

# Brugada Like Pattern in ECG with Drug Overdose

Kiran HS\*, Ravikumar YS\*\*, Jayasheelan MR\*\*\*, Prashanth#

## Abstract

Tricyclic antidepressants (TCAs) may have dangerous cardiac effects in overdose. ECG is useful as both a screening tool for tricyclic antidepressant exposure and as a prognostic indicator. TCA overdose may produce various ECG changes. We report a case of Dothiepin overdose resulting in Brugada like pattern including RBBB which resolved spontaneously.

## Introduction

Tricyclic antidepressants (TCAs) may have dangerous cardiac effects in overdose. ECG is useful as both a screening tool for tricyclic antidepressant overdose and as a prognostic indicator. TCA overdose may produce various ECG changes. We report a case of Dothiepin overdose resulting in Brugada like Pattern which resolved spontaneously. We are reporting this case for the rarity of this ECG entity.

## Case Report

A 28 years old female patient was admitted to ICU at 9 pm with deliberate consumption of some "unknown" tablets, the details of which were not available at the time of admission. On examination, vital parameters were stable, with pulse rate of 90/min, BP of 130/70 mmHg & SpO<sub>2</sub> -100% on room air. She was drowsy, but responding to verbal commands and there were no focal neurological deficits. Examination of other systems was unremarkable.

Initial ECG showed ventricular rate of 100/min, normal PR interval, QRS duration of 0.12 sec, Brugada like pattern including RBBB and a downsloping ST segment elevation in leads V<sub>1</sub> – V<sub>3</sub>. QTc was slightly prolonged (0.50 sec) (Fig. 1). Patient did not have chest pain. Initial ABG, serum electrolytes, urea and creatinine were within normal limits. Cardiac enzymes were not elevated. Other basic investigations were unremarkable. Gastric lavage was done, she was given supportive treatment and she was under cardiac monitoring. ECG changes reverted back to normal spontaneously (Fig. 2) and patient had recovered completely the next day. Echocardiography was normal with no regional wall motion abnormalities. Relatives subsequently found empty strips of tablets in her room and patient confessed to have taken 10 tablets of Dothiepin 75 mg (prothiaden) and 14 tablets of Alprazolam 0.25 mg. She was discharged after 4 days and was advised regular follow up in psychiatry OPD.

## Discussion

Ever since its introduction as a new clinical entity by Pedro and Joseph Brugada in 1992, the Brugada syndrome<sup>1</sup> has attracted great interest because of its association with high risk of sudden death. It is a rare clinical and ECG entity consisting of sudden death from cardiac causes associated with RBBB and unusual ST segment elevation in right precordial leads (V<sub>1</sub> – V<sub>3</sub>).<sup>1,2</sup>

Our patient with TCA (Dothiepin) overdose had this rare Brugada-like ECG pattern, including RBBB and a down sloping ST segment elevation in leads V<sub>1</sub> – V<sub>3</sub> (fig-1), which resolved

spontaneously after 12hrs (fig-2).

Brugada ECG pattern has been noticed in retrospective analysis of patients with TCA overdose by Goldgran Toledano et al,<sup>2</sup> prompted by reports of 2 such rare ECGs in 1997 by Bolognesi et al.<sup>3</sup> Bolognesi et al<sup>3</sup> reported 2 patients with TCA overdose with abnormal ST elevation in right precordial leads associated with a marked QRS widening (RBBB and LAHB type).

Goldgran Toledano D et al<sup>2</sup> retrospectively studied 98 consecutive cases of TCA overdose and reported Brugada ECG pattern in 15 of these cases (Brugada ECG pattern was definitive in 12 and equivocal in 3 patients). The mortality rate was 6.7% among patients with Brugada ECG pattern and 2.4% among patients without it. In their study, the prevalence of the Brugada ECG pattern in patients with TCA overdose exceeded the prevalence in general population (0.05 to 0.1%).

Monteban Kooistra et al<sup>4</sup> retrospectively studied 134 patients with drug overdose. In 35 patients, a TCA was the main toxic substance. In 12 of these 35 patients with TCA overdose, there was no ECG abnormality, an increase in QRS duration was seen in 13 cases and 6 of them demonstrated a Brugada like pattern.

