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# Computed Tomography in Intra- and Suprasellar Epithelial Cysts (Symptomatic Rathke Cleft Cysts)

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The computed tomographic (CT) and pathologic findings in three cases of intra- and suprasellar epithelial cysts (symptomatic Rathke cleft cysts) are described. Literature review revealed that the characteristic CT finding is an intrasellar and/or suprasellar low-density mass that may or may not be enhanced. The enhancement is ringlike or capsular in nature. Whether the cyst wall is enhanced or not seems to be dependent on the histologic features. It is suggested that the enhancement may be caused by an inflammatory process, either septic or aseptic, or squamous metaplasia in the wall, which is possibly induced by degeneration or infection of the cyst contents. Without these additional pathologic processes, the Rathke cleft cyst, a simple retention cyst, may exhibit no contrast enhancement.

The epithelial cyst of the sellar region, or Rathke cleft cyst, is rarely sufficiently large to cause clinical symptoms. Symptoms, when present, result from compression of the optic chiasm, hypothalamus, or pituitary gland [1], and are indistinguishable from those caused by craniopharyngiomas or pituitary adenomas, the most common tumors encountered in the sellar region. Whereas craniopharyngiomas and pituitary adenomas are neoplasms and recurrences after nonradical surgery are not rare, epithelial cysts are benign in nature and are usually curable by simple evacuation of the cyst [2]. Preoperative differential diagnosis between these lesions is important for neurosurgeons in deciding the most appropriate therapy. In this report, we describe three cases of intra- and suprasellar epithelial cysts and review the literature to elucidate the computed tomographic (CT) characteristics of the cysts.

## Case Reports

### Case 1

A 52-year-old woman was admitted because of bilateral visual disturbances. Examination disclosed bitemporal hemianopia, decreased visual acuity, and optic atrophy on the left. She had no signs of increased intracranial pressure nor of hypopituitarism. Laboratory data including endocrinologic examinations were normal. Plain skull films showed a normal sella turcica. Axial and coronal CT disclosed an intra- and suprasellar mass of mixed low and isodensity. The isodense part and the cyst wall enhanced faintly after infusion of contrast medium (fig. 1).

At left frontotemporal craniotomy, a cystic tumor was found extending into the suprasellar cistern and elevating the optic chiasm. The cyst wall was incised, and thick, mucinous, whitish, puslike material was aspirated. The thick cyst wall was radically removed.

Histologic examination revealed that the inner surface of the cyst wall was lined by single or double layers of partly ciliated columnar epithelium. Stratified squamous epithelium, which seemed to be a metaplastic change of the columnar epithelium, was also present (fig. 1). Compressed pituitary cells and inflammatory cells were also present in the cyst wall.

The postoperative course was smooth, although replacement therapy was necessary for postoperative hypopituitarism. The visual field impairment of her right eye was slightly

