# Apoplexy of Rathke Cleft Cyst: A Case Report and Literature Review.

Zhao Xianlin, Wang Tingzhong, Liu Guojun

**Abstract**

Symptomatic Rathke cleft cysts (RCCs) are rare sellar and suprasellar lesions, and apoplexy is one of the most unusual presentations. Only a few cases of hemorrhagic apoplexy of RCCs have been reported and their pathogenesis is still poorly understood. In order to present a diagnostic thread to reduce misdiagnosis rate preoperatively, we reported one case of RCC apoplexy and reviewed the associated published literature. we also summarized the clinicopathological relationship on clinical symptoms, imaging features and intraoperative visualization of intracystic content.

***Key words:*** Rathke cleft cysts, apoplexy, hemorrhage, literature review

**Resumen**

Los quistes de la bolsa de Rathke sintomáticos son lesions selares y supraselares raras, siendo la apoplejía una forma inusual de presentación. Sólo unos cuantos casos de apoplejía hemorrágica han sido reportados y su pathogenesis es todavía poco entendida. Con la finalidad de disminuir errores de diagnóstico preoperatorio, reportamos un caso de quiste de la bolsa de Rathke sintomático y revisamos la literatura. También se resume la correlación clinica-patológica de los síntomas clínicos, estudios de imagen y la visualización intraoperatoria del contenido del quiste.

***Palabras clave:*** quiste de la bolsa de Rhatke, apoplejía, hemorragia, revisión de la literatura

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## Introduction

Rathke cleft cysts (RCCs), residue of Rathke's pouch during embryogenesis, are sellar or suprasellar congenital cysts. These benign lesions have been described in 22% of normal autopsies.[1] Most of them are asymptomatic. They can become symptomatic when they grow bigger enough to compress surrounding structures. RCCs were found in only 2%–9% of patients undergoing transsphenoidal surgeries for symptomatic sellar region lesions.[2,3] Rarely, RCCs can present in a manner similar to pituitary apoplexy, with acute-onset headaches, visual field and acuity loss, oculomotor palsies. We reported a case of RCC with acute blurred vision and apoplexy was confirmed by surgery and pathology. We also reviewed the the RCC apoplexy cases reported in the literature and summarize clinical presentation, imaging characteristics and intraoperative findings.

## Case report

A 47-year-old female presented with 3 years of slight headache which could be alleviated by peroral analgesic. She had irregular menstruation 2 years ago and menostasis without lactation a year ago. She suffered a sudden blurred vision half year ago and aggravating headache a month ago. Her serum PRL was normal. Radiological work-up was shown in figure 1.

The sudden aggravation of this patient was considered to be due to expansion of the contents of the pituitary fossa.

Apoplexy of pituitary adenoma is the most common cause of sudden enlargement of intrasellar lesion. However, on T1-weighted images the signal of supresellar cyst was too high to fit the signal of half-year-old blood. High signal on T1-weighted image could be lipid-rich cystic content, which Rathke cleft cyst could have. But apoplexy of Rathke cleft cyst is extremely rare. Dermoid cysts arise from midline location principally, contain lipid-like fluid and have the trend of sudden enlargement even rupture. All of these accorded with the characteristics of this case. Therefore, dermoid cyst was listed as the first of differential diagnosis, and then pituitary apoplexy and Rathke cleft cyst.

The Fourth Affiliated Hospital of China Medical University, Shengyang,Liaoning Province,P.R.China

Corresponding author: ZHAO Xianlin
Address: No. 4 Chongshan East Road of Huanggu District,Shenyang City, Liaoning Province, China
TEL: 008618247135005

