Case report

Lymphocytic hypophysitis presenting with diabetes insipidus: MR findings

T. Shimono¹, T. Yamaoka¹, K. Nishimura¹, H. Koshiyama², M. Sakamoto², T. Koh², K. Hayakawa¹

¹Department of Radiology, Kyoto City Hospital, 1–2 Higashi-kadachou Mibu Nakagyoku, Kyoto, Japan 604
²Divisions of Endocrinology and Metabolism, Department of Medicine, Kyoto City Hospital, 1–2 Higashi-kadachou Mibu Nakagyoku, Kyoto, Japan 604

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Abstract. It has been thought that neurohypophysial involvement manifesting as central diabetes insipidus in lymphocytic hypophysitis is rare. The radiological and clinicopathological features of two cases represent a variant of lymphocytic adenohypophysitis and/or lymphocytic infundibulo-neurohypophysitis are discussed.

Key words: Pituitary gland – Lymphocytic hypophysitis – Lymphocytic adenohypophysitis – Lymphocytic infundibulo-neurohypophysitis – Diabetes insipidus

Introduction

Lymphocytic hypophysitis is a rare inflammatory disorder of the pituitary gland. It can cause hypopituitarism and visual disturbances mimicking non-functioning adenomas. It has been considered that the adenohypophysis is the principal site of inflammation, whereas the neurohypophysis is spared [1, 2].

Recently, sporadic cases of inflammation of only neurohypophysial system have been reported as a cause of central diabetes insipidus. They were called lymphocytic infundibulo-neurohypophysitis [3].

We report two cases of inflammatory lesions of the pituitary gland that presented with diabetes insipidus. However, the adrenocorticism was also involved in the lesion on MR imaging. We believe that these cases represent a variant of lymphocytic adenohypophysitis and/or lymphocytic infundibulo-neurohypophysitis.

Case reports

Case 1

A 50-year-old woman with 6-year non-insulin-dependent diabetes mellitus complained of suddenly developed polydipsia and polyuria up to 6 l/day. She also had a headache, and her menstruation was regular. Her visual field and acuity were normal. There were no findings suggesting malignancy.

Her urinary and plasma osmolarity were 101 and 285 mOsm/kg with oral free water intake, respectively. Peak urinary osmolarity after water deprivation was 173 mOsm/kg and showed a further increase (522 mOsm/kg) after subcutaneous injection of pitressin. The peak plasma antidiuretic hormone (ADH) level, measured by specific radioimmunoassay (RIA), was very low (0.15 pg/ml), when plasma osmolarity was 296 mOsm/kg. These findings indicated a diagnosis of central complete diabetes insipidus.

Plasma growth hormone (GH), cortisol, adrenocorticotropic hormone (ACTH), luteinizing hormone (LH), follicle-stimulating hormone (FSH), and thyroid-stimulating hormone (TSH) levels were normal, and prolactin (PRL) slightly increased (26.8 ng/ml). Provocative tests of anterior pituitary functions revealed that they were not greatly impaired, except for blunt GH response and TSH response to hypoglycemia and to thyrotropin-releasing hormone (TRH), respectively. Growth hormone showed a normal response to growth hormone-releasing factor (GRF), indicating that the lesion was in the hypothalamus, including the pituitary stalk, which was in line with the increase in PRL.

Both pituitary cell antibodies (PCA) and pituitary cell surface antibodies (PCSA) were negative. The antinuclear factor, antithyroglobulin, and antithyroid microsomal antibodies were also negative, but the rheumatoid factor was positive.

Magnetic resonance imaging showed swelling of the whole pituitary gland and thickening of the pituitary stalk. It also revealed lack of high-intensity signal of
Fig. 1a, b. Case 1. a Unenhanced sagittal T1-weighted images show enlargement of the whole pituitary gland, thickening of the stalk, and lack of hyperintense signal of the posterior lobe. b Post-contrast sagittal T1-weighted images show marked homogeneous enhancement of the enlarged pituitary gland and thickened stalk.

