Pituitary apoplexy with minor cerebral infarction

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ABSTRACT

Pituitary apoplexy is a vascular event within the pituitary gland, in which haemorrhage or infarction may occur, and is commonly associated with pituitary adenoma. However, concurrent cerebrovascular incident beyond the gland is rare. This article reports a case of a pituitary apoplexy complicated with subarachnoid haemorrhage and cerebral infarction in a 60-year-old lady. She presented with sudden blurring of vision and right third cranial nerve palsy. Imaging revealed pituitary apoplexy with subarachnoid haemorrhage and cerebral infarction. Failing conservative management, surgical excision was performed. Her symptoms improved and she recovered well with no major neurological deficit.

Keywords: Pituitary apoplexy, subarachnoid haemorrhage, cerebral infarction, ptosis, vasospasm

INTRODUCTION

Pituitary apoplexy can be the first presentation of a pituitary adenoma. One of its rare complications is cerebral infarction. [1] Previous case reports have described patients with major neurological deficit during presentation with poor outcome. Cases in which patients escape major stroke are rarely highlighted. Two interesting theories on its pathophysiology have been described, direct mechanical arterial compression and indirect arterial vasospasm. [2] We report a rare case of pituitary apoplexy with minor cerebral infarction.

CASE REPORT

A 60-year-old Malay lady presented to the emergency department with sudden onset of blurring of vision and drooping of the right upper eyelid of three days duration. These were associated with giddiness. Her conscious level was normal. There was no vomiting, hemiparesis or slurring of speech. She was on oral medications for diabetes mellitus and hypertension and not on any antiplatelet or anticoagulant.

On examination, she was alert but appeared dehydrated. Her Glasgow Coma Score (GCS) was 15/15. Her vital signs showed normal blood pressure (110/64 mmHg), mild tachycardia (pulse rate 113/ minute), fever (temperature 38.6 °C) and normal oxygen saturation. Cranial nerves examination revealed complete right eye ptosis with dilated pupil that was not reactive to light. Extra-ocular assessment showed partial impairment of movement of the right eye in the superior-medial direction. She had a complete third cranial nerve (CN III) palsy of the right eye. Further ophthalmologic assessment

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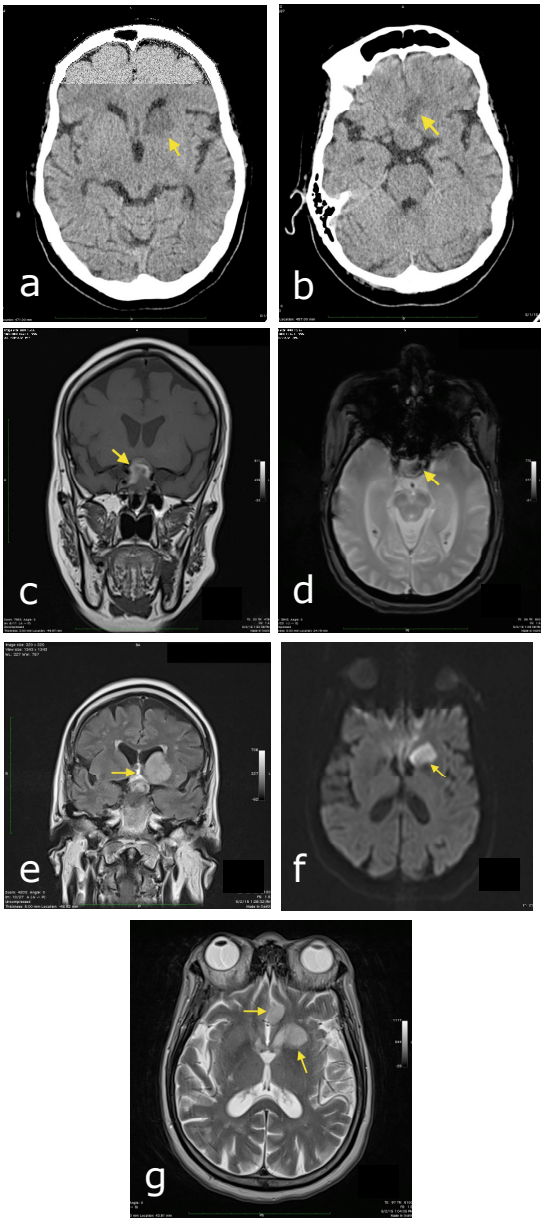
showed that the right eye had no perception to light. The left eye had perception to light but demonstrated temporal hemianopia. The rest of cranial nerves and neurological examination were normal.

