A Unique Case of Tetrodotoxin Poisoning

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Summary

A 69-year-old lady who was referred by her general practitioner with a diagnosis of food poisoning developed cardiorespiratory arrest shortly after arriving at the Casualty Department. Cardiac output was successfully restored with resuscitation but she had to be mechanically ventilated due to the absence of any spontaneous respiratory effort. Assessment 24 hours after admission, showed fixed and dilated pupils with brain stem areflexia. Her family was told that the prognosis was hopeless. Surprisingly, her condition rapidly improved a day later and she eventually had a good recovery. Her condition was actually due to severe tetrodotoxin poisoning after eating roe of the puffer fish and it was fortunate that appropriate aggressive resuscitation was instituted to revive the patient from her critical state.

Key Words: Puffer fish poisoning, Neurotoxins

Introduction

An extremely potent neurotoxin, known as tetrodotoxin, is found in the puffer fish. Despite this health hazard, there are still people who like to eat the puffer fish and this is particularly evident in Japan where specially trained, licensed chefs prepare it as a delicacy known as 'fugu'. Our patient actually presented with the classical features of severe tetrodotoxin poisoning after consuming puffer fish, although we were not aware of it initially, and she was only saved through the application of prompt and prolonged resuscitative efforts. Patients with otherwise unexplained signs of extensive brain damage may have tetrodotoxin poisoning and they are potentially salvageable with supportive therapy. This unique case amply illustrates this point.

Case Report

A 69-year-old lady of Cambodian descent was referred to the hospital by her family doctor with a diagnosis of food poisoning which was thought to be related to her ingestion of Chinese medication. Her husband believed that she had taken some form of traditional remedy at breakfast a few hours earlier. Not long after that, she complained of numbness in her fingers and went to consult the traditional healer who proceeded to massage her upper body and neck, with no apparent improvement. She then went to see the family doctor who noted that she was complaining of body numbness and weakness as well as chest tightness. At the clinic, she vomited several times but was still alert and conscious.

On arrival at our Casualty Department her breathing was irregular, she was cyanosed and the blood pressure was unrecordable. Cardiac monitoring initially showed a sinus bradycardia but she then developed asystole and stopped breathing. Cardiopulmonary resuscitation was immediately instituted and she was given intravenous Atropine and Adrenaline which successfully restored her cardiac output. However, she still did not have any spontaneous respiratory effort and she was mechanically ventilated through an endotracheal tube without any neuromuscular paralyzing agents or sedation.

Examination following the resuscitation showed that the pupils were fixed and dilated. The limbs were flaccid and tendon reflexes were not elicitable. She had

numerous circular marks on her upper torso and neck which were said to be due to the traditional healer's massage. Her blood pressure was 55/24 but this improved with intravenous infusion of Dopamine. A number of investigations were carried out at that time including urgent CT Scan of the brain, serum potassium, blood glucose and arterial blood gases; the results of which were all within normal limits. An electrocardiogram showed a sinus tachycardia with non-specific ST segment changes in the lateral leads.

Twenty four hours after the cardiac arrest, she had no signs of spontaneous respiratory effort and still required mechanical ventilation. Her score on the Glasgow Coma Scale was 3. Blood pressure and oxygenation were well maintained but the pupils remained fixed and dilated. The doll's eye, corneal, gag and cough reflexes were absent. The attending physicians felt that brain death was likely and that the prognosis was hopeless. Her relatives were told that the chances of recovery from this condition were extremely slim. The diagnosis was still unclear but she was thought to have extensive brain damage secondary to either a cardiac or intracerebral event. One possibility suggested was that the traditional healer's
vigorous massage had damaged her carotid arteries.

