A challenging case of transvenous lead extraction

Zorlu bir olguda transvenöz elektrot çıkartılması

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Summary– A 72-year-old male patient with a 7-year history of cardioverter-defibrillator (ICD) implantation was admitted to our clinic with pocket infection. One year prior to this admission, he had undergone an unsuccessful extraction procedure at another clinic, during which the older broken ICD lead had been left in place and a newer ICD lead implanted via the same pocket. The newer and older leads were extracted by mechanical dilator sheath and needle eye snare respectively.

Özet– Öyküsünden 7 yıl önce kalp-içi defibrilatör takıldığı öğrenilen 72 yaşında erkek hasta, cep enfeksiyonu nedeni ile merkezimize kabul edildi. Hasta bir yıl önce başka bir merkezde başarısız elektrot çıkartılması işlemine maruz kalmıştı. Eski sıyrılmış elektrot yerinde bırakılmıştı ve aynı cep üzerinden yeni bir elektrot yerleştirilmişti. Hastanın yeni ve eski elektrotları sırasıyla mekanik dilatör kılıf ve "needle eye snare" yardımı ile çıkartıldı.

Increasing use of of implantable cardiac rhythm devices brings with it an increase in the number of transvenous lead extraction procedures (TLEPs). The newer percutaneous modalities, including the mechanical dilator, mean that the majority of patients can now avoid general anesthesia and surgical intervention.[1,2] The extraction of broken or adherent leads is a major challenge in TLEPs.

We presented a case of challenging lead extraction due to pocket infection associated with lead endocarditis.

Abbreviations:

CRDIs	*Cardiac rhythm device infections*
ICD	*Cardioverter-defibrillator*
TLEPs	*Transvenous lead extraction procedures*

CASE REPORT

A 72-year-old male patient presented with complaints of fatigue, fever, and purulent discharge from his pacemaker pocket. His medical history showed an ICD implantation procedure 7 years previously. One year prior to the current presentation, he had been admitted to another clinic with similar complaints and had undergone an unsuccessful lead extraction procedure. The older broken ICD lead had been cut short in the pocket with the remnant lead left in the vascular system and a newer ICD lead had been implanted via the same pocket three weeks after the unsuccessful extraction procedure.

The pacemaker pocket was opened using the standard technique. The lead could not be extracted by simple traction. A locking stylet was positioned in the newer lead and then manual traction was retried. This attempt also failed, so the procedure was carried out with Evolution TM mechanical dilator sheath (Cook Medical) which was positioned over the lead (Figure 1a-c). Because the older lead was positioned completely intravascularly, a femoral approach was taken using the Needle's Eye Snare (Cook Medical) (Figure 1d) (Video 1-4*). No complications occurred during or after the procedure. A new ICD was implanted on the contralateral side 5 days later.

DISCUSSION

As a result of the growing number of implantable cardiac rhythm device procedures, the need for removal of malfunctioned or damaged transvenous leads is increasing. TLEPs are usually performed both for life-

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threatening conditions such as lead endocarditis and for elective indications such as pocket infection or lead failure.[3]

Clinical parameters such as previous history of device replacement or revision, occurrence of hematoma after implantation, fever at the time of pacemaker implantation and presence of temporary pacing wires are associated with the occurrence of cardiac rhythm device infections (CRDIs).[4] Coagulase-negative Staphylococci and Staphylococcus aureus are the most common cause of CRDIs.[5] As in our case, pocket infection is the most common clinical presentation (70%), followed by lead-related endocarditis.

Prevention of CRDI can be addressed before, during, and after device implantation. A parenterally administered antibiotic is recommended 1 hour before the procedure. Most experts strongly support the administration of antibiotic prophylaxis, such as first-generation cephalosporin, for CRDI.[5] Preoperative antiseptic preparation of the skin of the surgical site is the most important element of the procedure. Also, compulsive attention to sterile technique is mandatory.[5]

Recently published guidelines mention that complete removal of all hardware, regardless of location (subcutaneous, transvenous, or epicardial), is the recommended treatment for patients with established CRDI.[3] It has been shown by our group[6] that TLEP is safe even when vegetation is larger than 10 mm. Furthermore, this includes cases in which a localized pocket infection occurs in the absence of signs of systemic infection. The duration of antimicrobial therapy for pocket-site infection should be 10 to 14 days after cardiac rhythm device removal. Optimal timing for

