

Occam's Razor versus Hickam's Dictum: An Unusual Cause of Acute Renal Failure in Pediatric Solid Malignancy

Acute renal failure in pediatric malignancies is a common phenomenon. The common attributable causes are tumor lysis syndrome (TLS), postrenal obstruction, and drug-induced nephropathy, among others. It has therapeutic implications, and timely diagnosis and intervention is paramount to both short- and long-term outcomes of the patient. The case discussed below is a rare cause of acute renal failure in a patient of rhabdomyosarcoma (RMS).

An 18-year-old boy presented with pain and swelling in the right scrotum for 4 months. He underwent scrotal orchiectomy, and histopathology revealed alveolar RMS. Staging workup revealed retroperitoneal lymphadenopathy, multiple vertebral, bone marrow, and pelvic metastases. Two weeks later, the patient presented in emergency with high-grade fever, myalgias, headache, and conjunctival congestion. Clinical examination revealed tachypnea, tachycardia, and conjunctival congestion. The blood investigations revealed leukocytosis, thrombocytopenia, acute kidney injury, hyperkalemia, hyperuricemia, hypercalcemia, and metabolic acidosis [Table 1].

Table 1: Summary of investigations

Laboratory Parameters	Values
Hemoglobin (g/dl)	14.2
Total leukocyte count (cells/ μ l)	19,300
Platelet (/mm ³)	39,000
Blood urea (mg/dl)	300
Creatinine (mg/dl)	7.0
Sodium/potassium (mEq/L)	136/6.0
Blood gas	pH - 7.12, pCO ₂ -21, HCO ₃ ⁻ -9.0
Uric acid (mg/dl)	13.0
Ionized calcium (mg/dL)	1.73
Total bilirubin (mg/dL)	0.6
Aspartate transferase/alanine transferase/alkaline phosphatase (IU)	34/32/117

With the suspicion of sepsis and renal failure, the patient was started on broad-spectrum antibiotics and hemodialysis. Renal failure and electrolytes improved after a single session of hemodialysis; however, fever and hypercalcemia persisted.

The patient was evaluated for dengue, malaria, and chikungunya, which were negative. The serology for scrub typhus was positive by using immunochromatographic test, which was positive after a week as well. The patient was started on oral doxycycline at a dose of 100 mg twice daily, and he was afebrile after 48 h. Subsequently, his renal functions improved and he was started on multiagent vincristine, actinomycin-D, and cyclophosphamide regimens.

Acute renal failure in the background of pediatric malignancies can be due to TLS, postrenal obstruction, and drugs.^[1] TLS is rarely seen in pediatric solid tumors. Case reports have been published for neuroblastoma, medulloblastoma, and hepatoblastoma.^[2] In RMS, there are four cases with TLS published in literature [Table 2].^[3-5]

Three of four reported cases of RMS with TLS had bone marrow involvement. Our patient also had bone marrow involvement, and the possibility of TLS causing renal failure was kept. However, spontaneous TLS is extremely rare in RMS with only one case reported in literature.^[3]

Fever may be a presenting feature in patients with RMS with bone marrow metastasis.^[3,6] Applying Occam's razor, the primary diagnosis of RMS with bone and bone marrow metastasis could explain the findings of hypercalcemia, thrombocytopenia, fever, TLS, and acute renal failure.

On the contrary, as per Hickam's principle, alternative diagnosis can coexist. Fever, thrombocytopenia, and acute renal failure are the features of endemic diseases in India, such as malaria, leptospirosis, dengue, enteric fever, and scrub typhus.^[7] Our patient tested positive for scrub typhus.

Scrub typhus is a zoonotic disease caused by *Orientia tsutsugamushi* and transmitted by trombiculid mites. Clinical

Table 2: Rhabdomyosarcoma and tumor lysis syndrome

Age (years)	Sex	Site of tumor	Histology	Metastatic site	Systemic symptoms	Reference number
14	Male	Unknown	Embryonal	Disseminated including bone marrow	Fever, disseminated intravascular coagulation, and anemia	Bien <i>et al.</i> ^[3]
14.5	Female	Left parietal bone and soft tissues	Unclassified	Bone marrow	Weight loss and disseminated intravascular coagulation	
9	Female	Abdomen	Embryonal	Peritoneum and lungs	Weakness	Khan and Broadbent ^[4]
8	Male	Vertebral body	Alveolar	Bone marrow	None	Sanford <i>et al.</i> ^[5]

features are fever with chills, headache, myalgia, sweating, vomiting, lymphadenopathy, eschar, and maculopapular rash.^[8,9] Acute renal failure has been reported from 18% to 32% in two large series.^[8,9] Mortality has ranged from 9% to 24% depending on complications.^[8,10]

Our case is unique because to the best of our knowledge in the backdrop of metastatic RMS scrub typhus has not been reported previously. The clinical presentation of scrub typhus closely mimicked rare presentation of RMS with bone metastasis and TLS. It emphasizes the need to evaluate for benign causes of renal failure in patients with malignancy. A detailed history, physical examination, and directed investigations can clinch a curable but potentially fatal diagnosis in time. The clinicians need to keep an open eye for the possibility of a scrub typhus infection in endemic areas even among patients of some other primary diagnosis.

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Conflicts of interest

There are no conflicts of interest.

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