CASE REPORT

Transient pituitary enlargement with central hypogonadism secondary to bilateral cavernous sinus thrombosis: pituitary oedema?

Michael Joubert¹, Renaud Verdon² and Yves Reznik¹

¹Endocrinology Unit, University Hospital of Caen, 14033 Caen Cedex, France and ²Infectious Diseases Unit, University Hospital of Caen, 14033 Caen Cedex, France

(Correspondence should be addressed to M Joubert; Email: joubert-m@chu-caen.fr)

Abstract

Design: We report the case of an incidental pituitary mass discovered in the context of bilateral cavernous sinus thrombosis due to a bacterial pansinusitis.

Conclusions: Magnetic resonance imaging features of the pituitary lesion, together with transient central hypogonadism and total regression of the mass after anticoagulation and antimicrobial therapy, suggest that this lesion is a pituitary oedema of vascular mechanism. Other possible causes of pituitary mass in such a situation are also discussed.

European Journal of Endocrinology 160 873–875

Introduction

Clinically unsuspected lesions within the pituitary are found in up to 10% of autopsy series and in up to 38% of magnetic resonance imaging (MRI) series (1, 2). Availability and sensitivity of MRI raises the question of how to manage these previously unrecognized lesions.

Pituitary adenomas are the first aetiology for sellar masses, accounting for 10% of all intracranial neoplasms and 80% of pituitary masses. Less frequently involved lesions include craniopharyngioma, Rathke cyst, meningioma, chordoma, pituitary carcinoma, pituitary granuloma, metastases and pituitary abscess (3). Pituitary abscess occur exceptionally from localized or generalized infection and surgical drainage is generally mandatory for its cure (4). We report an incidentally discovered pituitary mass in a patient with septic bilateral cavernous sinus thrombosis. The spontaneous resolution of the lesion suggests an original mechanism involving an oedema of the pituitary secondary to cavernous sinus thrombosis.

Case report

A 32-year-old woman presented with generalized headache together with 39 °C fever. On clinical examination, photophobia and typical signs of meningitis were observed. Neither neurological symptom nor altered mental status was found. Standard biological screening showed accelerated erythrocyte sedimentation rate, elevated white blood cell count and high C-reactive

protein. Skull CT scan showed air–fluid levels, mucosal oedema, and air bubbles within maxillary, frontal, ethmoidal and sphenoidal sinuses. Cerebrospinal fluid (CSF) examination excluded subarachnoid haemorrhage but revealed a white blood cell count above 1000/μl, low glucose concentration, high protein concentration (650 mg/dl) and the presence of a methicillin-sensitive *Staphylococcus aureus*, all features suggestive of bacterial meningitis. The bacteria was also identified in blood and probably originated from the pansinusitis previously diagnosed. An i.v. antimicrobial therapy including cloxacilline (12 g/day), gentamicin (3 mg/kg per day) and metronidazole (1.5 g/day) was initiated promptly and the clinical and biological sepsis resumed rapidly. Thereafter, the patient unexpectedly developed a bilateral orbital oedema. A skull MRI was performed; on coronal contrast-enhanced T1-weighted image, sinus thrombosis involving both cavernous sinuses was seen, which narrowed the carotid within its cavernous portion and bulged the cavernous sinus with irregular gadolinium enhancement. A homogeneous pituitary enlargement bordering the optic chiasm was also observed (Fig. 1A). On T2-weighted image, pituitary enlargement was iso-intense. Anterior pituitary hormone testing revealed hypogonadotrophic hypogonadism while other pituitary functions were normal (Table 1). Diuresis and electrolytes analysis showed no diabetes insipidus. Intravenous heparin trial was initiated then replaced by an oral vitamin K inhibitor for 3 months together with antimicrobial therapy maintained for 4 months. Periorbital oedema resumed within 1 week.

Figure 1 Pituitary MRI (coronal contrast-enhanced T1-weighted image). (A) Bilateral cavernous sinus thrombosis (narrowing of the intra-cavernous segment of the carotid artery and bulging of the sinus with irregular enhancement; arrowheads) and pituitary homogeneous enlargement (arrow). (B) After 3 months of oral anticoagulation and antimicrobial therapy, normalization of cavernous sinus and pituitary aspect.

