Amiodarone-Associated Torsades de Pointes

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Citation

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Abstract

A 42 year old female presented with epigastric pain of one day duration, 5 days after starting erythromycin for cellulitis. In the ER, she had a cardiopulmonary arrest. During resuscitation she developed recurrent ventricular fibrillation requiring conversion with more than 3 D/C shocks for which she was started on IV amiodarone. Baseline, and current electrocardiograms showed QT prolongation, with hypokalemia and hypomagnesemia on blood tests (immediately supplemented). However, patient developed torsades de pointes (TDP) associated with seizures and hypotension, responding to D/C cardioversion every 1-2 hours. The amiodarone drip was stopped due to worsening QT prolongation, and Isoproterenol infusion was started to maintain a HR of 100 beats/min. Subsequently a transvenous pacemaker was inserted terminating the TDP, pending implantable cardioverter-defibrillator (ICD) insertion.

Conclusion: torsades de pointes induced by amiodarone-aggravated QT prolongation in a female patient with baseline QT prolongation, hypokalemia, hypomagnesemia and recent erythromycin use, a constellation of multiple causes.

INTRODUCTION

Torsades de pointes is a polymorphous ventricular tachycardia with variable QRS morphology associated with a prolonged QT interval. The original report described regular variation of the morphology of the QRS vector from positive to net negative and back again. This was symbolically termed torsade de pointes, or “twisting of the point” about the isoelectric axis, because it reminded the original authors of the torsade de pointes movement in ballet[1]. A variety of pathophysiological mechanisms have been implicated, including congenital disorders, electrolyte abnormalities and a variety of drugs. We present a case which demonstrates interplay of multiple factor associated with disastrous consequences.

CASE REPORT

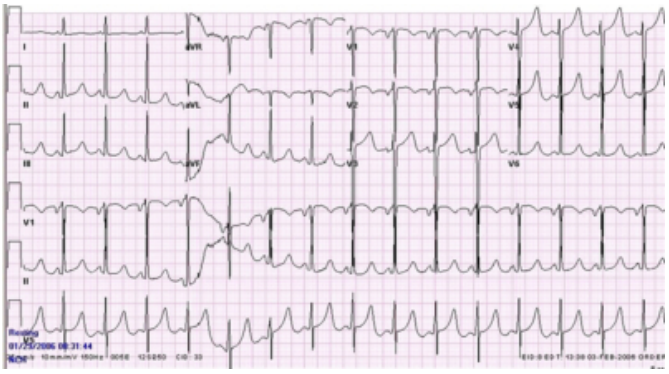
A 42 year old female with a history of coronary artery disease, s/p stent in Feb 2006, end stage renal disease on hemodialysis for the last 3 years, hypertension, chronic pancreatitis and alcoholism, presented to the ER complaining of epigastric pain of one day duration. The epigastric pain was 9/10 in intensity, non radiating, gradual in onset, continuous, no associated symptoms and no aggravating or relieving factors. Five days earlier she was diagnosed with cellulitis of her arteriovenous fistula for which she was given Erothromycin for 10 days. She had had her hemodialysis the same day. In the ER, the patient started having a seizure, became apneic, without a pulse or blood pressure. CPR was initiated and she was intubated. During resuscitation she developed recurrent ventricular fibrillation requiring D/C Cardioversions.

Examination revealed an unresponsive patient on ventilatory support. The temp. was 99.4, heart rate was 70 beats/min. and regular, blood pressure was 115/75 and respiratory rate was 20 breaths/min. Both lungs were clear and heart exam revealed a normal S1, S2 with no murmurs. Abdominal and limbs examinations were unremarkable with no erythema or inflammation over the AV fistula.

Laboratory tests revealed the following: sodium 141, potassium 2.5, Mg 1.4, chloride 101, bicarb 30, bun 14, creatinine 3.8, anion gap 10, troponin 0.07, AST:31, ALT 53, ALK-P 116, lipase 302, amylase 88.

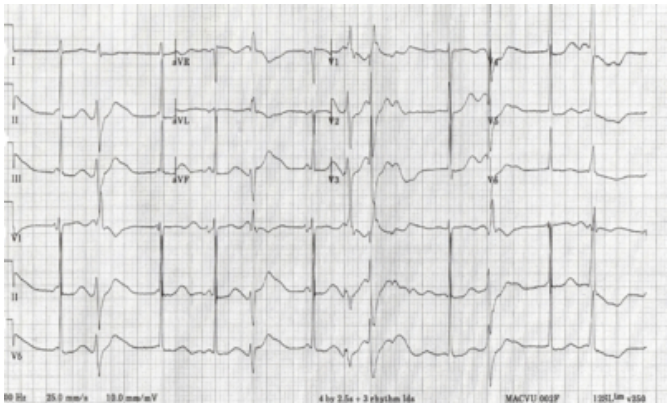
In the ICU, the first EKG revealed multiform premature ventricular contractions (PVCS) and left ventricular hypertrophy with prolonged QTc of 0.55 sec. figure-1.

