

A case of Chuanwu and Fuzi poisoning

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A 70-year-old man developed ventricular tachycardia after consumption of a self-prescribed dose of Chinese herbal medicine containing Chuanwu and Fuzi. He made a good recovery after initial resuscitation in Accident and Emergency department (A&E) as well as supportive treatment in CCU. This case report demonstrates the initial resuscitation of patient with Chuanwu poisoning, discuss its pathophysiology and variety of treatment. (*Hong Kong j.emerg.med.* 2000;7:230-233)

Keywords: Aconitine, chuanwu, Chinese herbal medicine, fuzi, ventricular tachycardia

Introduction

A 70-year-old Chinese man developed persistent, palpitation, dizziness, vomiting, and numbness around mouth and limbs two hours after ingesting a decoction of Chinese herbal medicine. He arrived at the Accident and Emergency department one hour after onset of symptoms.

The patient had a history of non-insulin dependent diabetes mellitus, hypertension and ischaemic heart disease. Recently, he suffered from muscle ache of both legs. Since he was a Chinese Herbalist, he wrote a prescription for himself and purchased the herbs from a neighborhood herbalist shop. Review of the prescription showed cured Chuanwu and Fuzi both weighing 12 g.

Upon presentation, he was conscious, tachypnoeic with respiratory rate 30/min, sweating. Physical examination reveals no signs of heart failure or muscle weakness. His blood pressure was 98/66 mmHg and pulse rate 148/min. Pulse oximetry revealed satisfactory oxygen saturation. Electrocardiogram showed polymorphic ventricular

tachycardia as in Figure 1. Bed-side glucose & haemoglobin tests were normal.

He was given high flow oxygen (15 L/min) through non-rebreathing facial mask and intravenous fluid challenge of normal saline 250 ml at full rate. Cardiac rhythm and oxygen saturation were monitored. Intravenous lignocaine 50 mg slow intravenous injection for three times 5 mins apart was administered to correct the rhythm but they were not immediately effective. Fifty grams of activated charcoal was given orally. During the period, patient remained conscious with a stable blood pressure despite the persistent ventricular tachycardia. He was subsequently admitted to the medical ward with a preliminary diagnosis of herbal poisoning resulting in ventricular tachycardia.

Arterial blood gas showed compensated metabolic acidosis (pH: 7.43 (7.35-7.45), P_{CO_2} : 3.35 (4.7-6.0), P_{O_2} : 10.27 (10-13), HCO_3^- : 16.6 (22-26), base excess: -5.1 (0±2)). Urgent electrolyte analysis showed normal sodium and potassium level. Cardiac enzyme tests showed normal LDH and CK levels. Complete blood picture was normal. Due to limitation of laboratory facility, assay of aconitine and its related alkaloids were not available.

He was later transferred to coronary care unit and received continuous lignocaine infusion 2 mg/min. He developed chest pain, which was readily relieved by Isoket[®] infusion. The arrhythmia reverted to sinus rhythm 2 hours (Figure 2) after admission. He remained stable, and was eventually discharged one week after admission.

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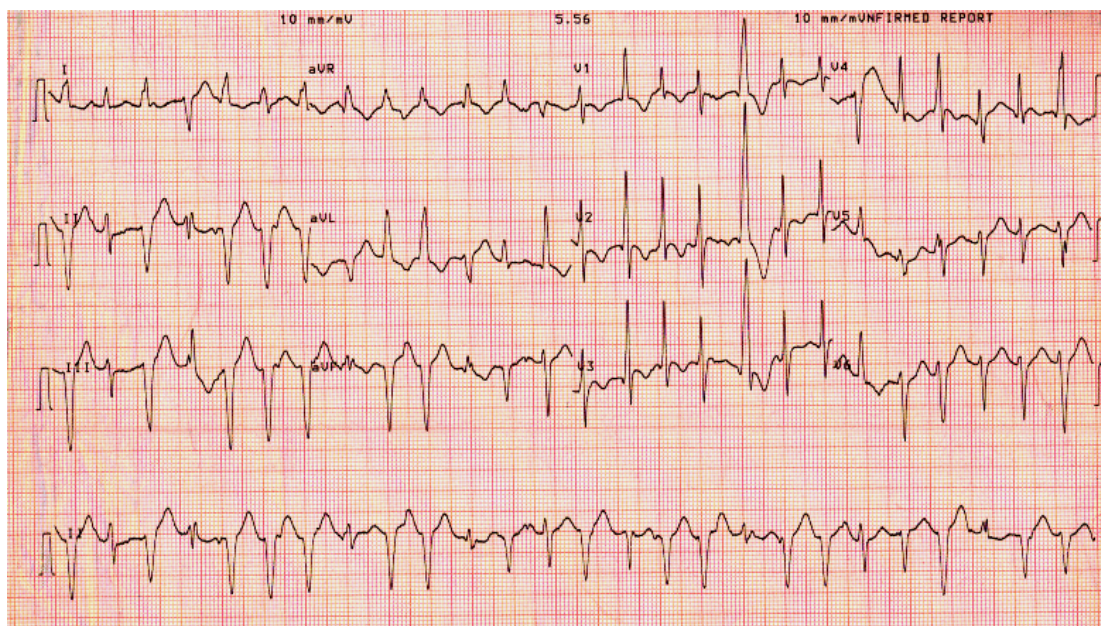


