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RESEARCH ARTICLE

A RARE CASE OF ACUTE PYELONEPHRITIS LEADING TO ACUTE KIDNEY INJURY IN A YOUNG MALE

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Abstract

A 16-year-old male presented with severe shortness of breath, fever with chills, and decreased urine output for four days. On examination, oxygen saturation was 84% on room air, blood pressure 140/90 mmHg, and heart rate 114/min. Respiratory system examination revealed bilateral coarse crepitations. Laboratory investigations showed markedly elevated blood urea (256 mg/dL) and creatinine (13.56 mg/dL) with metabolic acidosis (pH 7.27, bicarbonate 12.2mmol/L). Ultrasonography demonstrated bilateral swollen kidneys, and NCCT KUB confirmed acute pyelonephritis. The patient was managed with intravenous broad-spectrum antibiotics and haemodialysis in view of severe uraemia, acidosis, and volume overload. Over the following week, renal function and urine output improved significantly, and dialysis was discontinued. Subsequent evaluation revealed an HbA1c of 8.0%, indicating previously undiagnosed diabetes mellitus as an underlying predisposing factor. The patient was discharged on the 8th day in stable condition. This case underscores that acute pyelonephritis with acute kidney injury can be the first manifestation of undiagnosed diabetes mellitus, even in adolescents, and highlights the importance of early recognition, prompt antibiotic therapy, and renal support for favourable outcomes.

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Introduction:-

People with diabetes have an increased propensity to develop infections. Infections are more common, more severe, and often harder to treat. Some of the causes include hyperglycaemia, which impairs neutrophil function, poor glycaemic control, and glycosuria, creating an ideal environment for microbial growth and promoting bacterial growth in the urinary tract. Additionally, autonomic neuropathy may lead to bladder dysfunction, further increasing the risk of urinary tract infection (UTI).¹ UTI in diabetes can be asymptomatic or symptomatic, such as acute cystitis or acute pyelonephritis. Although several epidemiologic studies have shown that people with diabetes receive treatment for infection more often than those without, the magnitude of diabetes' effect on infection risk remains an active research question. Understanding the interplay between diabetes and infection susceptibility is crucial for timely diagnosis and effective management.²⁻⁴

Case Report:- A 16-year-old male with no known co-morbidities presented to ED with complaints of burning micturition, fever with chills for 7 days and decreased urine output for 4 days. The fever was intermittent high-grade

with chills and rigor with no diurnal variation. The patient started experiencing shortness of breath in the last two days before admission. There was no history of vomiting, loose stools, chest pain, abdominal pain, altered sensorium, no recent intravenous or intramuscular drug intake. On examination, the patient was obese (BMI 30 kg/m²), was dyspnoeic, maintaining oxygen saturation of 97% on 2-3 L/min oxygen, with generalised body swelling. BP was 140/90 mm of Hg, HR of 114 bpm, RBS was 171 mg/dl. On chest auscultation bilateral diffuse crepitations were present. Routine blood investigations are depicted in Table 1.

Serial laboratory parameters of the patient during hospitalization, demonstrating progressive improvement in renal function and normalization of inflammatory markers following treatment. (Hb – haemoglobin; TLC – total leukocyte count; SGOT – serum glutamic oxaloacetic transaminase; SGPT – serum glutamic pyruvic transaminase.)