Figure 1



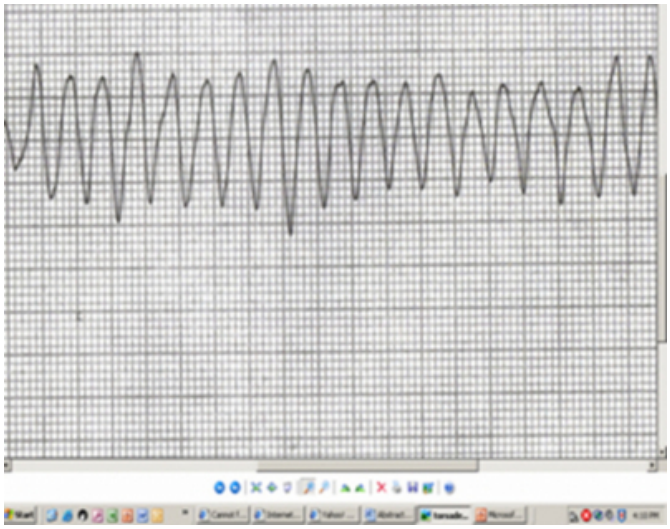
Baseline QTc was 0.50 sec. (figure 2).

Figure 2



By this time the patient had 4 episodes of ventricular-fibrillation all of which were converted to sinus rhythm with DC shock. Potassium and magnesium were immediately supplemented intravenously, and she was given 300 mg of amiodarone IV push, followed by a supplemental dose of 150 mg with an infusion of 1 mg/minute for 6 hours, then 0.5 mg/minute because of recurrent episodes of ventricular fibrillation. However, the patient started having torsades de pointes (figure 3) associated with seizures and hypotension, which responded to D/C cardioversion every 1-2 hours. An echocardiogram showed normal left ventricle systolic function with advanced diastolic dysfunction and severe mitral regurgitation. A follow up EKG revealed marked worsening of the QTc (0.79 sec.). The amiodarone drip was immediately discontinued; an IV infusion of isoproterenol at 1 microgram/min was initiated to maintain a heart rate of 100 beats/min, subsequently followed by insertion of a transvenous overdrive pacemaker which terminated the TDP. The patient was transferred to another facility for insertion implantable cardioverter-defibrillator.

Figure 3



DISCUSSION

Although amiodarone has been associated with a remarkably low frequency of proarrhythmic events and an incidence of torsades de pointes of less than 1.0%[2], amiodarone associated torsades de pointes has been reported increasingly in recent years [3, 4]. The risk factors for amiodarone associated torsades de pointes are: co-administration with drugs that may potentially prolong QT interval, female gender, hypokalemia, hypomagnesemia, reduced left ventricular systolic function, T-wave alternans and bradycardia[4].

Polymorphic ventricular tachycardia: Polymorphic ventricular tachycardia is often rapid, hemodynamically unstable, and life threatening, requiring urgent defibrillation. If the arrhythmia is stable (or after sinus rhythm has been established with defibrillation), pharmacologic therapy is used; the recommended therapy is based upon the QT interval on the baseline ECG [5, 6, 7, 8, 9, 10] :

QT interval prolongation: Polymorphic ventricular tachycardia associated with a prolonged QT interval is termed torsades de pointes. The patient may have a congenital prolonged QT syndrome or acquired disease from drug therapy, hypomagnesemia, or hypokalemia: a-Congenital QT interval prolongation can be acutely treated with lidocaine, beta blockers, and overdrive pacing.

b-The acute treatment of acquired QT prolongation is the withdrawal of the causative agent and reversal of any associated electrolyte abnormalities. Recommended therapies include magnesium, overdrive pacing, isoproterenol as a temporizing measure prior to pacing,

phenytoin, lidocaine, and with some drugs alkalinization of the plasma (e.g., quinidine toxicity).

No QT interval prolongation: Polymorphic ventricular tachycardia that occurs in the absence of QT interval prolongation is most often due to ischemia, which may be overt or silent. Recommended therapy is aggressive treatment of ischemia and correction of any electrolyte abnormalities. Antiarrhythmic agents can be used to reverse the arrhythmia and/or prevent a recurrence; recommended agents include beta blockers, lidocaine, amiodarone, procainamide, or sotalol.

SUMMARY

This patient's refractory ventricular arrhythmia is probably the result of a constellation of causes, which was enhanced by amiodarone, which has a low frequency of proarrhythmic events. Yet, amiodarone in combination with other high risk factors may be associated with an elevated proarrhythmic risk.

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