Rathke’s cleft cyst: clinicopathological and MRI findings in 22 patients


AIM: To evaluate clinical findings and magnetic resonance imaging (MRI) characteristics of Rathke’s cleft cyst (RCC) in 22 patients.

MATERIALS AND METHODS: Twenty-two patients were imaged using non-enhanced MRI and 17 underwent an additional contrast-enhanced MRI examination. Fifteen patients received an additional non-enhanced computed tomography (CT) examination, and amongst these, two underwent contrast-enhanced CT. Two radiologists read the images retrospectively. The imaging data were studied with regards to location, size, margin, signal intensity, enhancement characteristics, haemorrhage, and presence of calcifications. Clinical data, such as presenting signs and symptoms, physical findings, and medical histories, were collected. Histopathological studies were performed and analysed by two pathologists.

RESULTS: Nine lesions were located in the intrasellar region, 12 in both the intra- and suprasellar regions and one in the suprasellar region. The maximum diameter of the RCCs varied from 0.7 to 4 cm, with an average size of 1.7 ± 0.7 cm. MRI features of RCC were divided into three groups based on T1-weighted imaging (T1WI): hypo- (n = 6), iso- (n = 9), and hyperintensity group (n = 7). Patients in the latter two groups were statistically younger than that in the former group. The lesion size in the iso- and hyperintensity groups was significantly less than that in the hypointensity group (F = 6.421, p = 0.007). Only two cases showed enhancement after contrast injection in the cohort. One lesion with haemorrhage was found as were two cases with intracystic nodules.

CONCLUSION: Although MRI features of RCCs are variable, RCCs should be suspected when the following conditions occur: lesions located in the intrasellar region or involving both intra and suprasellar regions, less than 1.5 cm in diameter, iso- or hyperdense on T1WI and no signal enhancement after contrast injection. In addition, the first case of a RCC with a markedly enhanced intracystic nodule is reported.
diagnosis in patients with suspected RCCs is important as the recommended surgical treatment for symptomatic lesions is trans-sphenoidal drainage of the cyst with biopsy of the wall. The present study presents 22 cases of RCC with MRI findings from all patients and CT data from 15 patients. The presented data should enable more reliable diagnosis and management decisions.

**Materials and methods**

A retrospective review of brain diseases in the pathology archives of our institutions (third military medical university and hua shan hospital) from the years 1998 to 2008 revealed 22 cases of RCC. This retrospective study was performed with the approval of the review board and ethics committee of our institutions.

The evaluated patient group consisted of 14 female and eight male patients ranging in age between 9 and 80 years (average 40 ± 20.1 years) at the time of observation. Both non-enhanced and contrast-enhanced MRI images were acquired for 17 patients, only non-enhanced MRI images were performed for the other five patients; 16 were performed at 1.5T, six at 0.5T.

MR images at 1.5T (Horizontal, GE Medical Systems, Milwaukee, WI, USA) were acquired with a section thickness of 3 mm. Sagittal, unenhanced, T1-weighted spin-echo (SE) images were obtained in all patients. Additional unenhanced examinations: coronal, T1-weighted (14 patients); coronal, T2-weighted (12 patients); and axial, T2-weighted sequences (four patients) were available for some patients. Subsequently, sagittal and coronal Gd-DTPA-enhanced T1-weighted SE images were obtained in 13 patients.

At 0.5 T (Signa Coutu, GE Medical Systems, Milwaukee, WI, USA), MRI images were acquired at a section thickness of 3 mm. Sagittal, unenhanced, T1-weighted, SE images were obtained in all patients. Additional unenhanced examinations: coronal, T1-weighted (four patients); coronal, T2-weighted (three patients); and axial, T2-weighted sequences (three patients) were available for some patients. Subsequent sagittal and coronal Gd-DTPA-enhanced T1-weighted SE images were obtained in four patients.

CT (Highspeed, GE Medical Systems, Milwaukee, WI, USA) examinations were performed in 12 patients using coronal, unenhanced images of 3 mm thickness, three patients by axial, unenhanced images of 3 mm thickness. Additionally, coronal, contrast-enhanced images were obtained in two patients.

Two experienced radiologists reviewed the images retrospectively. All images were reviewed with regard to the location, size, margin, and characteristics of signal intensity. The presence of calcifications and characteristics of enhancement were also examined.