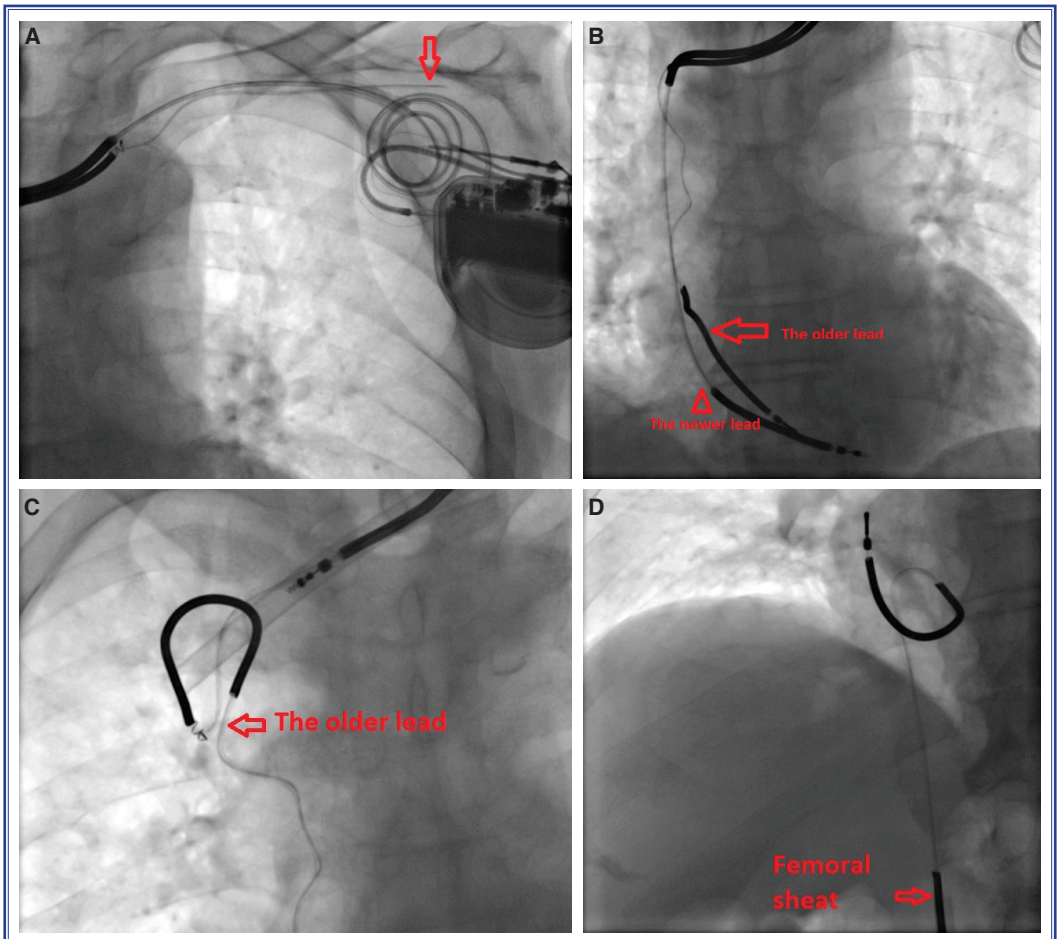

Figure 1. **(A)** Broken lead (arrow) is shown on fluoroscopy. **(B)** The older (arrow) and newer (arrowhead) leads are shown on fluoroscopy. **(C)**The older lead is released after extraction of the newer lead by mechanical dilator sheath. **(D)** The older lead is extracted by using Needle's Eye Snare device. Please note the femoral snare sheath.

device replacement is unknown. For pocket infections, 72 hours of elapsed time seems sufficient for implantation of a new device.

Due to adhesions, which frequently occurs with ICD leads, manual traction of the lead with a standard stylet is usually ineffective. As shown in studies by our group1 and Oto et al.,[2] complete lead extraction may be accomplished using the Evolution Mechanical Dilator Sheath, which is a relatively new mechanical sheath with a stainless steel bladed tip.

