The management of ventricular dysrhythmia in aconite poisoning.

Coulson JM and Thompson JP.

National Poisons Information Service (Cardiff), Cardiff and Vale University Health Board, Cardiff, UK, CF64 2XX

Introduction

Aconite alkaloids are highly lipid soluble and have a molecular mass of approximately 600 KDa. The most pharmacologically active are the 19-carbon diterpenoid ring-structured alkaloids that are able to bind to excitable tissues. The voltage-dependent Na⁺ channels (VOX_{Na⁺}) are the principle molecular targets of the aconite alkaloids, although ex-vivo evidence exists for an affinity for other ion channels, specifically cardiac HREG K⁺ channels. The LD₅₀ in rats correlates with the binding affinity of aconite alkaloids for VOX_{Na⁺} channels. Voltage-clamp studies on frog neurones suggest that aconitine lowers the activation threshold and eliminates channel inactivation, thereby acting as an agonist and maintaining the channel in the open state; this effect may also be increased at a low pH and increases conductivity of divalent ions through the channel pore. Clinically, this results in ventricular dysrhythmia, most commonly ventricular tachycardia.

Objective

There are no clinical trials of therapeutic approaches to the management of dysrhythmia secondary to aconite. The current advice cited on Toxbase® is to "treat arrhythmias conventionally". This study reviewed the published clinical evidence in order to rationalize the management of aconite-induced ventricular dysrhythmia.

Methods

A review of the English literature was conducted using the search terms “aconite”; “aconite + poisoning” and “aconite + dysrhythmia”.

Results

A total of 40 cases of probable aconite toxicity in humans were identified that resulted in ventricular dysrhythmia (Table 1, [1-6]). Thirty-four cases developed ventricular tachycardia, 2 ventricular fibrillation and 4 developed multiple ventricular ectopics.

Intravenous lidocaine was the initial treatment in 23 cases, apparently without success in correcting the dysrhythmia. Amiodarone was successful in 14 cases but not in three cases. Flecainide was successful in five cases, procainamide in two cases and mexiletine in two cases. Magnesium sulphate was administered in two cases with an apparently successful outcome. Direct cardioversion was used as the initial treatment in 10 cases, without success, and in a further five cases with other agents in which it also appeared to be unsuccessful. Nine patients required prolonged CPR, which was successful in six cases. In all cases, patients also received standard critical support.

Discussion

Consideration should be given to the following:

1) Early administration of bicarbonate and magnesium sulphate in the presence of ECG changes.
2) A role for class 1c agents, ideally flecainide, if there is no history of structural heart disease.
3) The importance of prolonged resuscitation.

Table 1

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Timing of the onset of symptoms (minutes)</th>
<th>Dysrhythmia</th>
<th>Treatments</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>VT(2)</td>
<td>Amiodarone + cardioversion (1), Amiodarone + Mg²⁺ (1)</td>
<td>Died (1) Survived (1)</td>
</tr>
<tr>
<td>1</td>
<td>60</td>
<td>VT</td>
<td>Lidocaine then Amiodarone</td>
<td>Survived</td>
</tr>
<tr>
<td>1</td>
<td>90</td>
<td>SVT then VT then PEA</td>
<td>Cardioversion + &quot;various pharmacological agents&quot; + prolonged CPR</td>
<td>Survived</td>
</tr>
<tr>
<td>1 with reporting of a further 4</td>
<td>20</td>
<td>Ventricular ectopics (1), VT (4)</td>
<td>Mg²⁺ + cardioversion (1), Flecainide (1), Amiodarone (2), Lidocaine (1)</td>
<td>survived (5)</td>
</tr>
<tr>
<td>17</td>
<td>-</td>
<td>VT (13), VF (2), ventricular ectopics (2)</td>
<td>Lidocaine (10), Amiodarone (5), Flecainide (2), Procainamide (1), Mexiletine (1). Prolonged CPR (7)</td>
<td>Survived (15), Died (2)</td>
</tr>
<tr>
<td>14</td>
<td>-</td>
<td>VT (12), ectopics (2)</td>
<td>Lidocaine (4), Amiodarone (5), Flecainide (2), Procainamide (1), Mexiletine (1).</td>
<td>Survived (14)</td>
</tr>
</tbody>
</table>

References


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