

## EP CASE REPORT

# Inappropriate shock due to quadruple counting in a patient with subcutaneous implantable cardioverter-defibrillator and a dual-chamber pacemaker

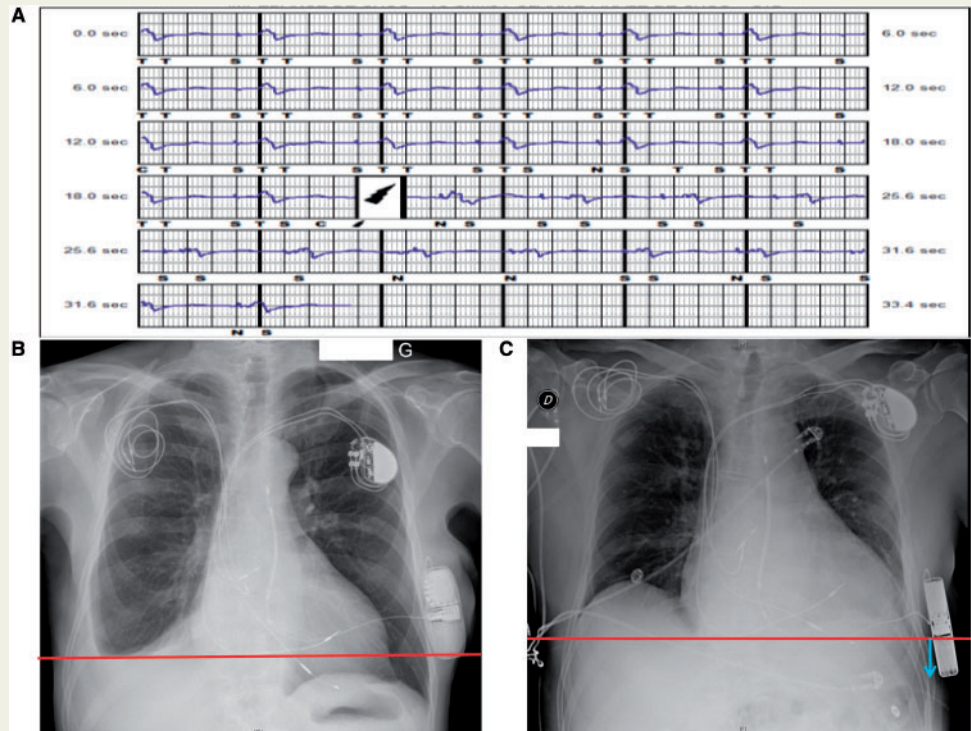
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A 62-year-old man was implanted in 1996 with a right-sided dual-chamber pacemaker (PM) for complete atrioventricular block. In 2002, he was reimplanted with a new left-sided PM with two new leads because of a failure of the previous ones. The two old leads have not been extracted. The second device was changed again 9 years later. The patient was dependent on his PM at both atrial and ventricular levels. In 2012, he was implanted with a left-sided subcutaneous implantable cardioverter-defibrillator (S-ICD) (CAMERON™, Boston Scientific), successfully tested during implantation for primary prevention in a severe dilated cardiomyopathy with 25% reduced left ventricular ejection fraction. Subcutaneous ICD was preferred to transvenous ICD to avoid infectious complication because of 4 old leads. The coronary angiography was normal. The patient experienced several appropriate shocks after implantation for fast ventricular tachycardia (VT). At the same time, he was registered on a waiting list for heart transplant.

In 2014, he was admitted in our hospital after three shocks delivered by S-ICD. He described one shock as unusual without palpitation nor syncope, while he was lying on the sofa. For this episode, ventricular electrogram analysis evidenced an intermittent oversensing of P and T waves associated with R-wave double counting due to paced wide QRS (200 ms), leading to a false VT (Figure 1A). For other shocks, T-wave oversensing during fast VT led to 'appropriate' shocks. P-wave oversensing was due to unipolar atrial pacing and was corrected by programming an atrial bipolar stimulation mode. T-wave oversensing and R-wave double counting were suppressed by changing S-ICD primary sensing vector in secondary one.



**Figure 1** (A) S-ICD ventricular electrogram analysis evidenced an intermittent oversensing of P and T waves associated with R-wave double counting due to paced wide QRS (200 ms), leading to a ventricular tachycardia wrong diagnosis. (B) Chest X-rays performed after S-ICD implantation in 2012. (C) Chest X-rays performed on admission in 2014: we observed an S-ICD displacement inferiorly and posteriorly without any change in the lead position after tractor accident. S-ICD, subcutaneous implantable cardioverter-defibrillator.

Comparing chest X-rays performed on admission (*Figure 1C*) and after S-ICD implantation (*Figure 1B*), an inferior and posterior S-ICD displacement could be observed without any change in the lead position. After further investigation, the patient had presented 5 months ago a syncope due to fast VT. He was successfully shocked while driving his tractor, which stopped in a ditch causing trauma and S-ICD displacement.

After device reprogramming, he did not experience any inappropriate shock until heart transplantation in 2015.

It has been demonstrated that patients with PM could receive a S-ICD safely [2–3]. We report for the first time a case of inappropriate shock due to quadruple counting in the same episode in a patient implanted with a PM and a S-ICD, whereas appropriate electrocardiographic screening, S-ICD programming, and post-operative ergometric testing were carefully performed. This cardiac signals oversensing could be explained by S-ICD accidental displacement.

Although the combination of PM/S-ICD is not recommended, Boston Scientific advises several precautions when programming the PM. Bipolar pacing mode should be mandatory as well as automatic sensitivity setting (CAG). Safety switch and minute ventilation should be deactivated.

**Conflict of interest:** none declared.

## References

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