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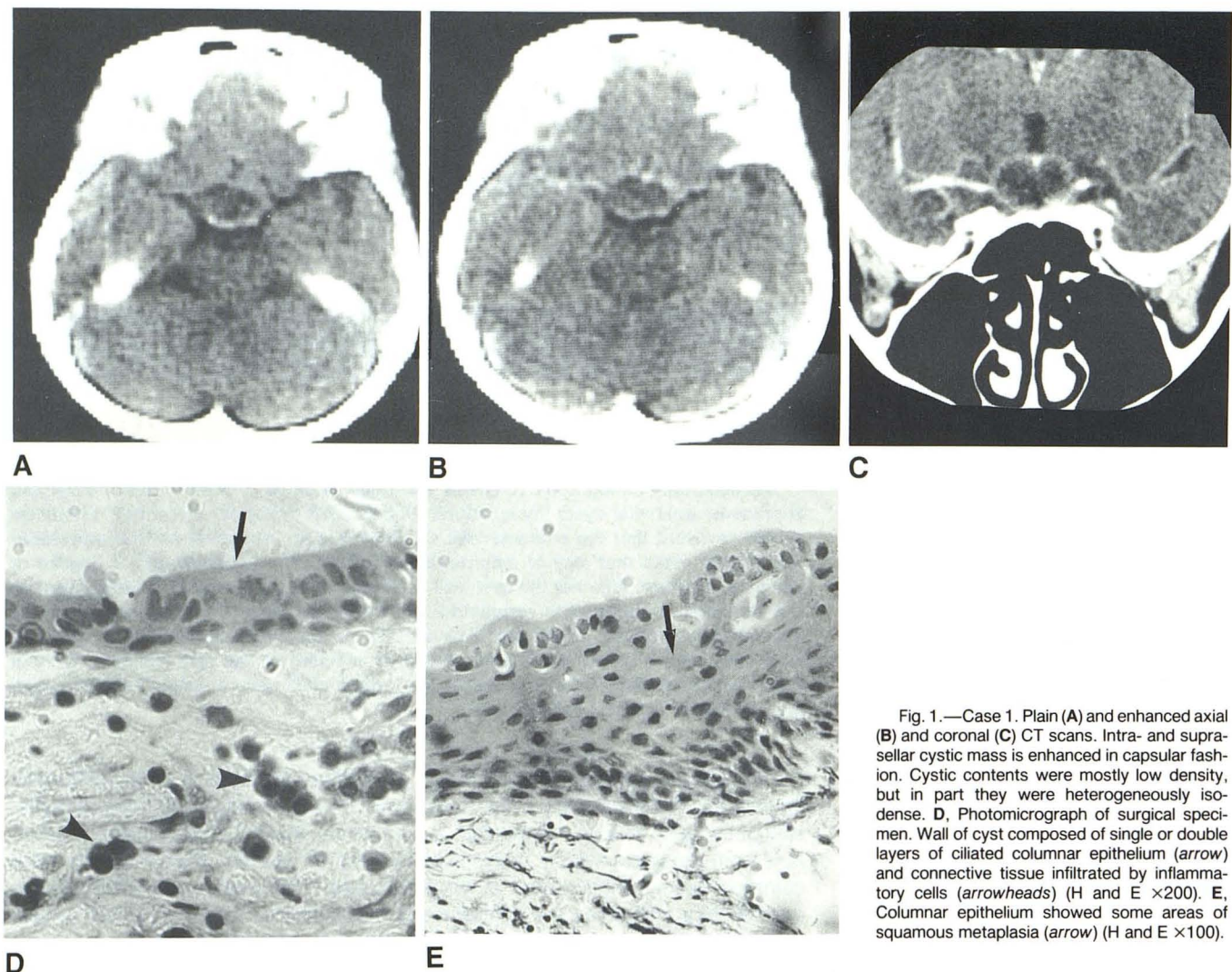


Fig. 1.—Case 1. Plain (A) and enhanced axial (B) and coronal (C) CT scans. Intra- and suprasellar cystic mass is enhanced in capsular fashion. Cystic contents were mostly low density, but in part they were heterogeneously isodense. D, Photomicrograph of surgical specimen. Wall of cyst composed of single or double layers of ciliated columnar epithelium (arrow) and connective tissue infiltrated by inflammatory cells (arrowheads) (H and E  $\times 200$ ). E, Columnar epithelium showed some areas of squamous metaplasia (arrow) (H and E  $\times 100$ ).

improved, and there was no tumor recurrence 12 months after surgery.

#### Case 2

A 53-year-old man was admitted because of bilateral visual field defects of 6 months' duration. Examination revealed a bitemporal upper quadrantanopia. Endocrinologic studies were normal. Plain skull films showed no abnormality. Axial and coronal CT disclosed a low-density mass in the sella turcica that extended into the suprasellar cistern. The mass did not enhance with contrast medium. There was no abnormal calcification (fig. 2).

A right frontotemporal craniotomy was performed. There was a thin-walled cyst within the suprasellar cistern from which about 2 ml of xanthochromic fluid was evacuated. The wall of the cyst was partly resected. Histologic examination revealed that the wall of the cyst was composed mainly of connective tissue without any inflammatory cells and a fragment of ciliated columnar epithelium (fig 2).

