60-BP lead was implanted to the right ventricular apex. During routine pacemaker follow-up, there was no effective atrial pacing. The ventricular lead functioned correctly. There was a suspicion of damaged coil wire of the atrial lead, which occurred probably 4 months earlier when the patient fell down and broke the left humeral bone. Chest X-rays revealed that the atrial lead that was damaged between the first rib and the subclavian region (Figure 1. A, B). The lead was completely fractured (i.e. with an extravascular and an intravascular portion). The patient was complaining of a pacemaker syndrome and listed for removal of the old atrial lead and

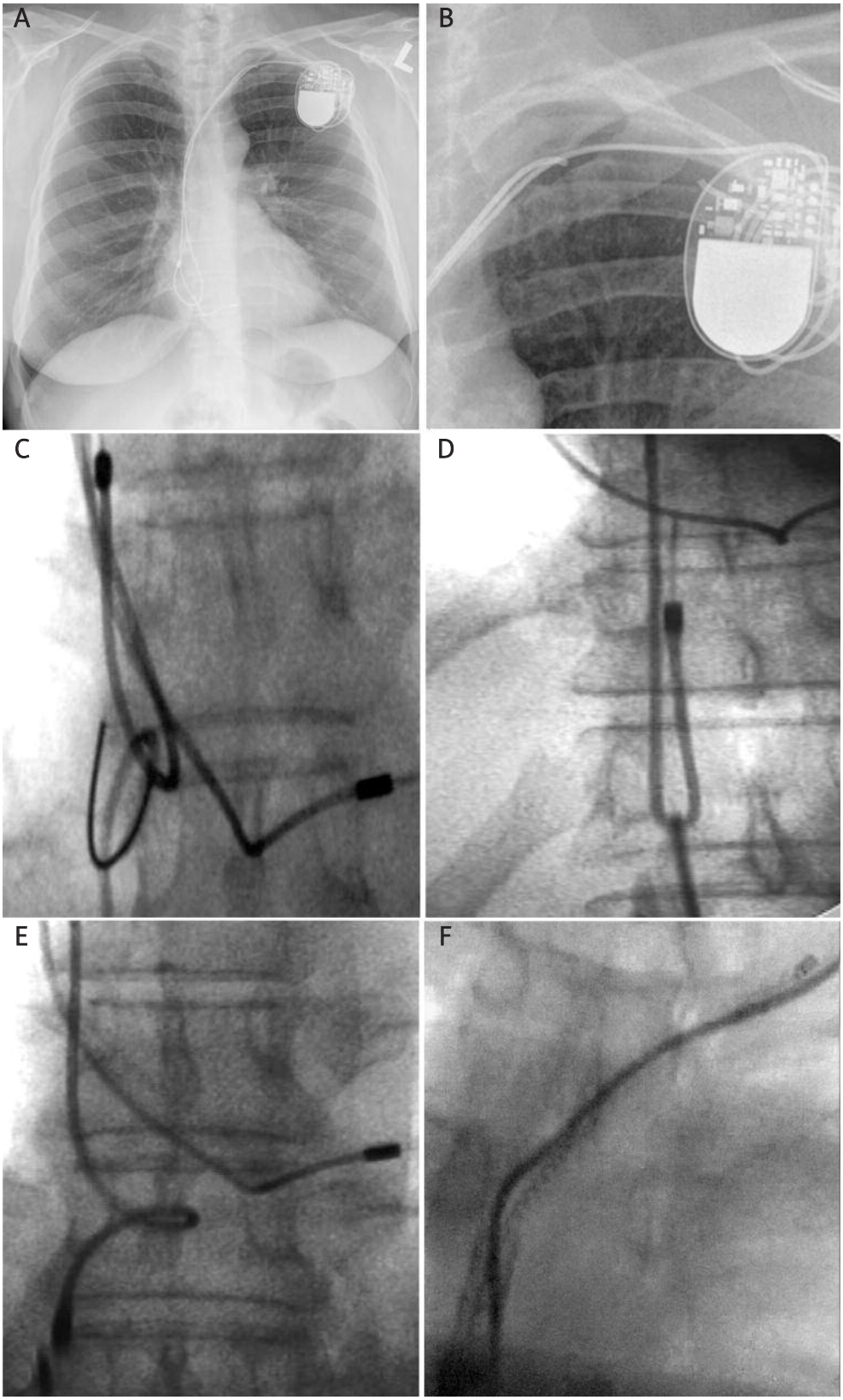

Figure 1. Anteroposterior (**A, B**) chest radiographs showing the fractured atrial lead with its proximal end anchored in the left subclavian vein, the intact ventricular lead and the DDD pacemaker. Removal of the atrial lead dislodged into the subclavian vein using the femoral approach. **C** – A pigtail loop was formed to free the head or the proximal end of the adhered atrial lead. **D** – The atrial lead was pulled into the femoral vein using the pigtail loop with the Dotter basket. **E** – The freed head was grasped with the Dotter basket. **F** – The angiographic Tephlon sheath was advanced over the elongated atrial coil and counter-traction was applied to free the adhered proximal end