When the patient was discharged 3 months after the acute episode, she was free of any symptom and her menstrual cycles were normal. Anterior pituitary functions and biological inflammatory parameters were all normalized (Table 1). Serial MRI study showed complete regression of the pituitary enlargement, cavernous thrombosis and sphenoidal sinuses infiltration (Fig. 1B).

Discussion

We hypothesize that our patient developed a pituitary oedema secondary to reduced venous drainage in the context of bilateral cavernous sinus thrombosis. Vascular anatomy of the pituitary may explain the transient pituitary enlargement and pituitary hormone deficiency. Anterior pituitary blood supply is principally driven not only through portal vessels but also through

Table 1 Basal and stimulated pituitary hormonal evaluation during the hospitalization for bilateral cavernous sinus thrombosis (initial evaluation) and 3 months later.

Hypothalamic-pituitary axis	Initial evaluation		Evaluation 3 months later	
	Basal (normal range)	Stimulated (normal range)	Basal (normal range)	Stimulated (normal range)
Corticotroph	Cortisol 8:00: 524 nmol/l (140–690) ACTH 8:00: 1 pmol/l (2–11)	After tetracosactide 250 µg IV: Cortisol: 1048 nmol/l (>550) ND	Cortisol 8:00: 207 nmol/l (140–690) ACTH 8:00: 5 pmol/l (2–11)	After tetracosactide 250 µg IV: Cortisol: 772 nmol/l (>550)
Gonadotroph	Oestradiol: 59 pmol/l (70–220) FSH: 0.6 U/l (1.4–9.6) LH: 0.2 U/l (0.8–26)	ND	Oestradiol: 99 pmol/l (70–220) FSH: 5.4 U/l (1.4–9.6) LH: 4.2 U/l (0.8–26)	After GnRH 100 µg IV: FSH: 8 U/l LH: 21 U/l
Somatotroph	GH: 3.3 mU/l (<15) IGF-1: 249 ng/ml (150–350)	ND	GH: 10 mU/l (<15) IGF-1: 250 ng/ml (150–350)	ND
Lactotroph	Prolactin: 13 µg/l (2–15)	ND	Prolactin: 10 µg/l (2–15)	After TRH 200 µg IV: Prolactin: 55 µg/l
Thyrotroph	Thyrotrophin: 3 mU/l (0.5–5) Thyroxine: 13.7 pmol/l (11–22) Triiodothyronine: 4.5 pmol/l (3–9)	ND	Thyrotrophin: 4.4 mU/l (0.5–5) Thyroxine: 16.5 pmol/l (11–22) Triiodothyronine: 4.3 pmol/l (3–9)	After TRH 200 µg IV: Thyrotrophin: 33 mU/l

ND, not documented.

arterial branches of the hypophyseal arteries (5). Venous drainage from the anterior pituitary principally extends to the cavernous sinuses, directly through sparse and probably insignificant lateral veins and indirectly through posterior pituitary veins. A fraction of venous blood from the anterior pituitary also enters the posterior pituitary capillary bed by a retrograde flow through posterior stalk portal vessels towards the median eminence of hypothalamus (6). In the present case, pituitary oedema might have resolved after anticoagulation treatment since blood flow through the cavernous sinuses should have been restored, allowing normal pituitary venous drainage. In this context, transient central hypogonadism may have resulted from increased intrasellar pressure, consecutive to cavernous sinuses thrombosis (7). Pituitary venous drainage allowed to restore gonadal function and to decrease serum prolactin.

Apart from this vascular mechanism, this case report first suggested an infectious process of the pituitary region. Pituitary abscess is a rare condition, often favoured by an adjacent sinusitis, which may extend to the sellar region. It may complicate a pre-existing intrasellar tumour, i.e. a pituitary adenoma, a craniopharyngioma or a Rathke's cleft cyst, or may result from locoregional extension or haematogenous spreading of sphenoidal sinusitis, meningitis, cavernous sinus thrombophlebitis or a contaminated CSF leakage (8). Its clinical presentation includes tumour signs i.e. headache, visual field defect and/or endocrine deficiency (4). The typical MRI presentation of a pituitary abscess is a hypointense signal on T-1-weighted sequences together with a hyperintense signal on T-2, suggestive of a liquid or necrotic lesion. It also usually includes an important sphenoidal involvement (effusion in the sinus and sellar floor destruction) contrasting with the small volume of the pituitary lesion (9). These features were not actually observed in the present case. The complete disappearance of the lesion at MRI further study without surgery neither supports the hypothesis of a pituitary abscess (4).