The patient's visual field impairment was markedly improved post-operatively, and there was no recurrence after 24 months.

#### Case 3

A 36-year-old woman had been treated by a gynecologist because of amenorrhea and galactorrhea for 2 years. In the 2 months before admission she had complained of heaviness of the head and visual disturbance. Neurologic examination revealed a bitemporal hemianopia. Endocrinologic examination disclosed mild hypothyroidism and moderately increased serum prolactin (45 ng/ml). There was no leukocytosis, and C-reactive protein was negative. On plain skull films, the sella turcica was slightly enlarged and a double floor was observed. An axial CT scan showed an intra- and suprasellar low-density mass with capsular enhancement. High-resolution coronal CT revealed that the superior and posterior aspects of the mass had a slightly higher density than the intrasellar cystic part (fig. 3).

Through a transsphenoidal approach, the dura of the sellar floor was opened and a soft, membranous, connective tissue was encountered. When the membrane was incised, thick yellow puslike material was discharged. The cyst was completely evacuated, parts of the cyst wall were resected, and the cavity was irrigated with saline-containing antibiotics because the surgeon considered it to be a pituitary abscess.



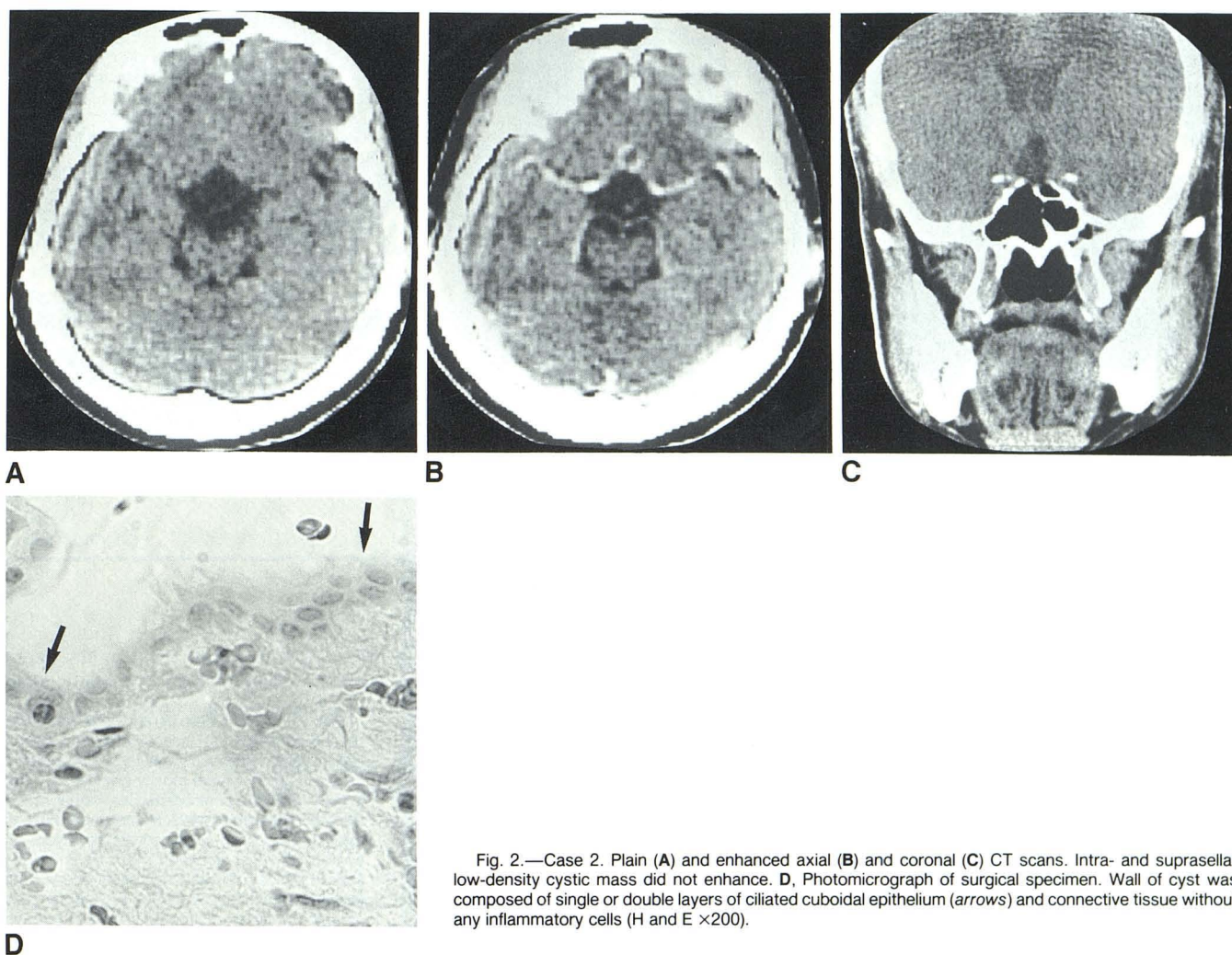


Fig. 2.—Case 2. Plain (A) and enhanced axial (B) and coronal (C) CT scans. Intra- and suprasellar low-density cystic mass did not enhance. D, Photomicrograph of surgical specimen. Wall of cyst was composed of single or double layers of ciliated cuboidal epithelium (arrows) and connective tissue without any inflammatory cells (H and E  $\times 200$ ).

