Tirelli, et al,. J Otol Rhinol 2014, 3:4
http://dx.doi.org/10.4172/2324-8785.1000165

Journal of Otology & Rhinology

Case Report

A SCITECHNOL JOURNAL

Intracavernous Carotid Aneurysm Mimicking Pituitary Adenoma: An Insidious Surgical Trap

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Abstract

Intracavernous internal carotid artery aneurysms can extend into the sella and simulate pituitary adenomas. Correct radiological differential diagnosis is fundamental. When treating intrasellar masses at the slightest suspicion of a nonpituitary origin, further workup should be considered. The possibility of a vascular lesion simulating a pituitary adenoma should always be evaluated by neurosurgeons and ear, nose, and throat surgeons operating in the sellar region.

We report a case of intracavernous carotid aneurysm mimicking a pituitary adenoma and emphasize the need for a critical neuroradiological evaluation for correct diagnosis and to avoid a potentially life-threatening situation.

Keywords: Carotid aneurysm; Pituitary adenoma; Differential diagnosis; Transsphenoidal endoscopic approach

Introduction

Aneurysms of the sellar region are commonly mistaken for pituitary adenomas, since they have similar clinical, endocrinological and neurological symptoms. They are responsible for parasellar syndromes with neurological and mass effect symptoms dominating the clinical presentation. The diagnosis of this rare but interesting aneurysm is vital for its proper management and to avoid catastrophic complications such as hemorrhage and visual loss [1-4]. We report a case of intracavernous carotid aneurysm mimicking a pituitary adenoma and emphasize the need for a critical neuroradiological evaluation for a correct diagnosis and to avoid a potentially life-threatening situation.

Case Report

A 68-year-old woman was concerned with a 2-month history of progressive visual loss in the right eye and a divergent strabismus. Visual acuity had severely decreased in the right eye (6/10) and the function of the right oculomotor nerve was markedly impaired. Enhanced brain Computed Tomography (CT) scan showed a suspected sellar pituitary adenoma, with erosion of the lateral portion of cavernous sinus (Figure 1).

Figure 1: a. Unhenanced brain CT on axial plane shows a mass (a) with an higher attenuation than CSF (cerebrospinal fluid) medial to the right intracavernous ICA (long arrow), projecting into the sella turcica and protruding into the right sphenoid sinus (asterisk), whose posterior wall is focally demineralized. b. On coronal plane, the lesion (a) is medial to the ICA and inferomedial to the clinoid process (short arrow).

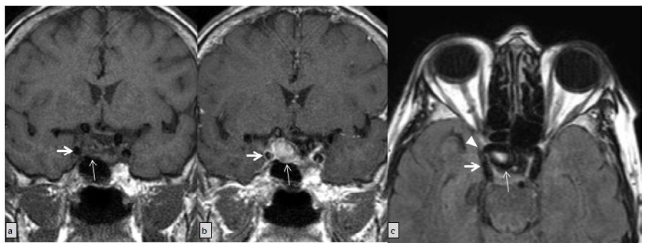

Figure 2: a. On coronal unhenanced MRI T1 image the lesion (long arrow) shows an intermediate-low signal intensity; b. Contrast enhancement is seen after Gadolinium administration, mimicking a solid mass; c. On axial T2-weighted fluid-attenuated inversion recovery sequence (T2 FLAIR), the lesion shows no signal at the periphery, with a hyperintense center; a thin communication (arrowhead) with the ICA (short arrow) may be suspected..

Endocrine evaluation revealed no abnormalities. Cerebral Magnetic Resonance Imaging (MRI) confirmed a large, ovoidal mass in the right portion of the sella compatible with a pituitary macroadenoma, extending to suprasellar region, with asymmetry of the optic chiasm and elevation of its right arm, without effects of compression (Figure 2 and 3).

