

Hybrid Renal Replacement Treatment in Acute Pulmonary Edema with Acute Kidney Injury following Multiple Wasp Stings: A Report of 3 Cases

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Wasp stings have been associated with a wide variety of reactions from mild local anaphylaxis-like wheal formation to fatal systemic complications. However, acute pulmonary edema (APE) is seldom reported in wasp venom poisoning. Here, we present 3 critically ill patients who developed APE and acute kidney injury (AKI) after multiple wasp stings and the successful intervention of hybrid renal replacement treatment (HRRT) in 2 of them.

We retrospectively analyzed 3 patients (F/M ratio: 2:1, 39–56 years old) with APE and AKI following multiple wasp stings between 2008 and 2009 in West China Hospital. One of them died unexpectedly 2 h after admission to our hospital. Autopsy showed acute pulmonary venous pleonemia, APE and massive necrosis of renal tubular epithelial cells as well as hepatic cells. HRRT, including plasmapheresis (PE), continuous venous-venous hemofiltration (CVVH) and sustained low-efficiency dialysis (SLED), was carried out for the other 2 patients. PE was performed on day 1 and day 2, respectively; CVVH was applied for at least 72 h until the conditions became stable, then was replaced with SLED. Blood purification was discontinued when patients developed polyuria (urine volume >2,500 ml/day) with the level of serum creatinine less than 265

μmol/l. After HRRT, the conditions of these 2 patients improved progressively. Repeated CT scanning indicated a significant amelioration of APE within 5 and 3 days, respectively, in parallel with the laboratory improvement and clinical course (fig. 1). Functions of the lung, heart, liver and kidney had recovered completely at discharge. The 2 patients were followed up for 2 months without any sign of residual organ dysfunction.

There have been few reports about APE following wasp stings in the past 40 years [1, 2], and the pathogenesis of APE due to wasp stings remains unclear. HRRT (CVVH + PE + SLED) in the management of APE and AKI following wasp stings has never been described. The benefits of CVVH both on cardiogenic pulmonary edema and noncardiogenic pulmonary edema are well known [3, 4]. Besides, CVVH represents a novel approach to remove circulating macromolecules like myoglobin (17 kDa) generated from rhabdomyolysis where intermittent hemodialysis (IHD) is inadequate. Compared to intermittent hemodialysis, CVVH guarantees more accurate volume control and more stable homeostasis, which are important for improving the prognosis, both for the survival of kidney function and the decrease in mortality. PE has been found useful because it can directly reduce the

massive amount of circulating venom or remove the circulating mediators of inflammation induced by the venom itself. SLED offers the advantages of flexible timing of treatment and reduced costs with the added benefit of unrestricted physician access to the patient during the day, minimizing the interference of renal replacement therapy with other intensive care unit activities, therefore it is better to replace CVVH with SLED when the patient's condition becomes stable. In our 2 cases, repeated CT scans indicated that APE disappeared after 5 and 3 days of intervention by HRRT, and renal function completely recovered after 22 and 37 days, respectively, which was faster than when the patients were treated by intermittent hemodialysis or peritoneal dialysis (1–3 months) as reported previously [5].

In conclusion, APE and AKI were life-threatening complications following wasp stings. HRRT is a novel and effective approach for the management of patients with such fatal systemic complications. An appropriate and timely choice of the blood purification mode is of great importance to the prognosis of the patients.

Ling Zhang and Zhengyan Li contributed equally to this paper.

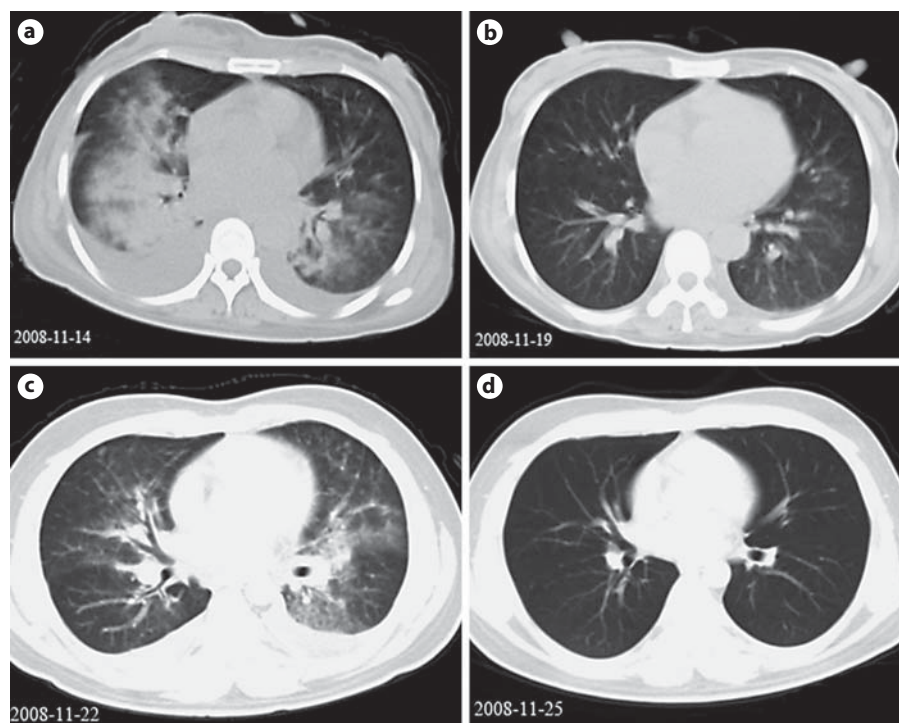


Fig. 1. Changes of CT scan in 2 patients treated by HRRT.

References

- 1 Karapata AP, Shumakov AG: A case of toxic pulmonary edema after the administration of bee venom in chronic nephritis. *Klin Med (Mosk)* 1961;39:142–144.
- 2 Riches KJ, Gillis D, James RA: An autopsy approach to bee sting-related deaths. *Pathology* 2002;34:257–262.
- 3 Sharma A, Hermann DD, Mehta RL: Clinical benefit and approach of ultrafiltration in acute heart failure. *Cardiology* 2001;96:144–154.
- 4 Piccinni P, Dan M, Barbacini S, Carraro R, Lieta E, Marafon S, et al: Early isovolaemic haemofiltration in oliguric patients with septic shock. *Intensive Care Med* 2006;32: 80–86.
- 5 Diaz-Sanchez CL, Lifshitz-Guinzberg A, Ignacio-Ibarra G, Halabe-Cherem J, Quinones-Galvan A: Survival after massive (>2,000) Africanized honeybee stings. *Arch Intern Med* 1998;158:925–927.