

Endovascular Therapy for Incidental Cavernous Aneurysm of Internal Carotid Artery Embedded into Large Invasive Non-Functional Pituitary Adenoma: A Case Report

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1. Abstract

Intracranial artery aneurysm is coincidentally found more frequently in pituitary adenoma, but cavernous aneurysm of internal carotid artery associated with invasive large pituitary adenoma is extremely rare which might be encountered during trans-sphenoid surgery and may cause catastrophic hemorrhagic complications. A 54-year-old female presented to us with chief complaints of headache, giddiness and blurred vision in left eye for 5 months. Neurological examination revealed bi-temporal hemianopia. Brain magnetic resonance imaging (MRI) and computed tomography angiography (CTA) were done for further investigation which described incidental coexistence of left cavernous internal carotid artery (ICA) aneurysm embedded in invasive large pituitary adenoma. Pituitary hormone analysis reports showed normal hormones level. Treatment of aneurysm was done with packing of coils followed by endoscopic endonasal transsphenoidal surgery (EETS) for excision of pituitary adenoma. Total excision of tumor was achieved. Post-operative status went uneventful and patient was discharged on 7th day of procedure.

2. Introduction

Most of aneurysms were found by accident and were unruptured among these pituitary adenoma associated with intracranial aneurysms. The concurrence of intracranial aneurysms in patients with pituitary adenoma are familiar than other brain tumors, however the presence of an aneurysm embedded into pituitary adenoma is extremely rare [1]. Cavernous or supraclivoid ICA aneurysms are

not noted commonly as aneurysms associated with pituitary adenoma spotted outside the sellar region and only 1-2% these aneurysms discovered in sellar region has been reported in the literature [2]; whereas, a growing number of incidental aneurysms associated with brain tumors are being identified with the advancement in angiographic techniques such as computed tomography angiography, magnetic resonance imaging and digital subtraction angiography. The main clinical manifestations have been noted from pituitary hormones dysfunction and optic nerve compression from PA [3]. Preoperative findings of such silent aneurysm are required to prevent from crucial functional outcome during tumor excision. We report a patient with an incidental left cavernous aneurysm of ICA embedded into invasive non-functional pituitary adenoma which was managed by EETS after endovascular coils embolization.

3. Case Report

A 54-year-old female presented with headache, giddiness and blurred vision in left eye for five months. Neuro-ophthalmological examination revealed bitemporal hemianopia. Magnetic resonance imaging (MRI) reported a large ill-defined infiltrative intensely enhancing lesion in sella-suprasellar region, measuring 47mm x 40mm x 41 mm appearing isointense on T1 and heterogeneously hypointense on T2 with mild restricted diffusion and few subtle foci of blooming on SW1 and nearly homogeneous on post-contrast images with involvement of the sphenoid bone, clivus, completely surrounding the posterior aspect of the left optic nerve, partially surrounding the posterior aspect of right optic nerve and

abutting and pushing the optic chiasma superiorly with bilateral cavernous sinus and is completely encasing the cavernous portion of left ICA and left Meckel cave invasion, extending into posterior ethmoid air cells and posterior nasopharyngeal pathway which are suggestive of invasive pituitary macro-adenoma or chordoma or skull base chondrosarcoma (**Figure 1 A,B,C,D**). We planned to excision of tumor by endoscopic endonasal transsphenoidal surgery (EETS). Therefore, three dimensional (3D)CT angiography was done for further evaluation of association of internal carotid artery with pituitary adenoma which revealed medially directed left cavernous segment of ICA aneurysm (5 x 4 x 2.5mm) (**Figure**

1 E). We tested pituitary hormones and normal pituitary hormones level were found. We first planned to perform endovascular coils embolization of aneurysm (**Figure 1 F, H, I**). Neuronavigation system (Medtronic) was used (**Figure 1 G**). Patient underwent endoscopic endonasal trans-sphenoidal surgery on second day of coiling and carefully dissected tumoral portion surrounding the coils treated aneurysm and at total excision of tumor was achieved (**Figure 1 J, K, L**). Patient's postoperative status went uneventful. Histopathology findings confirmed non-functional pituitary adenoma. Post operative pituitary hormone level was normal. Patient improved in vision and had no any CSF leakage during her first (1month) follow up period.

