Amitraz intoxication in two cattle

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SUMMARY

This paper presents the first clinical and biochemical findings and therapeutic management of amitraz intoxication in cattle. One Simmental cow aged 7 year old and one Simmental heifer aged 1 year old from a farm were referred to our clinic due to accidental intramuscular amitraz injection (respectively 19 and 10 ml of a 12.5% emulsifiable concentrate aqueous solution). Clinical examination of the cattle revealed anorexia, depression, decreased ruminal concentration, scleral congestion, mild bloat and loss of pupillary reflex. The cattle were treated intravenously with yohimbine hydrochloride (0.1 mg/kg BW) improved clinically 24 hours after treatment.

Keywords: Amitrazse, cattle, toxicity, yohimbine.

Case presentation

One Simmental cow aged 7 year old and one Simmental heifer aged 1 year old from a farm were referred to the Large Animal Internal Medicine Clinic (Veterinary Faculty, Firat University) due to accidental intramuscular amitraz injection by the animals owner unintentionally for the purpose of vitamin preparation. Amitraz is marketed under the trade name Kenaz, %12.5 emulsifiable concentrate aqueous solution in the Turkey. The drug had been injected via intramuscularly 19 ml and 10 ml to the cow and heifer, respectively.

A detailed physical examination was performed on the cattle. Anorexia, depression, decreased ruminal concentration, scleral congestion, mild bloat and loss of pupillary reflex were determined in the clinical examination. Rectal temperature, pulsation and respiration rates were normal.

Electrocardiograms of the cattle were recorded using an automated electrocardiograph (Cardioline, Delta 1, Remco, Italy). Electrocardiographic findings were normal in the cow and heifer pre- and post-treatment period, respectively. The cattle were treated intravenously with yohimbine (0.1 mg/kg BW) and improved clinically 24 hours after treatment.

Alanine aminotransferase (ALT), aspartate aminotransferase
(AST), lactate dehydrogenase (LDH), blood urea nitrogen (BUN), glucose, creatinine, calcium, chlorid, sodium, magnesium and potassium levels were determined on pre- and post-treatment periods (1st and 24th hour) by using a biochemistry analyzer (Olympus AU 2700 System, Optical Co Ltd., Japan). All biochemical parameters out of BUN were in the normal reference ranges in the cow. Although BUN, AST and LDH were increased, ALT, glucose, creatinine, chlorid, sodium, potassium and magnesium levels were in the normal reference ranges [3], but the calcium level was decreased in the heifer. The clinical and biochemical findings are summarized in the Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Pre-treatment period</th>
<th>Simmental cow Post-treatment first hour</th>
<th>Post-treatment first day</th>
<th>Pre-treatment period</th>
<th>Simmental heifer Post-treatment first hour</th>
<th>Post-treatment first day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body temperature (oC)</td>
<td>39.1</td>
<td>39.1</td>
<td>39.3</td>
<td>39.2</td>
<td>38.8</td>
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<tr>
<td>Pulsus rate (/min)</td>
<td>64</td>
<td>68</td>
<td>68</td>
<td>76</td>
<td>80</td>
<td>80</td>
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<tr>
<td>Respiration rate (/min)</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>24</td>
<td>28</td>
<td>28</td>
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<tr>
<td>Rumen contraction (/5 min)</td>
<td>3</td>
<td>9</td>
<td>Absent</td>
<td>1</td>
<td>4</td>
<td></td>
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<tr>
<td>Anorexia</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
<td>Mild</td>
</tr>
<tr>
<td>Bloat</td>
<td>Mild</td>
<td>Mild</td>
<td>Absent</td>
<td>Mild</td>
<td>Absent</td>
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<tr>
<td>Mydriasis</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
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<td>Absent</td>
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<tr>
<td>Scleral congestion</td>
<td>Mild</td>
<td>Mild</td>
<td>Normal</td>
<td>Excessive</td>
<td>Excessive</td>
<td>Mild</td>
</tr>
<tr>
<td>Depression</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
<td>Mild</td>
</tr>
<tr>
<td>Papillary light reflex</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Normal</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Normal</td>
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<tr>
<td>Inflammation findings in the injection site</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>40</td>
<td>37</td>
<td>33</td>
<td>22</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>85</td>
<td>79</td>
<td>74</td>
<td>212</td>
<td>195</td>
<td>211</td>
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<tr>
<td>LDH (U/L)</td>
<td>1167</td>
<td>1091</td>
<td>1071</td>
<td>2512</td>
<td>2364</td>
<td>2582</td>
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<tr>
<td>Glucose (mg/dl)</td>
<td>43</td>
<td>50</td>
<td>87</td>
<td>79</td>
<td>78</td>
<td>82</td>
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<tr>
<td>Creatinine (mg/dl)</td>
<td>1.5</td>
<td>1.4</td>
<td>1.3</td>
<td>1.2</td>
<td>1.1</td>
<td>1.2</td>
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<td>Urea (mg/dl)</td>
<td>59</td>
<td>53</td>
<td>53</td>
<td>94</td>
<td>90</td>
<td>96</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>9.0</td>
<td>8.5</td>
<td>8.3</td>
<td>7.7</td>
<td>7.8</td>
<td>7.7</td>
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<td>Chlorid (mEq/L)</td>
<td>104</td>
<td>107</td>
<td>107</td>
<td>99</td>
<td>102</td>
<td>99</td>
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<tr>
<td>Sodium (mEq/L)</td>
<td>144</td>
<td>144</td>
<td>145</td>
<td>142</td>
<td>142</td>
<td>142</td>
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<tr>
<td>Potassium (mEq/L)</td>
<td>5.4</td>
<td>5.1</td>
<td>4.7</td>
<td>5.0</td>
<td>4.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Magnesium (mg/dl)</td>
<td>2.26</td>
<td>2.30</td>
<td>2.09</td>
<td>2.64</td>
<td>2.53</td>
<td>2.54</td>
</tr>
</tbody>
</table>

