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Case Report

Sudden-onset nonhemorrhagic Rathke's cleft cyst mimicking apoplexy: A case report and literature review

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Abstract

Most Rathke's cleft cysts (RCCs) are asymptomatic. Of the symptomatic RCCs, those that rapidly develop and cause hemorrhagic RCC apoplexy are particularly rare. In this study, we report a case of nonhemorrhagic RCC apoplexy that is an acute-onset RCC without intracystic hemorrhage. This study included a 21-year-old male patient. His chief complaints were severe headache with sudden disturbance of consciousness, visual disturbance, and double vision. Head computed tomography (CT)/magnetic resonance imaging (MRI) and clinical course indicated a hemorrhagic RCC apoplexy that is an acute-onset RCC with intracystic hemorrhage, a nonhemorrhagic RCC apoplexy, or a pituitary apoplexy. We then performed endoscopic transsphenoidal surgery. Histopathological examinations revealed a nonhemorrhagic RCC apoplexy. The preoperative diagnosis makes it difficult to distinguish between acute-onset hemorrhagic RCC apoplexy, nonhemorrhagic RCC apoplexy, and pituitary apoplexy. We compared 26 cases of hemorrhagic RCC apoplexy with cases of nonhemorrhagic RCC apoplexy by reviewing previous literatures. Furthermore, we have determined the characteristics of nonhemorrhagic RCC apoplexy. Knowledge on these characteristics may be useful in the differential diagnosis. For the differential diagnosis and treatment of RCC apoplexy and pituitary apoplexy, it is important to appropriately perform surgical treatment and make an accurate diagnosis based on surgical and pathological findings.

Key words: Rathke's cleft cyst, nonhemorrhagic RCC apoplexy, hemorrhagic RCC apoplexy, pituitary apoplexy

Introduction

Rathke's cleft cyst (RCC) is a pituitary cystic disease derived from a remnant tissue of the embryonic Rathke's pouch, and most RCCs are asymptomatic. Of the symptomatic RCCs, those that rapidly develop and cause hemorrhagic RCC apoplexy are particularly rare. According to Binning *et al.*[1], RCCs can be classified as an acute-onset RCC with intracystic hemorrhage (RCC apoplexy) or an acute-onset RCC without intracystic hemorrhage (mimicking RCC apoplexy). While several case reports have investigated the clinical features of hemorrhagic and nonhemorrhagic RCC apoplexy, the difference between the two has not been determined. This study included a case of nonhemorrhagic RCC apoplexy due to sudden consciousness disturbance accompanied by visual disturbance and double vision. We had difficulty distinguishing the type of RCC before surgery. Previous case reports on hemorrhagic and nonhemorrhagic RCC were reviewed to characterize the clinical and pathological findings of this rare disease entity.

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Case report

The patient was a 21-year-old man. His chief complaints were severe headache with sudden disturbance of consciousness, visual disturbance, and double vision. He had experienced mild headaches and mild visual impairment for a year and suddenly found it difficult to read two days before hospitalization. On the day of his admission, he developed consciousness

