

Fatal Cardiogenic Shock and Liver Failure Induced by Verapamil in a Thyrotoxic Patient

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Verapamil is widely used for slowing the heart rate, especially for rapid atrial fibrillation.^[1] However, severe bradycardia is a dangerous adverse effect of this drug, and has been reported to cause severe cardiogenic shock in a patient with liver failure even after a single 80mg dose.^[2] Thyroid crisis has also been reported to be complicated with acute hepatic failure.^[3,4] We report a case of a 37-year-old male with thyrotoxicosis who developed fatal cardiogenic shock and liver failure after receiving verapamil 80mg three times a day in order to slow his heart rate.

1. Case Report

A 37-year-old male with a past medical history of rheumatoid disease. The patient had undergone aortic and mitral valve replacement 5 years prior to hospitalisation as a result of rheumatic heart disease, and had good left ventricular function following this procedure. About 4.5 years after the aortic and mitral valve replacement operation the patient developed a rapid atrial fibrillation and was treated with amiodarone 400mg once daily and verapamil 40mg three times daily, with partial improvement. Several months after initiation of amiodarone treatment, the patient developed amiodarone-induced thyrotoxicosis and was given verapamil 40mg three times a day

for 2 months, with no improvement (heart rate 120–130 beats/min). Amiodarone was withdrawn when the patient developed thyrotoxicosis and verapamil was started after the patient developed rapid atrial fibrillation. Thereafter, the verapamil dosage was increased to 80mg three times a day in order to slow his heart rate. The patient did not receive any other drugs.

Cardiogenic shock developed after the third dose of verapamil during his current hospitalisation: approximately 3 hours after the third dose of verapamil 80mg, the patient developed severe bradycardia and cardiogenic shock (which lasted for about 20 hours) complicated by fulminant hepatic failure (partial thromboplastin time [PTT] was 82 sec, and transaminases were ten times the normal range [alanine aminotransferase 550 IU/L, aspartate aminotransferase 440 IU/L]). The bradycardia preceded a drop in blood pressure from 120/85mm Hg to 65/40mm Hg. He was transferred to the intensive care unit and his bradycardia was reversed by administration of calcium and atropine (heart rate 60–65 beats/min), and blood pressure was maintained within the 90/60–100/70mm Hg range with intravenous fluids. The patient died from intracranial haemorrhage, and no other diagnostic procedures were performed because of the fulminant deterioration.

2. Discussion

Verapamil has been reported to cause severe cardiogenic shock in combination with atenolol and flecainide.^[5,6] Although verapamil is used in the treatment of tachycardia resulting from thyrotoxicosis,^[7] our patient demonstrated that long-term thyrotoxicosis may be a predisposing factor for cardiogenic shock even if successfully treated in the past with the same dosage of verapamil (80mg three times daily). The fulminant hepatic failure was induced by cardiogenic shock and induced a vicious cycle of elevated blood concentrations^[5] of verapamil, which in turn aggravated the cardiogenic shock by cardiodepression and caused more liver damage. The liver damage was most probably caused by the verapamil-induced cardiogenic shock. No previous liver dysfunction was noticed. We suggest that thyrotoxicosis made the patient's heart more susceptible to verapamil-induced cardiac depression and shock.

In conclusion, we advocate caution when administering verapamil to thyrotoxic patients.

References

1. Harrison's Principles of Internal Medicine. 15th ed. Table 230-4: Drugs used to treat cardiac tachyarrhythmias.
2. Stajer D, Bervar M, Horvat M. Cardiogenic shock following a single therapeutic oral dose of verapamil. *Int J Clin Pract* 2001 Jan-Feb; 55 (1): 69-70
3. Inoue T, Tanigawa K, Furuya H, et al. A case of thyroid crisis complicated with acute hepatic failure. *Nippon Naika Gakkai Zasshi* 1988 Apr; 77 (4): 564-7
4. Choudhary AM, Roberts I. Thyroid storm presenting with liver failure. *J Clin Gastroenterol* 1999 Dec; 29 (4): 318-21
5. Sakurai H, Kei M, Matsubara K, et al. Cardiogenic shock triggered by verapamil and atenolol: a case report of therapeutic experience with intravenous calcium. *Jpn Circ J* 2000 Nov; 64 (11): 893-6
6. Buss J, Lasserre JJ, Heene DL. Asystole and cardiogenic shock due to combined treatment with verapamil and flecainide [abstract]. *Lancet* 1992 Aug 29; 340 (8818): 546
7. Cobbe SM. Using the right drug: a treatment algorithm for atrial fibrillation. *Eur Heart J* 1997 May; 18 Suppl C: C33-9

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