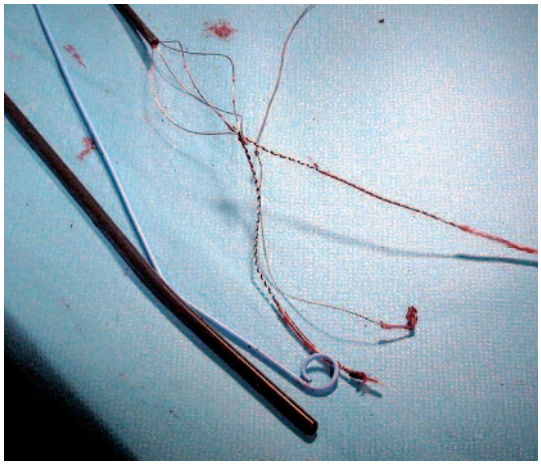

Figure 2. Byrd Femoral Workstation: angiographic Tephlon sheath, pigtail catheter, Dotter basket. The fractured old atrial lead extracted

implantation of a new one. Since a part of the damaged lead was extravascular, an increased possibility for vascular haemorrhage existed, there was a surgical team stand-by.

Lead removal

The atrial lead with its proximal end not accessible in the pacemaker pocket and at the clavicle level was explanted using a Cook Medical Device. The external insulation was broken and we did not try to insert the stylet from the proximal end of the lead to make the lead stiffer and try to dilatate at least adherences at the proximal part of the venous district. The fractured atrial lead with its proximal end was anchored in the left subclavian vein. A Byrd Femoral Workstation was placed in the left femoral vein and a pigtail catheter was used to pull down the proximal end from the wall of the left subclavian vein by pulling the distal end of the atrial lead (Figure 1. C). Despite numerous attempts the lead could not be freed from adhesion. Then, the Dotter basket was inserted and the pigtail catheter wound around the lead and the whole set was pulled into the inferior vena cava (Figure 1. D). Because of firm adhesion of the proximal end of the dropped-in lead, the operator decided to use a pigtail loop to free one of the tips. While pulling, the "head" of the lead was torn off the right appendage (Figure 1. E). The whole lead was elongated and straightened. Unfortunately, the inner part of the lead was torn up. The "head" was removed but the remaining part of the lead was still in the cardiovascular system. Attempts to extract the lead using the "needle's eye snare" were unsuccessful. Then, the Dotter basket was reinserted and the balloting tip was grasped. The lead was once again pulled into the left femoral vein. The manoeuvre resulted in further elongation and destruction, i.e. straightening, of the metal wire which lost its original coil shape and de-fragmentation of the inner silicone layer. An angiographic Tephlon sheath was advanced over the damaged lead (Figure 1. F) by the transfemoral entry site. By applying counter-traction and rotation-cutting forces the adhesion was separated in the upper part of the right atrium, innominate vein and left subclavian vein and the lead was removed. The proximal end of the coil of about 1 cm long was left in the subclavian vein. Subsequently, a new atrial screw-in lead was routinely safe implanted and connected to a new pacemaker. The procedure was not complicated (Figure 2).

Discussion

When considering the indication for any procedure or therapy, it is important to relate the strength of the clinical indication for transvenous lead extraction to the early and the long-term value of the outcome and the risk of the intervention evaluated on an individualized patient basis. The risk of transvenous lead extraction is highly dependent on the training and experience of the practitioner and the extraction team. Even the strongest indication should be considered contraindicated when the extraction team has little experience or inadequate tools [1, 3, 4, 6]. Lead extraction in this patient was indicated due to the fear of the fraction wire protrusion. A pacemaker syndrome was developed in our patient. In the case presented here, a femoral vein approach was used for transvenous extraction of a dropped-in lead adhered to the subclavian vein. This is in compliance with the recommendation to use femoral approach to remove more than one-year-old leads dislodged into the venous system and cardiac chambers [1-6]. However, our case required a complex technique of lead removal which was beyond the routine due to unexpected anatomical and technical aspects. It was surprising that the 4-month-old adhesion of the proximal end was very firm and required a complex removal technique. When removing old and firmly adhered leads there is a high risk of damaging the subclavian vein, innominate vein, vena cava superior and the lateral wall of the right atrium. Massive mediastinal haemorrhage and large pulmonary embolism are the most severe complications that may be fatal if surgical intervention is delayed. The technique of transvenous lead extraction we describe is unique due to its complexity. Current recommendations for lead removal allow for such unique modifications designed individually by an experienced operator [1-5]. Transvenous extraction of an old atrial lead dislodged into the subclavian vein may be feasible and safe in experienced hands, however, it may sometimes require a complex approach.

Transvenous extraction of an old atrial lead dislodged into the subclavian vein may sometimes require a complex approach. Failure lead removal enables safe implantation of a new lead at the same place.

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