disturbance with severe headache and a sudden worsening of the visual field disturbance. He had no medical or family history. He was rated as E2V3M6 using the Glasgow Coma Scale. He had bitemporal hemianopia and right-abduction nerve palsy. Head computed tomography (CT) revealed a 4-cm intrasellar and suprasellar high-density area accompanying a neoplastic lesion (Fig. 1). Head magnetic resonance imaging (MRI) showed mixed low and high signals on T1-/T2-weighted images (WI) and indicated an upward compression of the optic nerve (Fig. 2a, b). Gadolinium-enhanced T1WI confirmed the rim enhancement of the neoplastic lesion (Fig. 2c), which indicated either a hemorrhagic or nonhemorrhagic RCC apoplexy. The basal anterior pituitary hormone levels (TSH, 0.7 μIU/ml; free-T3, 2.6 pg/ml; free-T4, 0.9 ng/ml; LH, 1.2 mIU/ml; FSH, 1.9 mIU/ml; PRL, 3.7 ng/ml; GH, 1.42 ng/ml; IGF-1, 201 ng/ml; ACTH, 27.0 pg/ml; cortisol, 2.8 μg/dl; testosterone, 4.2 ng/ml) and other blood tests were within normal ranges. Endoscopic transsphenoidal surgery was performed because of progressive visual impairment. A viscous yellow butter-like content liquid was ejected after dural incision. Macroscopically, no rupture of the cyst wall or leakage of the internal solution into the surrounding tissues was observed. No hematoma or nodules were present in the cyst. These were findings of nonhemorrhagic RCC apoplexy (Fig. 3). His severe headaches, visual impairment, and consciousness disturbance promptly improved after surgery, but diabetes insipidus transiently appeared. Postoperative head MRI showed that the optic nerve and pituitary gland were decompressed (Fig. 4). Histopathological findings revealed RCC, which included a single-layer ciliated columnar epithelium with partly multi-row epithelial, goblet, and basal cells. Neutrophils, macrophages, and necrotic cells were retained in the cyst. Furthermore, an infiltration of the inflammatory cells in the cyst wall was observed (Fig. 5a, b).

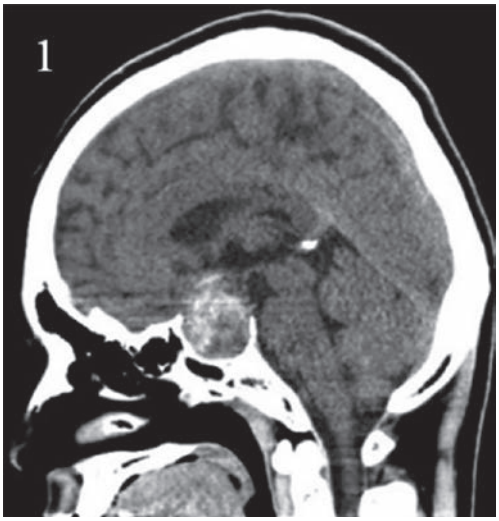

Fig. 1. Preoperative brain CT revealed a 4-cm-diameter intrasellar and suprasellar high-density mass. This high-density area was suspected of bleeding.

Discussion

RCCs comprise less than 1% of the major brain tumors[2], and only around 33% are symptomatic[3, 4]. Symptomatic RCCs are usually conservatively treated, but the 2%-9% that are accompanied by progressive symptoms, such as frontal headache and visual impairment, require surgical treatment[5]. Because RCC usually slowly develops, our case was extremely rare, showing a rapid progression with consciousness disorder, severe headache, impaired vision, and diplopia. Although this case was diagnosed as

