Wasp sting associated with type 1 renal tubular acidosis

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Wasp stings are a common day occurrence in tropical countries. Their venom contains a wide array of amines, peptides and enzymes, consisting of low molecular weight compounds such as serotonin, histamine, acetylcholine and several kinins that mediate direct toxic effects. Enzymes such as hyaluronidase and phospholipases allow the venom to spread. Generally, these stings cause local reactions that include immediate pain, wheal and flare reaction, which resolve within a few hours. Rarely, these reactions can cause systemic manifestations, organ dysfunction and even death. We describe one such extremely unusual presentation in which a wasp sting was associated with type 1 (distal) renal tubular acidosis (RTA).

A 24-year-old male college student from North–West India presented with sudden onset weakness in all four limbs 9 h following a wasp sting on the face. As an immediate measure, a local practitioner administered intravenous chlorpheniramine 25 mg and hydrocortisone 100 mg. The patient denied any history of vomiting, diarrhoea, dry eyes or mouth, dental caries, rash, polyarthritides, fatigue, palpitations, breathlessness, ulcers, blood transfusions, jaundice, weight loss, heat intolerance, diuretic use, hypertension, deafness, pathological fractures or recent surgery. His past history was unremarkable and there was no history of similar complaints in the family. He did not have any addictions and there was no history of exposure to heavy metals. General physical examination revealed a well-built male with the heart rate of 96 bpm, blood pressure of 110/70 mm Hg and respiratory rate of 18/min. No physical abnormalities were noticed. Neurological examination revealed flaccid quadriparesis (Power III/V) with elicitable deep tendon jerks in all four limbs. There was no sensory, cranial nerve or cerebellar involvement. The remainder of the systemic examination was unremarkable. Haematological investigations showed haemoglobin 140 g/L, total leucocyte count $7 \times 10^9$/L, platelets $150 \times 10^9$/L and ESR 4 mm after 1 h by the Westergren method with a normal peripheral blood smear. His biochemical profile revealed normal liver function (bilirubin 17.1 $\mu$mol/L, AST 32 U/L, ALT 38 U/L, serum alkaline phosphatase 108 U/L, serum proteins 62 g/L, albumin 42 g/L and globulin 20 g/L), a fasting blood sugar of 5.0 mmol/L, hypokalaemia with serum potassium of 2.9 mmol/L, normal sodium (137 mmol/L), calcium (2.32 mmol/L), phosphorus (1.26 mmol/L), chloride (110 mmol/L) and normal renal function (urea 5.2 mmol/L, serum creatinine 71 $\mu$mol/L). Routine urine examination showed a lack of albuminuria or glycosuria, and no cells, crystals or casts. Urine culture was sterile. Arterial blood gas analysis revealed uncompensated metabolic acidosis (pH 7.32, PaCO$_2$ 44, PaO$_2$ 100%, HCO$_3$ 18) with an anion gap of 9. Concomitant urinary pH was 5.5. A 24-h urine estimation revealed calcium 220 mg, protein 70 mg and creatinine of 1200 mg. Ultrasonography of abdomen was normal. Chest, abdominal and skeletal radiographs were normal. Electrocardiogram revealed no abnormalities. No abnormalities were seen in nerve conduction studies. An ammonium chloride test was performed by administering 0.1 g/kg body weight of ammonium chloride which showed worsening of acidosis without concomitant decrease in urinary pH (urinary pH remaining >5.5), confirming the diagnosis of type I (distal) RTA. Immunological workup (including serology for human immune deficiency virus, hepatitis B virus and hepatitis C virus, anti-nuclear antibodies and antineutrophil cytoplasmic antibodies) was negative. Thyroid function tests (T3 0.01 nmol/L, T4 108 nmol/L, TSH 4 mIU/L) did not reveal any abnormalities. A workup for Wilson’s disease (eyes for KF rings and serum ceruloplasmin) was negative. A diagnosis of type 1 (distal) RTA secondary to wasp sting was made. The patient was managed with intravenous potassium chloride (160 meq on Day 1, 80 meq on Day 2) followed by oral potassium chloride (60 meq from Day 3) and then 2 meq/kg/day of powdered sodium bicarbonate given orally. His muscle power improved to grade IV/V on Day 2 and to V/V on Day 3 following hospital admission. He was discharged on the fourth day and advised to take oral potassium chloride 40 meq/day and powder sodium bicarbonate 2 meq/kg/day.

Wasp stings are mostly associated with local reactions. Very rarely, these stings have been associated with cerebrovascular accidents, parkinsonism, encephalitis,
polyneuropathy, myasthenia, neuromyotonia, ptosis, optic neuropathy, myocardial infarction, aortic thrombosis, serum sickness and vasculitis [1–7].

Infrequently, wasp stings cause renal complications such as acute renal failure (due to haemolysis and rhabdomyolysis) and interstitial nephritis [8,9]. RTA is an extremely rare complication of wasp sting. A review of the literature revealed only one case of wasp sting associated with RTA reported by Agarwal et al. [10]. Their patient experienced not only RTA but nerve conduction studies also showed acute inflammatory demyelinating poly-radiculoneuropathy (AIDP) that improved after 2 weeks. The present case differed from that of Agarwal et al. [10] in that only RTA was present. In both cases, patients were diagnosed with RTA following wasp sting. Although such occurrences are extremely rare, we postulate that there is a definitive cause and effect relationship between wasp sting and development of RTA. However, it is unclear whether RTA was caused by wasp sting per se or whether a pre-existing RTA was precipitated by the sting. At this juncture, it is also difficult to define exact pathogenesis. Since both of these cases belonged to exactly the same geographical area, wasp stings in this region may contain special toxins that precipitate RTA. Further studies are needed to confirm or disprove the above hypothesis.

To conclude, the present report and that of Agarwal et al. [10] point to a correlation between wasp sting and RTA. Further studies will be required to elucidate the pathogenesis.

Conflict of interest statement. None declared.

References


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