



ORIGINAL RESEARCH PAPER

Neurosurgery

GIANT INVASIVE PITUITARY NEUROENDOCRINE TUMOUR(PITNET) COEXISTING WITH GIANT INTERNAL CEREBRAL ARTERY(ICA) ANEURYSM - A CASE REPORT

KEY WORDS: Pituitary neuroendocrine tumour, Giant ICA aneurysm, Trapping

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ABSTRACT

The simultaneous occurrence of intracranial aneurysms (IA) and primary brain tumors (BT) is frequently reported, with an estimated incidence of 0.5–7.4%. Among the tumor types associated with IA, pituitary adenomas (PA) are the most prevalent. Patients with PAs have a considerable prevalence of IAs. Hormonal imbalances and mechanical changes induced by tumor growth, particularly influenced by GH and IGF-1, contribute to this coexistence. Surgical intervention is common, requiring meticulous precautions to avoid complications. We report a case presented with headache and visual disturbances diagnosed with giant invasive pituitary tumour with giant ICA aneurysm developed acute ischemic stroke following DSA then underwent aneurysm trapping and subtotal excision of the lesion.

INTRODUCTION

The simultaneous occurrence of intracranial aneurysms (IA) and primary brain tumors (BT) is a frequently reported entity, with an estimated incidence of 0.5–7.4% according to prior studies(1). IA is associated with diverse types of tumors, among which pituitary adenomas (PA) are one of the most prevalent, second only to meningiomas.(2) Most aneurysms are associated with adjacent vessels, suggesting a link between the two pathologies, especially in the anterior circulation. Similarly, patients with acromegaly show a correlation with high levels of growth hormone (GH), further indicating a relationship between these tumors and the aneurysmal conditions in question. Therefore, a greater understanding of this phenomenon is clinically relevant, as the detection of aneurysms can alter surgical planning and treatment, particularly if the aneurysm is large or carries a high risk of rupture. Thus, the proper management of aneurysms in patients with pituitary adenomas is essential to minimize surgical risks and improve therapeutic outcomes(3).

Case Report

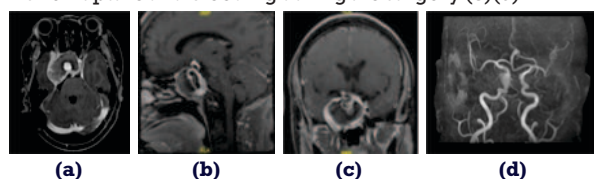
A 50 years old male presented with right sided headache, blurring of vision and proptosis. on examination RAPD on right side. Right side VP shunt was done elsewhere. Serum prolactin was high. MRI brain with contrast was taken showed partially thrombosed giant fusiform aneurysm is observed involving the cavernous, ophthalmic and clinoid segments of the right internal carotid artery. The patent portion of the aneurysm appears as a signal void on the T1 and T2-weighted images and demonstrates enhancement on the postcontrast study. The thrombosed portion of the aneurysm appears as concentric hyper/hypointensity on the T1 and T2-weighted images, with absence of enhancement. The size of the aneurysm including the thrombosed portion is approximately 4.1 x 3 x 3 cm (W x AP x CC). The thrombosed segment (appearing hyperintense on the T1 and T2-weighted images) extends laterally on the right side along the floor of the middle cranial fossa. T1 and T2 isointense soft tissue lesion is observed in the parasellar region on both sides encircling the aneurysm and extending anteriorly along the floor of the middle cranial fossa on the right side. Pituitary gland is not visualised separately. Postcontrast study shows homogeneous enhancement of this lesion. The lesion extends to the level of the orbital apex on the right side. There is erosion of the floor of the sella and extension of this lesion into the sphenoid sinus inferiorly. Superiorly, the lesion encases the supraclinoid segment of the right internal carotid artery. The optic chiasm is compressed and displaced posteriorly. Dimension of the lesion is approximately 3.9 x 5.2 x 5.5 cm

