

## CASE REPORTS

### CONGENITAL HYPOTHYROIDISM LEADING TO ACUTE KIDNEY INJURY WITH HYPERNATREMIC DEHYDRATION

*P R Inamdar, R M Bellad, V R Herekar*

#### Abstract

Congenital hypothyroidism leading to acute kidney injury (AKI) and hypernatremia is not reported in literature. A two month old infant presented with hypernatremic dehydration and AKI. He was detected to have poor suck due to hypothyroidism. His suck improved after supplementation with thyroxine.

**Keywords:** Congenital hypothyroidism, acute kidney injury, hypernatremic dehydration

#### Introduction

Hypernatremic dehydration is commonly seen in neonates and paraneonates requiring emergency admission, fluid resuscitation and occasionally peritoneal dialysis. Hypothyroidism is well known to be associated with hyponatremia. (1) But hypothyroidism might also present in neonates as poor feeding which in turn may lead to hypernatremic dehydration. Although hypothyroidism is associated with renal dysfunction, its association with acute kidney injury (AKI) in infancy is not known. We present a 2 month old infant who had congenital hypothyroidism and poor suck and who presented to us with hypernatremic dehydration and AKI.

#### Case Report

A 2 month old female infant on exclusive breast feeds, third born to a 22 years old mother, presented with primary complaint of anuria and lethargy for two days. Mother also complained that since birth the infant's suck was not vigorous (as compared to other two siblings), infant had constipation, cried little and slept a lot. Baby's birth history was normal and she had a birth weight of 2.8 kg. There was no history of prolongation of physiological jaundice. At presentation, infant had a depressed anterior fontanelle, skin turgor was prolonged and mucous membranes were dry. Bladder and kidneys were not palpable. Child had relative bradycardia compared to the degree of dehydration and had muffled heart sounds. Child's weight was 3.6 kg and her length was 50cm and head circumference was 37cm. The posterior fontanel was closed. She had a sallow complexion, protruding tongue and her hairline reached down the forehead. There was no edema. The child was initially rehydrated with two boluses 60cc/kg of 0.9% normal saline. Her pre-hydration sodium showed hypernatremia (155mmol/l) and hyperkalemia with serum potassium of 5.45mmol/l. Her urea and creatinine were elevated (205mg/dl and 3 mg/dl respectively). Fractional excretion of sodium could not be done due to limited resources. Ultrasound abdomen revealed bilateral medullary nephrocalcinosis (secondary to dehydration) with normal urinary tract anatomy. A diagnosis of pre-renal AKI with hypernatremic dehydration was made and the child was given intravenous fluid of 0.45% dextrose normal saline at 150cc/kg/day. On second day of admission her urea decreased to 45mg/dl, creatinine came down to 0.69 mg/dl, sodium was 140 mmol/l and

potassium was 4mmol/dl. Later maintenance fluid was continued. In view of history of chronic constipation with typical facial features, thyroid function test was performed. T3 was not detectable, T4 was 1.1mcg/dl and TSH was 150mcIU/ml. She was started on levothyroxine at 10mcg/kg/day. Her suck and milk intake improved, intravenous fluids were stopped and child was discharged

#### Discussion

Congenital hypothyroidism, a common cause of preventable mental retardation may be subtle at presentation and not evident in neonatal age group. Recently there is an increased trend towards neonatal screening and treatment of hypothyroidism but still at many centers routine screening is not followed due to financial constraints. Congenital hypothyroidism presenting with renal dysfunction is known but underreported. (2) Thyroid hormone plays an important role in growth, development and physiology of kidney. Hypothyroidism causes a decrease in the glomerular filtration rate, the renal plasma flow and free water excretion. (3) These effects are reversed on supplementation of thyroxine hormone. Literature on kidney dysfunction in pediatric hypothyroid patients are very few. Studies have demonstrated high incidence of congenital renal anomalies in congenital hypothyroidism. (2) Acute kidney injury has been reported in two hypothyroid adolescent patients one of which was due to rhabdomyolysis. (4) To the best of our knowledge, this is the first reported case of an infant presenting with AKI secondary to congenital hypothyroidism.

