

Cardiovascular glycoside-like intoxication following ingestion of *Thevetia nereifolia*/peruviana seeds: a case report

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Some plants contain glycoside compounds which determine cardiovascular symptoms similar to those observed after acute toxic digoxin administration. The present case report involves a patient who showed important cardiovascular symptoms following the ingestion of *Thevetia nereifolia*/peruviana seeds. About 30 min after ingestion, a 65-year-old man presented with dizziness, giddiness, numbness and a burning sensation, diarrhea, sweating, vomiting and ECG changes. At the time of admission he presented with tremors; his body temperature was 37°C, and blood analysis gave the following results: K 5.6 mEq/l, myoglobin 176 IU, troponin T 0.10 ng/ml, PO₂ 69 mmHg, PCO₂ 37.4 mmHg, pH 7.33, HCO₃⁻ 19.9 mEq/l, hemoglobin 14.8 g/dl, saturation 92.5%. Echocardiography showed a left ventricle with normal global and segmentary contractility. The following days, the patient showed a reduction, until total resolution, of the atrioventricular block and of the alterations of the ST segment. The ectopic beats also resolved; K value before discharge was 4.4 mEq/l. On the third day, the serum levels of digoxin were 0.15 ng/ml.

This case report is important because it describes all the cardiovascular and non-cardiovascular signs of glycoside toxicity in an adult patient who accidentally swallowed only two seeds (non-fatal dose) of *Thevetia*.

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Introduction

Poisoning by known and unknown plants may occur after accidental ingestion or in case of a suicide attempt, homicide or after inhalation of smoke from fires in which plants are burning¹. It is important to know, when patients are hospitalized following the ingestion of poisonous plants, the type of plant and the specific toxic substance implied. Some plants contain glycoside compounds which after ingestion, especially of the seeds, determine cardiovascular symptoms similar to those observed after acute toxic digoxin administration. The present case report involves a patient who presented with important cardiovascular symptoms following the ingestion of two seeds of *Thevetia nereifolia*/peruviana (Fig. 1)².

Case report

A 65-year-old man, with a familial risk for coronary heart disease and hypertension and treated with beta-blockers (meto-

prolol) and ACE-inhibitors until the morning prior to hospitalization, accidentally swallowed two seeds of *Thevetia nereifolia*.

About 30 min following ingestion, the patient presented with dizziness, giddiness, numbness and a burning sensation, diarrhea, sweating and vomiting.

He arrived in the emergency room showing dilated pupils and ECG changes (bradycardia, atrioventricular block, ectopic beats and ST segment alterations) (Fig. 2). His blood pressure was 145/80 mmHg and there were no signs of heart failure.

The patient was submitted to immediate gastric lavage and referred to our coronary care unit.

At the time of admission in the coronary care unit, the patient presented with tremors. His body temperature was 37°C. Blood analysis gave the following results: glucose 126 mg%, urea 56 mg/dl, creatinine 1.8 mg/dl, Na 146 mEq/l, K 5.6 mEq/l, Cl 110 mEq/l, Mg 1.7 mg/dl, P 3.2 mg/dl, CK 97 IU, CK-MB 14 IU, lactate dehydrogenase 360 IU, myoglobin 176 IU, troponin T 0.10 ng/ml, amylase 118 IU (nor-



Figure 1. *Thevetia nereifolia/peruwiana*.

mal values < 120 IU), white blood cells 10 200/mm³, red blood cells 4 860 000/mm³, platelets 192 000/mm³. PO₂ 69 mmHg, PCO₂ 37.4 mmHg, pH 7.33, HCO₃⁻ 19.9 mEq/l, hemoglobin 14.8 g/dl, saturation 92.5%.

Repeat ECG confirmed the alterations observed in the emergency room. His heart rate was approximately 56 b/min (mean).

Echocardiography showed a left ventricle with normal global and segmentary contractility and mild hypertrophy of the ventricular walls (12 mm). Color Doppler echocardiography did not reveal any significant alterations in blood flow.

During hospitalization, the patient was submitted to treatment with infusions of Ringer lactate and glucose solutions and was constantly asymptomatic.

