Idiopathic central diabetes insipidus

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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Diagnostic procedure
Technique: MR
Special Focus: Pathology Case Type: Clinical Cases
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Patient: 57 years, male

Clinical History:

Presentation with sexual complaints, thorough anamnesis revealed polyuria and polydipsia. Laboratory results showed elevated concentration of sodium (146 mmol/L; 136 - 146 mmol/l), alfa-fetoprotein (6, 4 ng/ml; < 6, 96 ng/ml), estradiol (70 pg/ml; 39, 8 pg/ml) and hyperprolactinaemia (34, 3 ng/ml; 2, 1 - 17, 7 ng/ml).

Imaging Findings:

The patient had magnetic resonance (MR) imaging with T1- and T2-weighted images of the pituitary, followed by dynamic imaging during contrast administration. This demonstrated a thickened pituitary stalk with homogenous contrast enhancement. (Fig. 1, 2 & 3) The neurohypophysis was very small but with preservation of T1-signal hyperintensity. (Fig. 1 & 2) The dynamic MR images showed no abnormalities and follow-up MR imaging showed a stable pituitary stalk thickness during a 10-month follow-up period. The scan depicted a small adenohypophysis with a T2- hypointense hypoenhancing microadenoma (5 x 3.5 mm) on the right side. (Fig. 3 & 4)

Discussion:

Central DI is characterised by decreased release of antidiuretic hormone (ADH) resulting in polyuria and polydipsia. In normal individuals ADH is synthesised together with oxytocin in the hypothalamus, transported along the pituitary stalk and released by exocytosis from the posterior lobe of the pituitary gland. [1] The central origin in DI results from lesions in the hypothalamic-neurohypophyseal axis with a differential diagnosis as listed below. [2, 3, 4]

Due to the large differential diagnosis, an extensive diagnostic work-up is necessary, including profound history taking and endocrinologic evaluation with blood, urine and if necessary cerebrospinal fluid samples. In our case an extensive endocrine evaluation confirmed the diagnosis of a partial diabetes insipidus (DI) of central origin. Additionally computed tomography of the thorax did not show any signs of sarcoidosis and cerebrospinal fluid sample had a normal cytological and biochemical analysis.

Surgical biopsy is the only technique to confirm infundibuloneurohypophysitis but should be reserved for progressive enlargement of the pituitary stalk. [1, 5, 6] In view of the negative test results and follow-up, a biopsy of the pituitary stalk was considered unsafe for our patient.

MR imaging clearly identifies and differentiates the normal posterior lobe from the anterior lobe due to the characteristic high signal intensity on T1-weighted images. The high signal on T1 weighted images is thought to be due to the normal storage of vasopressin-neurophysin complex in the neurohypophysis, explaining why in patients
with DI there is a loss of the high signal intensity on T1-weighted images. [1, 5, 6] In our case, the partial character of the DI explains the preservation of the T1-hyperintensity. This T1-signal alteration in DI may be associated with enlargement of the pituitary stalk or infundibulum. [1, 4, 6]

The association of posterior pituitary gland alterations with an altered anterior pituitary gland and hormone deficiency leads to a stronger suspicion of an infiltrative process. [4, 5] The dynamic MR images of our patient showed no abnormality, ruling out vascular causes, and follow-up MR imaging showed a stable pituitary stalk thickness. [6]

Careful follow-up with MR studies and endocrine evaluation should be performed every 3-6 months during the first 3 years, to establish the diagnosis before extensive disease has developed. After 3 years of unchanged imaging findings a malignant process is unlikely but follow-up should be continued during 2 years and every 2-5 years thereafter. [4]

The hyperprolactinaemia and the sexual complaints are explained by the microadenoma on the right side. [7]

**Differential Diagnosis List:** Idiopathic central diabetes insipidus (with simultaneous occurrence of a microadenoma), Inflammatory (e.g. infundibuloneurohypophysitis (INH) sarcoidosis), Neoplastic (e.g. metastatic germinoma), Ischaemia, Trauma (e.g. surgery), Idiopathic disease

**Final Diagnosis:** Idiopathic central diabetes insipidus (with simultaneous occurrence of a microadenoma).

**References:**


Description: Sagittal T1-weighted image without gadolinium shows the thickened pituitary stalk and the spontaneous hyperintensity of the neurohypophysis. Origin: Department of Radiology, Jessa Hospital, Hasselt, Belgium.
Figure 2

**Description:** Sagittal T1-weighted image with gadolinium demonstrates the homogenous enhancement of the thickened pituitary stalk. **Origin:** Department of Radiology, Jessa Hospital, Hasselt, Belgium.
Figure 3

Description: Coronal T1-weighted image with gadolinium not only shows the enhanced and thickened pituitary stalk but also displays the microadenoma on the right side. Origin: Department of Radiology, Jessa Hospital, Hasselt, Belgium.
Figure 4

Description: Coronal T2-weighted image demonstrates the small hypointense microadenoma on the right side. Origin: Department of Radiology, Jessa Hospital, Hasselt, Belgium.