The statistical analysis was performed by the statistician of our institution. In brief, testing for the difference in patients' age and cyst size between different groups was performed using the \( t \)-test. \( P < 0.05 \) was considered to be statistically significant.

**Results**

**Clinical features**

The clinical findings at the time of presentation and the patient history for the 22 patients are summarized in Table 1. Headache and visual impairment were the most common symptoms. Only four cases (18.2%) were correctly diagnosed as RCC. Eleven cases were preoperatively misdiagnosed as RCC.

<table>
<thead>
<tr>
<th>Patient no./sex /age (years)</th>
<th>Clinical presentation</th>
<th>Preoperative diagnosis</th>
<th>Cyst fluid</th>
<th>Surgical approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/F/20</td>
<td>Headaches and VI for 1 year</td>
<td>Pituitary microadenoma</td>
<td>Gelatinous, thick</td>
<td>TS</td>
</tr>
<tr>
<td>2/M/43</td>
<td>Headaches for 2 year</td>
<td>Pituitary microadenoma</td>
<td>Gelatinous, brownish</td>
<td>TS</td>
</tr>
<tr>
<td>3/F/47</td>
<td>Headache for 1 month</td>
<td>Pituitary microadenoma</td>
<td>Mucinous, gray</td>
<td>TS</td>
</tr>
<tr>
<td>4/F/25</td>
<td>Headaches for 3 months</td>
<td>Rathke’s cleft cyst</td>
<td>Mucinous, white</td>
<td>TS</td>
</tr>
<tr>
<td>5/F/42</td>
<td>Headaches and VI for 2 years</td>
<td>Arachnoid cyst</td>
<td>CSF-like</td>
<td>TS</td>
</tr>
<tr>
<td>6/M/20</td>
<td>Headaches for 1 year</td>
<td>Pituitary microadenoma</td>
<td>Mucinous, thick</td>
<td>TS</td>
</tr>
<tr>
<td>7/F/55</td>
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<td>Pituitary adenoma</td>
<td>Mucinous, yellow</td>
<td>TS</td>
</tr>
<tr>
<td>8/F/28</td>
<td>Headaches for 15 days</td>
<td>Pituitary adenoma</td>
<td>Gelatinous, milky</td>
<td>TS</td>
</tr>
<tr>
<td>9/F/21</td>
<td>Headache for 3 months</td>
<td>Pituitary microadenoma</td>
<td>Gelatinous, milky</td>
<td>TS</td>
</tr>
<tr>
<td>10/M/71</td>
<td>Headache for 1.5 months</td>
<td>Pituitary adenoma</td>
<td>Yellow creamy</td>
<td>TS</td>
</tr>
<tr>
<td>11/F/58</td>
<td>Headache and VI for 2 months</td>
<td>Pituitary microadenoma</td>
<td>Gelatinous egg white-like</td>
<td>TS</td>
</tr>
<tr>
<td>12/F/60</td>
<td>Headache for 4 months</td>
<td>Rathke’s cleft cyst</td>
<td>CSF-like</td>
<td>TS</td>
</tr>
<tr>
<td>13/F/25</td>
<td>Amenorrhea for 3 months</td>
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<td>Gelatinous, milky</td>
<td>TS</td>
</tr>
<tr>
<td>14/F/42</td>
<td>Headache for 6 months</td>
<td>Craniohypophyngioma</td>
<td>Motor oil-like</td>
<td>TC</td>
</tr>
<tr>
<td>15/M/52</td>
<td>Headaches for 3 month</td>
<td>Craniohypophyngioma</td>
<td>Creamy, yellow</td>
<td>TC</td>
</tr>
<tr>
<td>16/F/9</td>
<td>Headache and VI for 5 months</td>
<td>Rathke’s cleft cyst</td>
<td>Motor oil-like</td>
<td>TS</td>
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<tr>
<td>17/F/31</td>
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<td>Pituitary microadenoma</td>
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<td>TS</td>
</tr>
<tr>
<td>18/M/80</td>
<td>VI for 2 years</td>
<td>Arachnoid cyst</td>
<td>CSF-like</td>
<td>TS</td>
</tr>
<tr>
<td>19/M/35</td>
<td>Headaches for 3 months</td>
<td>Rathke’s cleft cyst</td>
<td>Motor oil-like</td>
<td>TS</td>
</tr>
<tr>
<td>20/M/71</td>
<td>VI for 2 years</td>
<td>Pituitary microadenoma</td>
<td>Mucoid, thick</td>
<td>TS</td>
</tr>
<tr>
<td>21/M/35</td>
<td>Dizziness for 1 year</td>
<td>Arachnoid cyst</td>
<td>CSF-like</td>
<td>TS</td>
</tr>
<tr>
<td>22/F/9</td>
<td>Headache for 6 months</td>
<td>Arachnoid cyst</td>
<td>CSF-like</td>
<td>TS</td>
</tr>
</tbody>
</table>

