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CASE REPORT

# Severe Hypotension After Amlodipine Use for Hypertension in a Newborn on Beta Blocker Therapy for Thyrotoxicosis

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**Abstract** A 35-year-old woman with a 9-year history of Grave's disease delivered a male infant weighing 2,210 g at 32 weeks of gestation by caesarean section. The neonate developed thyrotoxicosis and, at the age of 24 h, was treated with oral carbimazole (500 µg every 8 h) and propranolol (2 mg/kg/day in two divided doses). He subsequently developed hypertension on day 4, which required therapy with amlodipine (0.1 mg once daily). Severe hypotension developed within 24 h and required discontinuation of amlodipine, with initiation of intravenous inotropic support with dopamine and dobutamine (at a rate of 20 µg/kg/min). The blood pressure rapidly normalized, and both dopamine and dobutamine infusions were stopped within 36 h. A Naranjo assessment score of 6 was calculated, indicating that the severe hypotension was a probable adverse drug reaction caused by the combination of amlodipine and propranolol therapy.

**Key Points**

Antihypertensive medication combination therapy in neonates should be monitored closely for hypotension.

The interaction of a beta blocker and amlodipine therapy in the neonatal period needs to be studied further.

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## Introduction

Neonatal hypertension secondary to renal, endocrine or other causes is commonly seen in sick newborn infants [1]. Its treatment may include use of beta blockers, vasodilators such as hydralazine, calcium channel blockers or alpha blockers. Although amlodipine has been shown to be effective and safe when used in children [2], its use has not been fully studied in neonates nor in combination with beta blockers in that age group. However, amlodipine was listed in a recent review article as one of the treatment options for hypertension in neonates [3].

In an infant born to a mother with Grave's disease, we report the occurrence of severe hypotension, which developed after amlodipine was administered in addition to the beta blocker therapy already initiated for hypertension secondary to thyrotoxicosis. We describe the case and discuss the use of amlodipine in this age group.

## Case Report

A male newborn infant, with a birth weight of 2,210 g, was born by caesarean section at 32 weeks of gestation to a 35-year-old mother with a 9-year history of Grave's disease. He required mechanical ventilation for 3 days for respiratory distress syndrome. Thyrotoxicosis was confirmed by physical examination and laboratory investigations: his serum thyroxin (T4) level was 59 ng/dL and his thyroid stimulating hormone (TSH) level was 0.013 µIU/mL. Oral treatment with carbimazole 500 µg every 8 h and propranolol 2 mg/kg/day, divided into two doses, was started at 24 h after birth. On day 4, the infant developed hypertension, with a mean blood pressure ranging from 90

to 100 mmHg. On the recommendation of a paediatric nephrologist, therapy with amlodipine 0.1 mg orally once daily was started.

Twenty hours after administration of the first dose of amlodipine, the child developed severe hypotension, with a mean blood pressure of 27 mmHg, and required supportive care with mechanical ventilation and intravenous inotropes (dopamine and dobutamine at a rate of 20 μg/kg/min). Amlodipine was stopped, propranolol therapy was continued, a full septic work-up was performed and all cultures showed no bacterial growth. Following the discontinuation of amlodipine, the blood pressure normalized, and the inotropes were stopped within 36 h. By day 8, propranolol was discontinued, as the blood pressure and serum T4 level (14.7 μg/dL) were normal.

## Discussion

This case report aims to describe the occurrence of severe hypotension following amlodipine administration for hypertension developing in a preterm infant with thyrotoxicosis who was already receiving beta blocker. This is similar to the findings in an animal study by Ishizaka et al. [4], where more significant hypotension occurred when a beta blocker was added to amlodipine than when it was added to a newer calcium channel blocker.

Recent research supports the use of amlodipine, a calcium channel blocker, in young children. Robinson et al. [5] described its use in 33 children aged 1.3–16.9 years and showed that it was well tolerated when used for 6 months. Lago Rivero et al. [6] reported its use in refractory hypertension in a 5-year-old girl with secondary hypertension. By contrast, there have been no good studies on the use of calcium channel blockers in neonates. One case report described the development of subcutaneous fat necrosis in a newborn whose mother had received a calcium channel blocker [7]. A case report of death caused by an amlodipine overdose recommended caution when using it in young infants [8].

The current report suggests that severe hypotension may result from combining amlodipine with beta blocker therapy in neonates. Combination antihypertensive therapy in this age group should be used only with caution.

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**Ethics** Informed consent was obtained from both the infant's father and his mother for the publication of this report.



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