

# Intracoronary Electrocardiogram During Torsade des Pointes Secondary to Intracoronary Papaverine

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**Papaverine, a potent coronary vasodilator, is now commonly used to measure coronary reserve. We recorded intracoronary electrogram in a patient who developed Torsade des pointes after 10 mg of papaverine. This was associated with marked prolongation of the QT interval. The ventricular tachycardia self-terminated with shortening of the QT interval. We believe that although papaverine is a good agent because of its short duration of action, it must be used cautiously because of its effects on repolarization, which can result in arrhythmias.**

## INTRODUCTION

Papaverine is a potent, smooth muscle relaxant. Its major effect is on the smooth muscle of large blood vessels, especially coronary arteries. Papaverine is now frequently used to determine coronary vasodilator reserve in patients with fixed coronary artery disease and is reported to be ideal because of its short duration of action, thus permitting repeated measurements, and is free of significant deleterious effects [1,2]. We report on a patient in whom intracoronary as well as surface electrocardiograms were recorded during the development of Torsade des pointes after 10 mg of intracoronary papaverine.

## Case Report

A 61-year-old white male presented with anterior myocardial infarction and was treated with intravenous tissue plasminogen activator (t-PA). He was found to have single vessel stenosis of the left anterior descending coronary artery (LAD) with anterior hypokinesis. The patient's hospital course was uncomplicated with no evidence of heart failure, and the peak creatine phosphokinase (CPK) was only 1,470 IU/liter. Physical examination was normal except for an S4 gallop. Chest x-ray showed normal size cardiac silhouette. Electrocardiogram showed anterior myocardial infarction with ST segment elevation in leads V1-V4. The QT interval on baseline electrocardiogram was normal (0.42 sec). Renal function was also normal with serum potassium of 4.2 meq/liter. Because of the relatively low CPK, patient underwent elective balloon angioplasty of the LAD ten days after his myocardial infarction.

After insertion of standard percutaneous transluminal coronary angioplasty guiding catheters, and identification of target lesion, a 0.014 high torque floppy guide

wire (ACS, Inc., Santa Clara, CA) was positioned distal to the stenosis. Leads 2 and V5 were continuously recorded. An intracoronary electrogram was also recorded simultaneously by attaching the guide wire to the V lead of the surface EKG. After infusion of 10 mg of intracoronary papaverine to measure coronary vasodilator reserve, the patient reported chest pressure. The QT intervals increased to 0.64 sec with dramatic deep inversion of T waves on the intracoronary electrogram without any ST-T segment changes. Patient also developed occasional premature ectopic beats, which led to Torsade des pointes lasting for 7 sec (Fig. 1). The patient spontaneously reverted to normal sinus rhythm with shortening of the QT interval to 0.56 sec. During the subsequent successful balloon angioplasty, the patient had chest pressure and ST segment elevation with each inflation without any ectopy.

