

Acute pyelonephritis after recovery from heat stroke

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DESCRIPTION

Heat stroke is a debilitating disease that is characterised by inflammation, coagulation and tissue abnormalities.¹ Patients who have experienced heat stroke can manifest complications even after their body temperature has returned to normal.¹ However, data on the characteristics of patients who developed complications after their recovery from heat stroke are scarce. Here, we present a case of an older adult who developed acute pyelonephritis with ureteral calculus after recovering from a heat stroke.

An 81-year-old man supposedly lost consciousness while working outside. He claimed to have undergone a surgery for oesophageal cancer 3 years ago. The patient's height and weight were 165 cm and 55 kg, respectively. According to the patient's physical examination results, he had drowsiness, a Glasgow Coma Scale score of 14 (E3V5M6), a blood pressure of 200/110 mm Hg, a heart rate of 110 beats/min and a respiratory rate of 24 breaths/min. His body surface temperature was 40.1°C in the axillary region. Pain or infectious causes were not identified. Laboratory investigations revealed no findings suggestive of inflammation. An enhanced CT scan of the head, thorax, abdomen and pelvis showed a right urinary calculus with hydronephrosis and without perinephric fat stranding ([figure 1](#)). Consequently, the patient was diagnosed with heat stroke. Immediate body cooling using cold water and fluid infusion was performed. The patient's temperature decreased to <38°C within 45 min. He regained consciousness, and his vital signs were normalised. At 3 days after the onset of heat stroke, the patient developed fever and right flank pain. He was diagnosed with acute calculous pyelonephritis. *Enterococcus faecalis* was detected in blood and urinary culture findings. Accordingly, he received sulbactam/ampicillin (6 g/day). Then, ureteral stenting was performed on day 4 of hospitalisation. The postoperative course was

unremarkable. Thus, the patient was discharged on day 10 of hospitalisation.

Intestinal bacteria enter the systemic circulation because of the increased gut permeability, which is caused by heat stroke. This results in endotoxemia, systemic inflammation and sepsis.^{1,2} In this case, the patient presented with acute calculous pyelonephritis with *Enterococcus faecalis* bacteraemia. The patient had an asymptomatic right urinary calculus with hydronephrosis before the onset of heat stroke. *Enterococcus faecalis* can travel from the gut to the systemic circulation via the urinary tract because of increased permeability of the vascular endothelium during heat stroke. Infectious urine remained in the right kidney with hydronephrosis and caused acute calculous pyelonephritis. The colonisation of *Enterococcus faecalis* may have also caused acute calculous pyelonephritis because of the retention of the urinary catheter for several days during the perioperative period of the patient following his oesophageal surgery 3 years ago.³ Immune suppression, which worsens during heat stroke, and the existence of urinary calculus could have led to the development of acute calculous pyelonephritis in this patient.

Patients with urinary calculus and hydronephrosis can develop acute pyelonephritis after recovering from heat stroke. Acute pyelonephritis should be

Patient's perspective

I was weeding the garden at home during the day, and I lost consciousness. The weather was ideal for weeding because it had been raining for a few days, although the day after was finally sunny. I had undergone a major surgery 3 years ago. I gradually recovered physically, although I became more sensitive to the cold. I wore three undershirts, a down jacket and a mask as a precaution against the coronavirus disease 2019. At 1 hour after starting work, I suddenly had difficulty moving; therefore, I called for an ambulance. I am fortunate to have recovered in a healthy state.

Learning points

- ▶ Patients with urinary calculus and hydronephrosis can develop acute pyelonephritis after recovering from heat stroke.
- ▶ Acute pyelonephritis should be considered in patients with urinary calculus and hydronephrosis after recovering from a heat stroke, even if their physical examination findings are unremarkable.

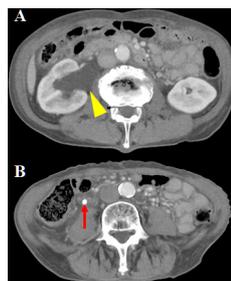


Figure 1 Enhanced CT reveals a hydronephrosis ((A) yellow triangle head) and right urinary calculus ((B) red arrow head). However, a perinephric fat stranding is not observed.



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considered in patients with urinary calculus and hydronephrosis after recovering from a heat stroke, even if their physical examination findings are unremarkable. Further, a ureteral stent placement or percutaneous nephrostomy should be performed immediately after the recovery in such patients.

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