The patient underwent endoscopic transnasal transsphenoidal hypophysectomy with the aid of the neuronavigation system. During dissection of the dural surface, sudden and profuse bleeding occurred from the lateral portion of the right sphenoid sinus, controlled by buffering with haemostatic material (Tabotamp). An angiography was immediately performed and this showed a right intracavernous carotid aneurysm (Figure 4).

Having assessed the risk of recurrence of bleeding and given the apparently good hemodynamic compensation in angiography, a right cervicotomy with the closure of the right internal carotid artery (ICA) and simultaneous monitoring electroencephalogram (EEG) was carried out.

Two days after surgery a brain CT recognized the thrombosis of the aneurysm, no evidence of the extracranial tract and moderate enhancement of the intracranial juxtaclinoid tract of the ICA, suggesting good vascular compensation through the circle of Willis (Figure 5).

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Received: May 14, 2014 **Accepted:** July 05, 2014 **Published:** July 15, 2014

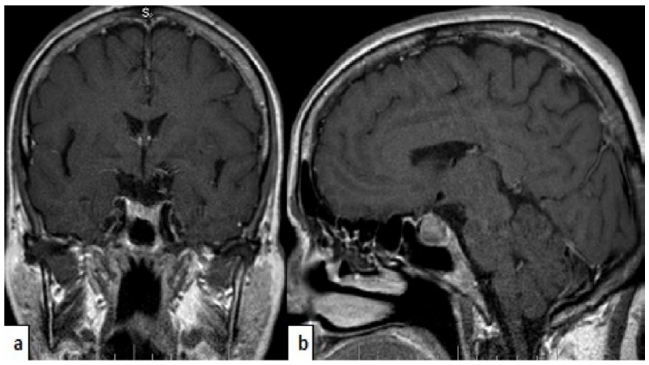

Figure 3: Coronal (a) and sagittal (b) RMN T1W sequences show a 'onion skin' lesion.

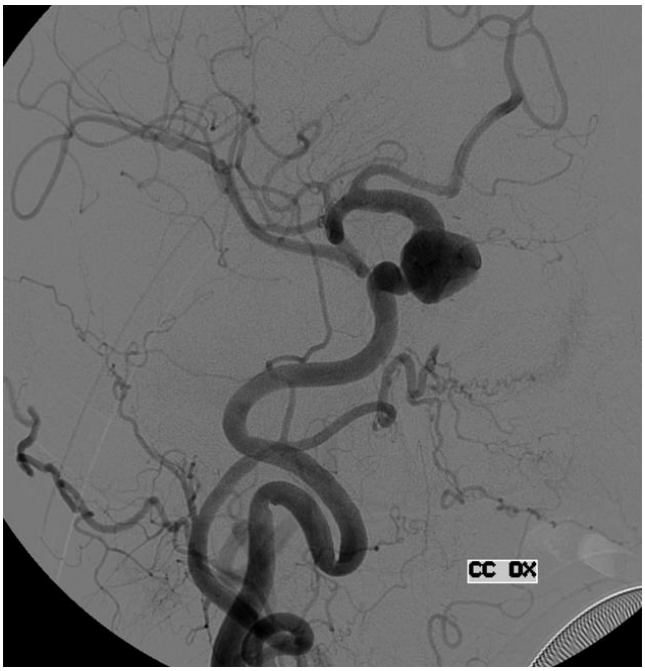

Figure 4: Digital subtraction angiography demonstrates an aneurysm of the cavernous tract of the ICA.

Symptomatically the patient was unchanged since the admission, without any bleeding during hospitalization. After 27 days a cerebral scintigraphy showed a good hemodynamic compensation from the left carotid and vertebrobasilar circulation (Figure 6).

To improve the cerebral vasculature of the right hemisphere and to avoid complications, three months after surgery, the patient underwent a STA-MCA (superficial temporal artery to middle cerebral artery) by-pass through a frontotemporal approach; the patient was discharged after nine days of hospitalization. A Magnetic Resonance Angiography (MRA) control confirmed the patency of the STA-MCA bypass in the absence of reperfusion of the aneurysmal dilatation note of the right carotid siphon and a CT after vascularization showed that the aneurysm was thrombosed (Figure 7).