(CC x W x AP). The anteroposterior measurement includes the component that extends along the floor of the anterior cranial fossa on the right side. Mediolateral dimension includes the giant thrombosed aneurysm. CT angiogram of brain showed fusiform aneurysm involving the cavernous, clinoid and ophthalmic segments of the internal carotid artery on the right side. Axial T2 weighted images shows giant partially thrombosed aneurysm. Patent portion of the aneurysm measures 1.6 x 1.2 cm reported as Status post ventricular shunt placement, Giant partially thrombosed fusiform aneurysm arising from the cavernous, clinoid and ophthalmic segments of the internal carotid artery on the right side with enhancing lesion in bilateral parasellar and suprasellar region around the thrombosed aneurysm and extending along the floor of the anterior cranial fossa on the right side, right orbital apex and compressing the optic chiasm. The lesion encases the supraclinoid segment of the ICA- probable invasive pituitary macroadenoma. Patient underwent DSA, during BTO patient developed weakness, hence procedure stopped. Post procedure patient developed weakness on left side and drowsy. immediate CT brain was done showed multiple large hypodense areas seen in the right frontal, temporal and parietal lobes with loss of grey-white differentiation and effacement of sulci suggestive of acute infarct on right side. serial CT brain showed large infarcts in right cerebral hemisphere with new small haemorrhage in frontal region compared to the previous CT study and increased mass effect. patient was managed conservatively. After 3 weeks mass effect has come down, patient improved clinically, underwent Trapping of aneurysm by Right proximal ICA ligation and clipping before ICA bifurcation along with subtotal excision of the lesion. HPE & IHC reported as pituitary neuro endocrine tumour. patient was discharged in a stable condition.

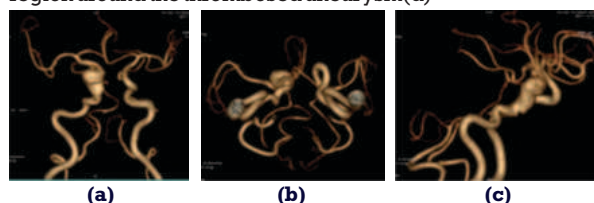
DISCUSSION

Patients diagnosed with pituitary adenoma have a high prevalence of intracranial aneurysms compared to the general population. In terms of location, Almeida Silva et al.(4) found that 89% of aneurysms are in the anterior circulation and 11% in the posterior circulation, but that when associated with pituitary adenomas this rate increased to 97% in the anterior circulation. The coexistence of a pituitary adenoma and an intracranial aneurysm can occur in different patterns and can be attributed to various etiologies which, alone or in combination, include mechanical, hormonal, circulatory, genetic and environmental factors.(4) As for hormonal balance, pituitary adenomas can manifest as hormone-secreting forms, affecting levels of GH, PRL or insulin-like growth factor (IGF-1). Both GH and IGF-1, when