Dothiepin is a tricyclic antidepressant. Cardiac effects of tricyclic antidepressants may be dangerous in over dose. ECG is useful as both a screening tool for tricyclic antidepressant exposure and as a prognostic indicator.<sup>5</sup> The most common ECG finding is sinus tachycardia. Other ECG changes that should be sought include prolonged PR, QRS and QTc, AV blocks, ventricular ectopics, nonspecific ST-T changes, terminal 40 ms right axis deviation of QRS in the frontal plane and the BRUGADA pattern - including RBBB and a downsloping ST elevation in leads V<sub>1</sub>-V<sub>3</sub>. Tricyclic Antidepressants block fast sodium channels in the myocardium and slow phase zero depolarization of action potential. Ventricular depolarization is delayed, which leads to prolonged QRS. QRS interval is best evaluated using limb leads. Widening of QRS is associated with seizures and arrhythmia. When QRS >100 ms there is 34% chance of seizures and 14% chance of arrhythmia. When QRS >160 ms, there is 50% chance of ventricular arrhythmia.

Prolongation of QRS >100 ms predicts a higher risk of arrhythmia and is an indication for sodium bicarbonate administration. Serum alkalization favours dissociation of the tricyclic away from myocardial Na<sup>+</sup> channels and the extracellular Na<sup>+</sup> load improves Na<sup>+</sup> channel function. In patients at risk of arrhythmia, consideration should be given to i.v. administration of 50ml of 8.4% sodium bicarbonate and the dose may be repeated every 15 minutes until the ECG normalises or the arterial pH ≥ 7.45. This is usually sufficient to allow restoration of normal cardiac rhythm and BP without a need of other antiarrhythmic agents.<sup>6,7</sup>

To conclude, in management of cases with TCA overdose, we should be aware of Brugada ECG pattern which is a marker of high risk of death.

\*Assistant Professor, \*\*Associate Professor & Unit Chief, \*\*\*Sr. Resident, #PG Student, Department of Medicine, JSS Medical College & Hospital, Mysore.

Received: 22.12.2008; Revised: 24.03.2009; Accepted: 02.07.2009

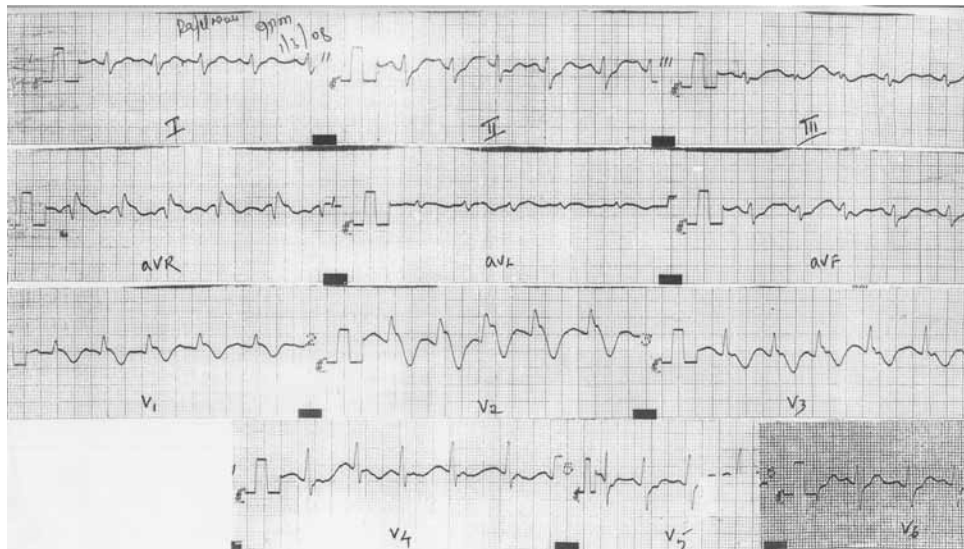


Fig. 1 : Initial ECG showing Brugada like pattern including RBBB & downsloping ST segment elevation in leads V<sub>1</sub> – V<sub>3</sub>.