**TABLE 1:** The clinical and laboratory findings in the cases.

**Discussion**

Accidental or uninformed intoxication involving insecticides or pesticides is a very likely and emerging problem throughout the world. The formamidine pesticide amitraz is widely available and used the world for the control of ectoparasites in farm animals and crops [26]. It is diluted with water before applying to animals, and is used as a dip or low pressure hand spray to beef or dairy cattle [25,30]. However, there has been no data about amitraz intoxication in cattle.

Experimental amitraz intoxication studies have been reported in dog and cat in the recent years [6,7,19]. In these studies, amitraz has been used the dose of 1 mg/kg via intravenously. The dose of accidental amitraz injection presented here was equivalent to 7.9 mg/kg for the cow and 12.5 mg/kg for the heifer. Depression, mild bloat, decreased gastrointestinal transit, and mydriasis determined in both cow and heifer were similar to those of experimental amitraz intoxication studies.

Amitraz inhibits intracellular insulin, but stimulated glucagon secretion and causes hyperglycaemia and hypoinsulinemia [1,10,27]. Although hyperglicemia was being reported as predominant clinical finding in amitraz intoxication in the human [2], dog [6], cat [7], and rat [35], serum glucose level was normal on the pre- and post-treatment period in the present cases. It has been reported that the BUN, creatinine, ALT, and AST levels were not affected by amitraz administration in the cat [7], humans [8], horses [32] and mice [13]. On the contrary, increased levels of blood urea nitrogen was determined in both cases and increased AST and LDH were determined in the heifer.

Both yohimbine and atipamezole has been used for treatment of amitraz intoxication successfully. Yohimbine was administered 0.1 mg/kg iv at a 2 mg/mL concentration in the experimental intoxication studies in the cat [7] and dog [6], and yohimbine was very effective in restoring the amitraz-induced hyperglycemia and reversed all alterations induced by amitraz. Yohimbine was preferred for the treatment of
these cases because it could be obtain immediately. The dose of 0.1 mg/kg intravenously at a 2 mg/mL of yohimbine appeared effective as a reversal agent for amitraz induced intoxication in the present cases.

In conclusion, our results suggest that intramuscularly amitraz intoxication is not a fatal condition in the cattle. In addition yohimbine hydrochloride may be useful in the treatment of amitraz-induced alterations in the cattle.

References


KIZIL (O.) AND COLLABORATORS