

Case Report



Anuria in solitary kidney patient with gastroenteritis: A case report study

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Abstract

For better management of acute kidney injury (AKI) and prevention of progressive renal injury, it is extremely important to manage infections such as gastroenteritis. In addition, anuria is considered a risk factor for AKI and even causes death in patients. An 18-month-old boy with vomiting and diarrhea for three days and anuria for 24 hours was referred to Farsan hospital. The patient had bulky and watery diarrhea about 7-8 times a day and vomited 3-4 times a day which was containing food particles. He had a fever on the first and second days. Ultrasound findings revealed that the right kidney did not exist, and the left kidney was affected by compensatory hypertrophy. Disorders in the patient's blood biochemical factors were also observed. Acidosis and other biochemical disorders were treated with bicarbonate drip, allopurinol, Lasix drip, and dopamine drip. After about 18 hours, anuria was treated.

Keywords: Anuria, Acute kidney injury, Solitary kidney, Gastroenteritis

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Introduction

Anuria occurs following shock, trauma, surgical procedures, renal injury and inflammation (1). The treatment of the infection can be an effective way to reduce the complications associated with anuria (2). Acute gastroenteritis is one of the main causes of acute preventable acute kidney injury (AKI) and kidney damage. Gastroenteritis causes kidney injury due to intravascular volume depletion, decreased arterial pressure, and glomerular filtration rate as a result of vomiting, diarrhea, and sepsis (3). On the other hand, solitary kidneys in individuals can be associated with an increased risk of chronic kidney disease (4). Therefore, an effective treatment strategy is needed for such patients.

Case Presentation

An 18-month-old boy living in Chaharmahal and Bakhtiari province in southwestern Iran, with vomiting and diarrhea (from three days before admission and anuria from the day before admission) was referred to Farsan hospital. The patient was the fourth child in their family and had no family history of the disease.

Clinical findings

The patient had bulky and watery diarrhea about 7-8 times a day and vomited 3-4 times a day which contained

food particles. He had a fever on the first and second days; afterward, it was controlled with medication. The patient had no history of cough or respiratory symptoms during the disease. The patient's parents did not report any history of contact with a positive COVID-19 patient nor did they report skin rashes or other problems. In Farsan hospital, some medical procedures such as the administration of three doses of 20 mL/kg of normal saline and one dose of two mg/kg furosemide (Lasix) were prescribed, and since the patient had anuria, a foley urinary catheter was performed. After two hours, the patient remained anuric and then was referred to Hajar hospital in Shahrekord. It is necessary to mention that the blood urea nitrogen and creatinine of the patient were reported to be 40 and 3.1 in Farsan hospital, respectively.

The patient was alert and lethargic upon arrival at the pediatric ward of Hajar hospital. The capillary refilling time was below three seconds. During the examination of the patient's head and neck, he had teary eyes, and the pupils were normal in size and reactive to light. Moreover, pre-orbital edema was observed. The patient was diagnosed with dry mucosa, the bottom of his throat was found to be normal, and lymphadenopathy was not observed. There was no skin rash, and his heart, lung, or vesicular breath sound were normal. During the examination, the abdomen was soft and without abdominal distension,

organomegaly, and mass. Furthermore, the genital examination was normal, and the pulse of the four limbs was complete and symmetrical. Other clinical findings were as follows:

Oxygen saturation: 95%

Temperature: 36.6°C

Respiratory rate: 36 per minute

Pulse rate: 93 per minute

Blood pressure: 90/60 mm/Hg

Laboratory and imaging findings

Ultrasound findings showed that the right kidney was not observed at the anatomical site, mild hydronephrosis with a diameter of 8 mm pelvis was observed for the left kidney of 87 × 42 mm with the thickness of parenchyma 9 (compensatory hypertrophy), and also the left renal parenchyma echo was enhanced. Furthermore, mild abdominal and pelvic free fluid were observed. The vascular flow was evident in the artery and vein of the left kidney, and the patient's bladder was empty. Other laboratory findings of the patient are tabulated in Table 1.

