Star fruit intoxication successfully treated by charcoal haemoperfusion and intensive haemofiltration

We report on a case of an elderly woman with chronic renal impairment, secondary to diabetic nephropathy, who developed a deep coma and seizure shortly after consumption of star fruit. She was managed in the intensive care unit, and her consciousness level improved dramatically after an 8-hour charcoal haemoperfusion and 30 hours of continuous haemofiltration. There were no long-term neurological or renal sequelae 9 months later. Early recognition of this condition, intensive dialytic therapy and supportive measures, as well as early initiation of charcoal haemoperfusion may improve the management of this potentially treatable condition.

Case report

A 76-year-old woman known to have chronic renal impairment secondary to diabetic nephropathy (serum creatinine level of 290 µmol/L, glomerular filtration rate of 15 mL/min/1.73m² by Modification of Diet in Renal Disease [MDRD] equation), and diabetic retinopathy was admitted for seizures and drowsiness in May 2007. She had a history of a lacunar stroke in 2002, with a small right internal capsular infarct demonstrated on a computed tomographic scan of her brain. She recovered completely from this with no residual neurological dysfunction. She had been followed up regularly in a general clinic for her medical conditions. On the day of admission, she was found by relatives to be in a state of mental drowsiness at midday. There was a 10-minute period of generalised tonic-clonic convulsion before her arrival at the emergency room, which was self-aborted. She was somnolent as measured by a Glasgow Coma Scale (GCS) of E4V5M6 on arrival at the emergency room. Her blood pressure was high (207/140 mm Hg) and she was tachycardic, with a heart rate of 125 beats/min on the electrocardiogram. She was afebrile. A physical examination revealed no neck stiffness, demonstrated spontaneous movement of all limbs, normal tendon reflexes, and bilateral withdrawal plantar reflexes. Her chest was clear. Her conscious state deteriorated to E1V1M3 on GCS 8 hours after admission. The working diagnosis made at that time was recurrent stroke involving the brainstem with an associated epileptic fit. She was admitted to the Acute Stroke Unit for further management. On admission to the Unit, she was in deep coma with no abnormal eye movements and no focal neurological signs suggestive of a brainstem lesion. The differential diagnosis was then revised to either metabolic encephalopathy or meningoencephalitis. Computed tomography of her brain showed an old right internal capsular infarct but was otherwise normal. The white cell count was 11.4 x 10⁹/L, haemoglobin 105 g/L, and platelet count 372 x 10⁹/L. Her blood urea and creatinine levels were 14.1 mmol/L and 319 µmol/L, respectively. There were no major electrolyte disturbances. She was put on intravenous phenytoin for control of her seizures. An empirical meningitic dose of ceftriaxone was started to cover for any central nervous system infection; a lumbar puncture performed later showed no evidence of central nervous system infection. Magnetic resonance imaging of her brain showed no radiological evidence of a brainstem lesion or meningoencephalitis. Her son was interviewed again, and he recalled that she had a similar episode of confusion, which subsided spontaneously, after ingesting star fruit about 10 days previously. He was certain that the patient had eaten two star fruits on the day of admission and was found to be mute with purposeless limb movements about 4 hours after ingesting the star fruits. He did not know whether the patient had hiccups before deteriorating. On the basis of this history she was diagnosed with star fruit poisoning with severe neurotoxicity.

The patient was intubated for airway protection, then put on mechanical ventilation and transferred to the intensive care unit for further management. In view of the marked signs of neurotoxicity suggesting a poor prognosis (altered consciousness and seizure), an 8-hour session of charcoal haemoperfusion was commenced, followed by 30 hours of continuous haemofiltration. She had profound hypotension shortly after the initiation of the charcoal haemoperfusion requiring inotropic support in the initial 24 hours. She
治療醫治

本文報告一名長期患有慢性腎衰竭併發糖尿腎病的年長女性，她進食楊桃後不久陷入深昏迷及出現抽搐。病人被送入深切治療部，經過8小時活性碳血液灌流及30小時連續血液過濾治療後，意識水平大大改善。9個月後並未出現與神經和腎有關的長期後遺症。及早確診、積極透析治療和支援措施，以及盡早施行活性碳血液灌流，都可以提高這種可治癒疾病的診療水平。

讨论

杨桃属于Oxalidaceae科，物种Averrhoa carambola。虽然在香港，杨桃并不特别流行。这种水果在热带国家和地区，如台湾、印度、泰国和巴西，是可获得的。它以不同的形式在这些国家和地区，如新鲜水果、沙拉，以及腌渍汁。它有甜和酸的口味。

杨桃在传统中草药中也用于止咳和利尿。

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forms of dialytic therapy in the management of this form of poisoning.

**Choice of dialytic therapy**

For mild star fruit poisoning, where there are no neurological symptoms on presentation, intensification of dialytic therapy, by either peritoneal dialysis or intermittent haemodialysis may lead to resolution of symptoms, as well as improved patient survival. On the other hand, for those with severe neurological symptoms such as impaired consciousness, seizures and hypotension, mortality rates remain high even with the use of aggressive dialytic therapy. Table 1 summarises the outcomes in this subgroup of patients using different dialytic modalities in the four largest series in the literature.

