# CanGaroo® Envelope

## FOR SUBCUTANEOUS IMPLANTABLE ELECTRONIC DEVICES

# CASE REPORT

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## CASE REPORT

A 35-year-old woman with non-ischemic cardiomyopathy (NICM) and severe left ventricular (LV) dysfunction with an ejection fraction (EF) of 29% suffered an out-of-hospital cardiac arrest from which she was successfully resuscitated. She underwent subcutaneous defibrillator (S-ICD) insertion at an outside hospital prior to discharge. One month later, she presented to our hospital with partial device erosion and pocket infection which required total system removal. A large amount of purulent material was encountered necessitating extensive debridement. Wound cultures eventually grew methicillin-sensitive *Staphylococcus aureus*. She was discharged on a 2-week course of oral antibiotics and a wearable defibrillator was prescribed.

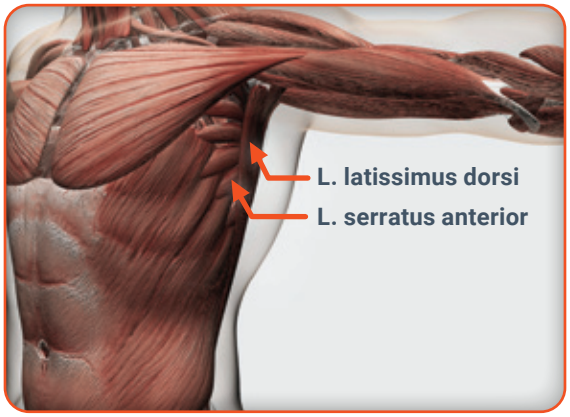


**Figure 1**

At the 2-week post-operative visit, her incisions were healing well without any signs of on-going infection. At the 12-week visit, her wounds had completely healed. Given the continued need for defibrillator therapy, re-implantation options were discussed and insertion of a transvenous implantable cardioverter-defibrillator (ICD) was recommended. The patient refused transvenous ICD insertion and was adamant about having another S-ICD implanted.

Due to the extensive amount of debridement performed at the time of system extraction, there was little to no subcutaneous tissue to create another pocket that could house the new S-ICD generator. A decision was made to implant the new S-ICD generator in an intermuscular pocket between the serratus anterior and latissimus dorsi and utilize the CanGaroo® Envelope, which is intended to securely hold a cardiac implantable electronic device (CIED) to create a stable environment when implanted in the body.[1]

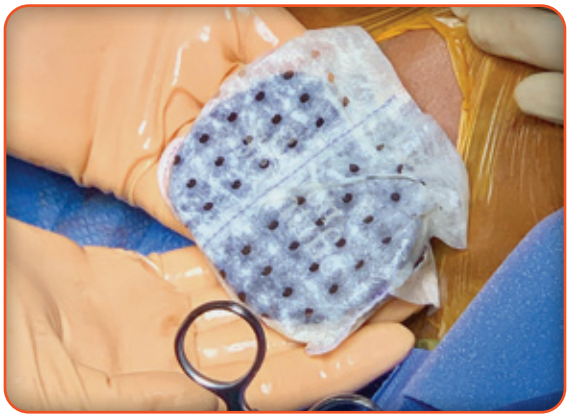

**Figure 2**

## PROCEDURE

The patient was brought to the electrophysiology laboratory, prepped and draped in the usual sterile fashion. A pre-operative antibiotic, vancomycin 1 gram, was infused over 60 minutes. The procedure was performed under general anesthesia. An incision was made distant from the original one and careful dissection was performed. The serratus anterior muscle was visualized and the overlying fascia was dissected after which the latissimus dorsi muscle was readily identified.

There exists a relatively avascular plane between the serratus anterior and latissimus dorsi muscles (Figure 1) which can be easily accessed using blunt dissection to create an intermuscular pocket.[2] This plane can be expanded enough to accommodate the dimensions of the Emblem™ MRI S-ICD generator (83.1 x 69.1 x 12.7 mm) (Figure 2).[3] After creating this intermuscular pocket, the S-ICD lead was tunneled and positioned using the 2-incision technique.[4]

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The lead was connected to the S-ICD generator and the entire apparatus was placed in a 10.8 x 8.9 cm CanGaroo® Envelope (Figure 2) that was hydrated in sterile saline and implanted in the intermuscular pocket.[1] The S-ICD generator was anchored to the serratus anterior muscle and fascia in 2 locations using the CanGaroo® Envelope. The pocket was assessed for hemostasis and irrigated with an antibiotic solution containing bacitracin 50,000 units mixed with 500 cc of saline. The pocket and sub-xiphoid incisions were closed in multiple layers using an absorbable suture.

Conversion testing of ventricular fibrillation (VF) was performed and the device successfully converted the induced VF with a 65 J shock. The shocking impedance measured 55 Ω. The procedure was concluded and the patient was discharged the next day.

## TEACHING POINTS

1. The S-ICD is associated with a lower risk of infection when compared to traditional transvenous ICDs, and the risk of systemic infections seems very low.[5] The pocket infections that do occur can be resolved with antibiotic therapy in the majority of cases without system explantation.[5] It is important to remember that a pocket-related infection still necessitates total system removal.[6]

2. After a patient experiences a CIED infection, one of the first questions to ask is whether another device is needed. This is especially relevant in patients who undergo ICD implantation for primary prevention because in a number of patients, EF improves with guideline-directed medical therapy and time. Therefore, the ICD may no longer be indicated.[6] In this case, another defibrillator was indicated due to her previous cardiac arrest.

3. Intermuscular implantation of the S-ICD has distinct advantages. The location of the intermuscular plane guarantees a posterior position of the generator. The generator sits directly against the serratus anterior without any intervening fat. Both features have been associated with better defibrillation efficacy.[7]

4. The CanGaroo® Envelope is intended to securely hold a CIED to create a stable environment when implanted in the body.[1] It conforms to the implantable device, supports and reinforces the pocket, and creates a stabilized environment that may reduce the risk of device erosion.[8] This patient presented with device erosion and subsequent pocket infection which required total system removal and benefited from an operative strategy that included the Emblem™ MRI S-ICD generator and CanGaroo® Envelope to minimize the risk of this complication from recurring.

**REFERENCES:**


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