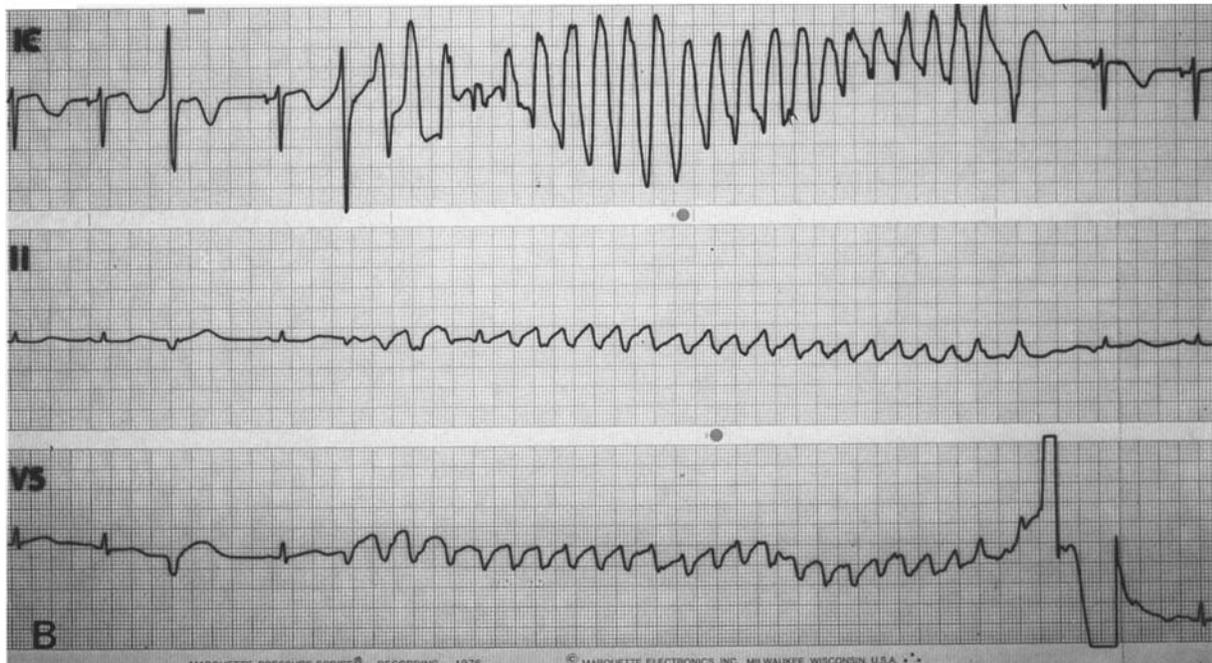
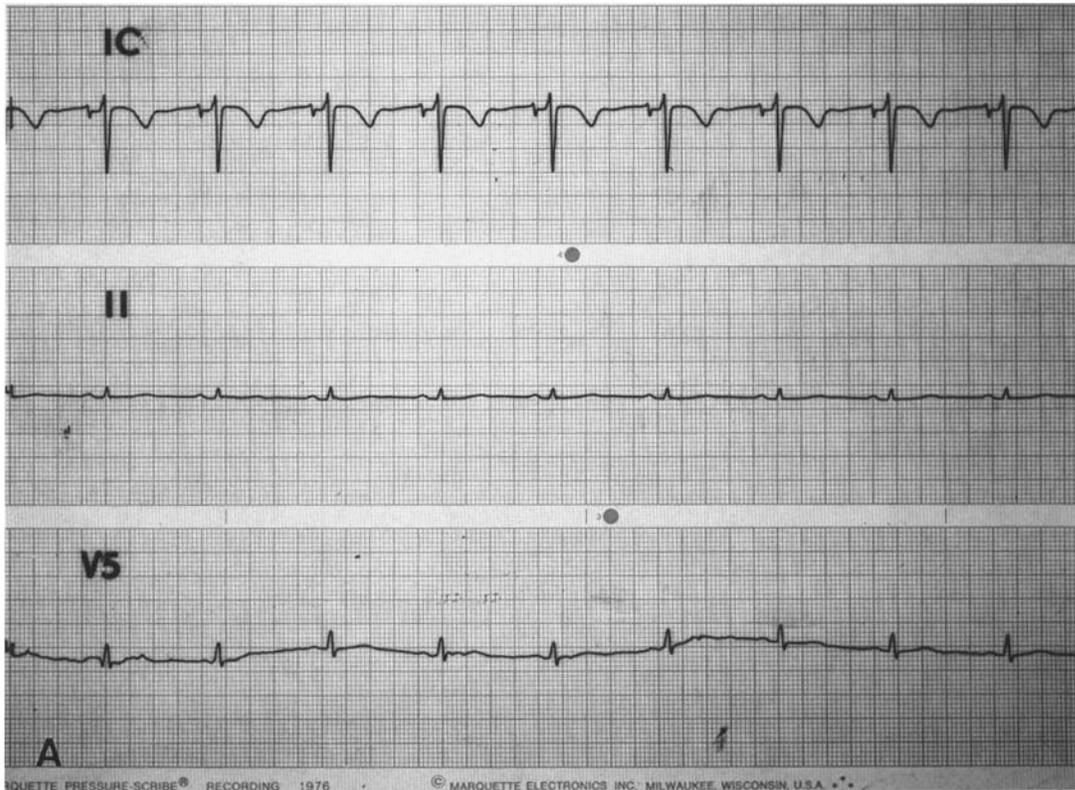
## DISCUSSION