A recently published meta-analysis revealed that patients treated in higher volume centers have a lower probability of minor complications and death at 30 days, regardless of infection rate, length of lead duration, type of device, and type of extraction.[7] In this study, the authors compared major and minor complications based on the results of the superior approach. However, it is well known that, after an unsuccessful superior approach, the femoral snare approach is required: In the literaure, in almost 27.1% of the evolution group and 8.2% of the laser group.[8] As mentioned above, adhered or entangled leads are more commonly encountered due to the increased necessity of multiple lead implantations in recent years and TLEP of these leads via the superior route is often impossible.[9]

The femoral approach using a snare extraction device is an alternative in such situations and often allows for successful completion of the procedure. In cases of a failed or impossible subclavian approach, Starck et al.[10] studied the impact on success rates of a femoral snare approach as a bailout procedure in lead extractions. They revealed that the femoral snare approach may improve overall success rates without relatively increasing operative risk. It is mentioned that when advancing the outer sheath of a Needle's Eye Snare device over the lead to apply counter pressure, the lead may become doubled over. The friction between the outer sheath and the lead may cause irreversible entrapment of the lead in the sheath. Although this is usually unimportant in pacing leads due to small lead diameter, during a TLEP of ICD leads, which have larger lead diameter, this challenge needs to be kept in mind. However, it can be overcome by keeping the lead one end, as in our case.

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****Supplementary video files associated with this article can be found in the online version of the journal.***

REFERENCES

1. Aksu T, Guray U, Sen T, Durukan M, Guray Y, Demirkan B, et al. Use of the mechanical dilator sheath for removal of endocardial leads: a single center experience. Pacing Clin Electrophysiol 2012;35:514–8. CrossRef
2. Oto A, Aytemir K, Canpolat U, Yorgun H, Şahiner L, Kaya EB, et al. Evolution in transvenous extraction of pacemaker and implantable cardioverter defibrillator leads using a mechanical dilator sheath. Pacing Clin Electrophysiol 2012;35:834–40. CrossRef
3. Wilkoff BL, Love CJ, Byrd CL, Bongiorni MG, Carrillo RG, Crossley GH 3rd, et al. Transvenous lead extraction: Heart Rhythm Society expert consensus on facilities, training, indications, and patient management: this document was endorsed by the American Heart Association (AHA). Heart Rhythm 2009;6:1085–104. CrossRef
4. Ipek EG, Guray U, Demirkan B, Guray Y, Aksu T. Infections of implantable cardiac rhythm devices: predisposing factors and outcome. Acta Cardiol 2012;67:303–10.
5. Baddour LM, Epstein AE, Erickson CC, Knight BP, Levison ME, Lockhart PB, et al. Update on cardiovascular implantable electronic device infections and their management: a scientific statement from the American Heart Association. Circulation 2010;121:458–77. CrossRef
6. Aksu T, Durukan M, Güray U, Colak A. Extraction of a large vegetation and ICD lead using the Evolution Mechanical Dilator Sheath. [Article in Turkish] Turk Kardiyol Dern Ars 2011;39:403–6. CrossRef
7. Di Monaco A, Pelargonio G, Narducci ML, Manzoli L, Boccia S, Flacco ME, et al. Safety of transvenous lead extraction according to centre volume: a systematic review and meta-analysis. Europace 2014;16:1496–507. CrossRef
8. Kennergren C, Bjurman C, Wiklund R, Gäbel J. A single-centre experience of over one thousand lead extractions. Europace 2009;11:612–7. CrossRef
9. Aksu T, Özcan KS, Güler TE. A potential explanation for lower minor complication rate for lead extraction in high-volume centres. Europace 2015;17:504. CrossRef
10. Starck CT, Caliskan E, Klein H, Steffel J, Falk V. Impact of a femoral snare approach as a bailout procedure on success rates in lead extractions. Interact Cardiovasc Thorac Surg 2014;18:551–5. CrossRef

Key words: Device removal; electrodes, implanted; pacemaker, artificial.

Anahtar sözcükler: Cihaz çıkarılması; elektrot; kalp pili, yapay.