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Case Report

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Renal Rim Mystery Post Hysterectomy: A Case Report of Acute Cortical Necrosis

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ABSTRACT

Background: Acute cortical necrosis (ACN) is an uncommon but severe cause of acute kidney injury, accounting for 6–7% of cases in developing countries. While obstetric causes such as postpartum hemorrhage and eclampsia are more frequently implicated, non-obstetric causes are rarely reported. Early recognition is vital, as the condition often leads to irreversible renal failure and dialysis dependence.

Methods: We describe the clinical course of a 34-year-old female who developed ACN following abdominal surgery. Patient details, clinical presentation, laboratory investigations, imaging studies, treatment, and short-term outcome were systematically documented.

Results: On the fifth postoperative day after total abdominal hysterectomy, the patient presented with abdominal pain, decreased urine output, and haematuria. Laboratory evaluation showed anemia, leukocytosis, hyperbilirubinemia, transaminitis, and severely deranged renal parameters (serum creatinine 7.76 mg/dL, blood urea 257 mg/dL). Blood culture grew *Klebsiella pneumoniae*. Computed tomography revealed the characteristic "reverse rim sign" with subcapsular cortical hypodensity, confirming ACN. The patient was managed in intensive care with intravenous antibiotics, diuretics, supportive measures, and two sessions of hemodialysis. Gradual symptomatic relief and partial renal recovery were observed, although dialysis dependence was anticipated at discharge.

Conclusion: This case highlights the occurrence of ACN as a rare non-obstetric complication following abdominal surgery. Radiological findings, particularly the reverse rim sign on CT, play a crucial role in early diagnosis. Prompt initiation of hemodialysis and supportive management can improve survival, though progression to end-stage renal disease is common. Awareness of this entity is essential to avoid diagnostic delay and to optimize patient outcomes.

Key-words: Acute cortical necrosis, Reverse rim sign, Acute kidney injury, Non-obstetric cause, Hemodialysis

INTRODUCTION

Acute Cortical necrosis (ACN) of the kidneys occurs due to ischemic destruction of components of renal parenchyma. Pathological processes central to decreased renal perfusion can be due to microvascular injury, vasospasm, intravascular perfusion, or any cause affecting the renal artery caliber.

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The characteristic feature of ACN is decreased urine output, which fails to resolve, and the deranged renal profile, which persists. Total anuria has been reported as the commonest presenting feature. Other causes, like sepsis, eclampsia, hemolytic uremic syndrome, and snake bites, can also lead to direct endothelial injury due to endovascular thrombosis and subsequent renal ischemia [1]. Rarely, trauma, acute gastroenteritis, drug-induced, and acute pancreatitis have also been known to cause ACN on a few occasions [2]. A few cases of parasitic infections like Plasmodium vivax causing malaria may also lead to ACN [3]. Progression to end-stage renal disease (ESRD) is a rule in diffuse cortical necrosis [4]. Confluent ACN is a rare but catastrophic disease and prognosis is generally referred to as poor [5].

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Bilateral involvement of the kidneys is associated with a high mortality, near totality [6]. Etiopathological differences occur in the settings of developing and developed countries. While ACN forms a rare cause of acute kidney injury (AKI) in developed countries (1.9–2%), it is much more prevalent in the developing world (6–7% of all causes of AKI) [7]. Incidence of ACN in developing countries has been reported as high as 60 to 70%, occurring due to obstetric complications, including postpartum hemorrhage, abruptio placentae, puerperal sepsis, septic abortion, placenta previa, eclampsia, intrauterine deaths (IUDs), thrombotic microangiopathy, and alike [8]. The pair of kidneys bears the brunt of the intractable complications of gravidity. Non-obstetric causes of ACN have also been reported, but infrequently [9]. What worries most of the treating physicians of ACN is its irreversible nature and the decline in renal function that persists. In many cases, like with complete loss of cortex, it can progress to end-stage renal disease, warranting hemodialysis [10]. The present study reports such a rare case of ACN of non-obstetric cause following an abdominal surgery.

CASE REPORT

A 34-year-old female, with a history of recent total abdominal hysterectomy (TAH) given heavy menstrual bleeding, presented to the emergency department on postoperative day 5th with complaints of lower abdominal pain for the last 4 days. The patient developed decreased urine output for the last 3 days. The patient experienced relief in symptoms temporarily, but started experiencing shortness of breath over the last two days. There was one episode of haematuria a day before presentation. There was no history of recent intramuscular injection, and no notable history of hypertension, diabetes, or old treated tuberculosis. Family history was unremarkable. She was a housemaker, with 3 living children (last delivery via normal vaginal route in a private nursing home, 5 years back). The patient had been experiencing irregular menses for the last year, associated with complaints of heavy menstrual bleeding with a history of passage of clots. The patient was diagnosed with multiple submucosal and intramural fibroids, for which the patient was managed surgically with TAH at an outside facility.

On presentation, the patient was conscious but confused, with stable vitals, maintaining blood pressure of 136/84 mmHg, pulse rate of 108 beats per minute, respiratory rate of 20 per minute, and oxygen saturation of 97% on 4 litres oxygen support. The temperature recorded on presentation was 101.4°F. On general physical examination, pallor and bilateral pedal oedema were present. Abdomen was tender on palpation over the surgical site. Bilateral basal crepts was present in chest on auscultation. Patient was managed in intensive care settings, and further investigations revealed deranged renal and liver profile (hyperbilirubinemia, transaminitis and hypoalbuminemia). The patient was found to be anaemic with raised leucocyte counts (Table 1). The likelihood of Acute Cortical Necrosis of bilateral kidneys due to sepsis was suspected. A computed tomography scan to visualize bilateral kidneys was taken up, which revealed a reverse rim sign with a thin hypodense rim of subcapsular cortex, indicating a degree of necrotic cortex (Fig. 1 & 2).

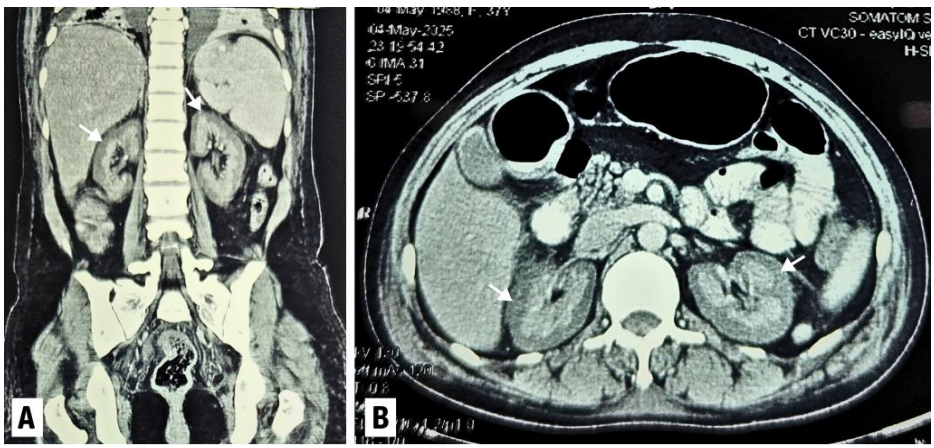

Fig. 1: Reverse rim signs suggestive of cortical necrosis in (A) Coronal and (B) Axial section of computed tomography scan of kidneys.

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Table 1: Routine Blood Investigations.

Investigation	Observed Values	Reference values
Haemoglobin	**8.3 g/dL**	12 – 15 g/Dl
Total Leucocyte Count	38200 cells/mm^3	4000 – 11000 cells/mm^3
Platelets	25000/µL	150000-450000/µL
Total Bilirubin	3.2 mg/dL	0.2 – 1 mg/dL
SGOT	140 IU/L	< 35 IU/L
SGPT	135 IU/L	< 35 IU/L
Total Protein	6.2 g/dL	6.6 – 8.3 g/dL
Albumin	3.8 g/dL	3.5 – 5.5 g/dL
S. Urea	257 mg/dL	13 – 45 mg/dL
S. Creatinine	7.76 mg/dL	0.5 – 1.2 mg/dL
S. Uric acid	10.6 mg/dL	3.5 – 7.2 mg/dL
Sodium	138 mEq/L	135 – 155 mEq/L
Potassium	5.7 mEq/L	3.5 – 5.5 mEq/L
Chloride	103 mEq/L	90 – 120 mEq/L