Histologic examination revealed that there were two types of epithelial cells in different parts of the wall. A specimen from the cystic part showed a single layer of ciliated columnar epithelium with thin connective tissue. Another specimen from the thick part of the wall showed stratified squamous epithelium similar to that of a craniopharyngioma of the squamous type with thick connective tissue that was infiltrated by inflammatory cells (fig. 3). The contents of the cyst were cultivated but no bacterial growth was observed. The patient's visual symptoms were markedly improved, and there was no recurrence of the tumor after 20 months.

## Discussion

The human hypophysis sometimes contains small epithelial cysts believed to be derived from remnants of Rathke pouch [3]. However, the Rathke pouch is purely ectodermal (stomodaeal origin) [4], whereas the epithelial cysts may have some of the features attributable to endodermal (foregut) origin [5, 6]. Thus it may be preferable to describe the cysts as intrasellar epithelial cysts rather than Rathke cleft cysts,

because the true origin of the epithelium in so-called Rathke cleft cyst is still obscure [7]. Whatever the cell of origin, it is apparent that there is a clinical entity of benign epithelial cysts that may cause symptoms due to compression of the structures around the sella turcica. Therefore, we describe these symptomatic epithelial cysts as symptomatic Rathke cleft cysts, as have previous authors [1, 2].

The CT findings of symptomatic Rathke cleft cyst have been reported sporadically [2, 8–15]. Eleven cases with good documentation as well as our three cases are summarized in table 1. In all cases CT showed a low-density cystic mass within or above the sella turcica. Three cases including two of ours contained a higher-density area within the cyst on nonenhanced scans [8]. While eight cases enhanced with contrast medium in a ringlike or capsular fashion, the other six did not.

There were some differences in the pathologic findings in the cases with enhancement as compared with those without enhancement (table 1). The contents of the cysts were semi-