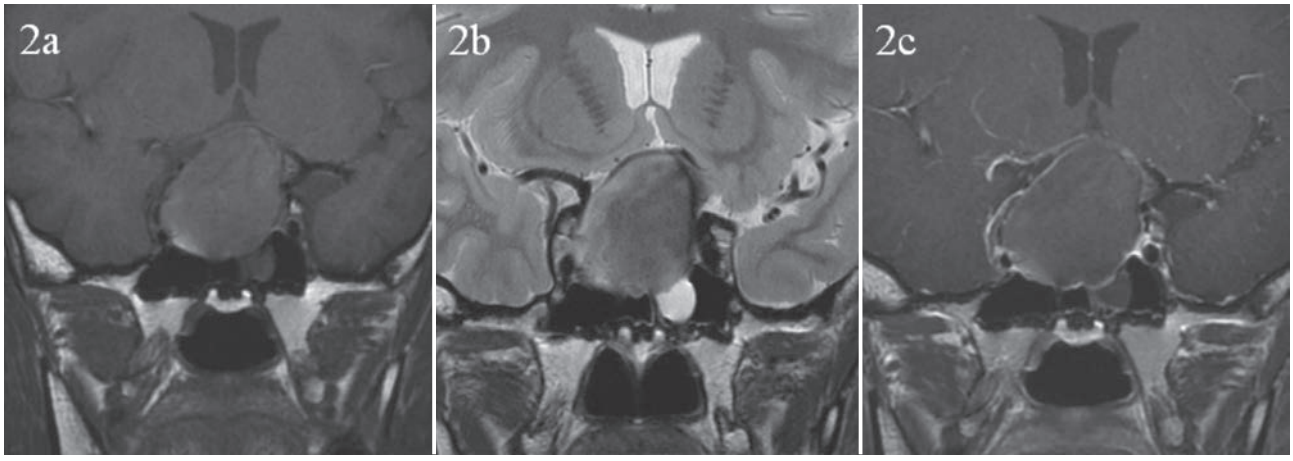

Fig. 2. Preoperative MRI demonstrated a mass with optic nerve compression on T1 (a)- and T2 (b) WI that were mostly low intensity and partially high intensity. (c) MR on T1WI with gadolinium administration showed rim enhancement.

nonhemorrhagic RCC apoplexy based on surgical and histopathological findings, it is generally difficult to distinguish it from other pituitary lesions based on the clinical symptoms and imaging findings alone.

In this case, it was difficult to distinguish the lesion from pituitary apoplexy, hemorrhagic RCC apoplexy, nonhemorrhagic RCC apoplexy, or craniopharyngioma before surgery based on imaging findings alone. T1WI MRI with gadolinium administration is useful for detecting intracystic hemorrhage. The imaging of nonhemorrhagic RCC apoplexy tends to show enhancement only at the rim of the lesion compared with that of hemorrhagic RCC apoplexy[6]. Moreover, the rim of craniopharyngioma presents with further enhancement than that of nonhemorrhagic RCC apoplexy. In our case, the rim of the lesion was more visible on T1WI MRI with gadolinium administration, suggesting that it was nonhemorrhagic RCC apoplexy rather than craniopharyngioma. In hemorrhagic RCC apoplexy, hemorrhage in the cyst is generally thought to be caused by a rupture of blood vessels around the cyst wall due to fluctuations in the blood pressure and blood vessel rupture in the granulation tissue of the cyst[7, 8]. On the other hand, the imaging of nonhemorrhagic RCC apoplexy is similar to that of intracystic bleeding because its contents contain inflammatory cells, which infiltrate into the cyst wall and surrounding tissues[6, 8]. In the present case, no rupture of the cyst was observed based on the intraoperative findings. Therefore, it is possible that the cyst wall was enhanced by gadolinium due to the infiltration of the inflammatory cells into the cyst wall and surrounding tissues. Therefore, we decided to investigate the characteristics of nonhemorrhagic RCC apoplexy in previous case reports.

Table 1[1, 8–16] shows 26 cases of hemorrhagic and

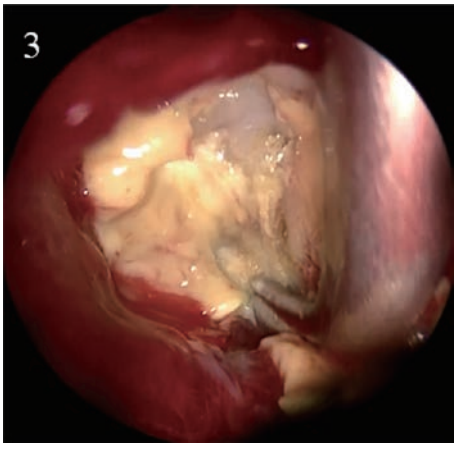

Fig. 3. Surgical findings showed a viscous butter-like yellowish liquid without bleeding within the lesion

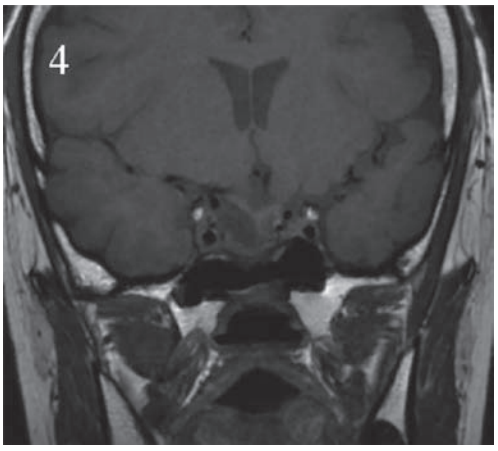

Fig. 4. Postoperative MRI demonstrated optic nerve decompression with the removal of the lesion