The patient was managed conservatively with intravenous antibiotics, diuretics, oxygen supplementation, tranexamic acid, and other supportive measures. Two sessions of haemodialysis were given due to worsening renal profile. Blood cultures obtained were suggestive of Klebsiella pneumoniae infection, sensitive to meropenem and tigecycline. Throughout treatment, the patient experienced gradual relief of symptoms, with improvement in urine output and decreased frequency of febrile episodes. Renal function improved with haemodialysis, but didn't return to normal limits. Renal biopsy was planned but not done as the patient was improving clinically. Patient was discharged on the seventh day from date of admission, on oral antibiotics (faropenem) and oral furosemide of 20 mg, and advised for further outpatient follow-up with the likelihood of need for maintenance haemodialysis (MHD) and need for arteriovenous fistula for the same.

DISCUSSION

In north India, estimates prove that over 28 years, 113 out of 2986 patients dialysed for acute renal failure were attributed to ACN [11]. Obstetrical causes of ACN are associated with poorer outcomes in contrast to non-obstetrical causes [12]. Postpartum haemorrhage is one of the leading obstetrical causes of ACN [13], with hemodynamic instability and disseminated intravascular coagulation at its heart. Evidence of endothelial homeostasis has been well drawn out, leading to a compromise in renal artery caliber [14]. Recent literature supports the evidence that obstetric causes of ACN are on a decline even in developing countries. However, overall occurrence of ACN is still a rare entity, and a non-obstetric cause is even rarer [15]. The present study reports such a case that developed ACN following total abdominal hysterectomy, followed by sepsis [16]. Similar clinical presentation has been seen in previously reported cases, with a history of major blood loss, and complaint of oligoanuria, indicative of reduced circulatory volume and disrupted endothelial homeostasis. Several theories with the use of procoagulants and antifibrinolytics in settings of DIC (like that employed in France to control postpartum hemorrhage), thus leading to 'uncontrolled coagulation' cause ACN [16], have also been proposed.

Prognosis of the disease has improved over the past few years and so has the mortality with the advent of more readily available and better haemodialysis techniques [18]. Use of computerized tomography (CT) has been an effective tool for early diagnosis of ACN. Loss of the cortical rim as visualized in CT aids in diagnosis [19]. Previous studies report partial recovery of renal function in such cases, but as seen in other cases, some dysfunction remained, and at times, this made the patient dialysis dependent [20]. The other cases, which show complete recovery or which do not require hemodialysis, have also been seen to achieve a dialysis-free survival of as long as 12 years [21]. But reduced mortality and improved renal outcomes have also increased the number of individuals with ESRD in need of MHD [22]. Prolonged periods of intermittent dialysis are justified in patients with a clear diagnosis of ACN. The rate of progression of ESRD in cortical necrosis has been reported to be as high as 30% to 50% [23]. The subject in the current study also underwent hemodialysis given deranging renal profile and the development of further uremic complications.

CONCLUSIONS

Acute cortical necrosis (ACN) continues to remain a devastating but under-recognized cause of acute kidney injury, particularly in resource-limited settings. Although obstetric complications are classically implicated, this case emphasizes that non-obstetric causes such as postoperative sepsis can also precipitate the condition. The hallmark "reverse rim sign" on CT imaging provides a

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crucial diagnostic clue and should be promptly identified to avoid delays in management. Timely institution of supportive measures, broad-spectrum antibiotics, and early hemodialysis are essential for improving patient survival and minimizing complications. However, despite aggressive management, many patients progress to dialysis dependence or end-stage renal disease, highlighting the guarded prognosis associated with ACN. Greater awareness among clinicians, especially in surgical and critical care settings, is needed to enhance early recognition, guide appropriate interventions, and improve long-term outcomes in such rare but life-threatening presentations.

CONTRIBUTION OF AUTHORS

Research concept- Diwya Jain, Bhavya Khattri
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