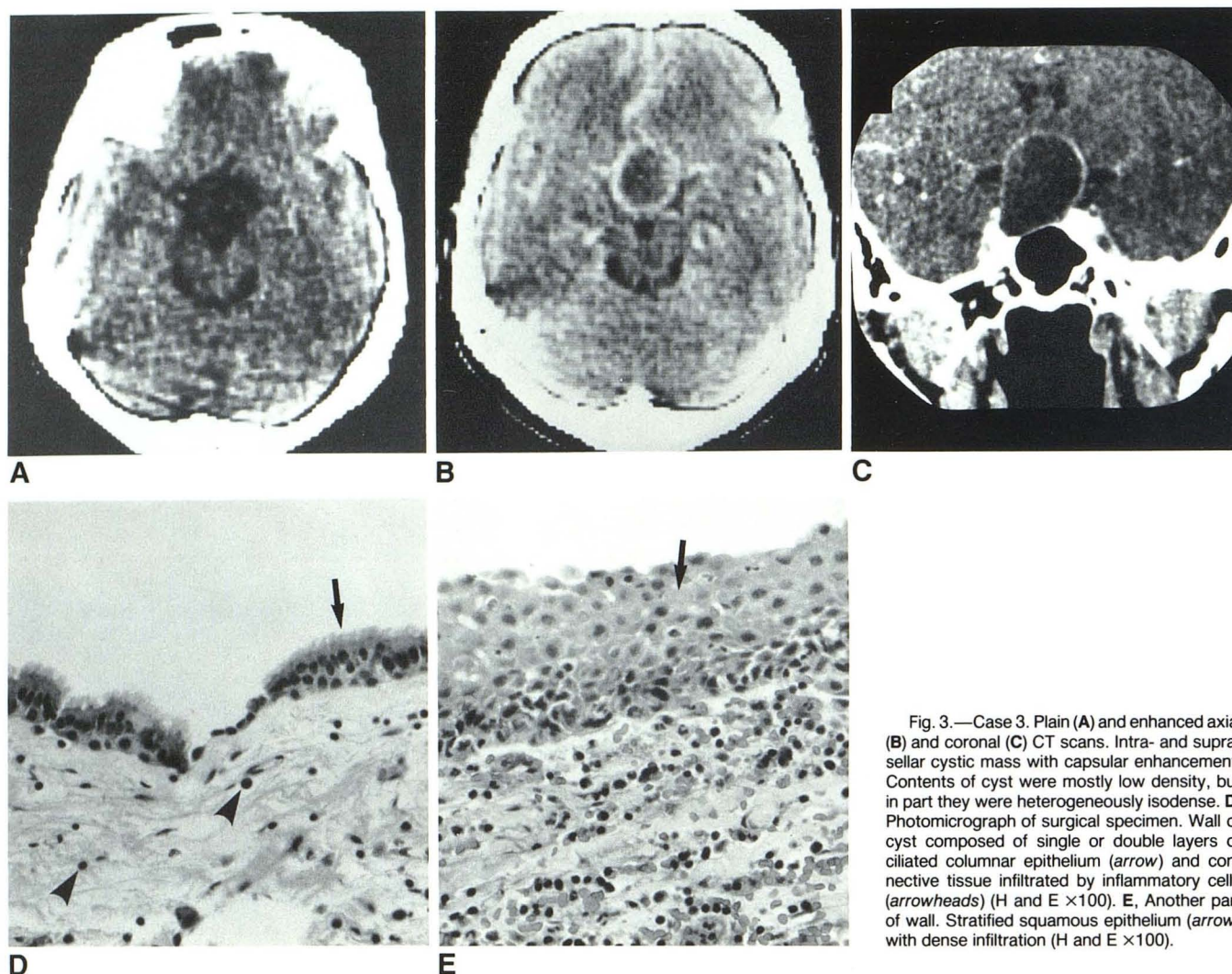


Fig. 3.—Case 3. Plain (A) and enhanced axial (B) and coronal (C) CT scans. Intra- and suprasellar cystic mass with capsular enhancement. Contents of cyst were mostly low density, but in part they were heterogeneously isodense. D, Photomicrograph of surgical specimen. Wall of cyst composed of single or double layers of ciliated columnar epithelium (arrow) and connective tissue infiltrated by inflammatory cells (arrowheads) (H and E  $\times 100$ ). E, Another part of wall. Stratified squamous epithelium (arrow) with dense infiltration (H and E  $\times 100$ ).

solid or viscous in six of the eight cases with enhancement, whereas the contents of six cases without enhancement were fluid. In addition to the typical columnar or cuboidal lining epithelium, regions of stratified squamous epithelium were present in four of the eight cases with positive enhancement, but no stratified squamous epithelium was found in cases without enhancement. Infiltration of inflammatory cells in the wall of the cyst was observed in four cases with positive enhancement and in one case without enhancement. Calcifications were observed histologically in two cases with positive enhancement.