**The role of charcoal haemoperfusion**

According to the literature only three patients with severe star fruit intoxication have been successfully treated with charcoal haemoperfusion (Table 2). All three patients deteriorated rapidly shortly after ingesting star fruit and had severe neurological symptoms (including impaired consciousness, coma, and status epilepticus) requiring admission to intensive care units for ventilatory support. Their neurological symptoms persisted after conventional haemodialysis but all three patients responded dramatically after 8-hour sessions of charcoal haemoperfusion. They returned to full consciousness within 24 hours of the charcoal haemoperfusion, and they had no recurrence of their neurological symptoms or long-term neurological consequences. These cases have three major implications—the importance of early recognition and risk stratification according to presenting symptoms; the early institution of supportive care, including intubation, mechanical ventilation, and inotropic support; and consideration of using charcoal haemoperfusion to manage patients who are not responding to intensive dialytic therapy. The benefits or otherwise of using charcoal haemoperfusion as a first-line treatment in people with severe neurological symptoms (such as deep coma and seizure) need to be examined with further large-scale studies.

It is difficult to be certain, in our case, whether it was the charcoal haemoperfusion or the haemofiltration that contributed most to our successful management. Our patient started to show an improvement in her GCS shortly after the 8-hour charcoal haemoperfusion (E, V, M; after 2 hours of haemofiltration), and continued to improve upon

### Table 1. Patient outcomes in severe star fruit intoxication treated with different dialysis modalities

<table>
<thead>
<tr>
<th>Study</th>
<th>Country/region</th>
<th>No. of patients with seizure/impaired consciousness</th>
<th>Treatment modality (No. of patients)*</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang et al, 2000</td>
<td>Taiwan</td>
<td>10 (All with impaired consciousness)</td>
<td>Intensified HD (10)</td>
<td>8 Deaths, 2 survivors</td>
</tr>
<tr>
<td>Hospital Authority data (unpublished, 2001)</td>
<td>Hong Kong</td>
<td>1 (Impaired consciousness)</td>
<td>CAPD</td>
<td>Death</td>
</tr>
<tr>
<td>Neto et al, 2003</td>
<td>Brazil</td>
<td>7 (All with seizures)</td>
<td>Symptomatic (2)</td>
<td>Death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CAPD (1)</td>
<td>Death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CAPD + 2-hour HD (1)</td>
<td>Death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IPD (1)</td>
<td>Death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IPD + CAVHD (1)</td>
<td>Death in 10 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conventional HD + CVVHD (15 hours) + daily HD (1)</td>
<td>Survived, recovered after 8 days</td>
</tr>
<tr>
<td>Tse et al, 2003</td>
<td>Hong Kong</td>
<td>1 (Impaired consciousness)</td>
<td>Daily HD</td>
<td>Survived</td>
</tr>
</tbody>
</table>

* HD denotes haemodialysis, CAPD continuous ambulatory peritoneal dialysis, IPD intermittent peritoneal dialysis, CAVHD continuous arterio-venous haemodialysis, and CVVHD continuous veno-venous haemodialysis

### Table 2. Patients with severe star fruit intoxication who were successfully treated with charcoal haemoperfusion

<table>
<thead>
<tr>
<th>Study</th>
<th>Region</th>
<th>No. of patients</th>
<th>Neurological symptoms</th>
<th>Dialysis modality before charcoal haemoperfusion</th>
<th>Time post-charcoal haemoperfusion for recovery in consciousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chen et al, 2005</td>
<td>Taiwan</td>
<td>1</td>
<td>Hearing impairment, urinary retention, disturbed consciousness and then coma</td>
<td>Haemodialysis (2 sessions)</td>
<td>Within 1 day</td>
</tr>
<tr>
<td>Wu et al, 2007</td>
<td>Taiwan</td>
<td>2</td>
<td>Hiccups, disturbed consciousness then coma; status epilepticus in 1 patient</td>
<td>Haemodialysis (2 sessions)</td>
<td>16-20 hours</td>
</tr>
</tbody>
</table>
completion of the 30-hour haemofiltration session, and had no recurrence of her neurological symptoms upon cessation of dialytic therapy. From the literature review summarised in Table 2, the effects of charcoal haemoperfusion are not evident immediately. All three patients recovered fully within 24 hours of the charcoal haemoperfusion.

There is limited information about the role of continuous dialytic therapy in the literature, but it is probably of low efficacy and requires prolonged treatment. In Neto et al’s series, only three patients were given continuous therapy. One patient received continuous arterio-venous haemodialysis (CAVHD) after intermittent peritoneal dialysis and died after 10 days (Table 1); one received conventional haemodialysis, followed by a 15-hour session of continuous veno-venous haemodialysis, and then daily conventional haemodialysis and survived after 8 days (Table 1); one patient presented with mental confusion and hypotension received a 36-hour session of CAVHD, followed by daily conventional haemodialysis and survived after 12 days of dialytic treatment. This suggests that charcoal haemoperfusion is a better management choice than the different modalities of continuous dialytic therapy.

In conclusion, star fruit intoxication should be suspected in patients with chronic renal disease who present with neurological symptoms, especially hiccups, unexplained changes in consciousness, or seizures. This condition is easily missed and may be potentially fatal. The rarity of this condition in our territory may be the result of patient education, but it may also be due to lack of awareness of this condition and/or under-reporting. Risk stratification according to neurological symptoms of patients is essential. Intensification of dialytic therapy, either in the form of peritoneal dialysis or intermittent haemodialysis, should be used to treat mild intoxication. For severe intoxication with impaired consciousness and/or seizures, the early institution of supportive therapy in an intensive care setting, as well as early initiation of charcoal haemoperfusion may improve the management of this potentially treatable condition. Patients with chronic kidney disease should be advised to never eat star fruit and its products.

References