

Child With Suspected Diabetes Insipidus

Suggestive history and physical findings	Initial laboratory and/or radiologic work-up can include:	When to refer	Items useful for consultation	Additional information
<p><u>Symptoms/Signs:</u> Polyuria, polydipsia, weight loss</p> <p>Pathological polyuria or polydipsia is defined as exceeding 2L/m²/day.</p> <p>Headaches (related to brain tumor), rash (related to Langerhans cell histiocytosis) may be seen.</p> <p><u>Family history:</u> May be positive in the rare hereditary causes of diabetes insipidus</p> <p><u>Differential Diagnosis</u></p>	<p><u>Blood/urine tests:</u></p> <ul style="list-style-type: none"> • Serum sodium • Blood glucose/urine glucose (to rule out diabetes mellitus) • Paired serum and urine osmolality <p>Serum osmolality greater than 300mOsm/Kg with urine osmolality less than 300mOsm/Kg establishes the diagnosis.</p> <p><u>Other tests to consider after consultation with Pediatric Endocrinologist:</u></p> <ul style="list-style-type: none"> • Antidiuretic hormone • Water deprivation test 	<p><u>Urgent:</u> If signs of dehydration are present, it may be necessary to hospitalize the patient and initiate work up as an inpatient</p> <p><u>Routine:</u> Most times when this diagnosis is suspected, a referral should be made and child seen by a specialist within the month</p> <p><u>Find a Pediatric Endocrinologist</u></p>	<p>Previous growth data/growth charts</p> <p>Pertinent medical records, including duration of symptoms</p> <p>Recent laboratory and radiologic studies</p>	<p><u>Additional Information</u></p> <p><u>References</u></p>

Differential Diagnosis of polyuria

- Psychogenic polydipsia: a rare condition where the primary pathology is polydipsia leading to wash out of the medullary concentration gradient
- Diabetes Mellitus: This will be associated with increased urine glucose excretion and elevated blood glucose.
- Central diabetes insipidus: (defect in ADH production):
 - Genetic causes
 - Trauma
 - Neurosurgical intervention
 - Radiation
 - Congenital anatomic defects
 - Neoplasms
 - Infiltrative, autoimmune and infectious causes: **Langerhans cell histiocytosis** is the most common type of infiltrative disorder causing diabetes insipidus.
 - Drugs
- Nephrogenic diabetes insipidus: (defect in ADH action)
 - Genetic
 - Acquired: this is more common and the causes can range from drugs, ureteral obstruction, polycystic kidney disease, medullary cystic disease or primary polydipsia with wash out of the medullary concentrating gradient.

Additional Information

Water Deprivation test should only be performed under close supervision by a specialist for confirmation of this diagnosis as patients can have cardiovascular collapse if not properly monitored.

Treatment of central diabetes mellitus:

- Infants with DI: First line of therapy in neonates and infants with DI is using expressed breast milk or a low solute formula like PM 60/40 and hydrochlorothiazide, as their diet consists mainly of liquids. Hydrochlorothiazide has been proven to be a safe and effective way to treat mild to moderate DI while avoiding the sodium fluctuations often seen with desmopressin treatment in infants.

- DDAVP/desmopressin is often used for control of significant polyuria/polydipsia. DDAVP is a synthetic long acting analog of vasopressin. It is available in oral tablets and melts, intranasal and subcutaneous form.
- There is a risk of sodium fluctuations and hyponatremia with DDAVP treatment. Care should be taken during treatment as inadvertent large doses may lead to severe hyponatremia and seizures. Ensuring “breakthrough” voiding close to the next dose can be helpful to limit risk of hyponatremia.
- In some older children with DI and intact thirst mechanism, increasing fluid intake to match urine output and avoid hypernatremia can be sufficient treatment. Children with intact thirst mechanism can usually self-regulate to increase their water intake to avoid dehydration. Avoiding pharmacological therapy can prevent sodium fluctuations and risk for hyponatremia.

Suggested References and Additional Reading

- Rivkees, SA, Dunbar N, Wilson TA. The management of central diabetes insipidus in infancy: desmopressin, low renal solute formula, thiazide diuretics. *Journal of Pediatric Endocrinology and Metabolism*, 2007, 20, 459-469.
- Cheetham T, Baylis PH. Diabetes insipidus in children: Pathophysiology, diagnosis and management. *Pediatr Drugs* 2002, 4, (12); 785-796.

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