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Case Report

Fatal acute intoxication of accidentally ingested nifedipine in an infant – A case report

Hiroki Yamamoto [a], Tatsunori Takayasu [b], Mizuho Nosaka [a], Akihiko Kimura [a], Yuko Ishida [a], Takashi Kawaguchi [a], Mie Fukami [a], Misato Okada [a], Toshikazu Kondo [a,*]

[a] Department of Forensic Medicine, Wakayama Medical University, Wakayama, Japan
[b] Forensic Toxicology Unit, Department of Forensic Medicine and Pathology, Graduate School of Medical Science, Kanazawa University, Kanazawa, Japan

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ABSTRACT

A fatal case of acute nifedipine intoxication in a two-year-old boy is presented. The boy accidentally orally ingested an unknown amount of his grandfather's nifedipine (40 mg/tablet), mistaking it for a ramune confectionery. Despite intensive medical treatment, his death was confirmed at 31 h after the accidental ingestion. The forensic autopsy revealed that there were neither pathological alterations or injuries in all of the organs. Toxicologically, nifedipine could be detected at the concentrations of 0.463, 0.669 and 13.0 μg/g in cardiac blood, peripheral blood and stomach contents, respectively. These concentrations were evaluated as fatal levels, and the cause of death was diagnosed as acute nifedipine intoxication. Recently, the number of infants and children who accidentally ingest drugs in the home is increasing. This case report prompts forensic pathologists and toxicologists to emphasize that children are always exposed to the risk of accidental drug ingestion in daily life.

1. Introduction

Dihydropyridine demonstrates greater selectivity for the calcium channels of vascular cells than for those of cardiac cells. Inhibiting calcium entry or release by blocking calcium channel suppresses the increase of the cytoplasmic calcium ion concentration, and causes relaxation of vascular smooth muscles and vasodilation [1]. Nifedipine is one dihydropyridine calcium channel blocking agent that is widely used as a first treatment of hypertension and angina pectoris [2–4] because it rapidly and effectively decreases blood pressure compared with other drugs [5].

As for the pharmacokinetics, nifedipine reaches peak concentration at 3 h after oral ingestion, and its biological half-life is 2–5 h [6–9]. The drug is supplied as the free base in 10 and 20 mg normal-release capsules. The initial oral dose is 10 mg given 3 times daily, and the effective daily dosage is 30–120 mg. The total daily dose should not exceed 180 mg [10]. In adult cases, oral administration of 10 mg of nifedipine resulted in a serum concentration of 0.05 μg/ml at 1.6 h [10]. Moreover, chewing of the tablet increased serum concentration of nifedipine [11].

Recently, the number that infants and children who accidentally ingest drugs prescribed to their family members is increasing based on the report from the Japan Poison Information Center. Accidental ingestion of psychotropic drugs, hypoglycemic agents, bronchodilators and antihypertensive agents cause especially serious health damage. Herein, we reported a fatal case of acute nifedipine intoxication due to accidental oral ingestion in a 2-year-old boy.

2. Case report

At noon on a certain day, a two-year-old healthy boy accidentally orally ingested nifedipine, which had been prescribed to his grandfather. Immediately, the grandfather consulted his attending doctor by telephone, and was told to observe the boy without doing anything. Approximately 1 h after the ingestion, the boy complained of dizziness, and was transported to a hospital by an ambulance. Upon arrival at 13:45, his blood pressure was unmeasurable and heart rate was 169 bpm. Consciousness level was evaluated as Grade 1–2 of Japan Coma Scale. Immediately after arrival, gastric lavage was conducted. At 14:25 (approximately 2.5 h after the ingestion), he had convulsions followed by cardiac arrest. At 16:10, spontaneous circulation was recovered because of resuscitation. However, at 19:30 on the next day (31 h after accidental ingestion) his death was confirmed. Fifteen hours after death, the forensic autopsy was performed at our department.

* Corresponding author at: Department of Forensic Medicine, Wakayama Medical University, 811-1 Kimiidera, Wakayama 641-8509, Japan.
E-mail address: kondot@wakayama-med.ac.jp (T. Kondo).

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3. Autopsy and histopathological findings

The deceased was 88 cm in height and 11.5 kg in weight. The rectal temperature was 16 °C (room temperature: 25 °C). Postmortem rigidity was markedly observed in all of the joints. Postmortem lividity, dark, reddish-purple in color, was apparent on the back. There was no mechanical injury leading to death. Internally, the heart weighed 60 g, and there were many petechial hemorrhages on the epicardium. The amount of heart blood, dark red in color, was 45 ml including a small amount of hemocoagula. In the bilateral pleural cavity, slightly yellowish fluid was observed (left: 50 ml, right 75 ml). The bilateral lungs were severely congestive and edematous (left: 128 g, right 111 g). The brain was also edematous (1160 g). There were 100 g of dark, reddish-brown stomach contents including moderately digested green and yellow vegetable pieces. Although the other organs were moderately congestive, pathological lesions were not observed. Histopathologically, no significant findings leading to death were found in any organ.