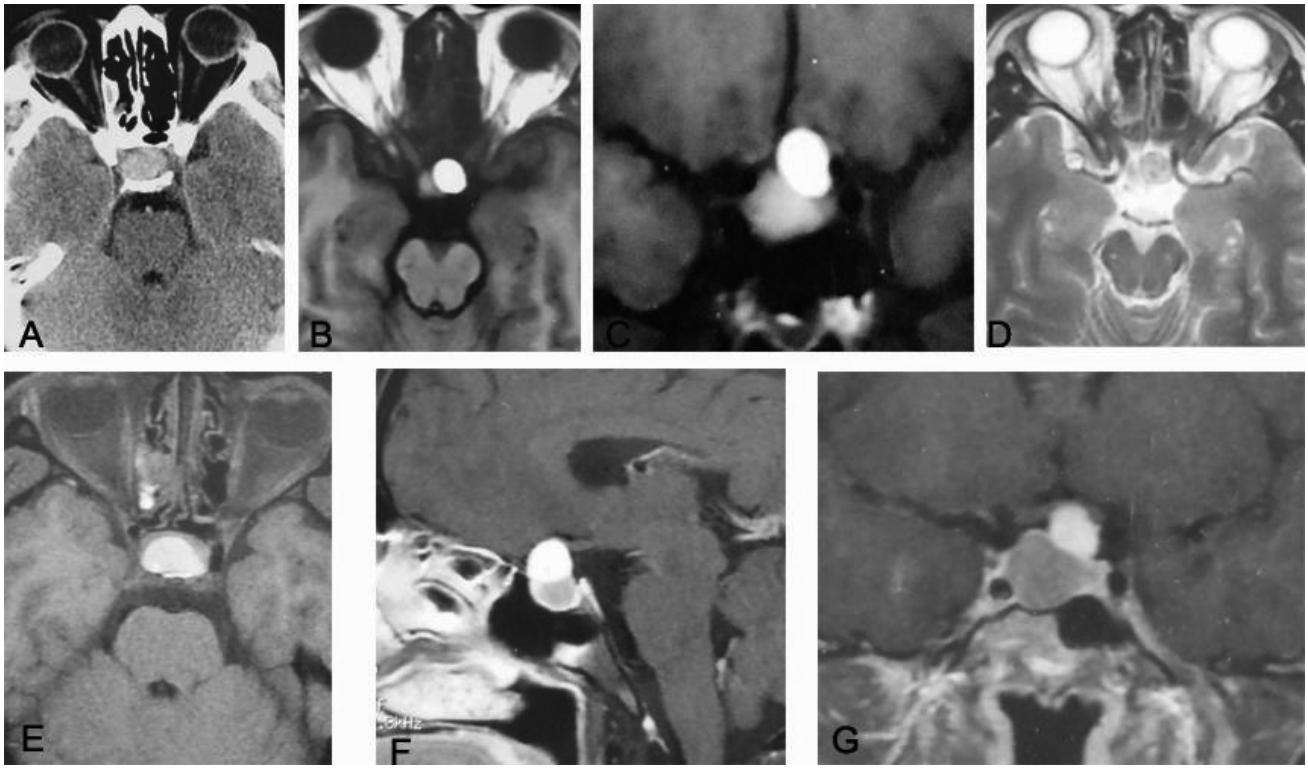


**Figure 1.** Radiological work-up of the patient. CT revealed a slight hyperdense intrasellar lesion (A). MRI T1-weighted axial (B) and coronal (C) images showed the lesion located intra- and suprasellarly with double-cystic shape. Suprasellar cyst was hyperintensity while intrasellar cyst was isointensity. The lesion was isointensity on T2-weighted image (D). On FSE image (E), the intrasellar cyst had high signal which suggested lipid-rich content. The normal pituitary gland was compressed anteriorly and became crescent-shaped. After contrast agent injection, enhancement of the lesion was not seen on sagittal (F) and coronal (G) images. There was no nodule on cyst wall. The intrasellar lamina of enhancement was the compressed normal pituitary gland (F).

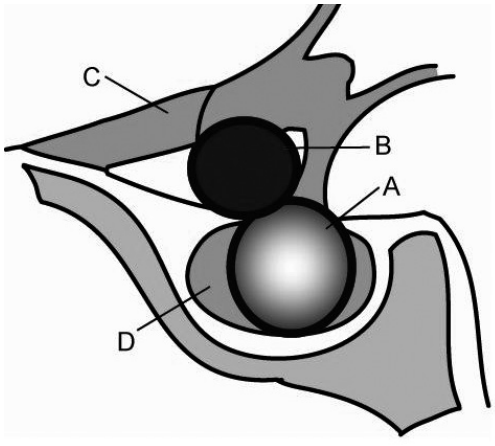


**Figure 2.** Schematic diagram of intraoperative finding.
A. intrasellar part of the cyst with yellowish mucinous content.
B. suprasellar part of the cyst with hemorrhage-like fluid.
C. compressed optic nerve.
D. compressed anterior pituitary.