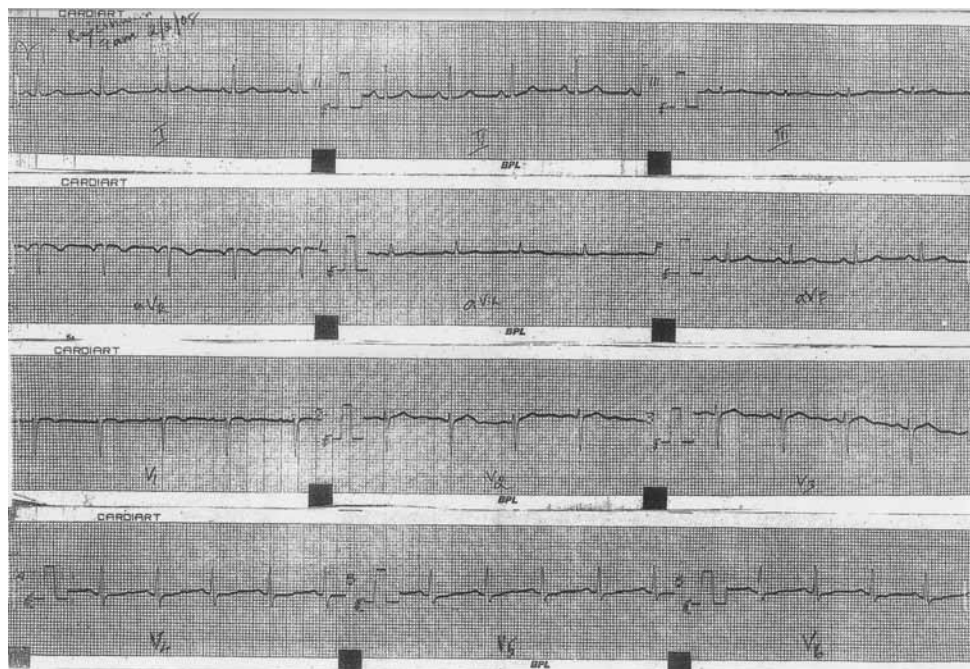


Fig. 2 : ECG after recovery showing complete resolution of Brugada like pattern

## Acknowledgements

We express our sincere thanks to our respected Principal Dr. Raghottam Rao, respected Medical Superintendent, Dr. Veerabhadrapa and respected HOD, Prof. Dr. Basavana Gowdappa, for their encouragement. We express our sincere thanks to the lab-departments for the reports provided in the workup of the case.

## References

1. Antzelevitch C, Brugada P, Brugada J, Brugada R et al. Brugada syndrome : 1992 – 2002, A Historical perspective. *J Am Coll Cardiol* 2003; 41: 1665-1671.
2. Goldgran Toledano D, Sideris G, Kevorkian JP. Overdose of cyclic antidepressants and the Brugada syndrome. *N Engl J Med* 2002; 346: 1591-1592.
3. Bolognesi R, Tsialtas D, Vasini P et al. Abnormal ventricular repolarisation mimicking myocardial infarction after heterocyclic antidepressant overdose. *Am J Cardiol* 1997; 79: 242-5.
4. Monteban – Kooistra WE, Van den Berg MP, Tulleken JE et al. Brugada Electrocardiographic pattern elicited by cyclic antidepressant overdose. *Intensive Care Med* 2006;32: 281-5.
5. Liebelt EL, Francis PD, Woolf A. Serial ECG changes in acute tricyclic antidepressant overdose. *Crit Care Med* Oct 1997;25: 1721-6.
6. Thanacoody HK, Thomas SH. Tricyclic antidepressant poisoning; Cardiovascular toxicity. *Toxicol Rev* 2005; 24: 205-214.
7. Hoffman JR, Votey SR, Bayer M, Silver L. Effect of hypertonic sodium bicarbonate in the treatment of moderate to severe cyclic antidepressant overdose. *Am J Emerg Med* 1993; 11: 336-341.