Figure 1. Electrocardiogram showed polymorphic ventricular tachycardia.

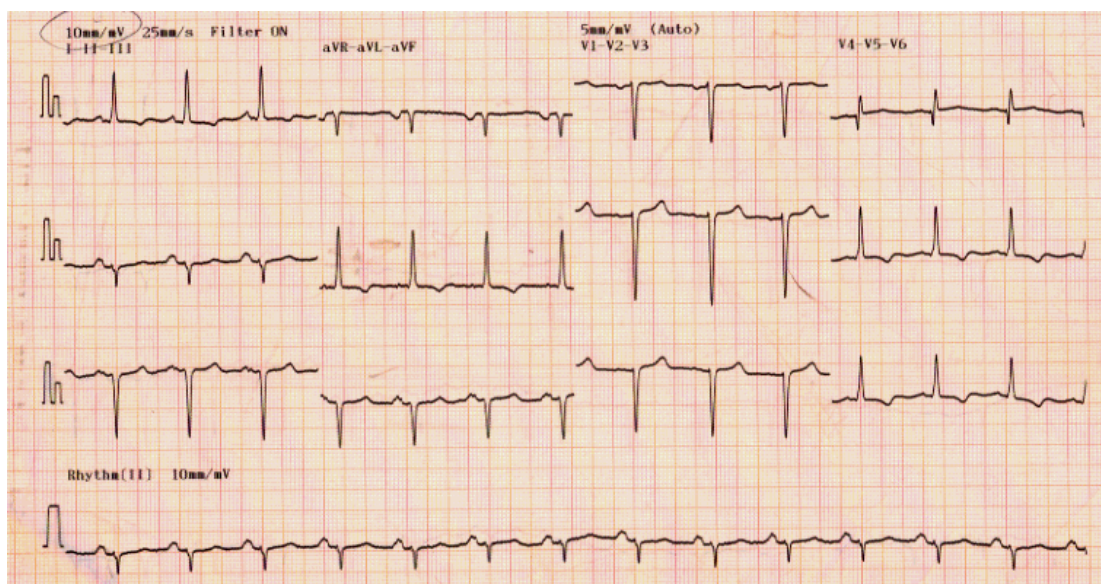


Figure 2. Electrocardiogram showed reversion to sinus rhythm.

Discussion

Chuanwu (川烏) and its related herbs e.g. Fuzi (附子) and Caowu (草烏) are poisons that are known to Chinese herbalists for the last two millennia. Chuanwu is the dried rootstock of the plant *Aconitum carmichaeli*, and Fuzi the lateral root of the same species. Caowu is the rootstock of *Aconitum kusnezoffii*. According to studies of Tai

and Chan, the most prevailing herbal poisoning in Hong Kong is aconite poisoning caused by Chuanwu and Caowu. These two plants and the other species of the subgenus *Aconitum* contain C_{19} -diterpenoid-ester alkaloids e.g. aconitine, mesaconitine and hypaconitine and other biologically active substances such as higenamine. Animal models have shown that these alkaloids have anti-inflammatory effects similar to steroid and

NSAIDS, which account for their therapeutic role in rheumatism.

The issue of Chuanwu and its related herbs is under tight legal control in Taiwan and Mainland but not in Hong Kong and the Western Hemisphere. Because of their narrow safety margin between therapeutic analgesic effect and their known cardiotoxic effect, they have no place in modern Western medical therapy. However they are frequently included in Chinese herbal medicine prescribed for rheumatism.

