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(CASE REPORT)

Post obstuctive diuresis – relief is not the end! The problem just starts

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Abstract

Aim and background: Post-obstructive diuresis (POD) following relief of urinary tract obstruction is usually a self-limiting phenomenon. However pathological POD can occur resulting in various complications. This case report describes a patient who developed POD and was managed effectively

Objective: To familiarize emergency physicians with the occurrence of post obstructive diuresis following relief of urinary obstruction

Case report: 78-year-old man presented to our ED with complaints of difficulty in urination for past 1 week. On examination, his abdomen was distended with palpable bladder. Vitals and other systemic examinations were normal. Bladder was decompressed by catheterization and around 1000 ml urine drained. Patient developed massive diuresis post decompression of bladder in the following days. He was treated with intravenous fluids and electrolyte imbalances corrected appropriately.

Conclusion: Early diagnosis by close monitoring and timely management reduces complications following decompression of urinary bladder

Clinical significance: To increase the awareness among emergency physicians thereby enabling early diagnosis and foresee the complications and improve the outcomes of the patients

Keywords: Urinary retention; Bladder decompression; Diuresis; Post obstructive diuresis

1. Introduction

Acute drainage of an obstructed urinary tract can unmask deranged renal mechanisms and result in uncontrolled, unregulated urine production known as post obstructive diuresis (POD)[1]. POD can be either physiological or pathological. If the post-obstructive diuresis condition becomes pathologic, it can cause serious consequences such as dehydration, electrolyte abnormalities, hypotension, hypovolemic shock, and even result in death. We encountered a patient in our ED who had post obstructive diuresis following decompression of acute on chronic urinary retention.

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2. Case presentation

78-year-old man who was a known case of diabetes mellitus and hypertension on treatment presented to our emergency department with complaints of difficulty in urination for past 1 week associated with inability to void urine in spite of urge to void and constipation for past 2 days. Examination of the patient revealed the following findings: pulse 110/min; BP 140/80 mmHg; SpO2 97% in room air; JVP and temperature normal. On examination, his abdomen was distended with palpable bladder. Other systemic examinations were normal. IV access established. Bladder was decompressed by catheterization and around 1000 ml urine drained. Urologist and nephrologist consulted and expert opinion obtained. Intravenous fluids (Normal saline, ringer lactate rushed followed by 5% dextrose started at 100 ml/h) given. IV antibiotics (Piperacillin-tazobactam and levofloxacin) and other supportive medications started. Over the next 3 hours, he had around 3000 ml of urine output (blood tinged) for about 1500 ml of IV fluids given. The rate of IV fluids increased to 250 ml/hr. His blood investigation results obtained which showed elevated renal parameters (urea 118 mg% and creatinine 4.1 mg%), dyselectrolytemia (Serum Sodium 116 mEq/L, Potassium 5.2 mEq/L, Chloride 86.3 mEq/L, Bicarbonate 15.6 mEq/L) and elevated total leucocyte count (TLC 13400 cells/cu mm , polymorphs 92% and Hemoglobin 13.4 gm%). Ultrasonography of the abdomen revealed mucosal irregularity in the urinary bladder suggestive of chronic outlet obstruction and grade3 prostatomegaly. Serum prostate specific antigen was elevated to about 77.37 ng/ml (reference range: upto 4 ng/ml). Total urine output on day 1 of admission was around 7.4 litres for input of around 3.5 litres. Enema was given and he passed large volume of stools.

On day 2 of admission, his vitals remained stable his blood investigation revealed improvement in his renal parameters and electrolytes became normal (urea 76mg%, creatinine 2.3 mg%, sodium 134.5 mEq/l, Potassium 4 mEq/L, Chloride 99 mEq/L, Bicarbonate 20 mEq/L). 3 litres of intravenous fluids given and around 3.5 litres of oral fluids were given. The total urine output (clear) on that day was around 6.8 litres.

On day 3 of admission, he was given around 3 litres of IV fluids and around 2 litres of oral liquids. His urine output was around 5.5 litres that day. His vitals remained stable. His renal parameters became normal (urea 26 mg%, creatinine 1.1 mg%, sodium 136, potassium 4.4, chloride 99.8, bicarbonate 22.7 mEq/L)

On day 4 of admission, around 3 litres of IV fluids and 2 litres of oral fluids were given. TRUS (transrectal ultrasound scan) guided prostate biopsy was done. He was stable and around 5.3 litres of urine output was there.