Treatment

The patient was recommended to keep nothing by mouth. The serum was applied based on insensible water loss plus urine output, and intake output was controlled. Sonography of the kidney and the urinary tract was done, and blood pressure was checked every hour. The treatment was done according to the initial management

Table 1. Laboratory and urinary biochemical findings of the patient

Laboratory tests	Range
Na ⁺ (mmol/L)	144
K ⁺ (mmol/L)	4.7
P (mg/dL)	6.6
BUN (mg/dL)	36
Cr (mg/dL)	2.2
Ca (mg/dL)	7.7
Bs (mg/dL)	92
Mg (mmol/L)	2.1
Alb (mg/dL)	2.8
CRP (mg/L)	7
WBC (× 10 ⁹ /L)	10300
NETs (ng/μL)	54
Hb (g/L)	11.1
PLT (mm ³)	182000
pH	7.18
PCO ₂ (mm Hg)	23
HCO ₃ (mEq/L)	8.5
BE (mmol/L)	-19

Note. Na: Sodium; K: Potassium; P: Phosphorous; BUN: Blood urea nitrogen; Cr: Creatinine; Ca: Calcium; Bs: Blood sugar; Mg: Magnesium; Alb: Albumin; CRP: C-reactive protein; WBC: White blood count; NETs: Neutrophil extracellular traps; Hb: Hemoglobin; PLT: Platelet count; PCO₂: Partial pressure of carbon dioxide; HCO₃: Bicarbonate; BE: Bass excess.

of children's acute renal failure (5,6). Based on the test results (Table 2), bicarbonate drip, Lasix drip, and dopamine drip were prescribed for the patient. Other treatments are listed below:

- Serum Dw 5% 80 cc + 3.7 NaCl + 15 mg Lasix + 4.5 cc NaHCO₃ within 6 hours.
- Dopamine ampoule 60 mg in 100 cc normal saline at a rate of three drops per minute.
- Meropenem 100 mg injection ampoules every 12 hour IV (Intravenous) infusion (adjust dose).
- Clindamycin 100 mg injection ampoules every 6 hour IV infusion (adjust dose) which were then discontinued.
- Check the sodium, potassium, and venous blood gas 4 hours later.
- The serum adjusts every 6 hours.

Afterward, the previous serum continued for 6 hours, and because of the high level of uric acid (9.5 mm/dc), allopurinol 18 mg was administered by gavage every 6 hours.

About 18 hours after mentioned treatments, the patient's anuria was treated, and the patient's urine flowed. After two days, the patient was discharged with blood urea nitrogen and creatinine of 15 and 0.6, respectively

Discussion

This case study investigated the success of treating a patient with anuria and gastroenteritis, and the patient later was diagnosed with a solitary kidney. Acidosis and other biochemical disorders were treated with bicarbonate drip, allopurinol, Lasix drip, and dopamine drip. In a case series study that was conducted on six patients who were affected with acute gastroenteritis-induced AKI, three patients were treated by conservative treatment alone with fluids, electrolyte management, and antibiotics therapy (3). Ashida et al in their retrospective

Table 2. The results of the second and third laboratory tests during treatment

Laboratory Tests		Range
Na ⁺ (mmol/L)	1*	143
	2**	140
K ⁺ (mmol/L)	1	4.9
	2	4.9
pH	1	7.22
	2	7.30
PCO ₂ (mm Hg)	1	18
	2	24
HCO ₃ (mEq/L)	1	7.1
	2	11.4
BE (mmol/L)	1	-20
	2	-12

Note. Na: Sodium; K: Potassium; PCO₂: Partial pressure of carbon dioxide; HCO₃: Bicarbonate; BE: Bass excess; * Second results of laboratory test after first-round treatment; ** Third results of laboratory test after Serum DW5 50 cc + 10 cc NA, HCO₃.

case study reported that obstructive uropathy associated with rotavirus gastroenteritis among children is rare, but this disease condition should be given greater attention when anuria is refractory to sufficient fluid replacement therapy (7). The prompt treatment of anuria is essential to prevent AKI. In addition, continuous renal replacement therapy and long-term monitoring of renal function are considered the key points in the treatment of anuria and recovery of renal function (8). In general, prolonged anuria is an adverse prognostic item for renal recovery. The simultaneous presence of sepsis and infection increases the risk of death in these patients (9). Since the current patient had only one kidney and suffered from anuria for several hours, fortunately, the treatment strategy was successful, and his problem was resolved. Therefore, it is recommended to carry out regular monitoring of kidney biochemical factors in the patients and to proceed step by step based on these principles to achieve successful treatment with minimal side effects.

Conclusion

Since the patient was affected with a solitary kidney and was suffering from anuria for several hours, fortunately, he responded to our treatment protocol and did not suffer from progressive kidney damage. For better management of acute renal failure and the prevention of progressive renal injury, it is recommended to use Lasix drip with dopamine drip (renal dose).

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Authors' Contribution

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Competing Interests

The authors declared no conflict of interests.

Ethical Approval

All the ethical principles related to the patient were considered in this study, and the consent of the patient's parents was obtained. Further, the study protocol was registered in the Ethics Committee of Shahrekord University of Medical Sciences with the code IR.SKUMS.REC.1401.083.

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