The aconitine and related alkaloid cause toxicity by activating the sodium channel of cell membrane and disturbing the automaticity of cardiac, neural and muscular tissues. It is also known that combination with some herbs e.g. chuanbeimu (川貝母) can increase their toxicity and therefore should be avoided. A number of ways had been implemented to reduce their toxicity. These include curing by boiling, steaming, frying, soaking in water, defatting, fermenting and denaturing with wine, vinegar, licorice, bile or urine. Decoctions are prepared by boiling the mixture for a specified time. It has been shown that aconitines are hydrolyzed to less toxic derivatives such as aconines. However, the therapeutic index is low. Severe poisoning has been reported after consumption of decoctions prepared from prescriptions containing 6 g of cured aconite. The recommended dose of cured chuanwu and caowu in the Pharmacopoeia of People's Republic of China has been progressively lowered from 8-12 g to 1.5-3 g.

Despite its lethal toxicity, Caowu remains a favourite dish in winter for people in southwest China like Kunming. This can be explained by the humid condition causing a lot of rheumatic problems. They cure and cook Caowu in all kinds of traditional way. Every winter in Kunming, there are always rumours concerning families intoxicated or even die from Caowu.

Clinically, the symptom onset is generally rapid, occurring within several minutes to several hours of ingesting the herbs. The early symptoms are neurological, typically numbness and paraesthesiae beginning in the mouth and then spreading to the limbs and the entire body. Patients are often restless,

comprehensive and may be confused. Headache, dizziness and sweating are common. Gastrointestinal disturbances include nausea, vomiting, diarrhoea, and abdominal colic. Palpitations, arrhythmia, and hypotension are common cardiovascular presentation. Refractory arrhythmia with hypotension, cardiac and respiratory failure are the usual causes of death.

Typical symptoms of intoxication such as nausea, vomiting and generalised paraesthesiae are due to parasympathetic activation and sensory nerve ending stimulation. Bradyarrhythmias and hypotension can be caused by muscarinic parasympathetic activation. Enhancement of trans-membrane inward sodium current during the plateau phase of the action potential prolongs repolarisation in cardiac muscles. This may induce after depolarisations with triggered automaticity.¹

Laboratory confirmation of aconite poisoning requires use of high performance liquid (or gas) chromatography. The specimen can be gastric content, blood or urine. Urine sample may reveal high concentration of aconitine alkaloids even when they are undetectable in blood.² Routine blood tests are non-specific, although acidosis and hypokalaemia are often common.

There is no specific antidote. The initial treatment at emergency department follows the ACLS protocol and focuses on management of airway, breathing and circulation. The arrhythmias range from bradycardia due to vagal stimulation to tachyarrhythmias such as ventricular tachycardia and ventricular fibrillation. Atropine is useful for bradycardia. The mechanism of the ventricular tachyarrhythmias probably explains their relative refractoriness to both drug treatment and DC conversion. Many antiarrhythmics have been tried for suppression of arrhythmias, but none are found to be consistently effective. In one series of 17 Hong Kong cases,³ it was reported that suppression of ventricular tachycardia was achieved by amiodarone in 5 cases, flecainide in 2, procainamide in 1 and mexilitine in 1. In some cases, the arrhythmias may subside spontaneously after several hours.

The next goal is decontamination. Gastric lavage is

useful if presentation is within one hour of herb ingestion. Activated charcoal should be given, but the optimum dose has not yet been established. However, the value of decontamination is yet unknown. Treatment is symptomatic and supportive after decontamination.⁵ Continuous monitoring of cardiac rhythm, blood pressure, and oxygen saturation is necessary and can best be achieved in intensive care unit. Any electrolyte and acid-base imbalance should also be corrected.

Chuanwu was the major culprit responsible for the poisoning. Fuzi, though less toxic, certainly enhanced the adverse effect of chuanwu. Accidental herbal poisoning can be caused by several factors. In this case, excessive dosage (4 times of the recommended dose) and individual response (ischaemic heart disease) were identified to be the major factors. Because of a relatively stable BP, our therapeutic approach was to achieve chemical cardioversion by intravenous lignocaine, decontamination with charcoal and close monitoring of cardiac rhythm and haemodynamic stability. In case of further deterioration in his arrhythmia or development of hypotension, DC conversion would be required. Fortunately, the patient made an uneventful recovery.

Inappropriate prescription by unqualified herbalists, inadequate curing of herbs, and non-adherence to recommended methods of decoction preparation all predispose to accidental *Aconitum* poisoning. Recently, the government of Hong Kong SAR has embarked on legislating legal surveillance on herbal practices. It seems the local scenario will change in the near future.

Summary

Chuanwu poisoning is difficult to treat and sometimes fatal. There is no specific antidote. Treatment aims at initial resuscitation and decontamination followed by symptomatic and supportive therapy. Anti-arrhythmic treatment is useful in some cases. Accidental chuanwu poisoning can be reduced by tight legal surveillance on herbal practices. Prevention is always better than cure. This certainly applies to the case of chuanwu poisoning.

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