Full blood count showed mild anaemia (haemoglobin 10.6 g/dL) with normal white cell and platelet counts. Serum electrolytes showed significant hyponatraemia (sodium 122 mmol/L) and mild hypokalaemia (potassium 3.3 mmol/L). Her serum urea was normal 4.5 mmol/L but creatinine level was mildly elevated (120.3 mmol/L). Her random capillary blood glucose was slightly high at 8.5 mmol/L. Urgent brain plain computed tomography (CT) scan revealed cerebral infarction involving the left straight gyrus and left caudate nucleus (Figures 1a and b).

Subsequent magnetic resonance imaging (MRI) of the brain showed a pituitary macroadenoma (1.5 x 1.6 x 2.2 cm), compressing onto the optic chiasm (Figure 1c). Infarction in the left straight gyrus and left caudate nucleus were also evident. T1 weighted (T1W) images demonstrated hyperintensity signal within the macroadenoma with corresponding susceptibility artefact seen on Gradient Recall Echo (GRE) representing subacute haemorrhage (Figure 1d). There was evidence of midline subarachnoid haemorrhage seen as hyperintense signal on T2 FLAIR images (Figure 1e). Hormonal investigation showed low thyroid stimulating hormone (TSH) level (0.08 uIU/ml) with normal thyroxine level (Free T3 and T4). Random cortisol, prolactin, luteinising and follicular stimulating hormones levels were normal.

The endocrinologist played important roles in her initial treatment. She was treated medically with intravenous hydrocortisone 100 mg thrice daily. The glucose readings were optimised and corrected the electrolytes imbalances. However, there was no improvement in her eye symptoms, and therefore



Figs. 1: A Computed tomography (CT) scan of the brain showing areas of acute infarction within the anterior cerebral artery territory (a) hypodensity in the left caudate nucleus (arrow) and (b) hypodensity in the left straight gyrus (arrow); a Magnetic Resonance Imaging (MRI) findings in keeping with pituitary apoplexy with subarachnoid haemorrhage (c) Coronal T1W shows high signal intensity within the macroadenoma (white arrow); (d) Axial GRE with corresponding susceptibility artifact seen within the pituitary tumour (black arrow); (e) Coronal T2 FLAIR: image shows abnormal high signal within the subarachnoid space at the midline (black arrow) in keeping with pituitary apoplexy with subarachnoid haemorrhage and (f) MRI (Axial DW1) showing areas of infarction involving part of the anterior cerebral artery territory; and (g) Axial T2W images showing abnormal high signal intensity of the left caudate nucleus (arrow) and the straight gyrus (arrow head) consistent with acute infraction.

surgery was decided to salvage her vision. On the eighth day of admission, she underwent a right pterional craniotomy and excision of the pituitary tumour. Intra-operatively a well-encapsulated retrochiasmal pituitary tumour with areas suggestive of necrosis was seen. This was carefully resected without any intra-operative complications.

Histopathology report revealed infarcted cellular tissues with some areas of haemorrhage with no viable pituitary tissue.

Postoperatively she was monitored in the intensive care unit. There was transient diabetes insipidus but otherwise recovery was uneventful. Post-operation serum hormones showed hypothyroidism (TSH 0.51 uIU/L – normal; T4 8.05 pmol/L – low; Free T3 <1.54 pmol/L - low) and low random cortisol level (33 nmol/L). Her random adrenocorticotrophin hormone (ACTH) level was normal, 12 pg/ml. She was started on oral levothyroxine, oral hydrocortisone and oral aspirin.

At one-month follow-up, the right eye ptosis almost completely resolved. However, the right eye blindness and left eye temporal hemianopia remained the same. There was no gross neurological dysfunction however the patient was noted to have slight delay in response during conversation. Nonetheless, she was able to continue with her daily activities independently.

