CLINICAL CASE

SUPRAORBITAL CRANIOTOMY APPROACH IN ENDOCRINE-INACTIVE PITUITARY ADENOMAS

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Abstract

Non-functioning pituitary adenoma is one of the most common endocrine tumour with a benign pattern in the majority of cases. We present the case of a 69 years old female admitted on endocrinology department for visual field defects, dizziness, memory disorder, bradylalia, bradypsychia. During medical examination, the patient presented a syncopal event, with abundant sweating and temporo-spatial disorientation. Magnetic Resonance Imaging revealed a pituitary macroadenoma of 23/33.3/37 mm with two spherical lesions overlapped ("snow man" shape), with mass effect on the cavernous sinuses extending to the posterior wall of the left sphenoid sinus. Visual field examination showed significant narrowing to both eyes. The hormonal profile revealed gonadotropic insufficiency and low Insulin-like Growth Factor 1 with normal prolactin and cortisol levels. Thyroid hormonal evaluation highlighted primary hypothyroidism due autoimmune thyroiditis. Two weeks later, adenomectomy was performed by supraorbital craniotomy. After discharge, she received the thyroid hormone replacement therapy initiated preoperatively and specific therapy for associated pathology: diabetes mellitus type 2, osteoporosis, and hyperlipidemia. Pituitary surgery is the first line treatment for the majority of patients with symptomatic endocrine-inactive adenomas. Further multidisciplinary close check-up is periodically recommended.

Keywords: pituitary tumour, macroadenomas, pituitary deficiency, autoimmune thyroiditis

Introduction

Non-functioning pituitary adenomas are relatively common, found incidentally as microadenomas and usually have insignificant clinical relevance [1]. The ones that require treatment are generally macroadenomas mostly because of their mass effect and associated hypopituitarism. Visual field defects are present in up to 80% of patients with non-functioning

macroadenoma at the time of the diagnosis and the majority of these patients have at least growth hormone deficiency and hypogonadism [2].

The diagnosis is based on Magnetic Resonance Imaging (MRI) with gadolinium contrast in order to appreciate tumour size and identify anatomical landmarks for surgery [2]. Endocrine studies should evaluate pituitary hormones and end-organ function in order to

determine if the tumour is hypersecreting or the need for hormonal substitution. Visual field testing is also required [3]. The treatment consists in both surgery and radiation therapy because of the large volume in order to prevent tumour progression or recurrence [4]. The gold standard for surgical treatment for macroadenomas is represented by a transcranial approach; the most commonly used is the fronto-spheno-temporal craniotomy.

If the hypersecretion of an endocrine index at the tumour level is absent, the response to therapy can be assessed by annual serial scans [5].

Case presentation

Admission – endocrine panel

A 69-year-old female patient with history of diabetes mellitus type 2, osteoporosis and dyslipidemia was admitted for visual field defects, dizziness, memory disorder, bradylalia and bradypsychia installed progressively over several months. The hormonal findings revealed decreased serum levels of IGF-1 (Insulin-like growth factor 1) of 44.5 ng/mL (normal: 69-200 ng/mL), low levels of serum FSH (follicle stimulating hormone) and LH (luteinising hormone), increased levels of TSH (thyroid stimulating hormone) with low FT4 (free thyroxine), decreased basal serum cortisol (of 0.41 ng/dL, normal: 0.61 – 1.35 ng/dL), and normal prolactin levels (Table 1). Thyroid antibodies were determined and increased values for ATPO (anti-thyroid peroxidase antibodies), of 74.1 U/mL (normal: <10 U/mL) and ATG (anti-thyroglobulin antibodies) of 234.4 U/mL (normal levels less than 4 U/mL) were obtained. Biochemical evaluation revealed hyperglycemia (of 148 mg/dL, normal: 74-106 mg/dL), with high HbA1c (glycated hemoglobin), of 6.70 % (normal 4-6 %), hyponatremia of 134 mmol/L (normal: 136-146 mmol/L), hypocloremia of 95 mmol/L (normal: 101-109 mmol/L) and decreased iron levels of 21 mg/dL (normal 60-180 mg/dL).

Acute event

Two days after admission, a syncopal event occurred, with abundant sweating, severe dizziness and temporo-spatial disorientation.

MRI (Magnetic Resonance Imagery) performed in emergency mode revealed a pituitary macroadenoma of 23/33.3/37 mm with two spherical lesions overlapped (“snow man” sign) and mass effect on the carotid sinuses extending to the posterior wall of the left sphenoid sinus (Figure 1).