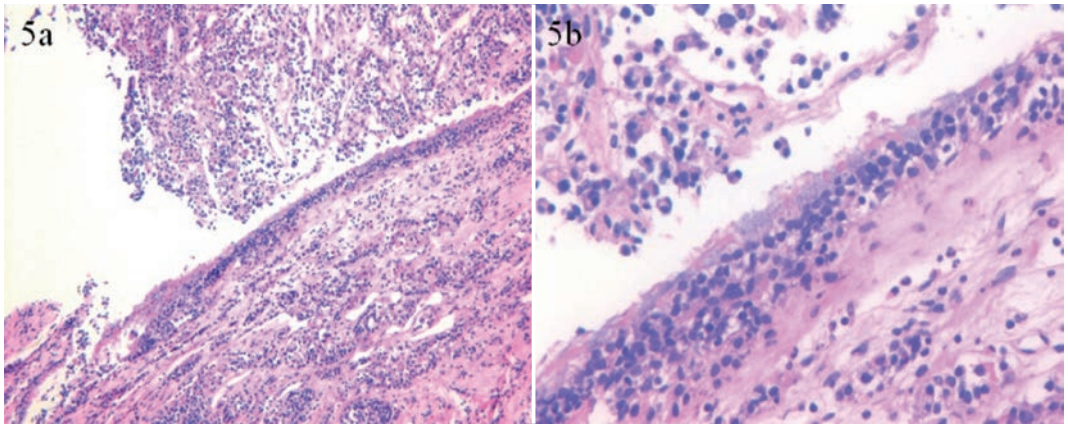

Fig. 5. Microscopic photographs stained with hematoxylin-eosin (×200[a], ×400[b]). This surgical specimen was composed of a single-layer ciliated columnar epithelium with partly multi-row epithelium, goblet, and basal cells and was diagnosed as a Rathke's cleft cyst. Neutrophils, macrophages, and necrotic cells were retained in the cyst. An infiltration of the inflammatory cells in the cyst wall was also observed.

Table 1. Clinical and pathological characteristics of 26 cases of RCC appoplexy with and without hemorrhage reported in previous literatures, including the present case

