Diaphragma Sellae Meningioma Associated Only with Signs of Hypopituitarism

—Case Report—

Shuzo OKUNO, Manabu HISANAGA, Shigeru TSUNODA*
and Toshisuke SAKAKI*

Department of Neurosurgery, Senboku National Hospital, Sakai, Osaka;

**Department of Neurosurgery, Nara Medical University, Kashihara, Nara*

Abstract

A rare diaphragma sellae meningioma presenting only with signs of hypopituitarism occurred in a 54-year-old male. Preoperative magnetic resonance (MR) imaging clearly demonstrated a small lesion in the supradiaphragmatic area immediately beneath the optic chiasm, displacing the pituitary stalk laterally. Intraoperatively, the tumor was confirmed to be attached only to the posterior leaf of the diaphragma sellae. Histological examination revealed a transitional type meningioma. Such a small meningioma may be associated only with hypopituitarism, as compression is confined to the pituitary stalk, not affecting the optic pathways. MR imaging can demonstrate the clinicopathological features of this small but significant tumor.

Key words: diaphragma sellae, hypopituitarism, meningioma, magnetic resonance imaging

Introduction

Diaphragma sellae meningioma is a rare type of suprasellar meningioma, with only eight cases previously reported in detail.^{1,3-6,9,11,12)} Diaphragma sellae meningioma is located similarly to suprasellar meningiomas.⁷⁾ Differential diagnosis is difficult even when clinical signs and conventional radiological methods are available. Magnetic resonance (MR) imaging achieves more accurate diagnosis of parasellar tumors,²⁾ and is essential in patients suspected of harboring a tumor not conclusively demonstrated by conventional neuroradiological methods.

We present a case of diaphragma sellae meningioma manifesting only as endocrinological dysfunction, and discuss the MR appearance.

Case Report

On October 2, 1989, a 54-year-old male was admitted to our hospital with a 12-month history of malaise with poor appetite, polydipsia, polyuria, and

alopecia of the axillary and genital regions. On admission, his height was 166 cm, body weight 41.5 kg (normal 50 kg), blood pressure 102/78 mmHg, pulse 52/min, and body temperature 34.9°C. Neurological examination was nearly normal including visual field and acuity. Serum electrolyte levels were Na⁺ 112 mEq/ml and Cl⁻ 81 mEq/ml with normal K⁺ level.

Computed tomographic (CT) scans showed an isodense suprasellar mass, mildly enhanced postcontrast (Fig. 1). Cerebral angiograms demonstrated no pathological vessels. Sagittal T₁-weighted MR images clearly demonstrated a well-demarcated, isointense supradiaphragmatic tumor immediately beneath the optic chiasm, homogeneously enhanced after administration of gadolinium-diethylenetriaminepentaacetic acid (Gd-DTPA). The pituitary gland was intact and separated from the tumor. Coronal T₁-weighted MR images showed that the tumor had displaced the pituitary stalk laterally. The tumor was apparently located posterior to the pituitary stalk (Fig. 2).

The basal serum growth hormone level was 0.9

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Author's present address: S. Okuno, M.D., Department of Neurosurgery, Meijibashi Hospital, Matsubara, Osaka, Japan.

Fig. 1 Preoperative pre- (left) and postcontrast (right) CT scans, showing a slightly enhanced mass in the suprasellar region, but little information about the relationship to surrounding structures.

ng/ml and adrenocorticotrophic hormone level was under 10 pg/ml, and both levels decreased in response to insulin. The basal prolactin (PRL) level was within the normal range, with a low peak level after thyrotropin-releasing hormone (TRH) injection. The serum thyroid-stimulating hormone level was normal, with a low response to intravenously administered TRH. The serum T3 and T4 levels were low at 0.1 ng/ml and 3.0 μ g/dl, respectively. The basal plasma cortisol level ranged from 2.7 to 4.8 μ g/dl with no daily cycle. The serum follicle-stimulating hormone and luteinizing hormone (LH) levels were within the normal ranges, both showing decreased responses to LH-releasing hormone stimulation. These data indicated hypopituitarism including PRL secretion. Hormonal replacement with hydrocortisone and T4 was therefore started. The provisional diagnosis was a supradiaphragmatic meningioma associated with hypopituitarism due to stalk compression.