An autoimmune process involving the pituitary gland was also questioned. Autoimmune hypophysitis (AH) may present on MRI imaging with a symmetric enlargement of the pituitary gland, undisplaced stalk, intact sellar floor and homogeneous gadolinium enhancement (10). The somehow short duration of the tumoral syndrome and the spontaneous resolution of the endocrine deficiency in the present case despite neither surgical treatment nor glucocorticoid trial do not favour the hypothesis of AH (10).

Pituitary apoplexy is a possible diagnosis since it abruptly occurs with the rapid onset of severe headache, visual field and/or ocular motility defects together with clinical signs of pituitary hormone deficiencies. By contrast, the lack of ocular signs, together with the complete regression of the pituitary mass on the 3-month MRI imaging, do not favour such a diagnosis (11).

Altogether, the hypothesis of the involvement of a pituitary oedema secondary to bilateral cavernous sinus thrombosis seems the most probable cause explaining the occurrence of a sellar mass in this patient. To our knowledge, this new mechanism of transient pituitary enlargement and hormone deficiency has not been previously described, and may be treated medically with an anticoagulant therapy together with anti-infectious drugs.

Declaration of interest

All the authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

Funding

This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

References

- 1 Teramoto A, Hirakawa K, Sanno N & Osamura Y. Incidental pituitary lesions in 1000 unselected autopsy specimens. *Radiology* 1994 **193** 161–164.
- 2 Chong BW, Kucharczyk W, Singer W & George S. Pituitary gland MR: a comparative study of healthy volunteers and patients with microadenomas. *American Journal of Neuroradiology* 1994 **15** 675–679.
- 3 Saeger W, Ludecke DK, Buchfelder M, Fahlbusch R, Quabbe HJ & Petersenn S. Pathohistological classification of pituitary tumors: 10 years of experience with the German pituitary tumor registry. *European Journal of Endocrinology* 2007 **156** 203–216.
- 4 Vates GE, Berger MS & Wilson CB. Diagnosis and management of pituitary abscess: a review of twenty-four cases. *Journal of Neurosurgery* 2001 **95** 233–241.
- 5 Gorczyca W & Hardy J. Arterial supply of the human anterior pituitary gland. *Neurosurgery* 1987 **20** 369–378.
- 6 Oliver C, Mical RS & Porter JC. Hypothalamic-pituitary vasculature – evidence for retrograde blood flow in pituitary stalk. *Endocrinology* 1977 **101** 598–604.
- 7 Arafah BM, Prunty D, Ybarra J, Hlavín ML & Selman WR. The dominant role of increased intrasellar pressure in the pathogenesis of hypopituitarism, hyperprolactinemia and headaches in patients with pituitary adenomas. *Journal of Clinical Endocrinology and Metabolism* 2000 **85** 1789–1793.
- 8 Hanel RA, Koerbel A, Monte-Serrat Prevedello D, Moro MS & Araujo JC. Primary pituitary abscess. *Arquivos de Neuro-Psiquiatria* 2002 **60** 861–865.
- 9 Bossard D, Himed A, Badet C, Lapras V, Mornex R, Fisher G, Tavernier T & Bochu M. MRI and CT in a case of pituitary abscess. *Journal of Neuroradiology* 1992 **19** 139–144.
- 10 Caturegli P, Newschaffer C, Olivi A, Pomper MG, Burger PC & Rose NR. Autoimmune hypophysitis. *Endocrine Reviews* 2005 **26** 599–614.
- 11 Verrees M, Arafah BM & Selman WR. Pituitary tumor apoplexy: characteristics, treatments and outcome. *Neurosurgical Focus* 2004 **16** E6.

Received 8 January 2009

Accepted 13 January 2009