There are two reports[3,5] in children. Both reports were in patients with chronic kidney disease. The first child had received alkaline water as a form of complementary medicine[3] and the second child had been prescribed rather high doses of sodium bicarbonate (6 mmol/kg/day).[4] Our patient had high serum creatinine at presentation, but the renal function had improved to normal.

CONFLICT OF INTEREST

The authors have declared that no Conflict of interest exists.

ETHICS STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Minimal change disease with Jack jumper ant stings: A case report

Insect stings from the order *Hymenoptera* have been associated with nephrotic syndrome, including minimal change disease (MCD) and other glomerular pathologies, since the first reported case following bee sting in 1955.[1] We document the first case of MCD associated with Jack Jumper Ant (JJA) sting. The JJA (*Myrmecia pilosula*) is endemic to southern and eastern Australia. JJA venom comprises peptides with broad enzymatic activity, histamine-like and eicosanoid releasing factors. The *pilosulin* peptides are the major components of JJA venom, basic peptides rich in lysine and arginine with cytotoxic effects.[2]

A 72-year-old female was referred with oliguria and fluid overload 24-h following uneventful Nissen fundoplication. Sixteen days before admission she suffered over a dozen JJA stings. A week before admission she developed swelling of both legs and 10 kg weight gain. She had prior hypertension and a baseline creatinine of 82 μmol/L.

On examination blood pressure was 178/83 mmHg, with elevated jugular venous pressure, anasarca and bibasal crepitations. Urine output was 300 ml/24 hours. Serum creatinine was 140 μmol/L (reference range: 45–90 μmol/L). Urine microscopy revealed no erythrocytes, urine protein: creatinine ratio was 478 mg/mmol (reference range: <3.5 mg/mmol), and albumin: creatinine ratio (uACR) 450 mg/mmol (reference range: <18 mg/mmol). Serum albumin was 23 g/L, total cholesterol 4.8 mmol/L, and international normalized ratio 1.0. Specific immunoglobulin E (IgE) to JJA venom was negative (<0.10 kIU/L).

A kidney biopsy showed normal glomeruli on light microscopy, normal basement membrane on silver staining, and the absence of deposits on immunofluorescence. Electron microscopy confirmed foot process effacement involving >90% of the glomerulus, supporting the clinical diagnosis of MCD. Immunohistochemical staining demonstrated evidence of (i) glomerular and tubular oxidative stress, with positive staining for 4-hydroxynonenal; (ii) glomerular activation of the glucocorticoid-sensitive Angptl4 pathway, without alteration in podocyte marker synaptopodin; and (iii) tubulointerstitial inflammatory $CD3^+$ T-cells and $CD1c^+$ dendritic cells.

A trial of diuretic therapy failed with fluid gain and elevated creatinine to 181 μmol/L. After a week, prednisolone 75 mg daily was commenced with rapid improvement in clinical status. At 1-month post-discharge, renal biochemistry had improved (creatinine 127 μmol/L, albumin 32 g/L, uACR 173). At 5-months, kidney function and weight returned to baseline (creatinine 87 μmol/L, albumin 34 g/L, uACR 0.5). Prednisolone was tapered off without side-effects. Kidney function remained stable at 10 months.

Only one case of MCD following ant sting has been previously reported,[3] and we document the first case as a consequence of JJA sting.

JJA stings are associated with high rates of anaphylaxis in endemic areas,[2] but an allergic mechanism does not appear to be the main driver of pathology in this case where specific IgE to JJA venom was negative. Direct toxicity of JJA venom by interaction with lipid bilayer membranes is reported.[4] We propose here that anionic podocytes of the glomerular basement membrane (GBM) are susceptible to the toxic effects of cationic *Pilosulin* peptides, resulting in oxidative stress. This case is consistent with previous reports that insect-sting associated nephrotic syndrome is steroid-responsive, with a good prognosis.

AUTHOR CONTRIBUTIONS

Each author has participated sufficiently in the work to take public responsibility for the content.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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