Author (year)	Case No.	Age, sex	Symptoms	Postoperative symptom improvement	Hematoma (+/−)	Magnetic resonance findings	Staging by cyst size and location*	Intraoperative findings and pathology
Onesti (1990)[9]	1	25, F	Headache	Improvement	+	T1 iso	Stage Ⅲ	Hemorrhage and necrosis
Kleinschmidt-DeMasters (1995)[10]	2	51, F	Visual deterioration	Unknown	+	T1 high T2 low	Stage Ⅲ	Tan, semisolid necrotic cyst, ciliated columnar cell lining with hemosiderin
Nishioka (1999)[7]	3	46, F	Headache, visual loss	Improvement	+	T1 high ~ low	Stage Ⅲ	Blood clots and mucous material
Pawar (2002)[11]	4	19, M	Headache, visual disturbance	Improvement	+	T1, T2 unknown Gd −	Stage Ⅲ	RCC Hematoma
Suzuki (2006)[12]	5	28, M	Headache, nausea, vertigo	Improvement	+	T1 low ~ high T2 low ~ high Gd cyst wall +	Stage Ⅲ	Hematoma Necrosis and squamoid epithelium
Binning (2008)[1]	6	24, F	Headache	Improvement	+	Unknown Nodule (+)	Stage Ⅲ	RCC Hematoma
	7	54, F	Headache, meningismus, visual loss	Improvement	+	Unknown Nodule (+)	Stage Ⅲ	RCC Hematoma
Komatsu (2010)[8]	8	46, M	Headache, visual loss	Improvement	+	T1 iso T2 mixed Gd cyst wall +	Stage Ⅱ	RCC (ciliated columnar epithelium) Hematoma
	9	56, F	Headache	Improvement	+	Unknown	Stage Ⅳ	RCC Hematoma
Ohnishi (2015)[13]	10	67, F	Unconscious	Improvement	+	T1 iso T2 high	Stage Ⅱ	White-tinged viscid fluid Hemorrhagic RCC Ciliated columnar cells and goblet cells Thin blood vessels
Kimura (1994)[14]	11	66, F	Headache, fever, drowsiness, visual disturbance	Improvement	−	T1 iso Gd −	Stage Ⅲ	Abscess, β-hemolytic streptococcus, RCC (ciliated columnar epithelium)
Kleinschmidt-DeMasters (1995)[10]	12	32, M	Headache, panhypopituitarism	Improvement	−	T1 iso T2 low	Stage Ⅱ	Tan, semisolid necrotic cyst Colloid and crystals Lymphocytic infiltration Amorphous eosinophilic colloid and crystals
	13	28, F	Headache, visual deterioration	Unknown	−	T1 iso T2 low	Stage Ⅱ	Eosinophilic colloid Cuboidal cell Amorphous eosinophilic colloid
Kurisaka (1998)[15]	14	8, F	Headache, deep ophthalmic pain	Improvement	−	T1, T2 high	Stage Ⅲ	Bloody coffee-like serous and mucinous-yellowish substance, cholesterin granuloma
Suzuki (2006)[12]	15	32, F	Headache	Improvement	−	T1 high T2 low ~ high Gd cyst wall +	Stage Ⅲ	Granulation tissue Ciliated epithelium Semisolid necrotic cystic content
Binning (2008)[1]	16	20, M	Headache, nausea,vomiting, diplopia	Testosterone HRT	−	T1 high (mix) T2 low (mix) Nodule (+)	Stage Ⅱ	RCC
	17	23, F	Headache, visual loss, hyperprolactinemia	Improvement	−	T1 high (mix) T2 low (mix) Nodule (+)	Stage Ⅲ	RCC
	18	49, M	Headache	Improvement	−	Unknown Nodule (+)	Stage Ⅰ	RCC
	19	21, F	Headache Decreased T4	Thyroid HRT	−	Unknown Nodule (+)	Stage Ⅲ	RCC
Komatsu (2010)[8]	20	72, M	Malaise, polyuria	Adenohypophyseal dysfunction	−	T1 iso T2 mixed Gd cyst wall +	Stage Ⅰ	Yellowish tenacious RCC (lymphocytic infiltration) Hypophysitis Lymphocytic infiltration
	21	44, M	Malaise, polyuria	Adenohypophyseal dysfunction	−	T1, T2 unknown Gd cyst wall +	Stage Ⅳ	RCC Hypophysitis Lymphocytic infiltration
Present case	22	21, M	Consciousness disorder, visual loss, double vision	Polyuria	−	T1 low ~ high T2 mixed Gd cyst wall +	Stage Ⅲ	RCC Ciliated columnar cells, goblet cells Yellowish-grayish creamy fluid Neutrophils, macrophages, necrotic cells Lymphocytic infiltration Neutrophils, macrophages, necrotic cells
Kawasaki (2004)[16]	23	30, M	Headache, vomiting	mprovement	Unknown	T1 iso ~ high T2 low Gd thin wall +	Stage Ⅱ	No surgery
	24	25, M	Headache, radiation pain	Improvement	Unknown	T1 iso ~ high T2 low Gd thin wall +	Stage Ⅱ	No surgery
	25	34, M	Headache	Improvement	Unknown	T1 iso ~ high T2 low ~ iso Gd thin wall +	Stage Ⅰ	No surgery
	26	31, M	Headache	Improvement	Unknown	T1 high T2 low Gd thin wall +	Stage Ⅰ	No surgery