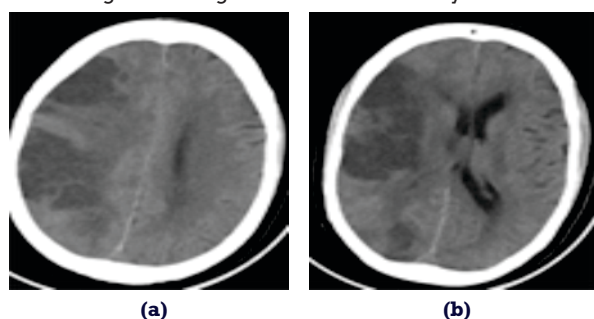
increased, can affect vessel structure, with GH being associated with the induction of arteriosclerotic and degenerative lesions in arterial structures of the Polygon of Willis.(5) Hermier et al.(6), in their study, identified that GH hypersecretion can induce the formation of aneurysms through a decrease in type III collagen. IGF-1, in addition to its aforementioned effects, can lead to the formation of neovessels in the direction of the tumor; these vessels being plausible for aneurysmal involvement and responsible for a significant increase in local circulation. Another important factor in the simultaneous development of these conditions is mechanical alterations. The growth of the tumor causes micro-anatomical changes in the cerebral circulation which, when confronted with the compression or traction caused by the tumor itself, modify local blood flow and lead to hemodynamic stress that favors the formation of aneurysms.(7) The possible expansion of the tumor can lead to invasion and weakening of the vessel wall, causing the aneurysm to grow and subsequently rupture. Both pituitary adenoma and aneurysm are conditions that require surgical intervention. Endovascular approach and surgical clipping are surgical options for IA, ruptured or unruptured. Management of pituitary adenoma involves primarily surgical intervention (except prolactinomas), with the transsphenoidal approach being the main surgical technique used for both NFA and microadenomas (GH, TSH and ACTH secreting adenomas, and aggressive prolactinomas). First-line treatment for prolactinomas consists in the use of dopamine agonists - bromocriptine or cabergoline. Other microadenomas can be treated with medical therapy in the cases not cured by surgery, for example using somatostatin analogs (octreotide, lanreotide, and pasireotide). Gamma Knife radiosurgery is a viable option as an adjuvant after subtotal resection or tumor recurrence. Simultaneous intervention of IA and PA through a craniotomy is viable in certain cases, approaching initially the aneurysm and then the adenoma (aneurysm coiling or clipping followed by gross or subtotal tumor resection). The staged approach—IA prior to PA—is considered a safe and effective method. The treatment of PA prior to the IA is not recommended due to the risk of rupture and bleeding during the surgery.(8)(9)



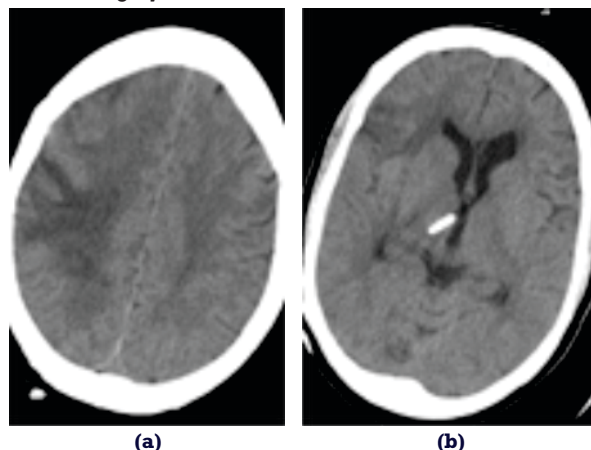
1. Pre op MRI Brain T1W1 with contrast (a)(b)(c) showing enhancing lesion in bilateral parasellar and suprasellar region around the thrombosed aneurysm(d)



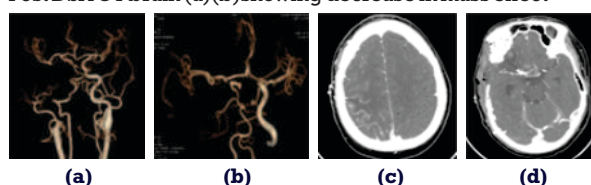
2. Pre op CT angiogram of brain (a)(b)(c) showing large partially thrombosed aneurysm involving cavernous and clinoid segments of right internal carotid artery



3. Post DSA CT brain (a)(b) showing multiple large hypodense areas seen in the right frontal, temporal and parietal lobes with loss of grey-white differentiation with mass effect



Post DSA CT brain (a)(b) showing decrease in mass effect



5. Post op CT angiogram showing (a)(b) status post ligation of right internal carotid artery with complete thrombosis (c)(d) status post clipping of distal right internal carotid artery aneurysm with complete exclusion and thrombosis of the aneurysm.

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