We sent the plant to an expert in botany and consulted the Anti-Poison Center in Pavia, Italy, which kindly provided all the necessary information about the toxic substances of *Thevetia* (glycoside-like substance).

The following days, the patient showed a progressive reduction, until total resolution, of the atrioventricular block and of the alterations of the ST segment. The ectopic beats also resolved (Fig. 2). On the third day, the serum levels of digoxin were determined (0.15 ng/ml). The thyroid hormone assay was also within normal limits (data not shown).

On the fourth day the patient was discharged. The ECG at the time of discharge was similar to a previous ECG performed 1 month before the ingestion of *Thevetia* (ECG signs of left ventricular strain due to chronic hypertension). The patient's heart rate was 70 b/min. Electrocardiography revealed sinus rhythm and a normal P-R interval (Fig. 2). The gastrointestinal and neu-

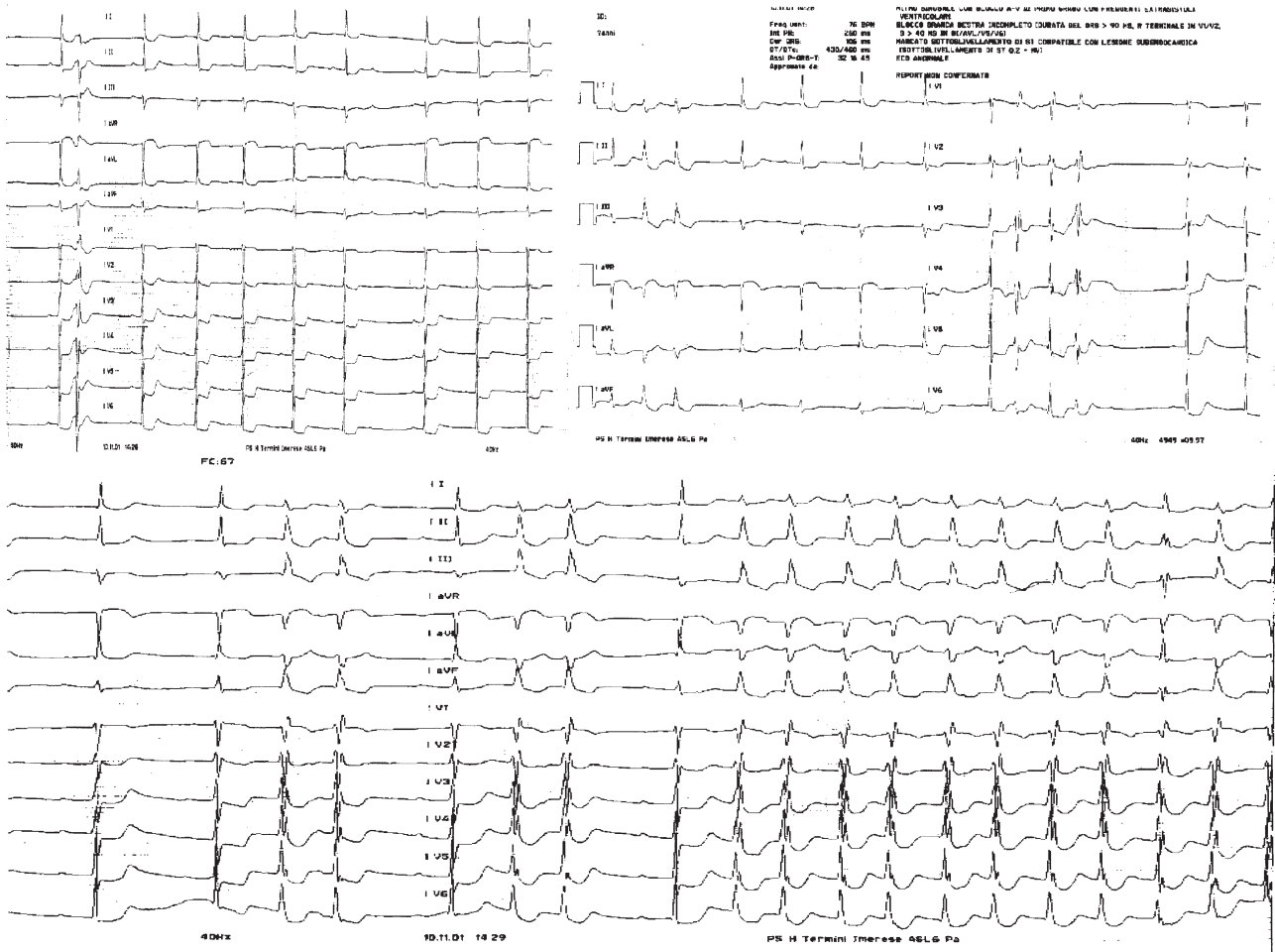
rological symptoms had completely disappeared. Serum K⁺ values were 4.4 mEq/l.