Parameters	Value	Normal limits	Units
TSH	4.22*	0.4-4	µIU/mL
FT4	0.41*	0.61-1.35	ng/dL
ATPO	74.1	<10	U/mL
ATG	234	<4	U/mL
IGF1	44.5	69-200	ng/mL
GH	0.21	<7	ng/mL
FSH	9.87	16.7-114	mU/mL
LH	0.41	10.8-56	U/L
Basal cortisol (8 a.m.)	27.6	6-23	µg/dL
Prolactin	13.2	2.74-19.6	ng/mL

*before daily treatment with levothyroxine

Table 1 - The endocrine preoperatively parameters in a 69-year-old female patient diagnosed with non-functioning pituitary macroadenoma.

Figure 1 - Intravenous Contrast MRI performed preoperatively on a 69-year-old female patient: a pituitary macroadenoma of 23/33.3/37 mm with two spherical lesions overlapped (“snow man” sign) and mass effect on the carotid sinuses. (A-Sagittal Plane, B- Coronal plane)

Figure 2 - Visual field examination showing a significant narrowing to both eyes of a 69-year-old female patient diagnosed with a pituitary macroadenoma

Acute event

Two days after admission, a syncopal event occurred, with abundant sweating, severe dizziness and temporo-spatial disorientation. MRI (Magnetic Resonance Imagery) performed in emergency mode revealed a pituitary macroadenoma of 23/33.3/37 mm with two spherical lesions overlapped (“snow man” sign) and mass effect on the carotid sinuses extending to the posterior wall of the left sphenoid sinus (Figure 1). Neurological examination has established the presence of vestibular syndrome and suggestive signs for moderate hydrocephalus. An ophthalmological consult was carried out and, a significant narrowing to both eyes was discovered on visual field examination (Figure 2). All these were consistent with pituitary apoplexy so emergency surgical approach.

Surgical therapy

The patient was transferred to the neurosurgery department for surgical treatment. Two weeks later the ablation of the sellar tumour by a right supraorbital craniotomy was performed. Under antibiotic, antiinflammatory, anticoagulant and depletion therapy, the postoperative evolution was good. The patient was hospitalized for 13 days and after discharge, she continued thyroid hormone replacement therapy initiated preoperatively with 50 µg of daily LT4 (Levothyroxine), antidiabetic and hypolipidemic medications. The histopathological examination confirmed a pituitary adenoma. Further multidisciplinary close check-up is periodically recommended.

Discussions

Particular aspects of the case

Despite the large volume of the tumour, the patient presented only mild headaches during the recent years.

The diagnosis was delayed despite the visual field defects in both eyes that were considered a normal aging manifestation.

Another particularity of the case was the absence of increased prolactin values specific in this type of tumours and also the absence of poliuria-polydipsia syndrome.

Differential diagnosis

The differential diagnosis of adenoma included other pituitary masses as craniopharyngioma meningioma, arachnoid cyst, glioma of the suprasellar region, metastatic tumour and granulomatous diseases, such as lymphocytic hypophysitis [6]. Some of these could not be excluded in the absence of the histopathological exam.

Surgery as main option

The first line treatment for the majority of patients with symptomatic endocrine-inactive adenomas, consists in transsphenoidal surgery and the removal of the adenoma is the preferred and most effective therapy [7]. The cure rate is generally higher for smaller tumours and for those that do not invade the cavernous sinus. Conversely, the cure rate is lower for larger tumours (over 30 mm) and those that invade the cavernous sinus [8]. Overall, transsphenoidal tumour resection results in an improvement in visual acuity and visual field deficits in most patients, headache resolution in approximately 80% of patients, and improvement in hypopituitarism in a few number of cases [9]. The surgical approach for macroadenomas is transcranial, the most commonly used being the frontosphenotemporal one [8]. For our patient a right supraorbital craniotomy was preferred.

In addition or instead of surgery

As a second line therapy for endocrine inactive tumours, radiation is used for patients with residual tumour after the initial surgery. Radiation or repeat transsphenoidal surgery or both are generally indicated if the tumour expands as seen on the following MRIs [10, 11, 12]. Because stereotactic radiation can deliver a higher radiation dose to the tumour is more safely and, therefore, is the preferred radiation technique [13,14]. Studies have shown that external beam radiation causes loss of the remaining normal pituitary function over 5 to 10 years. Stereotactic radiosurgery may also cause loss of the pituitary function, but less frequently than external beam radiation [15]. For our patient, radiotherapy could be a good choice as the postoperative Computed Tomography (CT) revealed the presence of a residual tumour mass of 32/20/21 mm.

Conclusions

Even though surgery is the treatment of choice, pituitary macroadenomas have a high recurrence rate and an increased prevalence of postoperative hypopituitarism. Therefore, further multidisciplinary close check-up is periodically recommended. Radiotherapy is a good therapeutic alternative, especially for the elderly patients with postoperative residual tumour mass.

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