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Giant Asian honeybee or *Bambara* stings causing myocardial infarction, bowel gangrene and fatal anaphylaxis in Sri Lanka: a case series

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ABSTRACT

The sting of Giant Asian honeybee (*Apis dorsata*) or *Bambara* in Sinhala and *Karunge Kulavi* in Tamil is a common environmental hazard in Sri Lanka known to cause immediate allergic reactions, which could be fatal in sensitized individuals. We reported myocardial infarction, bowel gangrene and fatal anaphylaxis in a prospectively proven case series and the association of these uncommon complications with delayed removal of stingers from the patients' skin.

1. Introduction

Rock honeybee or Giant Asian honeybee (*Apis dorsata*, Fabricius 1793) is widely distributed throughout sub-Himalayan and oceanic Asia including countries such as Sri Lanka, India, Malaysia and Thailand[1,2]. In local languages, it is called *Bambara* in Sinhala and *Karunge Kulavi* in Tamil. It lives in a colony of a large single vertical comb and these colonies are frequently found at high-rock faces and caves (some of them are of archeological importance) and at tree tops away from human access. In Sri Lanka, these colonies are found notably in Sigiriya and Bambaragala. It is aggressive by nature and when disturbed worker bees exhibit a defensive behavior known as 'defense waving' and attack anybody in the vicinity[3]. Very often travelers, trackers and pedestrians are the potential victims of heavy attack. A giant honeybee is approximately 17-20 mm long and has a stinger attached to its viscera. It generally stings once only, as its barbed stinger as well as the venom sac is usually left behind embedded in the victim's skin[4]. Clinically, this finding helps to differentiate giant honeybee stings from hornets (*Vespa affinis*, *Vespa tropica* & *Vespa mandarina*) stings as the hornets do not leave their stingers in the skin of the victim[5]. The sting apparatus of the giant honeybee has its own musculature and ganglion which keep on delivering venom even after detachment[4]. In Sri Lanka, stinging by the giant honeybee is a common environmental hazard leading to many hospital admissions, but hospital data are unreliable as the attending physicians very often fail to identify and name them correctly. In clinical practice, giant honeybee stings are considered less serious than hornets (*Vespa affinis*) stings as deaths have only been reported due to hornet stings in Sri Lanka[6]. Therefore, the gravity of giant honeybee stings is ignored and overlooked. In 2008, the Teaching Hospital, Peradeniya, a tertiary care hospital in the Central Province of the island received 83 cases of stings, of them the majority were caused by the giant honeybee. All these patients were managed in the Poisoning Unit by a team of physicians, who authored this case series. The clinical details were recorded in the bed-head tickets on daily basis until recovery and discharge from the hospital. Of the total case load, we selected proven 4 cases as they had either unusual complication or death or uneventful recovery on removal of stingers. Other patients had either an immediate Type I hypersensitivity reaction or local pain which responded to standard treatment, where further analysis seemed not necessary. Our description

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includes clinical details of 4 patients who had definitive Giant Asian honeybee stings and of them, necropsy details of 2 patients who succumbed to sting injuries.

2. Case 1

In May 2008, a 57-year-old previously healthy man was brought to the General Hospital, Peradeniya (GHP) with more than two hundred giant honeybee (Figure 1) stings that occurred 2 h before, whilst walking on the road in a remote area. Initially, he was rushed to a nearby rural hospital, where he was resuscitated and transferred by ambulance to GHP for further management. On admission, he complained of severe abdominal pain, chest discomfort and developed vomiting and passed dark coloured urine, but did not complain of difficulty in breathing or itching. On examination, he was conscious and rational, but looked anxious and agitated. However, he was haemodynamically stable and the radial pulse rate was 86 per minute and the blood pressure was 120/80 mm Hg. His skin had multiple embedded stingers with erythematous base. He also had tenderness in the epigastrium. All stingers were removed from the skin and medications such as intravenous hydrocortisone, chlorphenamine and metoclopramide were given. Further, he was kept under observation, monitoring all the vital parameters. Of the initial investigations, the 12-lead electrocardiogram (ECG) showed ST segment elevation and Q waves in leads Ⅱ, Ⅲ, AVF suggestive of acute inferior myocardial infarction and the cardiac marker, Troponin T (a cardiac structural protein) became positive. The first urine sample showed a positive reaction with the stick test suggestive of haemoglobin, blood or myoglobin in the urine. The urine microscopy showed no red cells, but further analysis to differentiate haemoglobin from myoglobin was not possible due to lack of technology. However, over the next 10 hours, the urine colour returned to normal colour and he maintained good urine out put. The full blood count was normal except low haemoglobin level of 10 g/dL and blood urea, creatinine and transaminases were normal.

