

# Salade malade: malignant ventricular arrhythmias due to an accidental intoxication with *Aconitum napellus*

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Intoxication with *Aconitum napellus* is rare in our regions. Aconite alkaloids can cause ventricular arrhythmia by a prolonged activation of sodium channels. Because the margin of safety is low between the analgesic and toxic dose, intoxication is not rare when Aconite is used in herbal medicine. We present a case in which a 39-year-old male was accidentally intoxicated with Aconite. Even though no antidote or adequate therapy is available he was successfully resuscitated. (*Neth Heart J* 2008;16: 96-9.)

Keywords: intoxication, aconite, aconitum, cardiotoxic, resuscitation

**A***conitum napellus*, commonly known as Aconite, Monkshood or Wolfsbane, is a herb with bluish-purple flowers (figure 1). It can be found throughout the world and is notorious for its toxicity. Most notably, the Roman emperor Claudius (41 to 54 AD) was murdered by his spouse Agrippina so her son Nero could then ascend the throne. It is thought that he was poisoned with Aconite. Even though it has known toxicity, Aconite roots are often sold freely and are commonly used in herbal medicine for treating musculoskeletal pain. However, the margin of safety between analgesic and toxic doses is very low. Therefore, intoxications are not extremely rare, especially in Southeast Asia. The most important cause of death due to an intoxication with Aconite is malignant ventricular tachyarrhythmia. We report an extraordinary

case in which an accidental but life-threatening intoxication with Aconite occurred. Our patient recovered completely after prolonged resuscitation.

## Case report

A 39-year-old male with no medical history was admitted to our emergency department with collapse and signs of food intoxication. Less than two hours before, he had eaten a homemade salad of canned tuna and herbs from his own garden. After ingestion he became unwell with sweating and he developed paresthesiae in both his hands and tongue. Later he experienced nausea, vomited and had profound diarrhoea. Shortly before his admission he had collapsed once, and spontaneously regained consciousness. When he was first seen by paramedics, his blood pressure was unrecordable and ECG showed a broad complex tachycardia.

When admitted to our emergency department we saw an ill, sweaty man who was still conscious. He told us that he had ingested more than 100 g of a kind of herb, which our patient believed to be celery. He had never eaten this before and it was unclear whether the ingested herb could be digitalis. At this moment he experienced dizziness and nausea. He had no complaints of chest pain. There was no history of intoxication with either nicotine, alcohol or any drugs. In his family there were no cases of sudden cardiac death; his father had undergone a percutaneous coronary intervention at the age of 64 years.

The ECG showed a monomorphic ventricular tachycardia with a frequency of 220 beats/min (figure 2). After five minutes this rhythm evolved into a polymorphic ventricular tachycardia and subsequently ventricular fibrillation. Resuscitation was initiated immediately including intubation. Our patient received multiple direct current cardioversions. Sinus rhythm could not be restored initially; ventricular tachycardias persisted even though pulsations were palpable when this rhythm was present. He received epinephrine, 5 grams of magnesium and 450 mg of amiodarone intravenously. After one hour of resuscitation we managed to sustain an atrial rhythm with multiple polymorphic ventricular complexes (figure 3). After

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*Figure 1A. Aconite with its bluish purple flowers, note that the shape of the flower resembles a Monk's hood.*



*Figure 1B. Aconite when it is not yet flowering. Our patient ate the herb when it was in this stage; he assumed it was celery.*