Figure 5: a. Contrast-enhanced brain CT performed after trans-sphenoidal approach and cervical internal carotid artery ligation demonstrates interruption of the anterior floor of the sella turcica (long arrow); b. The aneurysm exhibits a lower enhancement than surrounding vascular structures, suggesting thrombosis (short arrow).

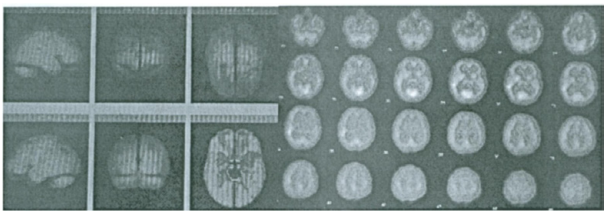

Figure 6: After 27 days a cerebral scintigraphy showed a good hemodynamic compensation from the left carotid and vertebrobasilar circulation.

Discussion

Aneurysms of the sellar region may appear as intrasellar masses and they may mimic pituitary tumors by producing endocrine disorders and by compressing adjacent cranial nerves. Anomalous large arteries, such as the trigeminal or transsellar-carotid variants, may run through the sella. Such aneurysms typically arise from the cavernous or supraclinoid portions of the ICA and extend eccentrically to involve the sella. The prevalence of intracranial aneurysms varies widely ranging from 0.4% to 3.6% in autopsy studies and up to 6% in studies of patients undergoing cerebral angiography. While most occur in the anterior circulation, those projecting into the sellar region account for 1% to 2% of all intracranial aneurysms [5].

Patients with intracranial tumours may show a host of symptoms

Figure 7: Brain CT after vascularization confirms that the aneurysm is thrombosed.

depending on the site and size of the lesion. They may be observed with non-specific symptoms such as fatigue, weight loss or headaches, or with nasal or even subarachnoid bleeding and cavernous sinus syndrome. When these tumours extend into the sellar region, visual field defects and symptoms of pituitary hormonal deficiency may well be the first discernible symptoms. This symptomatology may be present also in other spreading lesions as aneurysmal dilatation. The most common presentation of intracranial aneurysms is subarachnoid haemorrhage for intradural portion of ICA aneurysm, or caroticocavernous fistula (CCF) for extradural portion. The subarachnoid haemorrhage may also be caused by a pituitary apoplexy. The risk of the above mentioned symptomatology increases once the aneurysm size exceeds 2.5 cm [1].

In patients presenting with intracranial symptoms CT is usually requested. CT is frequently used to delineate the anatomy of the sphenoid sinus as a precursor to trans-sphenoidal surgery for a sellar mass [6]. A CT scan of an intrasellar aneurysm would show a homogenous pituitary mass possibly with rim-like calcification but it would be difficult to differentiate from a pituitary tumour [7]. An intrasellar aneurysm may mimic a pituitary adenoma, and can be reliably diagnosed using imaging techniques in paramount.

MRI is the radiological procedure of choice in the preoperative assessment of patients suspected of having pituitary tumours or recurrences, since, in addition to depicting the tumour; it defines the arterial anatomy excluding all but very small coexistent aneurysms [8].

The usefulness of MRI in the evaluation of various central nervous system lesions is well recognized. In cases of vascular lesions, demonstration of ICA, normal venous flow, rapidly flowing shunted blood, if any, and the anatomical relationship with surrounding structures is extremely important.