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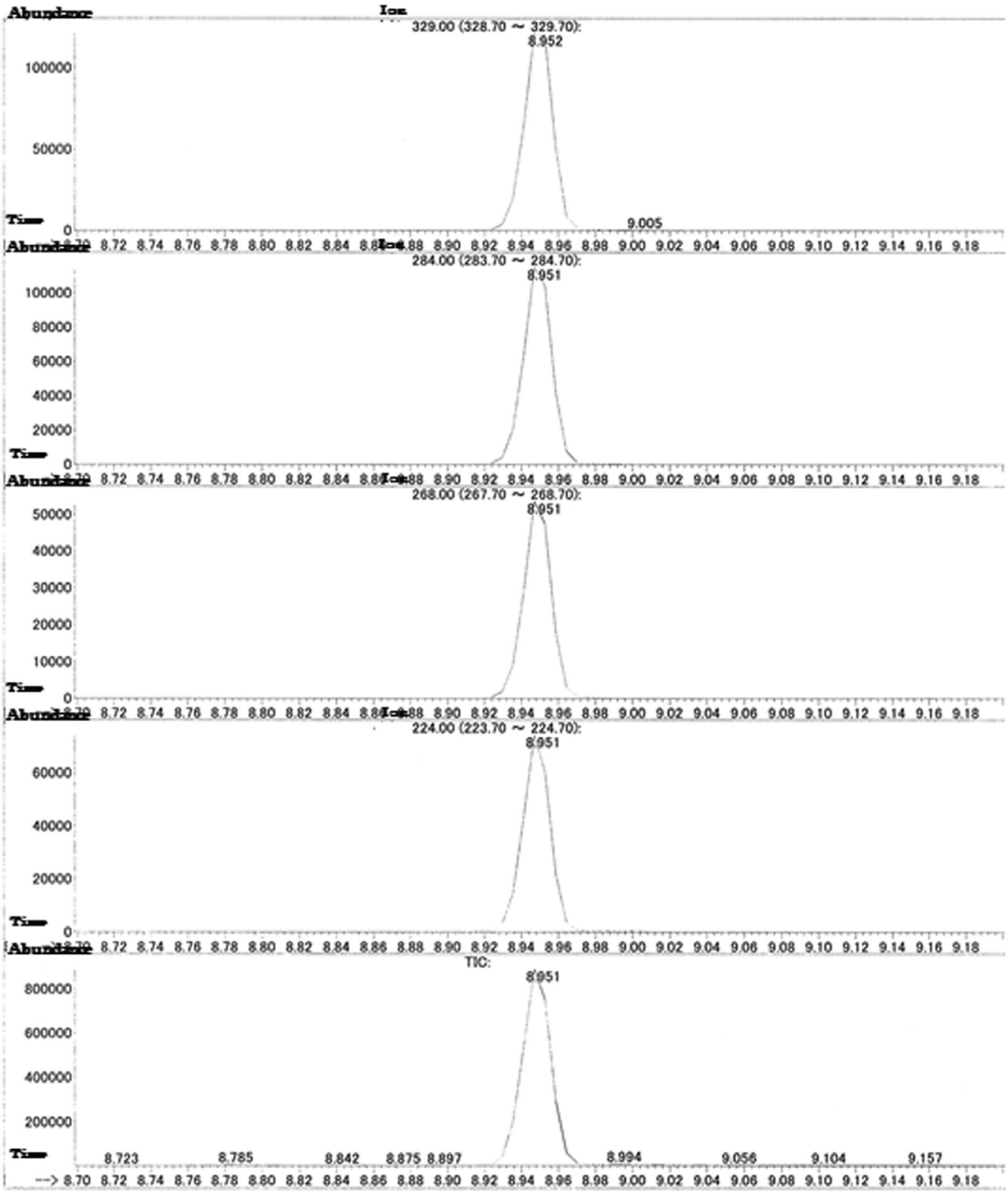

Fig. 1. Mass chromatograms (A to C) and mass spectra (D to F) of nifedipine in the standard sample (A, D) and extracts of peripheral blood (B, E) and stomach contents (C, F) obtained at the autopsy. The arrows on the chromatograms (B, C) and mass spectra (E, F) indicate the peaks of nifedipine.