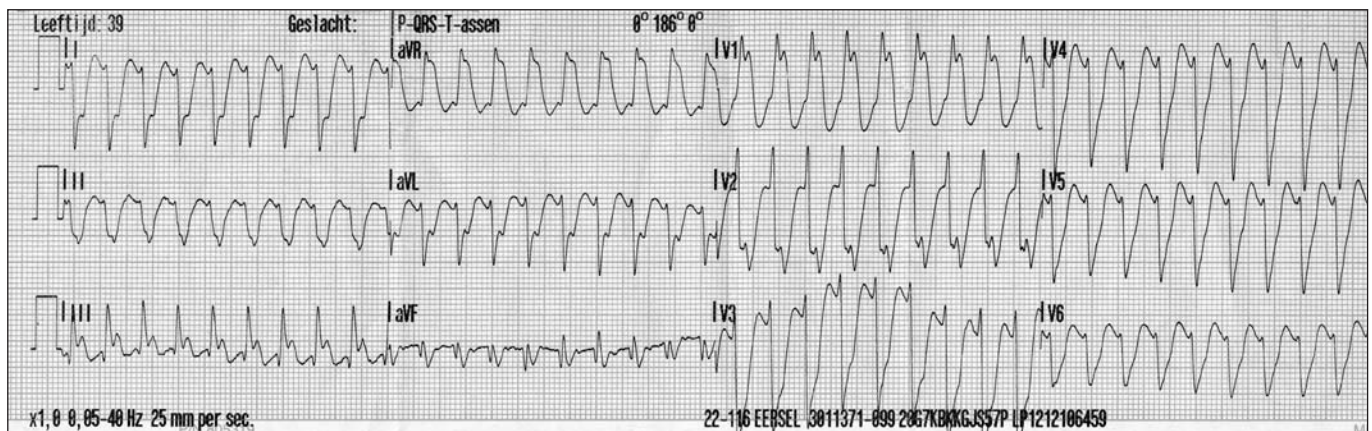
four hours a sinus rhythm was present. Within 12 hours our patient was no longer in need of mechanical ventilation or inotropic support. There were no sequels of any arrhythmias and he made a full neurological recovery. Coronary angiography showed no signs of coronary artery disease, which made an ischaemic cause for his ventricular arrhythmias less likely.

Our suspicion of an intoxication was confirmed when the ingested herb was taken to the hospital and recognised as being Aconite. Unfortunately it was not possible to determine serum levels of aconite toxins and definitely confirm our diagnosis. His serum had already been used for toxicological screening and detection methods were not available. Given the clinical presentation and recognition of the ingested herbs, we feel sure we can conclude that the ventricular arrhythmia was due to an intoxication with Aconite.

### Discussion

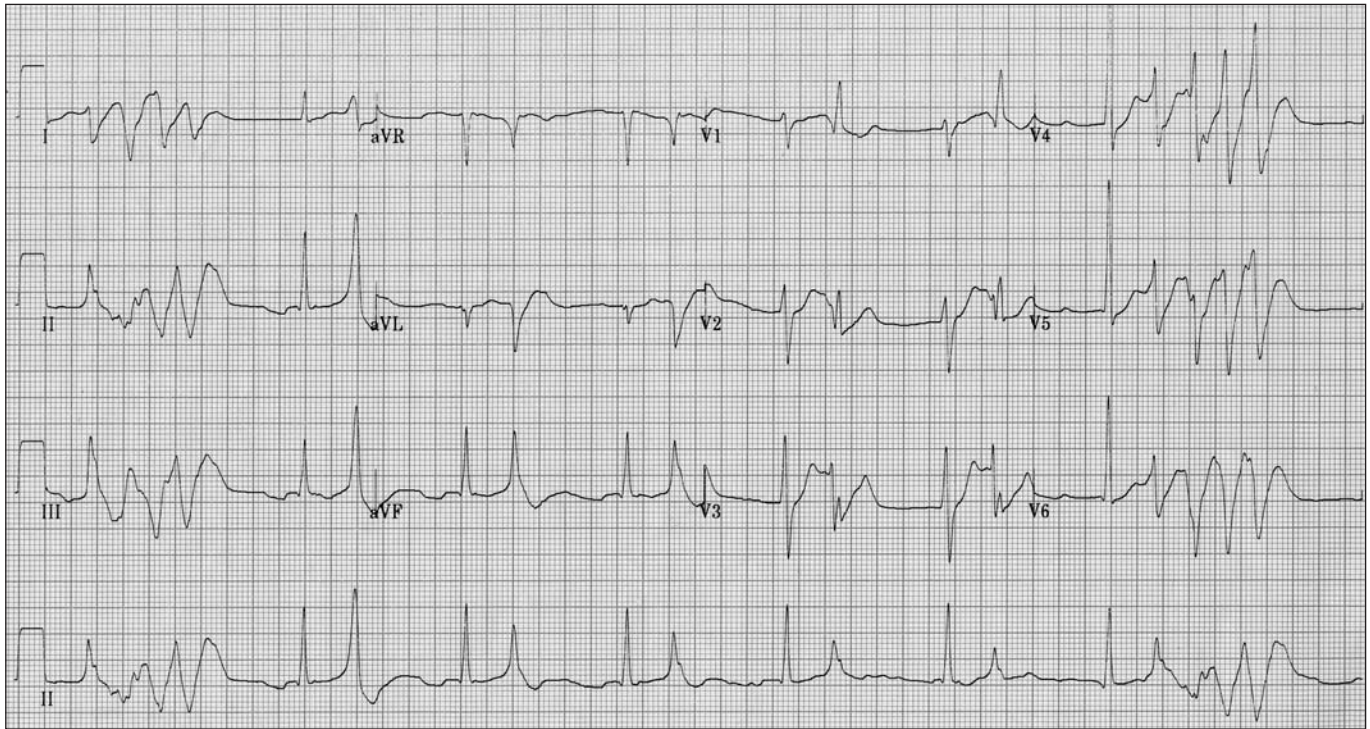
Herbs are used widely in alternative medicine for treating numerous symptoms and diseases. In general, herbs