Forty eight hours after admission, she opened her eyes spontaneously and could move all her limbs. Her family doctor called to let us know that the patient's young nephew had caught some *ikan buntal* (puffer fish) and the patient had consumed the roe of the fish for breakfast on the morning of admission. Neither the patient nor the nephew were aware that puffer fish was poisonous and they had never consumed it in the past. In fact, the reason behind the consumption of the puffer fish was not as a traditional remedy, although our patient regularly takes such remedies and she did take Chinese medication that morning. Her husband, being unaware of her eating the puffer fish roe, had mistakenly ascribed her symptoms to the traditional remedy.

After 3 days in hospital, the patient was able to breathe on her own and was extubated. Her recovery after that was progressive but slow due to ataxia and poor head control. By the 10th day of admission, muscle power had gradually returned to 5/5, she could eat and talk and was just starting to get out of bed. Her relatives insisted on taking her home after 12 days in hospital. Examination of the patient 3 months after the incident showed that she had indeed made a complete recovery.

Discussion

Tetrodotoxin, which is present in large amounts in the liver and roe of the puffer fish, exerts its neurological effects by blocking the voltage gated sodium channels in myelinated and non myelinated nerves[1]. The clinical features of the poisoning vary considerably and seem to depend on the amount of the toxin consumed and thus depend on which parts of the fish are eaten[1]. Our patient happened to consume the roe of the puffer fish and thus developed the most severe form of puffer fish poisoning.

The progression of tetrodotoxin poisoning has been divided into four degrees:

- first degree: oral paraesthesia with gastrointestinal symptoms such as vomiting, diarrhoea and abdominal pain
- second degree: motor paralysis and paraesthesia involving extremities, intact reflexes
- third degree: muscular incoordination, dysphagia, respiratory distress, precordial pain, cyanosis, hypotension.
- fourth degree: impaired consciousness, respiratory paralysis, cardiac arrhythmias, severe hypotension.

In retrospect, it is clear that our patient's clinical features were consistent with the progression of the tetrodotoxin poisoning to its most severe form.

There are no controlled clinical trials which demonstrate the efficacy of any specific form of drug treatment in tetrodotoxin poisoning, although claims have been made for the usefulness of anticholinesterase drugs such as edrophonium and neostigmine[1]. The mainstay of treatment still appears to be supportive care with the use of dopamine and atropine to correct problems with hypotension and arrhythmias respectively, in conjunction

with assisted ventilation. There are a number of other cases, along with our patient, that seemed to have recovered from severe tetrodotoxin poisoning with no permanent sequelae despite the apparent features suggesting hypoxic brain damage.

This case serves as a reminder to us that puffer fish poisoning is not entirely unknown in Malaysia, although the most recently reported cases have come from East Malaysia rather than Peninsular Malaysia[2,3]. Our case was initially complicated by the lack of detailed history concerning exactly what she had eaten and this nearly led to us abandoning supportive therapy at an early stage. The lesson we must learn from here is that supportive care should be maintained while strenuous efforts are being made to establish any potentially reversible causes, especially in a case where the aetiology of the cerebral insult is not well defined. Furthermore, in patients with suspected tetrodotoxin poisoning, we strongly recommend that resuscitative treatment be continued even in the presence of signs suggestive of brain death.

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Second Malignant Neoplasms: An Increasingly Recognized Complication of Childhood Cancer

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Summary

Second malignant neoplasms (SMN) are an increasingly recognized late complication seen in childhood cancer survivors . A total of 3 cases of SMN have been found in the Department of Paediatrics , University Hospital Kuala Lumpur after a 15-year experience of treating childhood malignancies. Two cases are described here . The first developed abdominal non-Hodgkin's lymphoma 3 years after undergoing an allogeneic bone marrow transplant for second relapse of acute lymphoblastic leukaemia, while the second child developed myeloid leukaemia two years after completing treatment for acute lymphoblastic leukaemia. Progress in the management of childhood cancer in Malaysia and the availability of bone marrow transplantation facilities have increased the number of childhood cancer survivors ; leading to increased incidence of SMN.

Key Words: Second malignancy, Late complications of childhood cancer, Cancer