Figure 1. Giant Asian honeybee (*Apis dorsata*), 19mm long.

In 12 hours, he developed abdominal distension with absent bowel sounds. Abdominal X-rays showed distended bowel loops (Figure 2). An ultrasound scan of the abdomen revealed evidence of small bowel obstruction. At this juncture, the opinion of the surgical team was sought and they decided to manage the patient conservatively under surgical care considering the patient's poor general condition and newly developed myocardial infarction. After six days of absolute constipation, the patient passed loose stools. Abdominal distension decreased and he tolerated liquids. On the ensuing days, he developed a left sided pleural effusion and hoarseness of the voice. Examination revealed unilateral vocal cord palsy. He continued to lose weight and developed intermittent diarrhoea with recurrence of abdominal distension. He was given parenteral nutrition and antibiotics. Despite the intensive management, the patient succumbed to his illness on the 38th day of hospitalization.

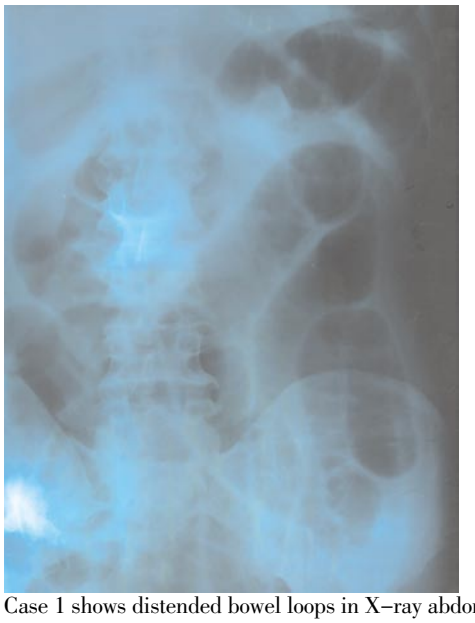

Figure 2. Case 1 shows distended bowel loops in X-ray abdomen.

At necropsy, a fibrotic area in the posterior myocardium was detected, but the coronary arteries were normal. There was no evidence of atherosclerosis in the vasculature except scanty lesions in the aorta. Histology showed extensive endomycial, interstitial and perimycial fibrosis with scattered foci of neutrophilic infiltrate. These findings were considered consistent with an acute myocardial infarction which probably occurred around the time of the stings.

Lungs were congested. Both kidneys were normal. The small intestine was distended and showed a segment of full-circumference gangrene about 15 cm in length. The mesenteric arteries were normal.

3. Case 2

A 70-year-old elderly lady was admitted to GHP within 20 minutes after being stung by many giant honeybees (>200). She complained of pain in the body and developed watery diarrhoea about 3 times, which subsided in a few hours. All stingers were removed within a short time. She was kept under observation for 2 days and she made an uneventful recovery. All investigations including 12 lead ECGs were normal.

4. Case 3

A previously healthy 62-year-old female was stung by giant honeybees while working in an estate (>100). It took about 2 hours to bring her to GHP, where all stingers were removed. On her way to hospital she developed tightening chest pain and sweating. On examination, pulse rate was 76 per minute, blood pressure was 130/90 mmHg. She had neither itching nor difficulty in breathing. The 12 lead ECGs showed gradual development of T wave inversion in anterior chest leads. Her cardiac Troponin T was positive. The diagnosis of acute myocardial infarction was made and she was treated with aspirin, nitrates, low molecular weight heparin and statins. She made a full recovery on day 7 and was referred to a cardiologist for further management.