* : The definition of the staging by cyst size and location was described in the text.

nonhemorrhagic RCC apoplexy that have been reported. These include 10 cases of hemorrhagic RCC apoplexy, 12 cases of nonhemorrhagic RCC apoplexy, and 4 cases in which the presence or absence of intracystic bleeding was unknown. Few reports have accurately described the cyst size based on diagnostic imaging. We categorized cases with a cyst size below 20 mm and limited to the intrasellar region as the "localized intrasellar group" (stage I; n =5) and those with a cyst size of 20 mm or more or extending to the cavernous sinus or suprasellar region but not compressing the optic nerve as the "extrasellar extension without optic compression group" (stage II, n=9). Moreover, cases with a cyst size of 20 mm or more or extending to the cavernous sinus or suprasellar region and compressing the optic nerve were classified as the "extrasellar extension with optic compression group" (stage III, n=10), whereas cases without reported cyst size or imaging findings were classified as the "cyst size unknown group" (stage IV, n=2). These results suggest that hemorrhagic and nonhemorrhagic RCC apoplexy cases are associated with relatively large mass lesions that extend to the extrasellar region.

Six of the nine cases (Case Nos. 11, 14, 15, 17, 19, and 22) of nonhemorrhagic RCC apoplexy with extrasellar extension exhibited particularly large tumorous lesions that compressed the optic nerve. Thus, we concluded that cases with extrasellar extension and optic nerve compression were more likely to be nonhemorrhagic RCC apoplexy. The present case of nonhemorrhagic RCC apoplexy had a particularly large tumorous lesion extending to the extrasellar region that compressed the optic nerve, which is consistent with these results.

Seven of all cases (Case Nos. 12, 16, 17, 19, 20, 21, and 22) in Table 1 had pituitary dysfunction before and after surgery. All seven cases with pituitary dysfunction before and after surgery were diagnosed as nonhemorrhagic RCC apoplexy. Therefore, nonhemorrhagic RCC apoplexy cases were more likely to have pituitary dysfunction. The present case of nonhemorrhagic RCC apoplexy accompanied by temporary postoperative diabetes insipidus is also consistent with this finding.

We also investigated the relationship between nonhemorrhagic RCC apoplexy cases with pituitary dysfunction and cyst size. Seven cases of nonhemorrhagic RCC apoplexy had pituitary dysfunction, with one case in stage I, five in stages II and III (two without and three with optic nerve compression), and one in stage IV. The cases of nonhemorrhagic RCC apoplexy with pituitary dysfunction often have mass lesions extending to the extrasellar region.

Seven of the 12 cases (Case Nos. 11, 12, 13, 15, 20, 21, and 22) of nonhemorrhagic RCC apoplexy showed pathological findings, including inflammatory cells and necrotic tissue. Inflammatory cells may be involved in the progression and symptoms of nonhemorrhagic RCC apoplexy.

Based on the findings of this study, it was suggested that both hemorrhagic and nonhemorrhagic RCC apoplexy are relatively large masses, extending to the parasellar region. Larger lesions with optic nerve compression tended to be nonhemorrhagic RCC apoplexy. Our case contained findings of a larger mass, hypopituitarism, and inflammatory cells.

Conclusion

We reported a case of nonhemorrhagic RCC apoplexy with sudden consciousness disturbance, headache, visual disturbance, and double vision. Cases of both hemorrhagic and nonhemorrhagic RCC apoplexy are rare. It is important to distinguish them from pituitary apoplexy and craniopharyngioma; however, it is difficult to make a differential diagnosis based only on imaging findings and clinical symptoms. Sudden clinical onset is explained by acute intracystic bleeding in hemorrhagic RCC apoplexy and surrounding inflammation in nonhemorrhagic RCC apoplexy. For the differential diagnosis and treatment of RCC apoplexy and pituitary apoplexy, it is important to appropriately perform surgical treatment and make an accurate diagnosis based on surgical and pathological findings.

Conflict of interest disclosure

The authors declare that they have no conflict of interest.

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