Toxic Squash Syndrome: A case series of diarrheal illness following ingestion of bitter squash, 1999–2011

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Background:
The cucurbitacins are a class of tetracyclic triterpenoids produced by members of the Cucurbitaceae family, which includes pumpkin, zucchini, cucumbers, squash, melons, and gourds. Cucurbitacins impart a bitter taste and are thought to protect plants against insects. Cucurbitacin-containing plants have played a role in various folk and alternative medicine practices with touted anti-inflammatory, antipyretic, and antimicrobial properties. The cucurbitacins have known cytotoxic effects and have been investigated as potential chemotherapeutic agents since the 1960s.

We present two cases of diarrheal illness following ingestion of a few bites of bitter-tasting squash which required ICU admission for severe dehydration. This prompted a review of the Oregon and Washington databases for similar cases, which yielded a cohort of 17 cases of Toxic Squash Syndrome.

Case series:
We established a case definition of Toxic Squash Syndrome that included:
1. Exposure to Cucurbitaceae within 24 hrs.
2. Specific description of a bitter taste, and
3. Diarrhea with abdominal pain or nausea/vomiting and no other more likely cause of the syndrome.
We conducted a retrospective review of our poison center databases from 1999–2011 using the search criteria of human exposure with a substance code indicating an ingestion of one of the following: cucumber, zucchini, or a member of the Cucurbitaceae family.

17 cases met the case definition of Toxic Squash Syndrome. 11 (65%) were women. All cases were adults. In most cases, only 1 or 2 bites of squash had been ingested.

The majority of patients experienced diarrhea (88%, or 15), and symptom onset, when recorded, was usually within 3 hours of exposure.

4 patients required hospital admission for control of their symptoms, and 2 required ICU level care for severe dehydration.

Table 1

<table>
<thead>
<tr>
<th>Patient characteristic</th>
<th>% of patients (n = 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea or vomiting</td>
<td>41% (7)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>41% (7)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>88% (15)</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>24% (4)</td>
</tr>
<tr>
<td>ICU admission</td>
<td>12% (2)</td>
</tr>
<tr>
<td>Onset of symptoms within 0–3 hours</td>
<td>47% (8)</td>
</tr>
<tr>
<td>Onset of symptoms unknown</td>
<td>47% (8)</td>
</tr>
</tbody>
</table>

Table 2

Index cases:
A 71 year old male (patient A) and a 70 year old female (patient B) presented to an Oregon emergency department (ED) after eating a meal containing a squash that had been growing on the compost pile in their backyard for several weeks (see image 1). The squash was so bitter that it ruined the meal, and they only ate a few bites each. Two hours later, both patients developed nausea, vomiting, and diarrhea, and patient A had a syncopal event. Both were admitted overnight to the ICU for severe dehydration and had hematochezia and elevated liver enzymes.

Patient A, who did not develop hematochezia, had an elevated WBC count (17.9) but normal liver enzymes. Both were admitted overnight to the ICU for severe dehydration and treated with IV fluids.

Patient B’s laboratory studies

<table>
<thead>
<tr>
<th></th>
<th>HD#1 (0400)</th>
<th>HD#1 (0700)</th>
<th>HD#1 (1030)</th>
<th>HD#2</th>
<th>HD#3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>434</td>
<td>290</td>
<td>190</td>
<td>54</td>
<td>--</td>
</tr>
<tr>
<td>ALT</td>
<td>302</td>
<td>234</td>
<td>215</td>
<td>108</td>
<td>--</td>
</tr>
<tr>
<td>Hgb (g/dL)</td>
<td>16.9</td>
<td>--</td>
<td>14.7</td>
<td>12.1</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Table 2

Discussion:
Cucurbitacins occur naturally in members of the Cucurbitaceae family. Wild-growing varieties may contain high cucurbitacin levels, but those bred for human consumption are usually nontoxic. Levels may be increased, however, due to changes in growing conditions, over-ripeness, or other factors. The toxins are heat stable and will not be destroyed by cooking. Squash containing high levels of cucurbitacins may not be visually distinguishable from non-toxic varieties.
The consumption of bitter-tasting bottle gourd juice, widely touted in Indian alternative medicine practices for anti-diabetic and anti-hypertensive effects, has been associated with reports of significant GI distress, volume loss, hypotension, GI hemorrhage, elevation of liver enzymes, and even death. We did not identify published cases of serious GI illness specifically associated with bitter-tasting squashes in Western medical literature, perhaps owing to attribution of symptoms to other causes or prior to less severe illness at the time of presentation.

Our series is limited by our narrow search terms and by its dependence on Poison Center reporting and consistent coding by specialists. The true incidence of this syndrome is unknown.

Conclusion:
We present the first case series of “Toxic Squash Syndrome” as defined by onset of gastrointestinal illness within 24 hours of ingestion of bitter-tasting Cucurbitaceae.

Prospective identification of cases would allow better description of this syndrome, aggressive management of patients exhibiting more serious signs of illness, and testing of food samples for cucurbitacins to establish a definitive link between the toxin and GI illness.

References: