

Case report

Pituitary apoplexy in a 19-year-old woman: An uncommon age and gender presentation

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Abstract

Pituitary apoplexy is a rare clinical syndrome that is caused by acute hemorrhage or infarction of the pituitary gland. It is most frequently reported in men during the 5th and 6th decades of life and is rarely encountered in young women. In this report, we describe a 19-year-old woman who presented with acute visual disturbance accompanied by occasional mild headaches. Ophthalmologic examination revealed bitemporal hemianopia, and head magnetic resonance imaging demonstrated an intrasellar mass with suprasellar extension, intratumoral hemorrhage, and optic chiasm compression, consistent with a pituitary macroadenoma with apoplexy. The patient also had a history of secondary amenorrhea, thereby suggesting possible endocrine dysfunction. This case highlights the importance of considering pituitary apoplexy in young patients with acute visual disturbances.

Keywords: Bilateral hemianopia, case reports, optic chiasm, pituitary adenoma, pituitary apoplexy.

Pituitary apoplexy (PA) is a rare clinical condition. The term was first introduced by Brougham, *et al.* in 1950 to describe cases of necrosis and hemorrhage occurring in patients with pituitary tumors. However, pituitary tumor-associated hemorrhage had previously been described by Bailey in 1898.⁽¹⁻⁴⁾ PA is defined as a clinical syndrome that results from the hemorrhage and/or infarction of the pituitary gland, most often occurring within a pituitary adenoma.^(1,4-6)

The reported prevalence and incidence of PA vary widely among studies.⁽⁷⁾ The precise estimation of the prevalence and incidence of PA is challenging, as subacute cases often present with mild or nonspecific symptoms that may remain undiagnosed.⁽⁶⁾ A United Kingdom study reported 6.2 cases per 100,000 individuals,⁽⁸⁾ whereas a population-based regional cohort in Finland estimated the incidence at 0.17 per 100,000 individuals per year.⁽⁹⁾ Moreover, PA has been reported to occur in 2.0% – 12.0% of patients with pituitary adenomas.⁽¹⁰⁾

The clinical manifestations of PA range from asymptomatic presentation to severe manifestations, including the deterioration of consciousness, headaches, visual impairment, nausea, vomiting, and hormonal dysfunction, depending on the extent of pituitary gland hemorrhage, edema, and necrosis.^(1-3, 5-7) The most common presenting symptom is headaches, followed by visual impairment.^(2-5, 7, 11) We present a case of a 19-year-old woman with pituitary apoplexy presenting with bitemporal hemianopia.

Case report

A 19-year-old woman presented to the neuro-ophthalmology clinic with a chief complaint of blurred vision in the right temporal visual field for the past week. She had difficulty reading and described her vision as “double and overlapping.” When viewing from a distance, she perceived her visual field as constricted. She also experienced mild, occasional headaches, with no associated nausea, vomiting, or identifiable aggravating factors. Furthermore, she had no complaints of tinnitus, anosmia, or other neurological deficits. There was no history of head or ocular trauma and no family history of similar complaints.

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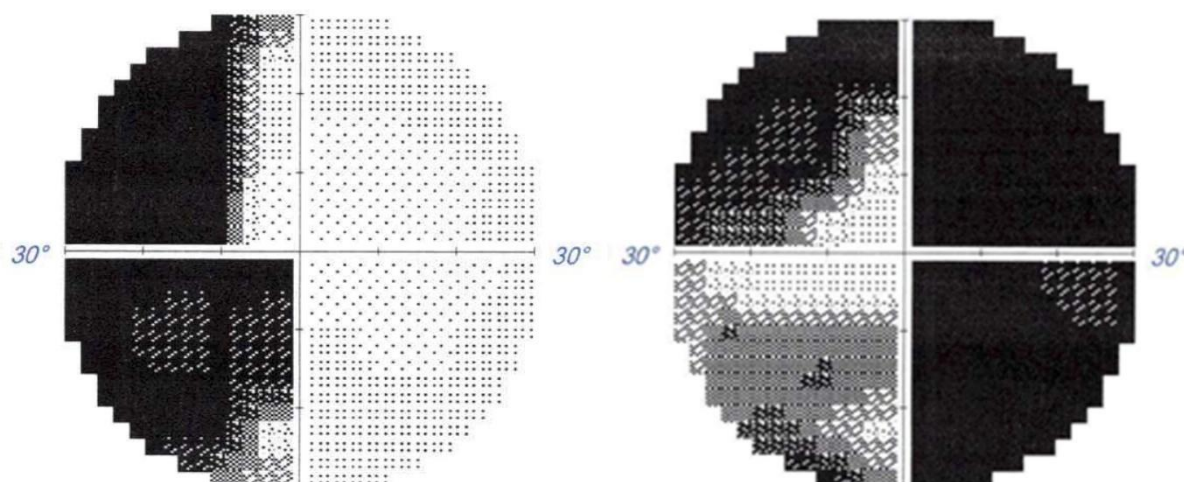


Figure 1. Humphrey visual field testing showed bitemporal hemianopia.

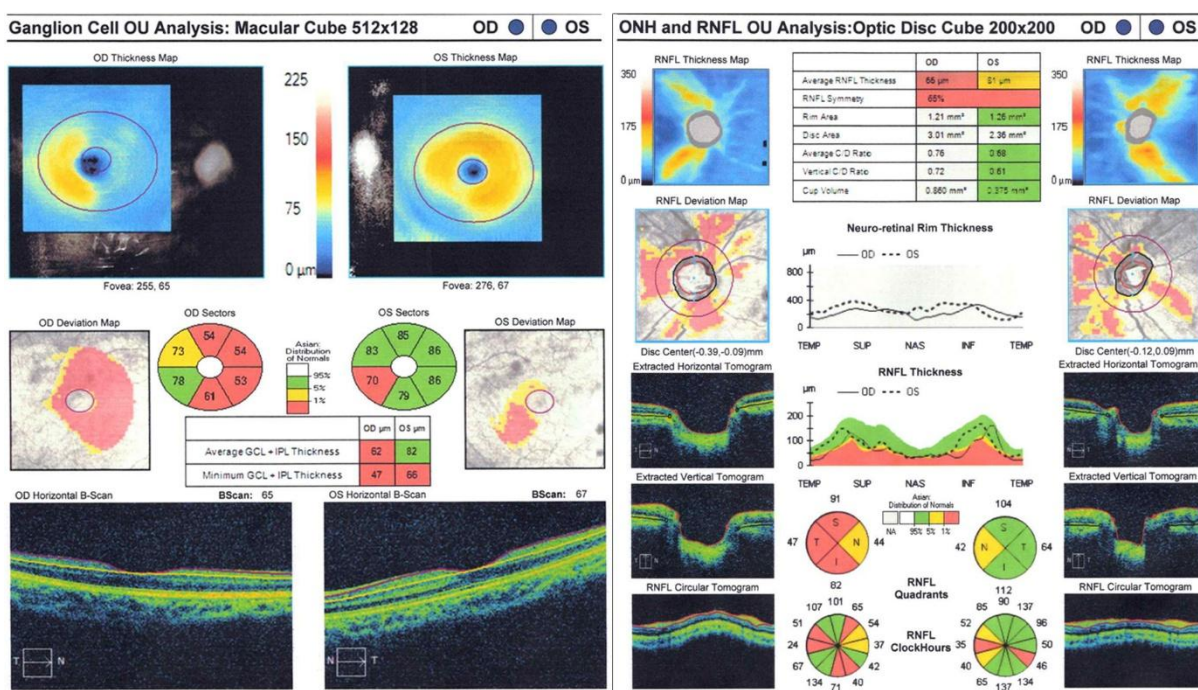


Figure 2. OCT showed thinning of optic nerve head, ganglion nerve layer, and inner plexiform layer. OCT, optical coherence tomography.

The patient also reported menstrual disturbances. Menarche occurred at age 14, but she had not menstruated since. Previous evaluation by an obstetrician-gynecologist, which included ultrasonography, revealed a normal uterus; however, a hormonal abnormality was suspected. No hormonal testing had been performed before presentation.

Ophthalmic examination revealed that the right eye's visual acuity was counting fingers at 1 m, with no improvement with a pinhole. The left eye measured 6/45, improving to 6/12 with pinhole. Intraocular

pressures were within normal limits, and eye movements were good in all directions, with orthophoria. Pupillary light reflexes were normal in both eyes. A relative afferent pupillary defect (RAPD) grade 3 was detected in the right eye, whereas no RAPD was present in the left. Both optic discs appeared pale, and Humphrey visual field testing revealed bitemporal hemianopia (Figure 1). Optical coherence tomography (OCT) revealed thinning of the optic nerve head, ganglion cell layer (GCL), and inner plexiform layer (Figure 2).

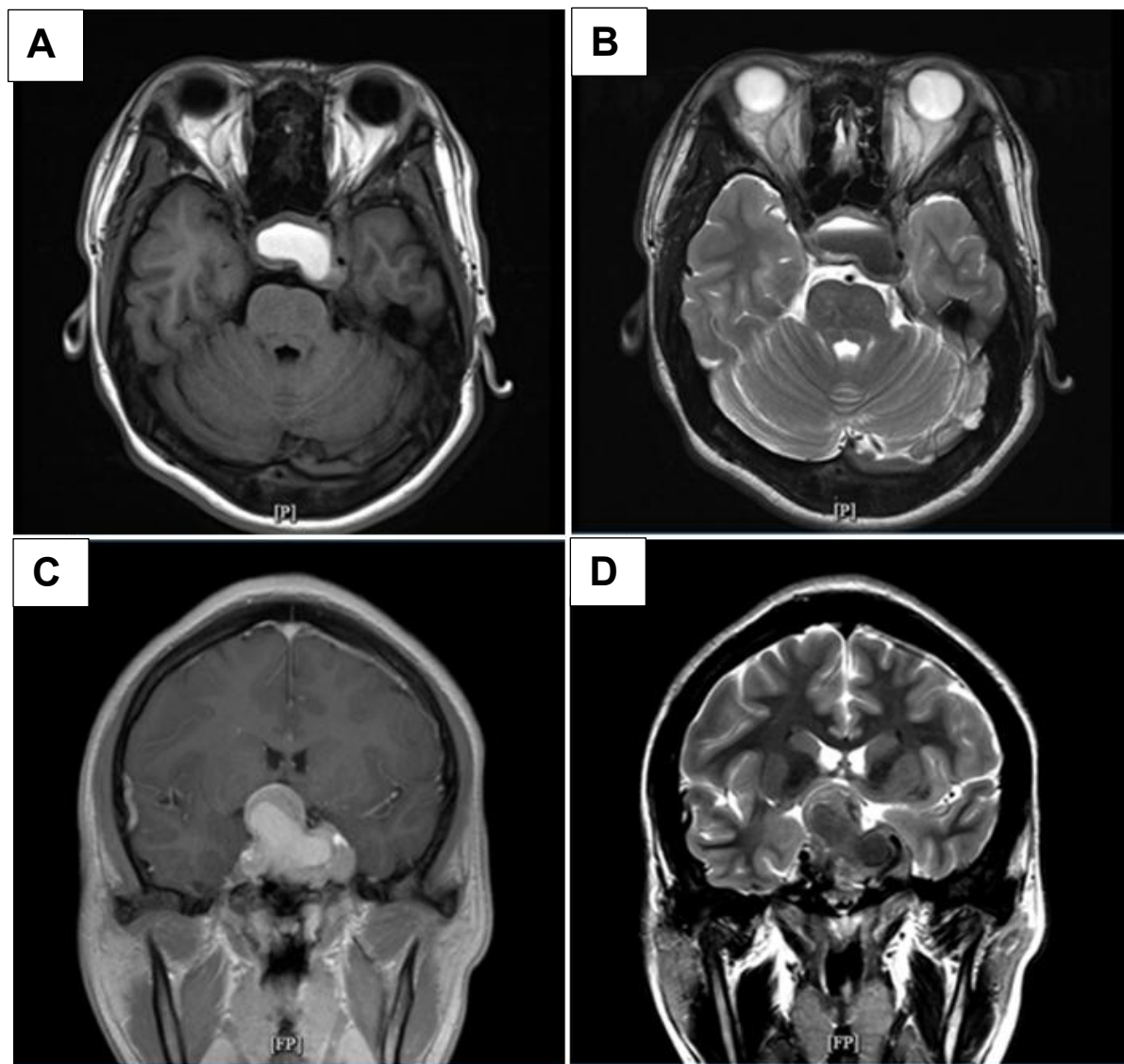


Figure 3. Head MRI showing an intrasellar mass with features of apoplexy. (A) T1W axial image without contrast shows hyperintensity within the sellar region, (B) T2W axial image without contrast shows fluid-fluid level within the mass, (C) T1W coronal image with contrast shows enhancement at the solid parts of the mass, (D) T2W coronal image without contrast show displacement of the optic chiasm and left ICA. ICA, internal carotid artery; MRI, magnetic resonance imaging.

Head magnetic resonance imaging (MRI) with contrast demonstrated a well-defined, lobulated, solid mass occupying the intrasellar region with suprasellar extension, with different intensities on the T1W1/FLAIR and T2W1 sequences. The mass displaced the optic chiasm superiorly, caused remodeling of the sella turcica, and compressed the left intracavernous internal carotid artery inferiorly within the cavernous sinus compartment (**Figure 3**). The MRI also revealed thickening of the sphenoid sinus mucosa.

Following the MRI, the patient underwent hormonal evaluation. The results showed decreased levels of luteinizing hormone (LH; <0.09 mIU/mL) and follicle-stimulating hormone (FSH; 0.73 mIU/mL). Moreover, the prolactin levels were markedly elevated

($2,333.89$ ng/mL). Testosterone (51 ng/dL) and growth hormone (GH; 29.2 ng/mL) levels were elevated, whereas progesterone level was decreased (0.12 ng/mL). Thyroid function tests, including free triiodothyronine (free T3), free thyroxine (free T4), and thyroid-stimulating hormone (TSH), were within normal limits, and morning cortisol levels were also within normal limits.

The patient was given citicoline and referred to the neurosurgery department for further evaluation and management. However, she did not return for follow-up at our hospital, and information regarding her subsequent management, including whether surgical or conservative treatment was pursued, as well as the treatment outcomes, is unavailable.

Discussion

PA has been most commonly reported during the 5th and 6th decades of life, with a mean age of onset of 57 years, and it is rare in children and adolescents.^(1, 2, 7) This may be explained by PA commonly occurring as a complication of pre-existing pituitary tumors and is associated with various precipitating factors, including hypertension, diabetes mellitus, pregnancy, and surgical procedures, which are more prevalent in adults than in children.^(1, 3, 6, 10, 11) Although estimating PA incidence and prevalence in adults is already challenging, it is even more challenging in children and adolescents due to the rarity of the condition in this group. To our knowledge, the youngest patient reported with PA was a 6-year-old, as described in the case report by Sakalas R, *et al.* in 1973.⁽¹²⁾ A literature review published in 2021 identified only 22 cases of PA in patients under 20 years old since 1980, following the advent of computed tomography (CT).⁽¹³⁾ PA is more frequently observed in men, with a reported male-to-female ratio of 2:1.^(1, 5, 11) In this report, we describe a case of PA in a 19-year-old woman, which is an uncommon presentation given the rarity of this condition in young females.

The most common symptom of PA is headache, occurring in 80.0%–90.0% of cases.^(3-5, 7, 11) Typically, it presents as severe, frontal or retro-orbital, and often thunderclap in nature, although status migrainosus or paroxysmal hemicrania has also been described. Only a few reports describe insidious-onset headache.^(4, 10) In many instances, sudden severe headache is the initial symptom and is frequently accompanied by nausea and vomiting.⁽⁷⁾ Several mechanisms have been described to account for headache in PA. Some studies suggest it results from dural stretching and irritation caused by blood and cellular debris in the subarachnoid space. In contrast, others have attributed it to a rapid increase in intrasellar pressure due to hemorrhagic infarction of the pituitary gland.^(7, 11) Unlike the typical severe headache of PA, our patient reported only mild, occasional headaches.

Visual impairment is another common clinical manifestation of PA.⁽²⁻⁵⁾ In a Tunisian study, visual impairment occurred in 75.0% of patients with PA.⁽⁵⁾ It results from the effect of sudden sellar expansion, which compresses the surrounding structures, particularly the optic apparatus and cranial nerves. In addition, superior compression of the optic chiasm typically causes decreased visual acuity and

campimetric defects, most often bitemporal hemianopia. Lateral extension into the cavernous sinus can involve the cranial nerves, typically the third cranial nerve, which causes oculomotor nerve palsy characterized by impaired adduction, ptosis, and mydriasis.^(1, 7) The most frequent manifestations, in descending order of occurrence, are decreased visual acuity, bitemporal hemianopia, and extraocular palsy.^(4, 7, 11) In this case, the patient developed bitemporal hemianopia, which was confirmed by Humphrey visual field examination and supported by MRI evidence of chiasmal compression, which is consistent with previously described findings.

MRI is the imaging modality of choice for patients with suspected PA because it can visualize and detect the presence of an adenoma, hemorrhage, necrosis, or edema within the pituitary gland, as well as compression of the optic chiasm or other adjacent structures.^(1, 2, 11) In our patient, the contrast-enhanced head MRI findings were consistent with a pituitary macroadenoma complicated by apoplexy, which displaced the optic chiasm and the left carotid artery. Boellis, *et al.* previously reported that MRI of patients with PA typically shows an intra- and supra-sellar expanding mass with variable signal intensities on T1WI and T2WI sequences,⁽²⁾ which is consistent with our findings. Among the MRI sequences, the T2-weighted gradient-recalled echo is considered the most sensitive for detecting pituitary apoplexy. A common imaging feature is hyperintensity on the T1-weighted sequences within the sellar region; however, this finding is not entirely specific, as similar appearances can also be observed in other parasellar lesions.⁽¹⁴⁾ In addition, sphenoid sinus mucosal thickening has been described as an MRI finding suggestive of PA,^(1, 2, 11, 14) which was also present in our patient. CT can be performed if MRI is contraindicated or unavailable.^(1, 2, 7, 11)

PA most commonly occurs in pituitary adenomas, the majority of which are previously undiagnosed (approximately 80%).⁽⁴⁾ Although it may arise in any adenoma subtype, it is most frequently seen in macroadenomas and nonfunctioning adenomas, followed by prolactinomas.^(4, 5, 11) Pituitary adenomas are the most commonly identified non-metastasizing neoplasms of the pituitary gland.⁽¹⁵⁾ These are classified by size as microadenomas (<10 mm) or macroadenomas (≥10 mm), and by functionality as functioning (i.e., hormonally active) or nonfunctioning (i.e., hormonally inactive).^(15, 16) Functioning adenomas

typically present earlier, often in younger patients, with clinical features of excess hormone production (e.g., hyperprolactinemia),⁽¹⁷⁾ In contrast, nonfunctioning adenomas usually remain clinically silent until they reach a sufficient size to exert a mass effect.⁽¹⁸⁾ A hormonal workup is required to identify pathological secretions and distinguish functional from nonfunctional adenomas.⁽¹⁵⁾

In the present case, the patient's hormonal profile revealed marked hyperprolactinemia, with elevated GH and testosterone levels and decreased LH and FSH, which suggests a mixed-functioning pituitary adenoma and raises suspicion of a macroprolactinoma with possible GH–prolactin co-secretion. Prolactinomas are the most commonly identified functional pituitary tumors.^(1, 4, 15) They are classified as microprolactinomas (≤ 10 mm), macroprolactinomas (>10 mm), and giant prolactinomas (>40 mm).⁽¹⁹⁾ Moreover, serum prolactin levels correlate with tumor size, with levels >500 $\mu\text{g/L}$ strongly suggesting a macroprolactinoma.^(15, 20) Furthermore, prolactinomas are more prone to hemorrhage,⁽¹⁰⁾ which is consistent with previous reports and the findings in this case.

PA management requires a multidisciplinary team involving endocrinologists, neuroradiologists, neurosurgeons, and neuro-ophthalmologists.^(1, 3) Management strategies range from conservative to surgical approaches, but the implementation of each remains debatable. The Pituitary Apoplexy Guidelines Development Group in the United Kingdom created a scoring system that incorporates visual acuity, visual field defects, cranial nerve palsies, and the Glasgow Coma Scale, with scores ranging from 0 to 10. A score of ≥ 4 suggests surgical intervention.^(3, 6) Our patient had a score of 4, which prompted referral to the neurosurgery department for further management. When surgery is indicated, the transsphenoidal approach is preferred, as it provides effective decompression of the optic apparatus and adjacent structures while minimizing patient morbidity and mortality.^(1, 10) Surgical decompression has been demonstrated to improve visual acuity, visual field defects, ophthalmoplegia, and hormonal deficits in most patients, with normalization of visual acuity reported in up to 50.0% of cases. However, the long-term superiority of surgery over conservative management remains unknown.^(1, 7, 10) Unfortunately, the patient was lost to follow-up, and information regarding her subsequent management and outcomes is unavailable.

OCT can provide prognostic information regarding visual field outcomes.^(1, 21, 22) A retinal nerve fiber layer (RNFL) thickness of less than 75 μm is associated with a poor visual prognosis.⁽²¹⁾ In addition, pre-operative visual field defects, duration of visual symptoms, and GCL thinning on OCT have been identified as predictors of poor postoperative visual recovery in patients with pituitary adenomas.⁽²²⁾ In this case, thinning of the GCL was observed, with RNFL thickness measuring 55 μm in the right eye and 81 μm in the left eye, which suggests a poorer visual prognosis, particularly for the right eye.

Conclusion

PA, although rare in young patients, should be considered in cases presenting with acute visual disturbances, particularly decreased visual acuity and bitemporal hemianopia.

Author contributions

IKA contributed substantially to the study concept and design, acquired the data, conducted data analysis and interpretation, and critically revised the manuscript for important intellectual content. JJ contributed substantially to data acquisition, literature review, and manuscript drafting and revision. All authors approved the final version submitted for publication and take responsibility for statements made in the published article.

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Conflict of interest statement

The authors have each completed the International Committee of Medical Journal Editors Form for Uniform Disclosure of Potential Conflicts of Interest. The authors have no potential conflicts of interest to disclose.

Patient consent statement

The authors certify that they obtained all appropriate patient consent forms. In this form, the patient's guardian consented to the patient's images and other clinical information being reported in the journal. The patient's guardian understands that the patient's name and initials will not be published and that due efforts will be made to conceal the patient's identity, but anonymity cannot be guaranteed.

Data sharing statement

Data generated or analyzed for the present report are included in this published article. Further details are available from the corresponding author on reasonable request after deidentification of the patient whose data are included in the report.

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