

Regional anesthesia of the hemithorax for the implantation of a subcutaneous implantable cardioverter-defibrillator (S-ICD)

Bartosz Sadownik^{1,2}, Piotr Nowakowski¹, Marcin Michalak³, Paweł Andruszkiewicz¹, Marcin Grabowski³

1 2nd Department of Anesthesiology and Intensive Care, Medical University of Warsaw, Warsaw, Poland

2 Department of Descriptive and Clinical Anatomy, Medical University of Warsaw, Warsaw Poland

3 1st Department of Cardiology, Medical University of Warsaw, Warsaw, Poland

A 33-year-old man was referred for the implantation of a subcutaneous implantable cardioverter-defibrillator (S-ICD) as the primary prevention of sudden cardiac death.^{1,2} The procedure was performed under regional anesthesia of the hemithorax, with combined ultrasound-guided serratus anterior plane block (SAPB),³ pectoral nerve block II (PECS II), and parasternal block (PSB). The first implantation of an S-ICD without general anesthesia was described by Droghetti et al⁴ in 2018. We present a modified method of regional anesthesia for the 3-incision intermuscular technique. Pectoral nerve block II was performed instead of PSB at the level of the second rib.⁵ Compared with the procedure reported by Droghetti et al,⁴ the total dose of local anesthetics was reduced by using 1 mg/kg of 0.125% bupivacaine solution. For infiltration of skin incision, 1% lidocaine was used by the operator. Oral paracetamol (1 g) and intravenous dexamethasone (0.1 mg/kg) were given as premedication 1 hour before the start of anesthesia. After confirming the S-ICD location under fluoroscopy, the incision and tunneling lines were marked (FIGURE 1A). Under full sterile conditions for each block and after skin infiltration with 1% lidocaine, an 80-mm 22G Stimuplex needle (B. Braun, Melsungen, Germany) was inserted into the interfascial plane under ultrasound guidance using the in-plane technique. Ultrasonography was performed using the EPIQ 7C system (Philips Ultrasound, Bothell, Washington, United States) with a 12-MHz linear transducer. The informed consent for

the procedure and image publication was obtained from the patient.

For SAPB, the patient was placed on the right side with the left hand raised above the head. The ultrasound probe was placed in the frontal plane in the posterior axillary line. After identifying the serratus anterior and latissimus dorsi muscles (FIGURE 1B; Supplementary material, *Video S1*), the needle was inserted into the interfascial plane 2 intercostal spaces above the incision line, and 30 ml of 0.125% bupivacaine was injected (FIGURE 1C; Supplementary material, *Video S2*).

For PECS II, the patient was in the supine position, and the ultrasound probe was placed in the sagittal plane in the left mid-clavicular line at the level of the second rib. After identifying the pectoral muscles (FIGURE 1D), 5 ml of 0.125% bupivacaine was deposited above and below the pectoralis minor.

For PSB, the ultrasound probe was placed in the sagittal plane at the level of the fifth rib laterally to the left sternal line. The pectoral fascia was identified, and 7 ml of 0.125% bupivacaine was deposited inferiorly.

The procedure began 35 minutes after regional anesthesia was performed. Sedation during surgery was achieved by an intravenous infusion of dexmedetomidine at a dose from 0.03 to 1 µg/kg/h without a loading dose as well as fentanyl at a dose of 0.05 µg/kg/min (Ramsay Sedation Scale [RSS] score, 3–4). During the procedure, intravenous metamizole (2.5 g) was administered. Oxygen was supplied by a nasal cannula. Basic monitoring was provided (electrocardiography,

Correspondence to:

Bartosz Sadownik, MD,
2nd Department of Anesthesiology
and Intensive Care, Medical
University of Warsaw,
ul. Banacha 1a, 02-097 Warszawa,
Poland, phone: +48 22 599 20 02,
email: bsadownik@wum.edu.pl
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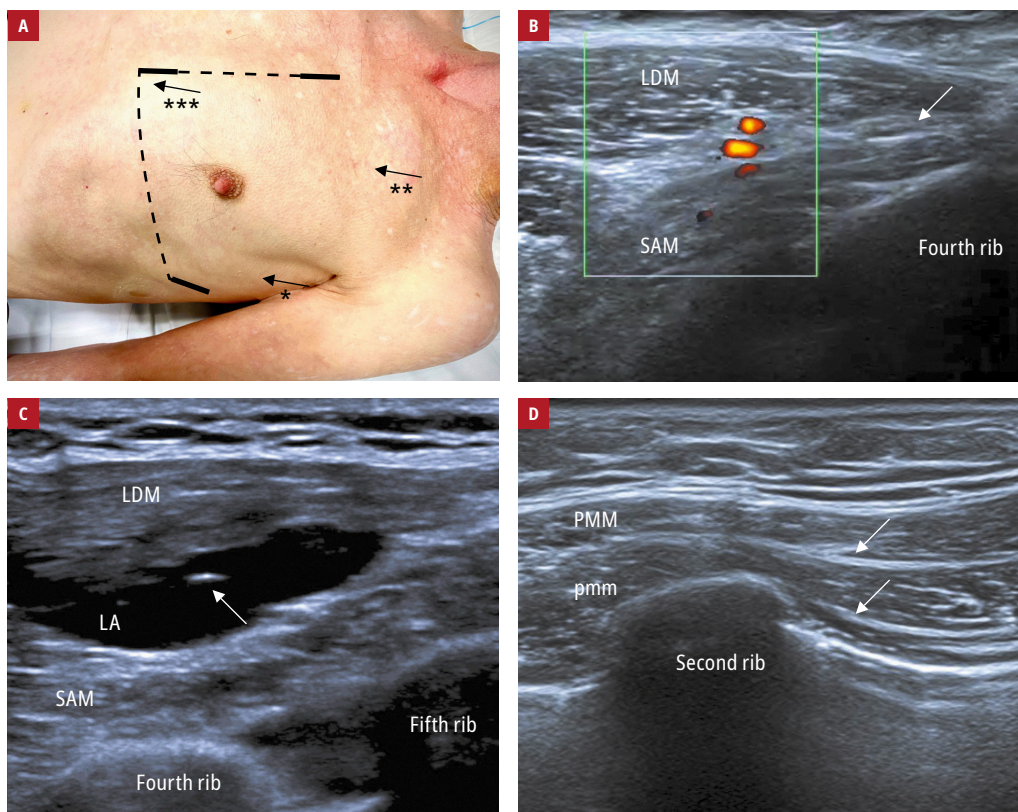


FIGURE 1 **A** – an image showing the incision line, tunneling lines (dotted line), and injection points for serratus anterior plane block (*), pectoral nerve block II (**), and parasternal block (***); **B** – the serratus anterior muscle (SAM), latissimus dorsi muscle (LDM), and thoracodorsal artery (red marks); color Doppler ultrasound, interfascial plane (arrow). Before each insertion of the needle, blood vessels were identified and assessed to eliminate the risk of accidental injury; **C** – ultrasound of the SAM, LDM, and local anesthetic (LA). The position of the tip of the needle (arrow) was confirmed by low resistance infusion of saline solution and enlargement of biconvex-shape hydrodissection of the interfascial planes during infusion; **D** – ultrasound of the pectoralis major muscle (PMM) and pectoralis minor muscle (pmm). For pectoral nerve block II, LA was deposited in the interfascial planes (arrows).

oxygen saturation, noninvasive blood pressure, respiratory rate). The variability of heart rate and blood pressure was below 10% relative to baseline. Before pacing-induced ventricular fibrillation, an intravenous infusion of propofol (0.5 mg/kg) was administered for patient sedation (RSS score, 5). Two hours after the procedure, the patient assessed comfort during the operation as high and reported that he would agree to this method of anesthesia again. No complications were noted during the 30-day follow-up.

SUPPLEMENTARY MATERIAL

Supplementary material is available at www.mp.pl/kardiologiapolska.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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REFERENCES

- 1 Ptaszyński P, Grabowski M, Kowalski O, et al. Subcutaneous implantable cardioverter-defibrillator in prevention of sudden cardiac death in Poland - opinion paper endorsed by the Polish Cardiac Society Working Group on Heart Rhythm [in Polish]. *Kardiol Pol.* 2017; 75: 1057-1060.
- 2 Kempa M, Budrejko S, Sławiński G, et al. Polish single-centre follow-up of subcutaneous implantable cardioverter-defibrillator (S-ICD) systems implanted for the prevention of sudden cardiac death. *Kardiol Pol.* 2018; 76: 452-458.
- 3 Blanco R, Parras T, McDonnell JG, Prats-Galino A. Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. *Anaesthesia.* 2013; 68: 1107-1113.
- 4 Droghetti A, Basso Ricci E, Scimia P, et al. Ultrasound-guided serratus anterior plane block combined with the two-incision technique for subcutaneous ICD implantation. *Pacing Clin Electrophysiol.* 2018; 41: 517-523.
- 5 Droghetti A, Fusco P, Marini M, et al. Ultrasound-guided serratus anterior plane block and parasternal block in cooperative sedation for S-ICD implantation. *Pacing Clin Electrophysiol.* 2019; 42: 1076-1078.