Table 1: Routine blood investigations

Parameters/Date	Day 0	Day 1	Day 6	Day 14	Day 21
Hb (g/dL)	11.3	11.7	11.4	11.9	12.2
TLC (cells/ μ L)	22k	16k	11k	9.4k	8k
Platelets ($\times 10^5$ cells/ μ L)	1.14	1.46	1.78	2.04	1.79
Urea (mg/dL)	256	180	98.8	82	64
Creatinine (mg/dL)	13.6	11.8	9.2	5.4	2.12
Sodium (mEq/L)	127	129.3	133	135	134
Potassium (mEq/L)	5.09	5.1	4.28	4.11	3.86
Calcium (mg/dL)	7.9	7.8	8.8	8.6	8.5
Phosphorus (mg/dL)	6.8	6.4	5.9	5.6	5.1
BilirubinTotal (mg/dL)	0.9	0.8	0.6	0.6	0.5
Bilirubin Direct (mg/dL)	0.3	0.2	0.3	0.2	0.3
SGOT (IU/L)	32	28	29.4	33	26
SGPT (IU/L)	19	24	18	22	16
Total protein (g/dL)	6.4	6.8	7	7.2	7.4
Albumin (g/dL)	3.1	3.5	3.7	3.6	3.8

Keeping a possibility of UTI, further investigations were proceeded, USG KUB was done which was suggestive of bilateral bulky kidneys (Figure 1A and 1B). A NCCT KUB was performed which confirmed USG findings and was suggestive of acute pyelonephritis. (Figure 1C, 1D and 1E). Even though there was no history of diabetes mellitus on presentation, but due to raised persistent blood sugar readings, an HbA1c was done, which turned out to be 8.0%. The patient tested negative for viral markers.



Figure 1. Imaging findings suggestive of acute pyelonephritis.

(A, B) Ultrasound KUB images showing bilaterally swollen kidneys.

(C–E) NCCT KUB images showing bilateral bulky kidneys on coronal and axial sections (red arrows indicate renal enlargement).

The patient was managed conservatively and started on intravenous antibiotics (Piperacillin and tazobactam, Levofloxacin) and 3 sessions of haemodialysis were given starting after day 1 of admission, in view of severe acidosis, uraemia and volume overload (Figure 2), and other supportive treatment. The patient responded well to the treatment. Urine culture and antibiotic sensitivity, which was sent on first day of admission, showed *E. coli* sensitive to the ongoing antibiotics as shown in TABLE 2.

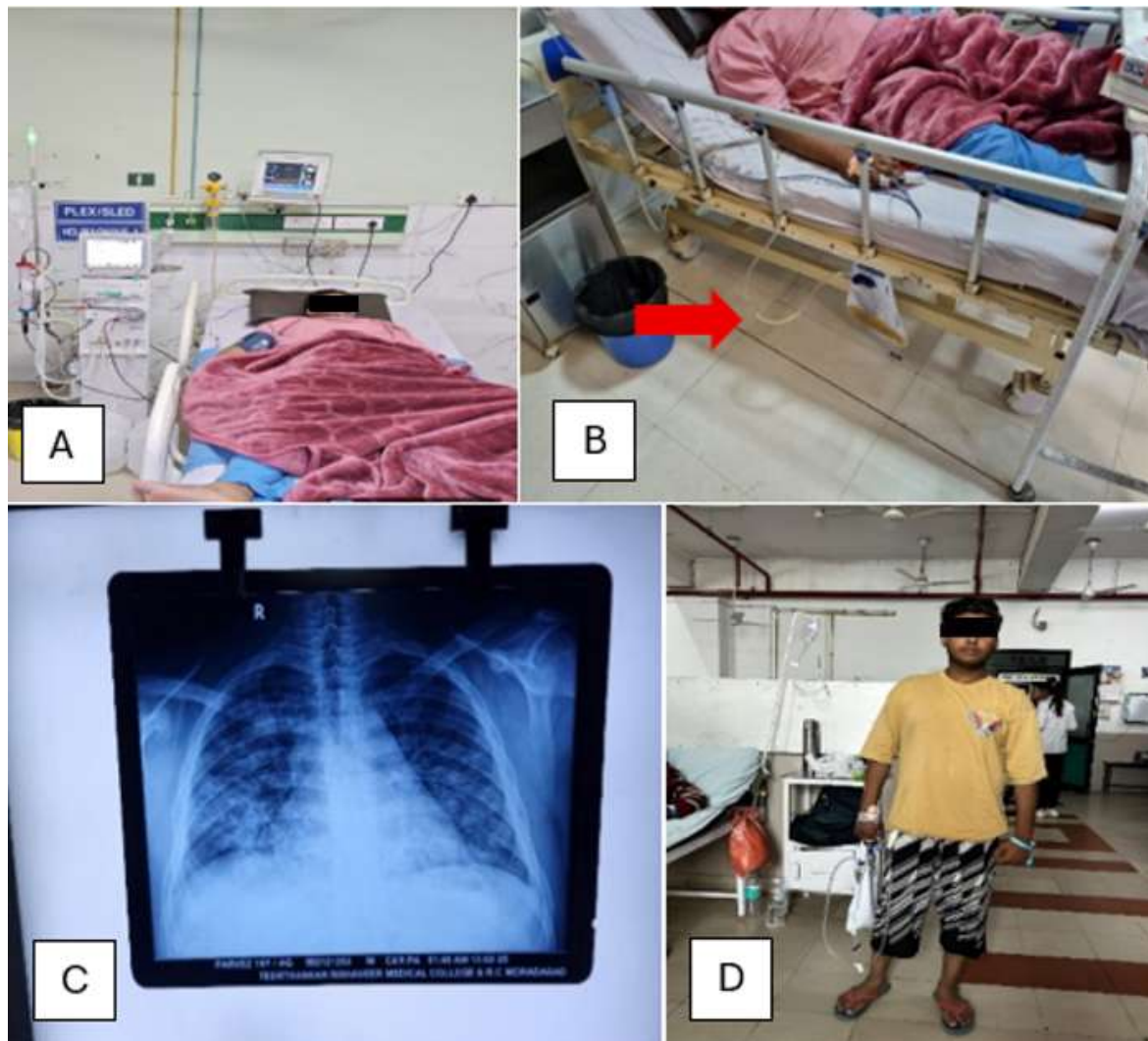


Figure 2. Management and clinical course.

(A) Patient undergoing haemodialysis.

(B) Pus seen in Foley's catheter (red arrow) indicating pyuria.

(C) Chest X-ray showing features of pulmonary oedema.

(D) Patient at the time of discharge in stable condition

Table 2: Summary of diagnostic findings, culture results, and other relevant investigations. (2D ECHO – two-dimensional echocardiography; LV RWMA – left ventricular regional wall motion abnormality; EF – ejection fraction; HbA1c – glycosylated haemoglobin; NCCT – non-contrast computed tomography.)

2D ECHO	No LV RWMA, Normal LV systolic function (EF = 55-60%)
Blood C/S	Sterile after 5 days of incubation period
Urine Routine/microscopy (Day 1)	Albumin= absent Sugar = absent RBC = Nil Pus cell = 20-25/hpf Epithelial Cells = 0-1/hpf
Urine C/S	<i>E. coli</i> Sensitive to: Amikacin Cefoperazone Gentamycin Levofloxacin Meropenem Piperacillin
Thyroid profile	TSH=3.33uIU/mL T3=0.96ng/mL T4=9.58ug/dL
HbA1c	8.0%
Procalcitonin	0.5ng/mL
NCCT Head	No obvious significant abnormalities detected in the present scan.

Considering the autoimmune aetiology for renal dysfunction, ANA, C3/C4, ANCA all investigations were sent which all came out to be negative. 2DEcho was performed in view of volume overload features like pulmonary oedema, but 2DEcho findings were within normal limits. Over a period of next 6 days, the patient started improving, urine output normalised, the patient became symptom-free, dialysis catheter removed, and the patient was discharged in vitally stable conditions on oral antibiotics and follow up advice.

Discussion:-

Diabetes mellitus predisposes individuals to more frequent and severe infections, including urinary tract infections (UTIs), due to hyperglycaemia-induced immune dysfunction and glycosuria that facilitate bacterial growth.⁵ In some instances, a complicated UTI may serve as the first manifestation of undiagnosed diabetes, as seen in this adolescent patient. Acute pyelonephritis can progress rapidly to acute kidney injury (AKI), particularly in diabetics. Complicated UTIs are associated with significant morbidity and mortality, with reported AKI development in up to 14% of hospitalized cases.⁶ Early recognition and prompt management are therefore critical to prevent permanent renal impairment. Recent literature highlights increasing antimicrobial resistance among uropathogens in diabetic patients, necessitating judicious antibiotic selection.⁷ The emergence of resistant *E. coli* strains underscores the importance of culture-based therapy.⁸ Additionally, studies indicate that acute pyelonephritis in diabetics often follows a more aggressive course with a higher risk of abscess formation and renal dysfunction.^{9,10} This case underscores that severe infection and renal dysfunction can occur even in young, previously healthy individuals with unrecognized diabetes. The patient's recovery following antibiotic therapy and short-term haemodialysis highlights the importance of early metabolic evaluation, aggressive infection control, and supportive renal therapy. Clinicians should maintain a high index of suspicion for occult diabetes in adolescents presenting with complicated UTIs or unexplained renal failure, as timely intervention can significantly improve outcomes.¹¹

Conclusion:-

This case highlights that complicated UTI can be the first manifestation of undiagnosed diabetes mellitus, even in adolescents with no known comorbidities. Acute pyelonephritis can rapidly progress to acute kidney injury if not promptly diagnosed and managed. It reinforces the importance of early recognition, comprehensive metabolic evaluation, and aggressive treatment—including antibiotics and dialysis when indicated—to ensure favourable

outcomes. Clinicians should maintain a high index of suspicion for diabetes in young patients presenting with severe infections and metabolic disturbances. Early intervention is key to reducing morbidity, preventing permanent renal damage, and saving lives.¹¹

Conflict of interest – Nil

Ethical committee clearance- Proper ethical committee clearance obtained.

Informed consent- Written and informed consent was taken from the patient.

References:-

1. Nitzan O, Elias M, Chazan B, Saliba W. Urinary tract infections in patients with type 2 diabetes mellitus: review of prevalence, diagnosis, and management. *Diabetes Metab Syndr Obes.*2015;8:129–36.
2. The Epidemiology of Complicated Urinary Tract Infection: A Systematic Literature Review. *Infect Dis Ther.*2025;14:1157–81.
3. Antimicrobial resistance of uropathogens in diabetic patients. *BMC Infect Dis.*2025;25:11358.
4. Clinical profile and outcome of emphysematous pyelonephritis presenting to a tertiary care hospital. *Afr J Urol.*2023;29:51.
5. Clinical Outcomes of Acute Pyelonephritis in Type 2 Diabetes Mellitus. *J Diabetes Complications.* 2024; (PubMed ID: 39741610).
6. Association of SGLT-2 inhibitors with bacterial urinary tract infection in type 2 diabetes. *BMC EndocrDisord.*2023;23:211.
7. Almutairi T, et al. Uropathogens and antibiotic resistance patterns in diabetic patients: A 5-year retrospective study. *Front Cell Infect Microbiol.*2022;12:941256.
8. Palla AR, et al. Acute pyelonephritis in diabetic patients: clinical characteristics and outcomes. *Cureus.* 2020;12(9):e10472.
9. Chen YH, et al. Diabetes and severity of acute pyelonephritis: a retrospective cohort study. *BMC Nephrol.*2019;20:134.
10. Roux A, Lobbedez T, Lévesque H, Fickentscher C. Acute pyelonephritis complicated by renal abscess in an adolescent: a rare but serious complication. *Clin Kidney J.* 2014;7(1):92–4.
11. Hooton TM. Uncomplicated and complicated urinary tract infection: understanding the spectrum. *N Engl J Med.*2019;380:109–18.