M, male; F, female; VI, visual impairment; CSF, cerebrospinal fluid; TS, trans-sphenoidal; TC, transcranial
pituitary adenoma or pituitary microadenoma, four cases as arachnoid cyst, and three as craniopharyngioma.

Follow-up was undertaken from the date of surgery and ranged from 4 to 36 months. No follow-up data were available for 10 patients. No recurrence was found in patients available with follow-up data.

Neuroradiological findings

Localization

The RCC were located in the intrasellar region in nine patients, 12 in the intra- and suprasellar regions, and one in the suprasellar region. The maximum diameter of the RCCs in the present series varied from 0.7 to 4 cm, with an average size of $1.7 \pm 0.7$ cm.

Based on T1-weighted imaging, the MRI appearance of RCC could be grouped into three groups: hypo-, iso- and hyperintensity. The signal intensity of these lesions was compared to that of normal white matter.

Hypointensity group

Six patients (6/22, four female and two male patients) had hypointensity lesions on T1-weighted imaging. The mean age was $47.3 \pm 24.5$ years (range 9–80 years). Five cases were located in intra- and suprasellar (Table 2), the other one in intrasellar (Fig. 1). The average lesion size of the six lesions measured $2.4 \pm 0.9$ cm (range 1.5–4 cm). All six lesions were hyperintense on T2-weighted imaging (Table 3). The signal intensity was homogeneous in five cases, and in the other one case, inside the cyst, a small, isointense nodule on both T1 and T2-weighted imaging (Fig. 2) was found. Out of these six patients, contrast-enhanced MRI images were obtained in five patients. Partial and slight rim enhancement was found in one case (Fig. 3), moderate partial rim enhancement was found in another lesion with marked enhanced nodule (Fig. 2). The other three cases showed no enhancement.

Of these six patients, two patients underwent unenhanced CT and enhanced CT images were available in one of the two patients. The two lesions had homogeneous hypodensity. No enhancement was found in the patient who had undergone enhanced CT.

Isointensity group

There were nine lesions (9/22, seven female and two male patients) with isointensity on T1-weighted imaging. The mean age was $39.9 \pm 16.5$ years (range 20–71 years). Five cases were located in the intrasellar region, three in the intra- and suprasellar region, and one in the suprasellar region (Table 2). The average lesion size of the nine lesions measured $1.6 \pm 0.5$ cm (range 0.7–1.8 cm). On T2-weighted imaging, five lesions were hyperintense, three iso- and hyperintense (Fig. 4), and one hypointense (Fig. 5; Table 3). The signal intensity was homogeneous in all cases. All lesions showed no enhancement after the administration of contrast medium.

Of these nine patients, six patients underwent non-enhanced CT. Hyperintensity was found in four cases, iso-intensity in two, but lesions were found in only three cases; the other three lesions showed increased pituitary height.

Hyperintensity group

Seven cases (7/22, three female and four male patients) showed hyperintensity on T1-weighted imaging. The mean age was $33.7 \pm 21.3$ years (range 9–71 years). Three cases

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Location of lesions</th>
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<tbody>
<tr>
<td>Group</td>
<td>Intra-sella</td>
</tr>
<tr>
<td>Hypointensity</td>
<td>1</td>
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<tr>
<td>Isointensity</td>
<td>5</td>
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<tr>
<td>Hyperintensity</td>
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</table>