Hypothyroidism is known to be associated with hyponatremia which is more common in patients with elevated TSH compared to those with normal TSH. (5) The mechanisms proposed are anti-diuretic hormone being excessively released due to hypovolemia, reduced renal glomerular filtration rate with blood flow leading to a reduction in free water formation and decreased synthesis and release of atrial natriuretic peptide. (6)

Hypernatremic dehydration due to inadequate breast feeding presents clinically between first and third weeks of life. Lactation failure secondary to neonatal factors, such as poor suck, or to maternal factors, such as stress, mastitis, or sore/retracted nipples lead to a vicious circle in which when breast milk production is reduced, the neonate becomes weak and sucks poorly, and the drive for lactation drops further and dehydration occurs. (7) Complications of hypernatremic dehydration include: acute renal failure, elevated liver enzymes, disseminated intravascular coagulation, brain edema, intracranial hemorrhage, cavernous sinus thrombosis and bilateral iliac artery thrombosis. (8) Therapy for hypernatremia includes adequate hydration orally if the child is clinically stable and relactation. Intravenous rehydration may be required if the neonate's serum sodium is significantly

elevated and in presence of any complications. (9) In setting of AKI, peritoneal dialysis may also be required. (10) In our patient, we presume that poor suck due to hypothyroidism led to lactation failure and hypernatremic dehydration, which complicated the existing state of low glomerular filtration leading to acute kidney injury.

We report this case to highlight that hypernatremic dehydration can be presenting feature of congenital hypothyroidism. We also stress that need of the hour is to introduce routine screening of all neonates for hypothyroidism to prevent such complications even in resource limited settings.

#### **Contributor Statement**

PRI and RMB were involved in preparing the Manuscript, VRH was involved in collecting data.

**Funding :** None

**Conflict of Interest :** None

#### **References :**

1. Liamis G, Milionis HJ, Elisaf M. Endocrine disorders: causes of hyponatremia not to neglect. *Ann Med.* 2011;43(3):179-87
2. del-Río Camacho G, Tapia Ceballos L, Picazo Angelín B, Ruiz Moreno JA, Hortas Nieto ML, Romero González J. Renal failure and acquired hypothyroidism. *Pediatr Nephrol.* 2003;18(3):290-2.
3. Iglesias P, Diez JJ. Thyroid dysfunction and kidney disease. *Eur J Endocrinol.* 2009;160(4):503-15.
4. Joshi B, Jones D, Rochford A, Giblin L. Hypothyroidism and associated acute renal failure. *J R Soc Med.* 2009; 102(5): 199-200.
5. Comak E, Koyun M, Kılıçarslan-Akkaya B, Bircan I, Akman S. Severe Rhabdomyolysis and Acute Renal Failure in an Adolescent with Hypothyroidism. *Turk J Pediatr.* 2011; 53(5): 586-9
6. Schwarz C, Leichtle AB, Arampatzis S, Fiedler GM, Zimmermann H, Exadaktylos AK, et al. Thyroid function and serum electrolytes: does an association really exist? *Swiss Med Wkly.* 2012;142: w136696.
7. Fahmy WF Hanna, Maurice F Scanlon. Hyponatraemia, hypothyroidism, and role of arginine-vasopressin. *The Lancet.* Volume 350, Issue 9080, 13 September 1997, Pages 755-756.
8. Zaki SA, Mondkar J, Shanbag P, Verma R. Hypernatremic dehydration due to lactation failure in an exclusively breastfed neonate. *Saudi J Kidney Dis Transpl.* 2012;23(1);125-8
9. Unal S, Arhan E, Kara N, Uncu N, Aliefendioglu D. Breast-feeding-associated hypernatremia: Retrospective analysis of 69 term newborns. *Pediatr Int.* 2008; 50(1): 29-34.9
10. Livingstone VH, Willis CE, Abdel-Wareth LO, Thiessen P, Lockitc G. Neonatal hypernatremic dehydration associated with breast-feeding malnutrition: a retrospective survey. *CMAJ.* 2000;162(5);647-52.
11. Yildiz N, Erguven M, Yildiz M, Ozdogan T, Turhan P. Acute peritoneal dialysis in neonates with acute kidney injury and hypernatremic dehydration. *Perit Dial Int.* 2013;33(3):290-6.

---

**From:** Department of Pediatrics, Jawaharlal Nehru Medical College, Nehru Nagar, Belgaum, Karnataka, India.

**Address for Correspondence:** Dr. Prithi R. Inamdar, 15/25, Krishnakunj, Raghavendra Colony, RC Nagar, 2nd stage, Belgaum 590006.

**Email:** shenoypreeti@rediffmail.com



**DOI No.** 110.7199/ped.oncall.2016.19

---