On October 16, 1989, a grayish, well-demarcated tumor was exposed through the arachnoid membrane immediately beneath the optic chiasm using the right pterional approach. The tumor capsule was carefully separated from the pituitary stalk by blunt dissection. After removal of most of the tumor, the attachment to the posterior leaf of the diaphragma sellae was identified and coagulated. Histological examination of the surgical specimen revealed a transitional meningioma (Fig. 3). Tumor cells demonstrated immunoreactivity to vimentin and epithelial membrane antigen.

Postoperatively, the hormonal replacement therapy was continued. The hormonal basal levels and responses to stimulation tests were not significantly

Fig. 2 upper: Sagittal T₁-weighted MR images, clearly demonstrating a well-demarcated, isointense supradiaphragmatic tumor beneath the optic chiasm (left), homogeneously enhanced after administration of Gd-DTPA (right). The pituitary gland is intact and distinguishable from the tumor (arrow). lower: Coronal T₁-weighted MR images following Gd-DTPA administration, demonstrating a homogeneously enhanced tumor, just in contact with the optic chiasm (left). The pituitary stalk is displaced laterally by the tumor (arrow) (right).

Fig. 3 Photomicrograph of the surgical specimen, demonstrating a transitional meningioma.

different postoperatively, but the PRL response to TRH stimulation did improve. His visual acuity and field remained normal.

Discussion

The diaphragma sellae is the bilayer dura mater with a centrally perforated pore for the pituitary stalk, called the diaphragmatic foramen. This bilayer extends from the tuberculum sellae to the upper margin of the dorsum sellae and posterior clinoid processes, although marked variations are also recognized.¹⁰ A meningioma originating from the inner surface of the diaphragma sellae may grow into the pituitary fossa and become completely intrasellar.⁴ Such a meningioma is difficult to differentiate symptomatically and radiologically from a non-functioning pituitary adenoma. Meningiomas originating from the outer layer, in contrast, extend mainly to the suprasellar area.⁵ Smaller tumors especially, as in our case, may be associated only with hypopituitarism, as compression is confined to the pituitary stalk, not affecting the optic pathways. An increase in size may cause visual failure. Simultaneous involvement of the sub- and supradiaphragmatic regions is not unusual for diaphragma sellae meningiomas.^{6,9} Normal variations in the shape and size of the diaphragma sellae and the relationship to the pituitary stalk, infundibulum, and pituitary gland may influence the individual clinical signs and symptoms.

The transsphenoidal approach is usually used for complete surgical removal of intrasellar meningioma.^{4,6,12} Most supradiaphragmatic meningiomas can be approached subfrontally or pterionally like other suprasellar meningiomas.^{1,5} However, removal of a meningioma extending across the diaphragma sellae may require inspection for residual tumor by crossing the diaphragma sellae during surgery. An additional approach should then be employed at another time.⁹ Therefore, preoperative neuroradiological evaluation of the tumor extent and relationship to surrounding neural and vascular structures is essential in planning the procedure.

In previously reported cases, preoperative conventional radiological methods never clearly depicted the location and contour of these tumors, and the diagnosis of diaphragma sellae meningioma was based on intraoperative findings and postoperative histological examination. In our case, CT scans suggested a mass in the suprasellar region, but gave no accurate anatomical information or differential diagnosis. MR imaging is best for visualization of parasellar lesions.² Sagittal and coronal images are

particularly valuable for assessing the tumor extent and the involvement of adjacent structures. In our case, MR images demonstrated a well-demarcated, isointense mass in the supradiaphragmatic area immediately beneath the optic chiasm, separated from the normal pituitary gland and optic pathways, and homogeneously enhanced following administration of Gd-DTPA. Such findings most likely indicate a meningioma,⁸ but MR imaging does not necessarily allow differential diagnosis between meningioma and other lesions.¹³ The location of the tumor and demarcation or homogeneity are the most distinctive features of a meningioma. Although MR imaging can only suggest the diagnosis of a meningioma, MR imaging can demonstrate the clinicopathological features and aid therapeutic planning for this small but significant tumor.

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Address reprint requests to: S. Okuno, M.D., Department of Neurosurgery, Nara Medical University, 340 Shijo-cho, Kashihara, Nara 634, Japan.