<table>
<thead>
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<th>Table 3</th>
<th>T2 signal characteristics of lesions</th>
</tr>
</thead>
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<tr>
<td>Group</td>
<td>Hypointense on T2</td>
</tr>
<tr>
<td>Hypointensity</td>
<td>6</td>
</tr>
<tr>
<td>Isointensity</td>
<td>3</td>
</tr>
<tr>
<td>Hyperintensity</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 1 Unenhanced, sagittal, T1-weighted imaging (a); axial, T1-weighted imaging (b); and T2-weighted imaging (c) of an 80-year-old man with RCC. The lesion is located entirely in the intrasellar region and is homogeneous in signal intensity on both T1 and T2-weighted imaging.
were located in the intrasellar region, and four in the intra- and suprasellar regions (Table 2). The average lesion size of these seven lesions measured 1.4 ± 0.3 cm (range 1–2.3 cm). On T2-weighted imaging, four lesions were hyperintense, two isointense (Fig. 6), and one hypointense (Fig. 7; Table 3). The signal intensity was homogeneous in all cases. All lesions showed no enhancement after the administration of contrast medium.

Of these seven patients, six underwent non-enhanced CT. Hyperintensity was found in two cases, isointensity in four. Lesions were found in only four cases; the other two lesions showed only increased pituitary height.

**Intra-operative findings**

All patients underwent surgical treatment, with 20 undergoing surgery via the trans-sphenoidal approach and two via transcranatomy. Intra-operatively, the content of cysts was different: in six that had a hypointense T1 signal, the content was clear, cerebrospinal fluid (CSF)-like in five cases, and gelatinous in one case. Of nine cysts with isointense T1 signals, the content was gelatinous in three cases, mucinous in five cases, motor oil-like in one case. Of seven lesions with hyperintense T1 signals, the cyst was gelatinous in two lesions, mucinous in one lesion, creamy in two lesions, motor oil-like in two (Table 4).

**Pathological findings**

A non-neoplastic epithelial cyst was confirmed in 18 cases by pathological examination. Well-differentiated columnar or cuboidal epithelium with ciliated cells was characteristically found. Goblet cells were also found in four cases and cholesterol crystals in two cases. Variation in the lining of the cyst wall included focal squamous metaplasia in four cases. Macrophagic–lymphocytic and similar granulomatous infiltrates were found in the surrounding tissue in three cases and amorphous eosinophilic colloid in two cases.

**Discussion**

RCC is a benign cystic lesion that is considered to be derived from remnants of Rathke’s pouch. The majority seem to remain asymptomatic and only a part of the cyst becomes symptomatic throughout its whole lifetime.2,3 The common symptoms in symptomatic RCC are headache (32.1–80%), endocrine disturbance (30–69.4%), and visual impairment (14.3–55.8%).4–6 Some authors have reported that the presence of headache did not correlate with the lesion size, it being more common in patients with high- and isointense cysts than those with low-intensity cysts on T1-weighted imaging.3,7 In the present cohort, headache (17/22) was the most common mode of presentation as
previously reported, but the presence of headache did not correlate with the lesion’s signal intensity on T1-weighted imaging. Visual impairment (6/22) was the second most common symptom, and endocrine disturbance was found in only one case in the present series. RCC patients with associated abscess formation, pituitary apoplexy, sphenoid sinusitis, empty sella syndrome, or pituitary adenoma have been previously reported, which complicates clinical symptomatology.\(^4\) It should be noted that spontaneous resolution can occur in RCC and no difference is found in clinical symptoms between cases of RCC with and without spontaneous resolution.\(^3,7\)

According to literature, RCCs occur at any age and generally peak in their incidence between the fourth and

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**Figure 3** Unenhanced coronal CT image (a); sagittal (b); coronal, T1-weighted imaging (c); T2-weighted imaging (d); contrast-enhanced, coronal, T1-weighted imaging (e); and sagittal, T1-weighted imaging (f) of a 42-year-old woman with RCC. The lesion is located in both the intrasellar and suprasellar regions, which shows typical cyst signal intensity and partial cyst wall enhancement after injection of the contrast agent (arrow).

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**Figure 4** Unenhanced, coronal, T1-weighted imaging (a); T2-weighted imaging (b); and contrast-enhanced, coronal, T1-weighted imaging (c) of a 43-year-old man with RCC. Intrasellar lesion shows isointensity on both T1 and T2-weighted imaging and no enhancement after contrast medium injection.
sixth decades of life. In the present series, the age of eight of the present cases (8/22) was between the fourth and sixth decades. The mean age at diagnosis was 40 years. The average age in the hypo-, iso- and hyperintensity group was 47.3, 39.9, and 33.7, respectively. The age in the latter two groups was statistically lower than that in the former group. The results concur with previous reports. It suggests that RCC with hyper- and isointensity on T1-weighted imaging has a tendency to occur at younger age than those with hypointensity on T1-weighted imaging.