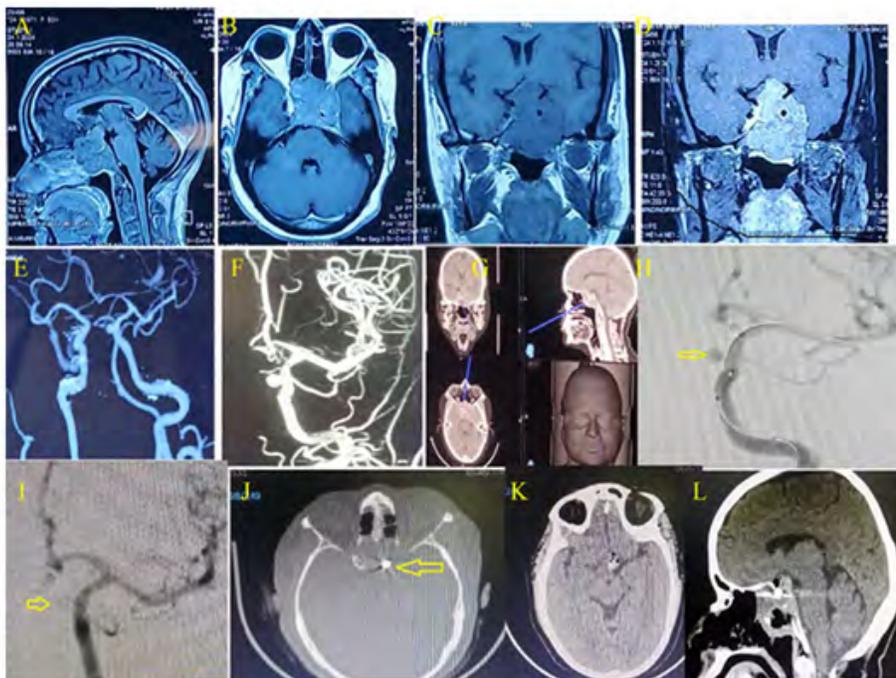


Figure 1: Non-contrast brain MRI: T1 weighted -Sagittal section (A), axial section(B), coronal section (C) and contrast brain MRI: coronal section (D) showing large infiltrative tumor extending to sellar and suprasellar, encasing B/L carotid artery and optic nerve(L>R) and infiltration to sphenoid bone, clivus, posterior ethmoid and sphenoid sinus, 3D-CTA (E) and 3D-DSA (F) showing medially located left cavernous aneurysm of internal carotid artery, Neuronavigation system showing tumor location (G), Micro-catheter advancing for coiling (H) and arrow - complete obliteration of aneurysm after coil embolization (I), post operative status: bone window CT head(J), axial CT (K) and sagittal CT(L) showing complete resection of tumor and embolized aneurysm, some air with hematoma in cavity.

4. Discussion

The occurrence of intracranial aneurysm with pituitary adenoma is regarded to be approximately 3.7% to 7.4% [1,4] where this is higher rate than reported other brain tumors (1.1%) [4]. ICA and anterior communicating artery usually supply to pituitary gland therefore aneurysm located in these artery have been frequently observed [5]. Similarly, a study done by Oh et al described that incidental aneurysms associated with PA were 50 % in ICA, 33.3% in middle cerebral artery, 11.1% in anterior cerebral artery, and 5.6 % in vertebra-basilar artery [6]. However, cavernous segment aneurysm of ICA with invasive large PA as in the present case report are extremely rare. Surgical complication can be catastrophic while removal of an cavernous extension of

tumor or separation of tumor capsule from major vessels if incidental aneurysms are associated with pituitary adenoma and not diagnosed preoperatively [1, 7-9]. The precise process of aneurysms formation associated PA is not clear, even though there are some theories have been postulated including local circulatory effect, endocrine effect, mechanic effect and direct invasion [10, 11]. Growth hormone secreting adenoma more frequently encountered with incidental aneurysm than non-functional adenoma have been reported because of hormonal induction for arteriosclerotic and degenerative changes with arterial wall as well as a result of hypertension(HTN) and diabetes mellitus (DM) [11,12]. But, our case did not have any past history of HTN and DM; and was non-functional pituitary macro-adenoma because all pituitary hor-

mones level was normal which is contrast to other result reported by Zesheng where 46.15% hyperplacatinomia and 23.08% GH secreting adenoma associated with incidental aneurysm embedded within PA [13]. Non-adjacent, adjacent and intra-adenoma type of PA associated with incidental aneurysm can be found on the basis of tumor and aneurysm location [14]. Most of intracranial aneurysms that associates with a PA are situated outside of the tumor itself [10], however cavernous aneurysms with PA that embed into a PA are extremely rare [10,11,13-15], which is similar to our case report where it was medially located left cavernous segment of internal carotid artery aneurysm of size 5mm x 4mm x 2.5mm embedded into large invasive PA.

Most of pituitary adenoma normally present with visual filed deficits, typically bitemporal hemianopsia even though isolated oculomotor nerve palsy without visual filed deficit have also been reported in some literatures [16,17]. The clinical manifestations are mainly from pituitary hormones dysfunction and optic nerve compression from large PA. The sudden onset of severe headache associated with nausea, vertigo and altered mental status, ophthalmoplegia, decreased in visual acuity and visual fields can be noted in hemorrhagic pituitary adenoma or ruptured aneurysm located near to sellar and suprasellar region [18]. In our case report, patient had headache, dizziness and blurred vision in left eye for 5 months and visual field deficit as bitemporal hemianopsia. The accepted treatment methods for PA with embedded aneurysm such as: simultaneous treatment of aneurysm and adenoma through microsurgical pterional or supra-orbital approach [3], two stage procedures combined with trans-sphenoidal or transcranial microsurgery, medical treatment, and radio-surgery after endovascular techniques have been described [11,14,19]. The priority of treatment for pituitary adenoma and intracranial aneurysm is still debatable due to surgical co-morbidity. We first performed endovascular coiling for aneurysm then on second day of coiling, endoscopic endonasal trans-sphenoidal surgery was performed for large PA which may decrease the possibility of lethal bleeding from aneurysm during EETS similar to report of other study [6]. Coils embolization can achieve better result than surgical clipping for aneurysm located specially in cavernous carotid artery embedded within PA[14]. In our case report, patient had better result and total resection of tumor was achieved without any complications of both procedures which EETS for PA was done after 24 hours of coils embolization of aneurysm. But there was a study where EETS for PA was done after 8 month following coils embolization for cavernous carotid artery aneurysm (20). This report has some limitations like retrospective study, single case report, and short follow up period.

5. Conclusion

The presence of a cavernous aneurysm embedded within an invasive pituitary adenoma is rare. We report successful result of coiling for incidental left cavernous aneurysm of internal carotid

and followed by EETS for non-functional invasive pituitary adenoma. Hence, pre-operative angiography, at least CTA or DSA is necessary to avoid lethal bleeding during trans-sphenoidal surgery for removal of pituitary adenoma.

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