An aneurysm is usually recognized as a dilated vascular cavity connected to the normal vascular anatomy and appears as a signal void due to high velocity signal loss. However, paradoxical enhancement may occur in the case of slow flow. Thromboses must be differentiated from neoplasms, but this is sometimes difficult. Methemoglobin and hemosiderin appear as high and low intensity, respectively, which may contribute to the differentiation of aneurysms from neoplastic lesions. The lack of artifacts from adjacent bone is one advantage of MRI [9,10]. Hence in the presence of endocrine abnormalities an MRI is preferred as it produces greater anatomical detail and allows multiplanar imaging. Aneurysms are better identified on MRI as areas of black (signal void) on both T1 and T2 weighted images; a thrombus as an area of white (high intensity signal) [11].

Aneurysms of the ICA will be seen to be contiguous with the parent vessel supplying it on MRI, to have internal flow effects and also clearly defined margins. There may also be a dark rim seen on T2 weighted images likely to represent hemosiderin deposition within the aneurysm. However, even an MRI may not be able to distinguish an aneurysm from an abscess. Hence angiography still remains the gold standard for the diagnosis of carotid aneurysms and to determine potential treatment options such as endovascular repair or surgery.

A case report of Chia-Sheng describes a “flow void mass” in the supraclinoid tract of the ICA as a possible cerebral aneurysm (confirmed by angiography) during the MR diagnostic study of pituitary adenoma [12].

Locatelli describes a similar case to ours, in which a brain CT shows a sellar hyperdense mass and a cerebral RM demonstrates the involvement of cavernous sinus. The clinical picture (trigeminal pain, severe and persistent headache) leads the neurosurgeon to request a diagnostic angiography that identifies instead an aneurysm of the ICA cavernous tract [4].

Correct and timely diagnosis is important because spontaneous rupture of cerebral aneurysm near the pituitary fossa resulting in subarachnoid hemorrhage further complicates the differential diagnosis with a pituitary aploplexy [4,13,14].

In the MRI era, routine angiography is probably not indicated before transsphenoidal surgery, inasmuch as MRI usually has sufficient resolution to rule out an associated aneurysm. In this case, in retrospect, we should have suspected that the presence of an unusual flow-void protrusion suggested a vascular component from the ICA. If a pituitary adenoma is present, the possibility of a coincidental aneurysm should always be considered. Careful MRI interpretation is required with preoperative carotid angiography to follow, if an aneurysm is suspected [8,15].

Generally, the symptoms of a non-functioning pituitary adenoma are given only by the compressive effect on surrounding anatomical structures. Local intrasellar mass effect may cause varying degrees of hypopituitarism. Neurological signs and symptoms develop with extrasellar growth. In our case the decrease in visus is justified by a squeeze on the optic chiasm while the divergent strabismus is related to the involvement of oculomotor nerve and compression on the cavernous sinus. The radiological study identified an erosion of cavernous sinus to the TC and an asymmetry of optic chiasm in the right arm to the RMN. Critical review of this study showed that the aneurysm was partially thrombosed with a lack of signal in T2 sequence; also in T1 sequence the presence of a thin edge could have led us to suspect an aneurysm. Even if trans-sphenoidal surgery offers safe and effective treatment in the overwhelming majority of patients with relatively low risk of new neurological and endocrinologic deficits, careful clinical evaluation and critical radiological study are basic and mandatory for a correct surgical procedure and to avoid catastrophic and potentially life-threatening consequences.

Conclusions

The presence of a sellar mass requires a critical evaluation of

the clinical picture and the neuroradiological study. Many diseases affecting the pituitary sella have similar clinical and radiological characteristics, such as neurological and hormonal disorders, and hence do not allow a simple differential diagnosis. Team work comprising the endocrinologist, the neuroradiologist and the surgeon is fundamental. MRI and MRA have reduced the risk of misdiagnosis, although the role of angiography is crucial in selected and ambiguous cases.

In this situation, the need for a precise diagnosis is emphasized in order to treat the aneurysm with surgical or endovascular techniques, but also to avoid a possibly life-threatening situation whenever a surgical approach is considered.

Conflict of Interest

Authors declare to have no potential conflict of interests.

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