



Introduction

- Polyuria is defined as urine output greater than 3 liters in a 24 hour period with the etiology divided into osmotic or water diuresis.
- The causes of polyuria include acute tubular necrosis recovery phase, post obstructive diuresis, psychogenic polydipsia, diabetes insipidus (central, nephrogenic, or congenital), hyperglycemia osmotic diuresis (OD), high protein diet, salt wasting nephropathies, and excess solute with water intake.

Case Presentation

- A 46-year-old male with DM, HTN, bipolar disorder on lithium was admitted with abdominal pain and constipation.
- Vitals were stable on admission without fever.
- CT scan showed small bowel obstruction and no hydronephrosis.
- Labs showed serum sodium 148 mmol/L, potassium 2.9 mmol/L, BUN 29 mg/dl, serum creatinine 1.89 mg/dl, and lithium level of 1.24 mEq/L.
- Bumex, metformin, and lithium were held. Day 3 of admission,
- TPN was started.
- Day 4 of admission he produced 4.5 liters of urine in 24 hours.
- He had urine osmolarity 615 mOsm/kg with an osmole excretion rate of 2767 mOsm/day.
- The serum sodium increased to 163 mmol/L. TPN was stopped and urine output decreased to 75 cc per hour.
- Resulting sodium was 153 mmol/L. Day 6, TPN and lithium were restarted.
- Polyuria returned. On Day 7 sodium was 160 mmol/L, urine osmolarity was 710 mOsm/kg, and resulting osmole excretion rate was 4,070 mOsm/day.
- TPN was subsequently decreased and by day 9 serum sodium normalized to 146 mmol/L on D5W and polyuria resolved.

	11/17/21		11/19/21		11/20/21	11/21/21		11/22/21
Cr	3.91	T P N	1.43	T P N	1.10		T P N	0.93
Urea	41		20		12			16
Serum Sodium	140		152		163			152
Glucose	122		294		274			283
Urinalysis Glucose		S T A R T E D		S T A R T E D	>1000		S T A R T E D	
Urinary Sodium	<20				<20			<20
Urine osmolality	360				615			
Urine Output	1.4 L		4.5 L		2.9 L	1.8 L		3.3 L

Discussion

- Osmotic Diuresis is defined as polyuria with a urine osmolarity of greater than 300 mOsm/kg and an osmole excretion rate of greater than 1000 mOsm/day.
- Determination of the daily excreted urinary osmoles, yield important clues to the cause of polyuria and should be included in the routine workup of polyuria.
- In OD the defect is an inability to reabsorb a substantial proportion of the filtered solute which can cause volume depletion and hypernatremia.

Conclusions

- High dietary intake/exogenous administration of solute can result in increased 24 hours urinary osmolar output causing OD.
- Our patient developed polyuria and hypernatremia secondary to TPN. In polyuric patients, TPN can be considered as a cause of OD.

References

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Arora N, Durvasula R. Recurrent Polyuria.Am J Kidney Dis 2018; 72(5):xvii-xix