are believed to be natural and therefore harmless. However, several are known to be toxic and possibly lethal. Aconite is especially notorious for its cardiac toxicity. Digitalis, belladonna, rhododendron, podophyllum roots and datura flowers are other herbs that can be cardiotoxic.<sup>1</sup>



*Figure 2. ECG upon arrival at our emergency department. The ECG shows a monomorphic ventricular tachycardia with a frequency of 220 beats/min. QRS complexes have an extreme axis of 180° and a right bundle branch block morphology. There is 'left rabbit ear' pattern in lead V<sub>1</sub> and the R/S ratio in lead V<sub>6</sub> is smaller than one.*





**Figure 3.** ECG shortly after successful resuscitation. The ECG shows a supraventricular rhythm, presumably not a sinus rhythm. Polymorphic ventricular complexes can be identified both isolated and in bigeminy. They exhibit R on T phenomenon. In addition two runs of polymorphic ventricular complexes can be seen.

Aconite plants contain the highly toxic alkaloids aconitine, meso-aconitine and hypo-aconitine. The margin of safety between analgesic and toxic levels of these alkaloids is very low. The amount of ingested aconitine can vary significantly with the amount of herb, time of harvest and preparation. When the herbs are boiled less toxic derivatives, known as aconines, will be obtained through hydrolysis. For this reason tea boiled from Aconite roots is usually used in herbal medicine. Intoxications are not rare when the herb is not prepared according to the instructions.<sup>1</sup> Aconite alkaloids exert their toxic effect by a strong affinity to sodium channels in cardiac and nerve tissue. This affinity causes a sustained activation of the sodium channels and persistent inward sodium current. The prolongation of the plateau phase of the action potential causes an induction of early after-depolarisations in the myocardiocyte. This results in the initiation of both atrial and ventricular arrhythmias. Activation of muscarinic receptors by aconitine plays an important role in the development of hypotension and bradyarrhythmia. Widespread excitation of cellular membranes suppresses neuromuscular transmission, resulting in paraesthesia in the mouth and limbs, and muscle weakness.<sup>2</sup>

The characteristic manifestation of an intoxication may initially resemble that of acute food poisoning with symptoms of nausea, vomiting and diarrhoea. In addition, patients experience neurological complaints, mainly paresthesiae. These symptoms may begin within several minutes to two hours after ingestion of the

herb.<sup>4</sup> Finally, in severe intoxications collapse may occur, mostly due to ventricular arrhythmia. Lin et al. described 17 patients with varying degrees of Aconite intoxications. Four (24%) of them developed ventricular arrhythmia and all of them were treated successfully.<sup>4</sup> In another study of patients, described by Tai et al., 15 of 17 patients (90%) developed ventricular arrhythmia with a mortality rate of 10%.<sup>1</sup>

An antidote for an Aconite intoxication is not available, nor is there any therapy with proven efficacy. Mechanical ventilation, inotropic support and resuscitation are usually necessary. In several smaller studies various antiarrhythmic drugs, including amiodarone, flecainide, lidocaine and magnesium, have been suggested to be effective in treating ventricular arrhythmia.<sup>1,3,4</sup> Rationally, each of these drugs has potential actions to inactivate sodium channels or to reduce early after-depolarisation. However, efficacy data vary and appear to be contradictory. We conclude that optimal cardiopulmonary supportive treatment is essential until Aconite toxins are cleared. When patients are successfully treated for their malignant ventricular arrhythmia, their outcome and prognosis is generally good. Almost all patients have no underlying cardiac disease and make a full neurological recovery.

### Conclusion

Aconite intoxication is quite rare in our regions. This is in contrast to Southeast Asia where it is often used

in herbal medicine. When unexplained ventricular arrhythmias are encountered, especially in combination with gastrointestinal and neurological symptoms, Aconite intoxication should be considered. Medical history should be obtained with special attention to medication, including herbal therapy. Neither an antidote nor an effective antiarrhythmic therapy is available. First-line therapeutic strategy mainly consists of supportive cardiopulmonary treatment until the Aconite toxins have been cleared. ■

#### References

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