His urine output gradually started decreasing and he was discharged 2 days later. He was advised to continue oral antibiotics, antihypertensives, oral hypoglycemic agents and other supportive medications and review in OPD with biopsy reports. On follow-up his biopsy was suspicious of malignancy and immunohistochemistry was done which confirmed urothelial malignancy infiltrating prostate and he was started on appropriate treatment for the same.

Table 1 Serial investigations of the patient

INVESTIGATION	DAY 1	DAY 2	DAY 3
UREA mg%	118	76	26
CREATININE mg%	4.1	2.3	1.1
SODIUM mEq/L	116	134	136
POTASSIUM mEq/L	5.2	4	4.4
CHLORIDE mEq/L	86.3	99	100
BIACRBONATE mEq/L	15.6	19	22.7
PSA ng/ml	77.37		

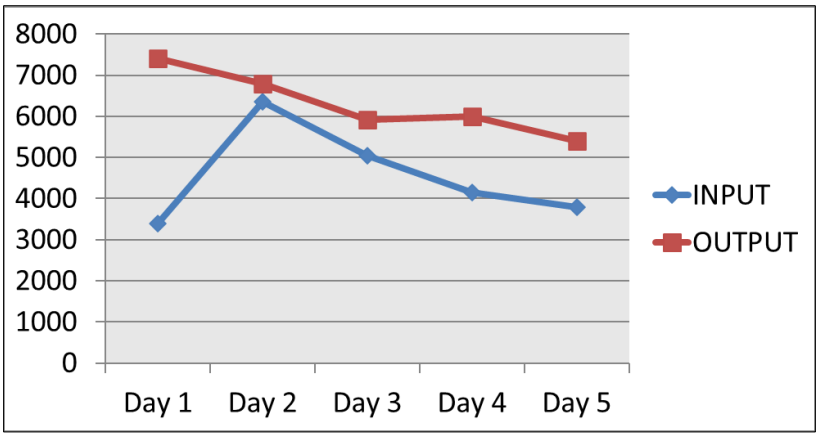

Figure 1 Intake and output record of the patient (in millilitre)

3. Discussion

Urinary retention is a one of the common clinical condition's patients presents with in hospitals. It can be either acute or chronic. Acute urinary retention has a rapid onset, suprapubic pain and inability to urinate. On the contrary, chronic urinary retention has a gradual onset, no associated pain and can pass only small amounts of urine.[1] The incidence of urinary retention is higher in men than in women and increases with age.[2] Apart from age and sex, other risk factors associated with an increased risk of urinary retention include lower urinary tract symptoms, prostate disease, long-standing diabetes, recurrent catheterization, fecal impaction, and the use of anticholinergic medications. Urinary retention can be diagnosed with a postvoid bladder ultrasound or the placement of a urinary catheter which can demonstrate a large residual urine volume [1](500 to 600 mL in acute urinary retention, > 800 mL to around 4 litres sometimes in chronic urinary retention)[3,4]