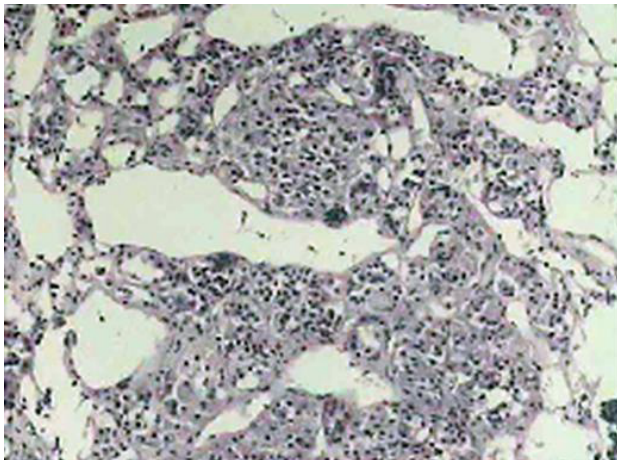

**Figure 3.** Hematoxylin and eosin stain of cyst wall showed simple cuboidal cells and eudostratified ciliated columnar cells were orderly arranged.

Considering the fact that content of dermoid cysts could cause severe chemical meningitis, we utilized pterional approach which provided better exposure and control of cyst content than transsphenoidal approach. Intraoperatively, the suprasellar cyst (figure 2B) was seen beneath the compressed optic nerve (figure 2C). The thin wall of the cyst was punctured and dark red necrotic-haemorragic fluid was extracted. The cyst collapsed after extracted. The cyst wall was cut open and intrasellar cyst was entered (figure 2A). Yellowish mucinous content was seen in intrasellar cyst. There was no septum between the 'two' cysts. Actually, it was a single cyst with double-lobular shape. No intracystic nodule was found. The diagnosis of Rathke cleft cyst was confirmed by pathology (figure 3).

**Table 1.** Summary of clinical presentation, imaging characteristics, intraoperative findings, and outcomes in patients with RCC apoplexy in this article and case reports in the literature.

| Case No. Author & Year | Age (yrs) Sex | Sudden symptoms and time§ | Shape of cyst | MRI signals T1 T2 nodule | MRI signals fit hemorrhage time, or not* | Pre-op Endocrine finding | Preo-op diagnosis | Content of cyst | Surgical approach | Results |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Onesti et al,[4] 1990 | 25 F | headache 4 days | Single cyst | iso — no | — | normal | Pituitary adenoma | Central necrotic hemorrhage | Trans-sphenoidal | normal |
| 2. Kurisaka et al,[5] 1998 | 8 F | headache several days | Single cyst | hyper hyper no | — | normal | Craniopharyn gioma or RCC hemorrhage | Hemorrhagic fluid, yellowish mucilage | Trans-sphenoidal | normal |
| 3. Nishioka et al,[6] 1999 | 46 F | headache visual field deficit 3 weeks | Single cyst | hyper — no the intensity decreased 3 weeks later | no | normal | RCC hemorrhage | Blood, mucilage | Trans-sphenoidal | normal |
| 4. Pawar et al,[7] 2002 | 19 M | headache blurred vision 1 week | Single cyst | hyper hypo no | no | normal | — | Hemorrhagic fluid, clear mucilage | Trans-sphenoidal | normal |
| 5. Rosales et al,[8] 2004 | 34 M | headache diplopia several days | Single cyst | mix mix no | — | High PRL,lowT4, TSH normal | Pituitary adenoma apoplexy | blood, yellowish fabric content | Trans-sphenoidal | normal |
| 6. Binning et al,[9] 2008 | 24 F | headache, unclear time | Single cyst | mix mix yes | — | normal | Pituitary adenoma | Hemorrhagic fluid, mucilage | Trans-sphenoidal | normal |
| 7. Binning et al,[9] 2008 | 54 F | headache visual field deficit, time unclear | Single cyst | mix mix yes | — | normal | Pituitary adenoma | Hemorrhagic fluid, mucilage | Trans-sphenoidal | normal |
| 8. Raper & Besser,[10] 2009 | 72 F | headache visual field deficit 2 weeks | — | — — yes | — | abnormal ADH | — | Thick brown fluid | Trans-sphenoidal | diplopia |
| 9. Case reported in this article | 47 F | blurred vision half a year, headache 1 month | 'Double cysts' | hyper iso no (suprasellar) iso iso (intrasellar) | no | normal | Dermoid cyst | Suprasellar blood, intrasellar mucilage | Pterional approach | normal |

§ refers to time from appearance of symptoms to MRI examination.

* MRI signals variation with time since hemorrhage[11] <24hrs, T1 iso, T2 slightly high
1-3 d, T1 slightly low, T2 very low
>3d, T1 very high, T2 very low
>7d, T1 very high, T2 very high
>14d, T1 iso, T2 slightly high

'—' refers to not mentioned in the literature or the information was not enough to draw a conclusion.