Fig. 2a-c. Case 2. a Unenhanced sagittal T1-weighted images show homogeneous enlargement of pituitary gland, thickened pituitary stalk, and lack of the hyperintense signal of the posterior lobe. b Sagittal T2-weighted images show mild hyperintense enlarged pituitary gland and iso-intense thickened stalk. c Photomicrograph of the pituitary specimen harvested shows remarkable infiltration mainly of lymphocytes and a small number of plasma cells (hematoxylin and eosin, magnification x 20).
the neurohypophysis on a plain T1-weighted image. Marked enhancement of the lesion was observed after injection of gadopentetate dimeglumine (Fig. 1).

Biopsy was performed through a transphenoidal approach. The resected specimen revealed diffuse infiltration of mainly mature lymphocytes without any evidence of sarcoidosis, tuberculosis, Langerhans' cell histiocytosis, plasmacytoma, or giant cell granuloma.

The patient was given and continued to require 2.5 μg/day of intranasal 1-deamino-8-D-arginine-vasopressin acetate trihydrate (DDAVP) and an oral hypoglycemic agent, but she did not require any other hormone replacement therapy.

Case 2

A 50-year-old woman complained of indolent developed hydropidipsia, polydipsia, and polyuria up to 41/day for 5 months. She had no other medical problems. Her urinary and plasma osmolality was 220 and 295 mOsm/kg with oral free water intake, respectively. Peak urinary osmolality after water deprivation was 382 mOsm/kg and showed a further increase (573 mOsm/kg) after subcutaneous injection of pitressin. The peak plasma ADH level was very low (0.21 pg/ml) when plasma osmolality was 302 mOsm/kg. These findings indicated a diagnosis of central partial-complete diabetes insipidus.

Plasma GH, cortisol, ACTH, LH, FSH, TSH, and PRL levels were normal. Provocative tests of anterior pituitary functions were also normal.

Magnetic resonance imaging showed homogeneous swelling of the whole pituitary gland and the pituitary stalk, and also lack of high-intensity signal of the neurohypophysis on a T1-weighted images. The lesion was isointense on a T1-weighted image and mildly hyperintense on T2-weighted images (Fig. 2a, b).

Biopsy was performed through a transphenoidal approach. The resected specimen of pituitary posterior lobe revealed diffuse infiltration of mainly mature lymphocytes (Fig. 2c).

The patient was treated with prednisolone for 2 months and continued to require 2.5 μg/day of intranasal DDAVP.

Discussion

Lymphocytic hypophysitis is an ambiguous term used to describe a chronic inflammatory lesion of the pituitary gland involving the adenohypophysis. It has been recognized with increasing frequency. Hypophysitis is one of the causes of pituitary dysfunction and has been diagnosed primarily in women who were or had recently been pregnant; however, it may also occur in premenopausal women with no recent history of pregnancy, postmenopausal women, and men [1, 2].

It is an autoimmune disorder and is frequently associated with Hashimoto's thyroiditis, adrenalitis, ovarian failure, atrophic gastritis, and pernicious anemia [4, 5]. It has not been considered that lymphocytic hypophysitis causes central diabetes insipidus and involves the neurohypophysis [5]; however, some cases of lymphocytic adenohypophysitis associated with diabetes insipidus and the inflammation of only the neurohypophyseal system, the infundibulo-neurohypophysis, have been reported very recently [3, 6-10]. Thodou et al. [10] reported that diabetes insipidus is encountered in 14–19% of cases of lymphocytic hypophysitis.

Imura et al. [3] considered that lymphocytic adenohypophysitis and lymphocytic infundibulo-neurohypophysitis are distinctly different entities, probably caused by different autoimmune processes. They also showed MR findings of lymphocytic infundibulo-neurohypophysitis, normal adenohypophysis, thickening of the infundibulum and/or pituitary stalk, and lack of the high-intensity signal of the neurohypophysis on T1-weighted images.