Torsade des pointes is often a malignant event associated with long QT interval. This can be due to congenital or acquired prolongation of the QT interval [3,4]. Papaverine, which is now frequently used to measure coronary vasodilator reserve, has been reported to be free of significant complications [1]. Wilson and White have noted prolongation of QT interval in some patients with a parallel increase in coronary blood flow velocity [1]. One of

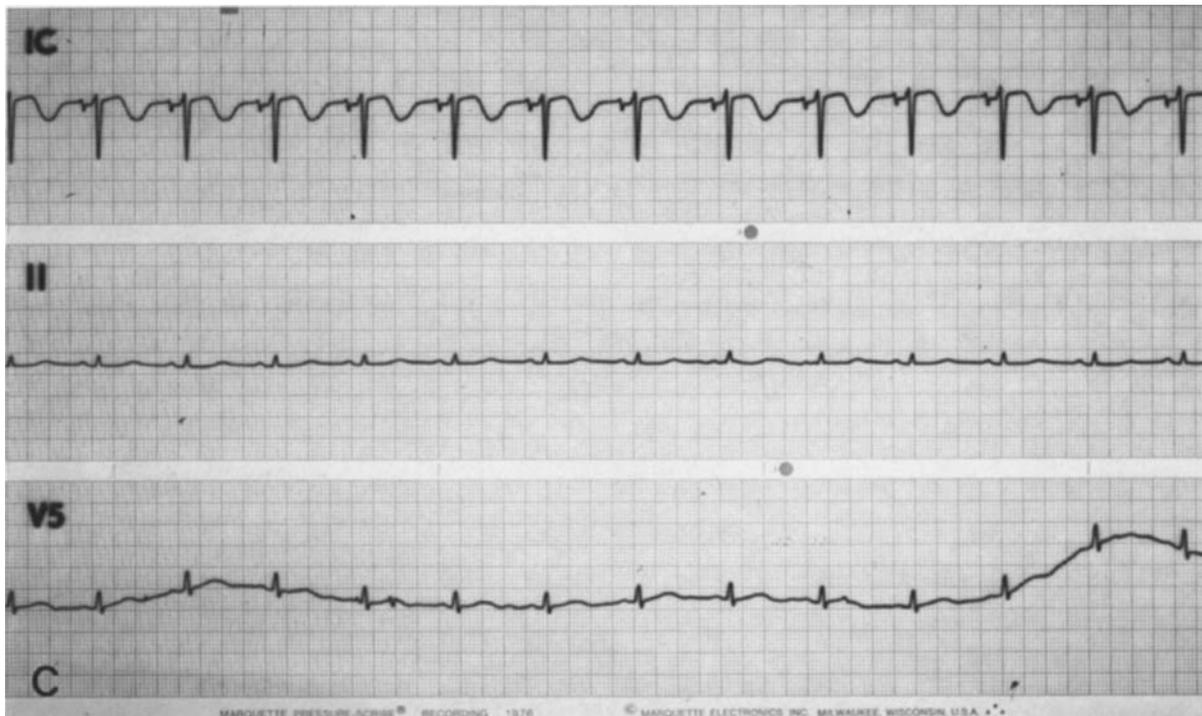
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Received May 4, 1989; revision accepted June 12, 1989.

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**Fig. 1. A: Baseline electrocardiogram showing leads intracoronary (IC), II, and V5. B: Prolongation of QT interval with the development of Torsade des pointes. C: Shortening of QT interval immediately post-conversion to sinus rhythm.**



their patients did develop a 5-beat run of ventricular tachycardia after 14 mg of intracoronary papaverine. Our patient manifested severe prolongation of QT interval to 0.64 sec with the development of Torsade des pointes. The ventricular tachycardia was self-terminating with shortening of the QT interval to 0.56 sec. It is possible that endocardial ischemia due to intracoronary "steal" from the endocardium to the epicardium may have resulted in inhomogeneous myocardial repolarization favoring the development of PVCs, which in association with a long QT interval led to Torsade des pointes. This is not likely, for during balloon angioplasty the patient developed angina with ST segment elevation without any arrhythmias. We feel that papaverine is a good agent for determination of coronary vasodilator reserve, but it must be administered cautiously because of its possible

effects on repolarization with prolongation of the QT interval, which may result in malignant ventricular arrhythmias.

#### REFERENCES

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