Kim et al[12] reported 4 cases of RCC hemorrhage of 53 cases of RCC. Chaiban et al[13] reviewed 11cases of RCC apoplexy in their institution over the past 10 years. The above cases were not included in the analysis due to the detailed information was not available.

### Review of the Published Literature

We reviewed the medical literature using PubMed to search for relevant publications on this entity. In reviewing the literature, we used the following search terms: Rathke cyst apoplexy, Rathke cyst hemorrhage, and Rathke cyst. Case reports that documented the clinical presentation and confirmed the presence of bleeding into an RCC were selected (only 8 cases) and were included in the analysis (Table 1).

### Discussion

*Clinical presentation.* Symptoms of RCC apoplexy are similar with those of pituitary apoplexy, but less severe.[14] Such symptoms include increasing headaches, visual changes, cranial nerve palsies, and variable degrees of hypopituitarism. They are the results of suddenly increased mass effect on the pituitary and surrounding structures such as sellar diaphragm, optic nerve and cavernous sinus. Most of RCC apoplexy patients have normal or slightly abnormal hormone level. Only 2 of 9 cases listed in table 1 had slight endocrine abnormality. Chaiban et al[13] had reported 4 cases of endocrine abnormality among 11 cases of RCC apoplexy, and 2 of them recovered immediately after surgeries, one case recovered gradually. For the case in this article, we analyzed clinical pathological correlation

**Table 2.** Clinical pathological correlation of the case reported in this article.

| Time | Symptoms | Clinical Pathological Correlation |
|---|---|---|
| 3 years ago | Slight headache | Intrasellar cyst compress sellar diaphragm upward. And nerves on diaphragm were stimulated. |
| 2 years ago | Irregular menstruation | Pituitary dysfunction. |
| Half year ago | Sudden blurred vision | Apoplexy cyst enlarged suprasellarly, compressed the optic nerve, and caused difficulty focusing. |
| 1 month ago | Aggravated headache nausea | Long term difficulty focusing caused aggravated headache and nausea.[15] |

after the diagnosis was clarified (table 2). RCC apoplexy couldn't be differentiated from pituitary apoplexy only based on clinical presentation.

*MRI and cyst content*

RCCs could be hypo- or hyperdense on CT scan. They are usually iso- or hyperintensity on MRI T1-weighted image, but minority of cases are hypointensity as well. The MRI signals of RCC on T1-weighted image depend on content components and concentration, especially the concentration of protein, cholesterol and triglyceride.[16] The appearance of cyst content is variable, including mucinous content, cholesterinic content, cytric oily liquid, simil purulent material, cerebrospinal fluid like fluid and necrotic-haemorragic fluid et al. Among those, simil purulent material is known as concurrent infection, which predict high recurrence rate, and need antibiotic therapy.[17] Billeci et al[18] analyzed MRI signals and intraoperative appearance of RCC, but no correlation was found. Neither did we find any regularity on reviewed RCC apoplexy cases (table 1). Therefore, intraoperative appearance of RCC content could not be estimated based on preoperative MRI signals.

MRI signals of RCCs are more complicated after intracystic hemorrhage. There are 3 types when blood and content mix together in RCCs.(1) homogeneous mixing, cyst remains homogeneous signal (case 1, 2, 3 and 4 in table 1). (2) heterogeneous mixing, cyst presents mixed signal (case 5, 6 and 7 in table 1). (3) not mixing, cyst presents double-lobular shape, blood and content occupies one lobe respectively (case 9 in table 1). MRI signals of hemorrhage change regularly with time since hemorrhage.[11] None of the cases we reviewed in table 1 had corresponding MRI signal and hemorrhage time, which indicated that regularity of signal change had lost after hemorrhage and cyst content mixed together. Interestingly, on the case we report in this article, hemorrhage and cyst content occupied one lobe respectively, but the signal of hemorrhage still was not coincident with hemorrhage time. We considered the reason for that is that although MRI showed clear boundary between two lobes, but no septum between two lobes was found intraoperatively, so hemorrhage and cyst content could still mix a little bit. Therefore, hemorrhage time of a apoplexy RCC could not be judged based on MRI signal.

*Shape of RCCs*

Most of RCCs are elliptical single cysts, and remain elliptical after apoplexy. Only the case we reported was double-lobular shape (table 1). Russell reported 2 cases of dumbbell RCCs, and intrasellar part of cyst was covered by simple ciliated columnar epithelium while suprasellar part was covered by squamous epithelium which should be seen in craniopharyngioma. That mean they were concurrent RCC and craniopharyngioma. Some researchers presumed that RCC was a transitional lesion prior to craniopharyngioma,19 but that theory is still controversial. Due to the lack of research, the reason of hemorrhage in RCCs is not clear yet. RCCs are constituted of simple or columnar epithelium, which make them fragile. Oka et al[20] considered small thin-walled vessels in granulation tissue on cyst wall as origin of bleeding. Double-lobular shape of our case was in accord with that presumption. The cause of double-lobe might be that bleeding origin located near inner wall of the cyst rather than center of the cyst, hemorrhage didn't mix with cyst content completely, and increased focal pressure on cyst wall caused external apophysis.