The most important factor related to positive enhancement appears to be the presence of inflammation in the cyst wall. Although the contents of the cysts have a puslike appearance in some cases, as cultures failed to identify a microorganism in most of the cases [9, 12], the inflammation may not necessarily be septic. Differences between the contents of the enhanced and nonenhanced cysts implies that degeneration of the cystic contents may cause an aseptic inflamma-

tory reaction, which may in turn cause squamous metaplasia of the columnar epithelium in the wall. Although some authors [1, 9] argue that the squamous epithelium in a Rathke cleft cyst is indistinguishable from that of the squamous type of craniopharyngioma, epithelial neoplasia was not seen in our cases of Rathke cleft cysts. Without these additional inflammatory changes, the genuine Rathke cleft cyst (a retention cyst) may not exhibit any contrast enhancement.

Although the differential diagnosis of parasellar tumors became much less difficult with the advent of CT, there has been little information available on the CT findings of symptomatic Rathke cleft cysts. When a suprasellar low-density cystic mass is enhanced in a ringlike or capsular fashion, it is difficult to differentiate a Rathke cleft cyst from either a craniopharyngioma [16] or pituitary adenoma. When the cyst does not enhance, the most likely diagnosis is a Rathke cleft cyst. With calcification in the cyst wall, a Rathke cleft cyst cannot be ruled out, although the more likely diagnosis is craniopharyngioma. An appearance of a purely low-density



TABLE 1: CT and Pathologic Findings in Symptomatic Rathke Cleft Cysts

Enhancement/Location: [Ref. No.] (Case No.)	CT Findings		Pathologic Findings		
	Density	Enhancement	Cystic Contents	Squamous Epithelium	Inflammatory Cells
<b>Positive/suprasellar:</b>					
[3] . . . . .	High & Low	Ring	Yellowish green; gelatinous	+	+
[4] . . . . .	Low	Ring	Puslike material	?	++
[5] (3) . . . . .	Low	Ring	Brownish fluid	+	?
[7] . . . . .	Low	Thin ring	Pus	?	?
<b>Positive/intra-/suprasellar:</b>					
[6] (1) . . . . .	Low	Ring	Viscous yellowish fluid	?	?
[6] (2) . . . . .	Low	Capsular	Machine-oil-like fluid	?	?
Our study (1) . . . . .	Low & iso	Capsular	Puslike material	+	++
Our study (3) . . . . .	Low & iso	Capsular	Puslike material	+	++
<b>Negative/intrasellar:</b>					
[8] . . . . .	Low	...	Motor-oil-like fluid	—	±
[6] (3) . . . . .	Low	...	Yellowish fluid	?	?
<b>Negative/intra-/suprasellar:</b>					
[9] . . . . .	Low	...	Watery clear fluid	—	?
[10] (2) . . . . .	Low	...	White serous material	—	—
[2] (2) . . . . .	Low	...	White milky fluid	—	—
Our study (2) . . . . .	Low	...	Xanthochromic fluid	—	—

mass without any areas of higher density may be helpful in distinguishing a Rathke cleft cyst from a pituitary adenoma, because the latter seldom presents as a purely cystic mass [17].

Other intrasellar and/or suprasellar cysts to be differentiated from Rathke cleft cysts include epidermoid cysts and arachnoid cysts. Irregular configurations of the cyst wall and calcium deposits may indicate epidermoid cysts [17, 18]. Since suprasellar arachnoid cysts are usually found in children and most are associated with hydrocephalus, this can help to distinguish them from Rathke cleft cysts [19].

The differentiation of a Rathke cleft cyst from other cystic masses in the sellar region on the basis of CT findings alone may be difficult if not impossible. Meticulous inspection of the cystic contents and histologic examination of the cyst wall are indispensable for establishment of the final diagnosis.

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