DISCUSSION

Pituitary apoplexy is a clinical syndrome as a result of haemorrhage and/or infarction of the pituitary gland which typically manifest with sudden onset headache, vomiting, visual impairment, and/or altered consciousness. [3] Acute pituitary apoplexy is a rare life threatening condition with reported incidence rate of between 0.6% and 9%. [4] Although implicated with many causative factors, the majority of spontaneous pituitary apoplexy occurs in patients with pituitary adenoma, as the tumour rapidly enlarges. [5] One of the rare complications of pituitary apoplexy is cerebral infarction. There is currently no reported data on its incidence rate and based on a literature review up until 2014, only 25 cases of such condition have been reported. [6]

There are two theories proposed for the underlying pathophysiology of the manifestation. As the tumour enlarges with or without intra-tumoural haemorrhage results in direct compression on the adjacent artery resulting in compromised blood supply. Vessels that can be affected include the anterior cerebral artery (ACA) and internal carotid artery (ICA) due to their proximate location. The ACA sits superior to the pituitary gland, whilst the cavernous portion of ICA lies lateral to it. They both form part of the closed loop of circle of Willis. In comparison, the middle cerebral artery, not part of the loop, is less likely to be compressed. [7]

Interestingly, not all cases of cerebral infarction from pituitary apoplexy will demonstrate arterial compression on imaging. Hence vasospasm was proposed as the likely other mechanism. This may occur as a result of subarachnoid blood and vasoactive substances released from the pituitary gland during the apopleptic event. [1] Transdiaphragmatic rupture of the sellar tumour is the most likely route by which blood travels into the subarachnoid space. [1] The theory of vasospasm was initially proposed by Cardoso and Peterson in 1983. [2]

Our patient's MRI showed compression on the optic chiasm and CN III resulting in visual impairment and ptosis. The macroadenoma was seen to be abutting on both cavernous ICAs but not causing significant impingement. MR images showed evidence of pituitary apoplexy and subarachnoid haemorrhage. There were associated abnormal high T2 weighted (T2W) and FLAIR signal changes on the left caudate lobe and left straight gyrus

with evidence of restricted diffusion (Figures 1f and 1g). Caudate lobe infarction, usually which manifest as changes in behavioural changes and cognitive function [8] and these were demonstrated to a certain degree in our case. As the infarction did not involve the whole ACA territory in our patient, it is postulated the most likely cause in our patient was vasospasm affecting the branches of the ACA.

The gold standard for imaging vasospasm or arterial compression in the brain is cerebral angiography. However, our patient was not subjected to this invasive investigation as her symptoms were mild. In mild cerebrovascular disease, the overall risk of neurologic complication (transient ischaemic attack (TIA) or stroke) is 4% and the risk of permanent neurological complication (disabling stroke) is 1%. [9] Although considered low, the risks may outweigh the benefits. Nonetheless, some have recommended performing cerebral angiography for patients who develop neurological deterioration to determine the cause. [10] However the timing of angiography may not coincide with vasospasm. In patients suspected to have pituitary apoplexy and found to have concurrent SAH on MRI, cerebral angiography is important to exclude other pathology such as vascular aneurysm within the circle of Willis that may coexist with or mimic pituitary adenoma. [5] It is therefore important for clinicians to assess patients individually and decide the best imaging option.

As demonstrated by our patient, clinical manifestation of cerebral infarction in PA may vary. The majority of patients such as our case have presented with major neurological deficit. Based on a literature review of 25 patients with this condition, all had reduced consciousness, and 72% (18/25) had either hemiparesis or hemiplegia. This was accompanied by visual disturbances in 28% (7/25) of patients. The mortality was rather high, 36% (9/25) patients; of which six were operated and three treated conservatively. [6] Our patient was fortunate as her symptoms were only confined to the eyes.

In conclusion, pituitary apoplexy is a potentially life threatening condition which can be complicated with cerebral infarction of varying degrees. It carries high morbidity and mortality. The incidence of pituitary apoplexy with minor stroke is probably under-reported. MRI combined with cerebral angiography is paramount to diagnose and determine the underlying cause. Vasospasm is the likely explanation for infarction if no evidence of arterial compression was shown. More data and research will be beneficial to help us understand its pathophysiology, identify those at risk, and improve treatment outcomes.

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