Alternative three-point lead configuration for successful external DC cardioversion in a seven-foot-tall former basketball player

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Direct current cardioversion (DCCV) is commonly used to restore sinus rhythm in patients with atrial fibrillation (AF). Unfortunately, it is still ineffective in up to 30% of patients. The outcome of the procedure can be affected by multiple factors, including AF duration, position and size of electrodes, left atrial (LA) diameter, patients' body features, and transthoracic impedance [1–3]. Although several modifications of standard DCCV were implemented to improve its effectiveness, including the transesophageal approach, vector-change, and dual DC shocks [4–5], it still can be challenging in obese or extremely large individuals.

We present a case of a 41-year-old male, a former professional basketball player, referred to our department for cardioversion of persistent symptomatic (European Heart Rhythm Association [EHRA] score IIa) AF after three unsuccessful DCCV attempts in the preceding three weeks. The patient was first diagnosed with paroxysmal AF in 2016 and since then was successfully cardioverted 6 times. After he retired from his professional basketball career, he gained weight, and on admission, he weighed 136 kg and was 213 cm tall (body mass index [BMI], 30 kg/m^2). Written informed consent was obtained from the patient before the procedure. Transthoracic echocardiography revealed an enlarged LA (4.7 cm) and normal left ventricular ejection fraction (66%). The patient was anticoagulated with rivaroxaban 20 mg q.d., and subsequent transesophageal echocardiography revealed no intracardiac thrombi.

Considering the previous unsuccessful DCCV attempts — despite using both classical anterolateral and changed-vector anteroposterior lead configuration, combined with manual pads compression and 360 J maximum energy — we decided to switch to an ad-hoc modified three-point lead arrangement, which is, in fact, a combination of the two mentioned configurations. A Zoll M-series biphasic external defibrillator (Zoll, Chelmsford, MA, US) with dedicated adhesive external patches was used. The anterior electrode was placed in the right parasternal line just below the clavicle; the posterior electrode was positioned on the back in the left paraspinal line on the Th4-Th6 level between the vertebrae and the scapula; the lateral electrode was placed in the apical region (Figure 1A and 1B). The connectors were cut off, and insulation was removed from the distal parts of the wires. Then the wires of the posterior and the apex electrodes were electrically connected by twisting together and clamping with pean forceps. The anterior electrode's wire was likewise connected to another surgical instrument. Both instruments, now considered the electrodes/poles, were placed on the electrically insulated table at the bedside (Figure 1C). In deep sedation (140 mg propofol *i.v.*), the defibrillator's paddles were placed over the forceps, and 360 J DC shock was applied, restoring sinus rhythm.

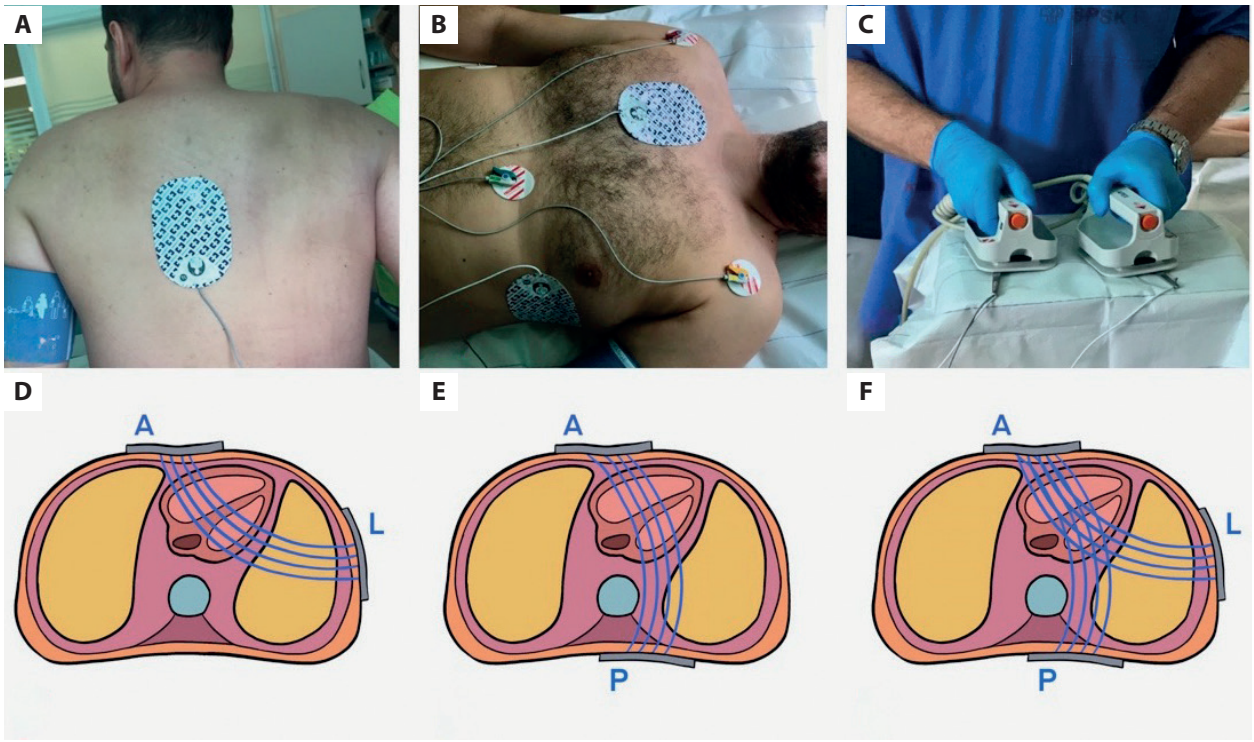

Figure 1. Ad-hoc modified three-lead configuration for external direct current cardioversion (DCCV) (panels **A–C**) and different current vectors and density during altered lead configuration for external DCCV: anterolateral (panel **D**), anteroposterior (panel **E**), and split antero-postero-lateral (panel **F**)

With standard DCCV, the current density in the heart tissue is similar in both recommended configurations: anterolateral and anteroposterior (Figure 1 D and 1E). With the anterior pad left in position and the other split equally to lateral and posterior locations (Figure 1F), both vector modification and possibly an increase of current density in the atria can be achieved. The proposed three-point DCCV procedure can be effective in restoring sinus rhythm when the standard approach fails.

Article information

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