Discussion

Our patient sustained an acute toxic glycoside-like effect after the accidental ingestion of two *Thevetia* seeds. Cardiac glycosides are found in all parts of the *Thevetia* plant, but the highest concentrations are found within the seeds¹. The effects of these glycosides are similar to those of digitalis but more rapid in onset. The more common signs and symptoms usually include vomiting, ECG changes, atrioventricular block, bradycardia^{3,4} and giddiness or dizziness⁴. Less common signs include ST segment depression, diarrhea, ectopic beats and palpitations. The glycoside compounds are best identified by radioimmunoassay, but the usual laboratory assay identifies only digoxin and does not allow distinction of all the glycoside molecules present in the plant. Still, the presence of reactivity for digoxin confirms the presence of glycosides in the patient's plasma⁵⁻⁷. The therapeutic regimen to which the patient was submitted was different to the standard regimen. This, in view of the fact that he arrived to our observation just 30 min after ingestion. Since the patient was completely asymptomatic, activated charcoal was not employed. The modest hyperkalemia was treated with glucose and insulin infusion. Atropine and phenytoin^{1,8} as well as digoxin immune FAB⁹ were not necessary.

In addition, we observed an increased value of troponin T (0.1 ng/ml). This value is usually considered as being at the upper limit of normal in patients hospitalized for chest pain. This finding is important because it may be the marker of glycoside-dependent myocellular damage even if the value is within normal limits (0.01-0.1 ng/ml). We comment this finding because the subsequent analyses showed a reduction up to < 0.01 ng/ml prior to discharge. We hypothesize that the toxic effects of the glycosides included injury at a microcellular level. Some cases of ingestion of *Thevetia* are reported in the literature^{4,10,11}. *Thevetia* is an ornamental shrub widespread in the tropical and subtropical regions (Fig. 1). It may also be cultivated as a houseplant. Two seeds are potentially fatal in a child and as few as 8 may be fatal in an adult. A level of 19 nmol/kg was found in the heart muscle¹⁰. Death can occur within 2 to 20 hours following ingestion^{1,3,4,12}. It contains the cardiac glycosides thevetin A and B, peruvoside and other toxic substances. It produces a more rapid onset of action than digitalis¹³. The effects of the thevetin glycosides thevetin A and B as well as those of peruvoside appear to be similar to those of digitalis, but occur more rapidly¹². They inhibit the Na/K pump. In addition, the thevetin glycosides stimulate the intestinal and urinary bladder walls. Initial hypertension¹² followed by hypotension secondary to bradycardia has been reported. ECG changes have been reported: numerous and vary-

ENTRY



DISCHARGE

Figure 2. ECG at entry and discharge.

ing cardiac rhythms (associated with sinoatrial and atrio-ventricular blocks), ST depression and ventricular excitability. A poor response to atropine is a sign of a poor prognosis¹⁴. Neurological signs have been reported in about one third of all symptomatic cases⁴. In addition,

gastrointestinal symptoms (vomiting, diarrhea) have also been described⁴. These patients have to be monitored with serial K⁺ determination as severe hyperkalemia may develop. Serum calcium and magnesium levels also have to be monitored. Glycosides found in these

plants may cross-react with the antibodies present in most radioimmunoassay kits and result in digoxin being reported as present. In fact, in these cases, there is no correlation between the serum levels and toxicity¹⁵.

This case report is important because it describes practically all the cardiovascular and non-cardiovascular signs of glycoside toxicity in an adult patient who accidentally swallowed only two seeds (non-fatal dose) of *Thevetia*.

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