On the other hand, Nishioka et al. [6] reported two cases of MR findings of lymphocytic hypophysitis presenting with diabetes insipidus, diffuse enlargement of pituitary gland, normal infundibulum and/or pituitary stalk, lack of the high-intensity signal of the neurohypophysis on T1-weighted images, and marked homogeneous enhancement of the lesion. These cases also present with normal adenohypophysial function.

In other reports of lymphocytic hypophysitis presenting with diabetes insipidus by Paja et al. [8] and Abe et al. [9], MR images show diffuse enlargement of the pituitary gland, thickening of the infundibulum and/or pituitary stalk, lack of high-intensity signal of the neurohypophysis on a T1-weighted images, and marked homogeneous enhancement of the lesion. Those cases also present clinically with hypopituitarism.

Clinical features of almost normal adenohypophysial function in our cases were similar to infundibulo-neurohypophysitis and the cases of Nishioka et al. [6]; however, our MR findings were similar to lymphocytic hypophysitis presenting with diabetes insipidus by Paja et al. [8] and Abe et al. [9].

We hypothesize that lymphocytic hypophysitis has a wide spectrum of clinicopathological and radiological features including both adenohypophysitis and infundibulo-neurohypophysitis, although some investigators think these varieties should not be included in the same category [3, 6]. Ahmed et al. [11] reported two cases with necrotizing infundibulo-neurohypophysitis presenting with a combination of diabetes insipidus and hypopituitarism. It is not certain whether they represent a distinct entity or an end-stage form of lymphocytic hypophysitis presenting with diabetes insipidus.

It has been reported that it is not easy to distinguish lymphocytic hypophysitis from pituitary adenoma by radiological appearance [2]. However, like our cases, the thickening of the infundibulum and/or pituitary stalk and lack of high-intensity signal of the neurohypophysis on a T1-weighted image may cause new differential diagnoses including sarcoidosis, tuberculosis, Langerhans' cell histiocytosis, plasmacytoma, lymphoma, or other granulomatous diseases.
In conclusion, we presented two cases with diabetes insipidus and almost normal adenohypophysial dysfunction. Their MR findings were diffuse enlargement of the pituitary gland, thickening of the infundibulum and/or pituitary stalk, and lack of high-intensity signal of the neurohypophysis on a T1-weighted image. Histology showed lymphocytic infiltration of the pituitary gland. We suggest that these cases represent a variant of lymphocytic adenohypophysitis and/or lymphocytic infundibulo-neurohypophysitis.

References

Book review


This book has been written primarily to give the resident basic information about radiological diagnosis in the various fields of neuroradiology and protocols for the diagnostic procedures, as well as prevention and treatment of complications. The size of the book makes it very suitable to keep in the pocket during the resident's first neuroradiology rotation.

Part I of the book starts with imaging protocols and guidelines for procedures performed in neuroradiology. Although specific protocols vary between different institutions and hospitals, the chapter contains much valuable basic information. Two chapters in this part of the book cover information about drugs related to neuroradiology, and sedation. These chapters are probably most valuable for residents working in the United States, since they refer in many places to specific US conditions regarding use of drugs and treatment strategies. This part of the book ends with a guideline regarding what study to order, which is definitely useful for the trainee.

Part II of the book, which comprises nine-tenths of the content, covers imaging fundamentals regarding all aspects of brain, spine, and head and neck pathology. In each chapter a brief description to the key facts is given regarding both clinical information and radiological findings for each diseases or condition. There are a large number of high-quality illustrations of the radiological findings with various methods. Each description of a disease or condition ends with suggested reading in widely available journals or books. The organization of this part of the book is excellent and the illustrations are in general of high quality and include modern techniques, as for instance diffusion-weighted MR imaging.

This book can be highly recommended as providing basic information in neuroradiology for residents, and definitely gives good value for the price.

Stig Holtd, Lund