5. Case 4

A 11-year-old child was admitted after giant honeybee stings while playing in an abandoned estate (>200). He was taken to nearby hospital and transferred to GHP. The removal of stingers took about 2 hours. He was stable and had normal blood pressure on admission. However, suddenly the child developed a cough and became dyspnoic. Then he collapsed with very low blood pressure and tachycardia. A pink froth pored out from his mouth. Medications such as adrenalin, hydrocortisone and chlorphenamine were administered. He was rushed to the Intensive Care Unit, intubated and connected to a mechanical ventilator. Despite the treatments the child died 6 hours after admission. The necropsy revealed gross pulmonary oedema and patchy haemorrhages in pericardium and lungs.

6. Discussion

Case 1 & 3 demonstrate that Giant Asian honeybee stings can cause acute coronary events such as myocardial infarction in previously healthy people immediately after many stings. The cardinal symptoms of an acute coronary event such as chest pain and sweating are masked to some extent by stings-related generalized body pain and agitation. Additionally, Case 1 demonstrates definitive gangrene of small intestine which caused an acute abdomen and obstructed bowel within the first 12 hours, which resulted in death after many days whilst being managed conservatively. A surgical resection of the involved bowel segment would have saved the life. However, there was risk of the patient's death during anaesthesia due to poor health and recent myocardial infarction. Case 4 suggests the possibility of severe anaphylactic reaction due to Type I hypersensitivity that resulted in severe pulmonary oedema and death. The message was the precipitous development of very severe reaction developing more than two hours after the stings. The previous sensitization was not apparent in the history and therefore, prediction of the reaction was not possible. In these cases, delay in removal of embedded stings from patients' skin could have contributed to more envenoming leading to complications. In Case 2, quick removal of all stings from the skin would have helped in preventing complications.

The main immune mechanism causing allergy and anaphylaxis in Giant Asian honeybee stings is the Type I hypersensitivity that operates through IgE mediated mast cell degranulation[7]. Occasionally, delayed reactions due to Type III hypersensitivity immune response could cause Arthus reaction and serum sickness[7]. However, a similar clinical picture could occur due to anaphylactoid reactions, where immunoglobulins are not involved and caused mainly by drugs and chemicals[7]. The chemical substances in bee venoms responsible for triggering different manifestations have been worked out as primarily a mixture of various enzymes, peptide and amines, sometime labeled as "apitoxin"[8]. However, the chemicals responsible and the mechanism of myocardial infarction and bowel gangrene remains an open question. Theoretically, the mechanism could be due to intense vaso-spasm of coronary and splanchnic arteries caused by some chemicals in the venom. In this case series, the common occurrence of abdominal symptoms such as diarrhoea, vomiting and abdominal pain indicates either allergy or splanchnic vaso-spasm. Myocardial infarction following hornet (*Vespa affinis*) stings is a recognized complication in Sri Lanka and vaso-spastic amines in hornet's venom are supposed to be responsible for its causation[6]. Similarly, 'killer' bees (Africanized honey bees, *Apis mellifera scutellata*) in Brazil are famous for deadly stings which cause multiple fatal complications including myocardial damage and death[9]. However, the Sri Lankan species, *Apis dorsata* is considered a less dangerous species.

The contribution of these fascinating insects in pollination and ecology is significant. Ever increasing human population, destruction of the natural habitat of insects, and increased eco-tourism would lead to a high incidence of human and insect encounter and conflict. This might result in more fatal stings with novel complications. Therefore, it is important to anticipate these complications in the management of patients to lessen fatalities. Early removal of embedded stingers seems useful as venom in the venom sacs continue to discharge for sometime. Early detection and management of anaphylaxis should be given priority, as it is the commonest life threatening complication. Doing a routine ECG in a doubtful case might detect coronary events early. Research into venom composition of the giant honeybee is an unexplored area in Sri Lanka and such data would help in developing better clinical management strategies in future.

Conflict of interest statement

We declare that we have no conflict of interest.

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