There is a clear female predominance for patients with RCC. The ratio of female to male cases can reach high up to 3.9 In the present series, the ratio of female to male cases was 1.75, but in the hyperintensity group, there was no female predominance.

RCC is usually located in the intrasellar region or combined intra- and suprasellar region. Complete suprasellar RCCs are rare. Only 8.3% of RCCs were reported to be located entirely in the suprasellar. In the present cohort, only one case (4.5%) was entirely located in the suprasellar region. The site of origin of these suprasellar RCCs is the pars tuberalis of the pituitary gland, which also derives from Rathke’s pouch and is located above the diaphragma sellae.

RCCs with hypointensity were slow growing and large, frequently causing visual disturbances, while RCC with other intensities were smaller in size when they manifested clinically. In the present series, the maximum diameter of cysts in the hyper- and isointensity group was less than 2 cm, and were 1.4 and 1.6, respectively, which was significantly less than that in the hypointensity group. The results were consistent with those previously reported.

In general, intracerebral cystic lesions typically exhibit hypointensity on T1-weighted imaging and hyperintensity on T2-weighted imaging. Although RCC is cystic, its MRI signal characteristics are quite variable. According to a previous paper, on T1-weighted imaging, only about one-third of patients show the typical cyst signal intensity, with the remaining usually exhibiting iso- or hyperintensity. In the present cohort, the signal pattern is the same as the previous reports. Lesions with hypointensity on T1-weighted imaging were found in only six cases (6/22). On
T2-weighted imaging, the most common pattern is hyperintensity.\textsuperscript{10} Hyperintense lesions on T2-weighted imaging were found in 15 patients (15/22), only two lesions showed hypointensity on T2-weighted imaging, but in the series of Kleinschmidt-DeMasters et al.,\textsuperscript{17} all cases available with T2-weighted imaging exhibited hypointensity on T2-weighted imaging; the cyst content of these cases being inspissated. Whereas Kucharczyk et al.\textsuperscript{15} noted that mucoid contents caused T2 hypointensity. In fact, the MRI intensities of RCC depend on the composition of the cyst.\textsuperscript{14–16} Some papers have reported the protein concentration within the cyst determines the MRI characteristics.\textsuperscript{15} Some authors believe that mucopolysaccharides (MPS) are responsible for the increased intensity of RCC on T1-weighted imaging.\textsuperscript{16} Whereas another paper suggested that high cholesterol and/or MPS might influence the signals, possibly in combination with cell debris from the cyst wall.\textsuperscript{18} Mixed intensity may suggest the presence of haemorrhage.\textsuperscript{2} In the present cohort, five lesions (5/6) with hypointensity on T1-weighted imaging contained a CSF-like transparent fluid of low viscosity. Whereas no lesions with iso- or hyperintensity on T2-weighted imaging contained CSF-like fluid, most of these lesions contained gelatinous or mucinous fluid of high viscosity. The variation of cyst intensity can not be solely explained by its content and results from a combination of factors. It should be noted that patients with two RCCs that had different T1 signal intensities, have been previously reported.\textsuperscript{4}

Sometimes, intracystic nodules can be found in RCC and its significance has been discussed in papers.\textsuperscript{1} Some intracystic nodules freely float without connection to the cyst wall,\textsuperscript{139} whereas some are adherent to the cyst wall.\textsuperscript{15} Pathological studies showed the nodules to be mucin clumps. Biochemical analysis shows the main components of nodules to be cholesterol and protein.\textsuperscript{1} These intracystic nodules exhibit hyperintensity on T1-weighted imaging, iso or hypointensity on T2-weighted imaging, and no enhancement after the administration of a contrast agent. As a consequence, an intracystic nodule with MRI features is suggestive of RCC diagnosis.\textsuperscript{1} The incidence of intracystic nodules varies from 17 to 78%.\textsuperscript{1, 20} In the present series, only two cases (9%) had intracystic nodules. It should be noted that an intracystic nodule with marked enhancement was found in one case, which to the authors’ knowledge, has not been reported previously.