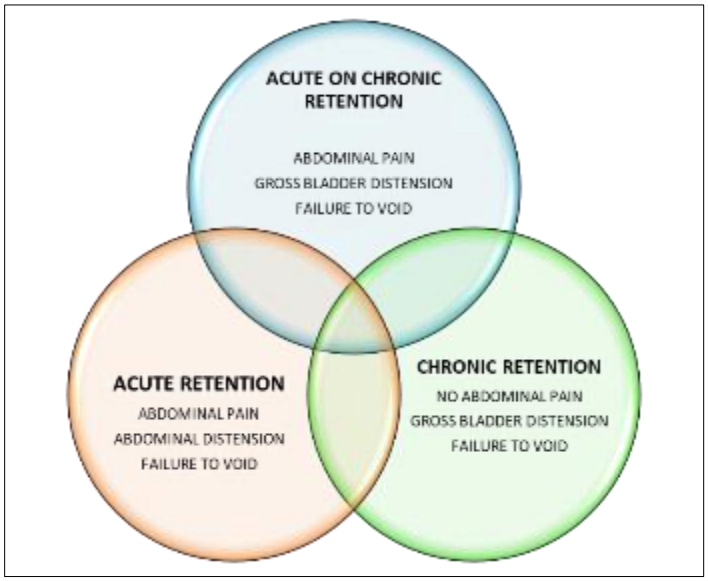

Figure 2 Features of different types of urinary retention

In an attempt to eliminate the accumulated salts and fluid after relief of obstruction, kidneys initiate diuresis until homeostasis is achieved which is termed as post obstructive diuresis (POD).[5] Studies indicate approximately 0.5% to 52% of patients develop postobstructive diuresis after relief of an obstruction.[6] POD can either resolve once hoemostasis achieved (physiological) or continue beyond hoemostasis (pathological) resulting in complications. Physiological diuresis is usually self-limited to 24 hours or less. When the obligatory loss of salt and water continues long beyond a homeostatic state, the condition becomes pathologic post-obstructive diuresis lasting for 48 hours or longer. [1]

The exact etiology is unclear, but it certainly involves several mechanisms such as the following

- Progressive reduction in medullary concentrating ability due to vascular washout
- Down-regulation of the sodium transport mechanism in the thick, ascending loop of Henle
- Reduction in glomerular filtration rate (GFR) leading to ischemia and damage to juxtamedullary nephrons
- Diminished response to antidiuretic hormone[1,7-10]

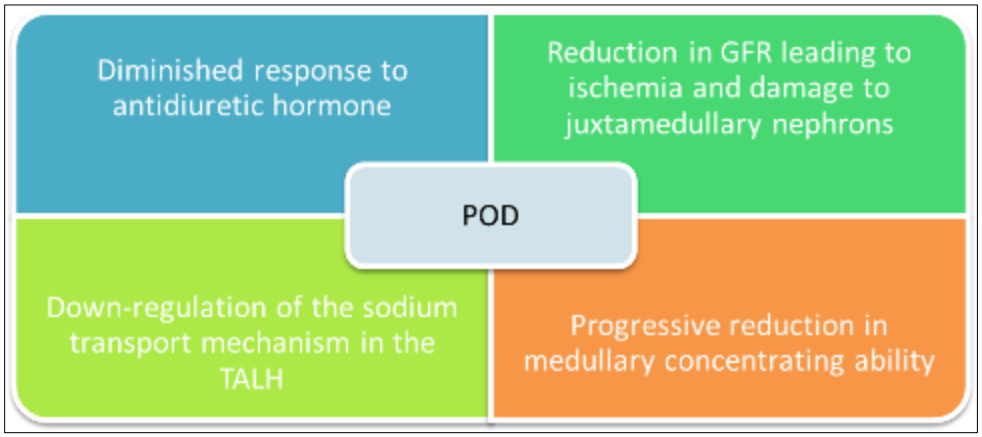

Figure 3 Pathophysiology of post obstructive diuresis

Careful monitoring of the patient helps in diagnosis. POD is diagnosed clinically when patient has urine output of nearly 200 mL/h for 2 consecutive hours or 3 L in a 24-hour period after relief of an obstruction.[5] The patients should be monitored closely for input output chart, vitals, renal parameters, electrolytes atleast every 12- 24 hrs or more frequently as necessary.[1,9] Urine analysis (sodium, potassium and osmolality) helps to differentiate type of diuresis (urea vs salt diuresis).Urea diuresis is usually self-limiting. Hypotonic urine (specific gravity of urine 1.000). urine sodium >40 mEq/L is consistent with pathologic salt-wasting POD suggesting the patient needs strict monitoring.[1,9]

Replacement of 75% of the previous 1-hour urinary output is recommended.[11]Maintaining negative fluid balance is essential as diuresis may be exacerbated or prolonged when excessive fluid is administered.[1] The type and amount of fluid should be tailored to the patient's needs based on his or her serum and urinary electrolyte levels and clinical hydration status.[1]

Complications of pathological POD include volume depletion, hyponatremia or hypernatremia, hypokalemia, hypomagenesemia, metabolic acidosis, shock and even death.[1,9,11]

4. Conclusion

Post obstructive diuresis when suspected and diagnosed early improves clinical outcomes. Admitting the patients after relief of urinary obstruction for a 24-hour observation period helps in picking up the diagnosis early. Patients with pathologic POD require strict monitoring of vital signs, fluid status, and serum electrolyte level. This article aims to promote awareness and urge all health care providers to foresee the complications post relief of urinary obstruction and thereby improving the outcomes of the patients

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of

The present research work does not contain any studies performed on animals/humans subjects by any of the authors'

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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