*Preoperative misdiagnosis*

Misdiagnose rate of RCCs apoplexy was high. Among all the cases in table 1, only one case (case 3) was diagnosed correctly preoperatively. It is common to misdiagnose RCCs apoplexy as pituitary apoplexy or craniopharyngioma. Pituitary adenoma accounted for 90% of patients who underwent sellar MRI. And RCCs accounted for 19% of nonadenomatous sellar masses.[21] The great disparity of incidence was an important reason of misdiagnosis. Moreover, RCCs lack characteristic MRI presentation. They could be iso- or hyper-intensity on T1-weighted image, and signal on T2-weighted image is also variable due to variable concentration of mucoitin and blood.[6,22] Byun et al[23] thought that short T1 and unenhanced nodule on cyst wall preferred RCC diagnosis, but specificity was not high. Among cases we reviewed (table 1), intracystic nodule were found in only 3 cases, of which case 6 and 7 were confirmed to have nodules intraoperatively instead preoperatively.[9] In some cases, compressed normal pituitary gland presents intrasellar ring enhancement on MRI,[18] which is likely mistaken for enhanced cyst wall (craniopharyngioma or cystic pituitary adenoma). RCC is preferred diagnosis if a sellar elliptical mass with smooth

outline has homogeneous MRI signal without calcification or internal enhancement.[24] However once a RCC apoplexy, the MRI signal is more complicated. Based on the cases reviewed in table 1, when MRI is performed on a patient who has sudden symptoms of apoplexy, the main differential diagnosis are RCC apoplexy and pituitary apoplexy. If the lesion has mixed signal, one can hardly be differentiated from the other. If the lesion has homogeneous signal, the differential diagnosis are RCC apoplexy and cystic pituitary apoplexy. Herein, the case with normal or slight abnormal hormone level prefers RCC apoplexy while the case with hypopituitarism prefers cystic pituitary apoplexy.[14] Ring enhancement can't be used as identification evidence, because it could be compressed normal pituitary gland.

**Treatment**

Asymptomatic RCC should be followed up while symptomatic RCC needs surgery.[25] RCC apoplexy needs surgery as soon as possible. It is known that transsphenoidal surgery is the best option. However, there is controversy over resection extent. The focus of controversy lies in whether total resection of cyst wall and content or partial resection (or biopsy) of cyst wall plus cyst content drainage. The former is more aggressive with higher risk and complications, but provides lower recurrence rate. The latter is safer, can improve symptoms as well,but the recurrence rate is higher. Madhok et al[26] reported 35 cases of RCCs underwent total resection of cyst by endoscopic transsphenoidal surgery. No complication was seen, only 2 cases recurred and didn't required reoperation. Nevertheless, the current mainstream view is that it is sufficient to drain cyst content and partial resect (or biopsy) cyst wall. Mayo medical center analyzed 74 cases of RCCs and drew the conclusion that gross total resection were associated with more complications, but didn't reduce the overall rate of recurrence.[27] Especially for children, cyst content drainage plus cyst wall biopsy is preferable because it is safer.[28,29] Transsphenoidal surgery can improve most patients' symptoms and endocrine abnormality.[30] All the 8 reviewed cases of RCCs apoplexy (table 1) underwent transsphenoidal surgery and all cases' symptoms relieved, so did the 11 cases of RCCs apoplexy reported by Chaiban et al.[13]

**Conclusion**

RCCs apoplexy is a rare disease. The clinical presentation is similar with and a little milder than that of pituitary apoplexy. It is hard to differentiate RCCs apoplexy from pituitary apoplexy only based on MRI image. Hemorrhage time of apoplexy RCC can't be judged based on MRI signal. Ring enhancement can't be used as identification evidence, neither. RCC apoplexy should be considered if a patient has symptoms of apoplexy, sellar mass shows homogeneous signal on MRI and endocrine abnormality is not severe. Surgery and pathology is required to confirm the diagnosis. Cyst content drainage plus cyst wall partial resection (or biopsy) through transsphenoidal approach is the best option to treat RCCs apoplexy.

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