RCC with apoplexy is rare, as only a few reported cases.\textsuperscript{4,21–23} RCC with apoplexy can be either haemorrhagic or non-haemorrhagic in character\textsuperscript{20} and usually exhibits hyperintensity on T1-weighted imaging and hypointensity on T2-weighted imaging. In the present series, one case had the same MRI signal features as that previously reported. It is hard to distinguish haemorrhagic RCC apoplexy from non-haemorrhagic RCC apoplexy based on the MRI characteristics. For RCC apoplexy patients without haemorrhage, cyst expansion and encroachment on neighbouring structures might be the mechanism for non-haemorrhagic RCC apoplexy.\textsuperscript{20}

Calcification is rare in RCC and was not found in the present series. To the authors’ knowledge, only 10 cases with calcification have been reported previously and three of those 10 cases presented with histological findings of ossification.\textsuperscript{16,25–27} Calcification is curvilinear and partially surrounded in shape. The shape of calcification is important for the differentiation between RCC and craniopharyngioma. It may result from non-specific deposits originating from meningeal tissue or epithelial lining of the cysts.\textsuperscript{25,26} The ossification occurs as a result of mesenchymal cells by inflammatory, chemical, or mechanical stimulation.\textsuperscript{25,26}

Most RCCs show no enhancement after contrast agent injection. RCCs with patchy or ring enhancement have

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
Group & Consistency of contents & & & \\
\hline & CSF-like & Gelatinous & Mucinous & Creamy & Motor oil \\
\hline Hypointensity & 5 & 1 & & & \\
\hline Isointensity & 3 & 5 & 1 & & \\
\hline Hyperintensity & 2 & 1 & 2 & 2 & \\
\hline Total & 5 & 6 & 6 & 2 & 3 \\
\hline
\end{tabular}
\caption{The intracystic contents of the lesions}
\end{table}
been sparsely reported. The enhancement can be attributed to the inflammation and/or squamous metaplasia in the cyst wall. In the present series, only two lesions (2/22) with enhancement were found. Both lesions were hypointense on T1-weighted imaging and showed ring enhancement of the partial cyst wall. A markedly enhanced intracystic nodule was found in one of two lesions. Histology showed that squamous metaplasia cell debris was the main component of the nodule. Some papers report that rim enhancement can be found in up to 50% RCCs. In fact, it is not the enhancement of the cyst wall but the normal enhancement of the pituitary gland surrounding which is relevant. It should be noted that it is very important for the correct discrimination of enhanced pituitary gland in diagnosing RCCs.

RCC should be differentiated from pituitary adenoma or pituitary microadenoma, arachnoid cyst and craniopharyngioma. Intrasellar RCC should be mainly differentiated from pituitary microadenoma. Dynamic MRI is helpful in this regard. Intrasellar RCCs shows no enhancement, whereas pituitary microadenomas have enhancement at the late phase and slow enhancement signal reduction. For RCC involving both intra- and suprasellar and those located in the suprasellar region, the main differential diagnosis includes arachnoid cysts, cystic pituitary adenomas, and cystic craniopharyngiomas. Arachnoid cysts are of CSF intensity and predominantly localized in the suprasellar region. It is uncommon for an arachnoid cyst to expand into the intrasellar region. The cyst in the cystic pituitary adenoma usually exhibit typical cyst signal features on MRI and the solid part has marked enhancement after contrast medium injection, which make it easy to distinguish an RCC from a cystic pituitary adenoma. RCCs might be indistinguishable from totally cystic cranioopharyngiomas based on routine MRI. Diffusion-weighted imaging single-shot fast spin-echo (DWI-SSFSE) with apparent diffusion coefficient (ADC) values is useful in differentiating pituitary adenomas, and cystic craniopharyngiomas.

In conclusion, the MRI findings of 22 cases of RCC were evaluated and discussed alongside further imaging data and clinical findings. The RCC appearance on MRI can be divided into hypo-, iso- and hyperintensity groups based on T1-weighted imaging. An RCC should be suspected with lesions with a diameter of <1.5 cm located in the intrasellar region or in both intra and suprasellar regions, which are iso- or hyperdense on T1-weighted imaging and have no signal enhancement. In addition, we report the first case of a RCC with a markedly enhanced intracystic nodule.

References