

CORRESPONDENCE

Mimicry of narrow-complex VT during arthroscopy

To the editor:

Medical equipment can interfere with an electrocardiogram (ECG) and mimic a dysrhythmia [1-7]. Unnecessary interventions may occur when artifact is misdiagnosed as ventricular tachycardia (VT) [8,9]. We encountered such an ECG artifact when an orthopaedic shaver was engaged during knee arthroscopy.

A 75 year old male was brought to the operating room for a left knee arthroscopy because of edema, erythema, and fever one week after left total knee arthroplasty. His past medical history was significant for myocardial infarction, atrial fibrillation, hypertension, congestive heart failure, dyspnea on exertion, obesity, tobacco use, gastroesophageal reflux, renal insufficiency and peripheral vascular disease. His past surgical history included angioplasty, coronary artery

bypass grafting, left knee arthroplasty, right knee arthroscopy, left shoulder arthroscopy, and left carotid endarterectomy. His medications were vancomycin, famotidine, morphine, metoprolol, hydralazine, simvastatin, and clopidogrel (it had been appropriately discontinued preoperatively). He had no allergies to medications.

Physical examination revealed a height of 191 cm, weight of 123 kg, blood pressure 139/80 mm Hg, pulse of 85 beats/min, oral temperature of 37.4⁰ C, and a room air SpO₂ of 98%. His airway was Malampatti class I. Examination of the thorax revealed that all lung fields were clear to auscultation, he had no heart murmurs, but an irregularly, irregular rhythm.

The ECG and chest roentgenogram demon-

Figure 1A (top), 1B (bottom). 1A demonstrates atrial fibrillation before surgical incision (leads II and AVL, respectively). 1B demonstrates artifact resembling ventricular tachycardia when the shaver is engaged and atrial fibrillation when the shaver is disengaged (leads II and AVL, respectively). Arrows indicate true heart beats.



strated atrial fibrillation and cardiomegaly, respectively. Laboratory examination revealed sodium 135 meq/L, potassium 4.0 meq/L, blood urea nitrogen 22 mg/dl, creatinine 1.6 mg/dl, glucose 114 mg/dl, hemoglobin and hematocrit were 9.2 g/dl and 29.7%, respectively.

The pre-incision ECG strip demonstrated atrial fibrillation (figure 1A, leads II and AVL). Upon commencement of the use of the orthopedic shaver (STRYKER corporation) the ECG mimicked narrow-complex VT (figure 1B, leads II and AVL). When the shaver was disengaged the mimicry ceased and the irregularly, irregular rhythm was manifest again. Re-engagement of the shaver again caused mimicry of VT. Throughout these events the patient's hemodynamic status was unchanged and pulse oximetry continued to demonstrate only the underlying atrial fibrillation.

The anesthesiology resident initially believed the rhythm was VT, however several facts caused the attending anesthesiologist to be disinclined towards such a diagnosis: (1) as previously mentioned, pulse oximetry and hemodynamics did not vary with the ECG, (2) the true heart beats could be separated from the artifacts when closely examining the AVL lead, (3) several abrupt engaging-disengaging maneuvers in the use of the shaver facilitated auditory and visual confirmation of the relationship between the shaver and the artifact on ECG. In addition, it must be mentioned that other dysrhythmias with rapid, regular, narrow-complex tachycardia without P waves include Wolff-Parkinson-White syndrome and paroxysmal supraventricular tachycardia.

Such misdiagnosis is not only confined to the operating room. One third of board-certified cardiac electrophysiologists and a majority of board-certified cardiologists fail to recognize artifacts that mimic VT [8] and unnecessary therapeutic recommendations may follow [9].

While previous studies have concluded that body movement and intermittent electrode-skin contact may be the most frequent cause of VT artifact [10], in the operating room medical equipment cannot be overlooked as a source of artifact.

In summary, we would like to remind our colleagues that characteristics differentiating artifact from VT in the operating room include: 1) lack of hemodynamic instability during the episode, 2) a QRS complex within the artifact, 3) pulse oximetry/plethysmography that is unchanging with the artifact, 4) an association with body movements, 5) an unstable baseline on the ECG before and/or after the event, and 6) an association with operative equipment that works with a pulsed or a "start-stop" mode. On a final note, we strongly recommend that the anesthesiology faculty be vigilant in the supervision of those whom they are training to be consultant anesthesiologists.

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