



Case Report

Atypical pituitary abscess lacking rim enhancement and diffusion restriction with an unusual organism, *Moraxella catarrhalis*: A case report and review of the literature

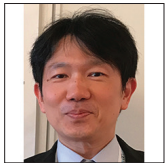
Tatsuya Kawano¹, Naoki Shinjima¹, Satoko Hanatani², Eiichi Araki², Yoshiki Mikami³, Akitake Mukasa¹

Department of ¹Neurosurgery, ²Metabolic Medicine, ³Diagnostic Pathology, Kumamoto University Hospital, Kumamoto, Japan.

E-mail: Tatsuya Kawano - freedom_tattyan811@yahoo.co.jp; *Naoki Shinjima - nshinjima-kuh@umin.ac.jp;

Satoko Hanatani - shanatani@kuh.kumamoto-u.ac.jp; Eiichi Araki - earaki@gpo.kumamoto-u.ac.jp; Yoshiki Mikami - mika@kuhp.kyoto-u.ac.jp;

Akitake Mukasa - mukasa-nsu@umin.ac.jp



*Corresponding author:

Naoki Shinjima,
Department of Neurosurgery,
Kumamoto University Hospital,
Kumamoto, Japan.

nshinjima-kuh@umin.ac.jp

Received: 19 August 2021

Accepted: 30 November 2021

Published: 20 December 2021

DOI

10.25259/SNI_835_2021

Quick Response Code:



ABSTRACT

Background: Pituitary abscess (PA) can be fatal if diagnosed late. Rim enhancement is a typical radiological finding of PA on postgadolinium T1-weighted magnetic resonance imaging (MRI). Diffusion-weighted imaging is helpful in distinguishing PA from other sellar cystic lesions. Herein, we report the first atypical case of PA showing neither rim enhancement nor diffusion restriction with an unusual organism, *Moraxella catarrhalis*.

Case Description: A 77-year-old woman presented with headache, polyuria, polydipsia, and fatigue for a month before presenting to a local hospital. MRI showed pituitary enlargement with contrast enhancement. She had neither fever nor visual deficits and was followed up with hormonal replacement. Six months later, she complained of visual impairment, and MRI showed further pituitary enlargement with a thickened stalk compressing the optic chiasma. Neither rim enhancement nor diffusion restriction was observed. Endoscopic endonasal transsphenoidal surgery was performed based on the radiological diagnosis of lymphocytic hypophysitis or pituitary tumors. A thick, creamy yellow pus was drained from the sellar lesion. Intraoperative rapid histopathological findings revealed polymorphonuclear leukocytes infiltrating the pituitary gland. PA was diagnosed, and irrigation and open drainage of the abscess was performed. Bacterial culture of the pus detected *M. catarrhalis* by mass spectrometer, confirming the diagnosis. She underwent appropriate antibiotic administration, and her visual deficits improved.

Conclusion: We report the first atypical case of PA showing neither rim enhancement nor diffusion restriction with *M. catarrhalis*. Even if preoperative findings are not suggestive of PA, it should be considered as a differential diagnosis. Intraoperative rapid histopathological findings are useful for accurately diagnosing PA and initiating appropriate surgical treatment.

Keywords: Diffusion-weighted imaging, Intraoperative rapid histopathological findings, *Moraxella catarrhalis*, Pituitary abscess, Rim enhancement

INTRODUCTION

Pituitary abscess (PA) was first described by Simmonds in 1914.^[17] Although rare and occurring in 0.2–1.1% of all operated pituitary regions,^[22] PA is potentially life threatening and associated with high mortality if prompt diagnosis and treatment are not instituted.^[10,16] Thus, early diagnosis, prompt surgical drainage by the transsphenoidal approach, appropriate antibiotic therapy, and hormone replacement are indispensable to the treatment of PA.^[26] As seen in

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

©2021 Published by Scientific Scholar on behalf of Surgical Neurology International

cerebral abscess, rim enhancement on postgadolinium T1-weighted magnetic resonance imaging (MRI) is a typical radiological finding of PA,^[5,15,24] though other sellar cystic lesions such as pituitary adenoma with cystic degeneration, Rathke's cleft cyst, and cystic craniopharyngioma, which can show similar radiological appearances of rim enhancement, make the diagnosis rather difficult.^[26] Diffusion-weighted imaging (DWI) has been widely used to distinguish brain abscesses from other ring-enhancing mass lesions such as certain malignancies and necrotic disease.^[25] Thus, evaluation with both gadolinium-enhanced T1-weighted imaging and DWI is useful to distinguish PA from other sellar cystic lesions.^[1,9,12,16,18-21] Herein, we report an atypical case of PA, suffered from *Moraxella catarrhalis*, showing neither rim enhancement nor diffusion restriction. In general, *M. catarrhalis* causes otitis media and sinusitis in children, and bronchitis and pneumonia in the elderly. To the best of our knowledge, there have been no cases of PA suffered from *M. catarrhalis*.

CASE REPORT

A 77-year-old woman presented to a local hospital with headache, polyuria, polydipsia, and fatigue for a month, but had no fever. Her laboratory studies showed panhypopituitarism without inflammatory findings such as an increase in white blood cells or C-reactive protein. MRI showed a 15 mm enlarged pituitary gland with heterogeneous contrast enhancement. She was referred to our hospital, where an ophthalmological evaluation showed normal visual acuity and no visual field disturbance. She was started on hormonal replacement therapy and was followed up.

Six months later, she had blurred vision in the left eye, and an ophthalmological evaluation showed a decrease in visual acuity with bitemporal hemianopia. MRI showed further pituitary enlargement with thickening of the pituitary stalk compressing the optic chiasma and a positive dural tail sign. Neither ring enhancement nor diffusion restriction was observed [Figure 1a-c]. The lesion was assumed to be lymphocytic hypophysitis or a pituitary tumor; but a histological diagnosis was needed for undertaking appropriate treatment.

Endoscopic endonasal transsphenoidal surgery was performed, and a thick, creamy yellow pus was drained out of the sellar lesion [Figure 1d]. The intraoperative rapid pathological findings showed polymorphonuclear leukocytes infiltrating the pituitary gland and no tumor cells, also reaffirmed by postoperative pathological results [Figure 2a and b]. We made an intraoperative diagnosis of PA and subsequently performed irrigation and drainage of the abscess. Postoperative MRI revealed no apparent change from preoperative MRI [Figure 3a-c]. We identified *M. catarrhalis* as organism by mass spectrometer (VITEK® MS). She was

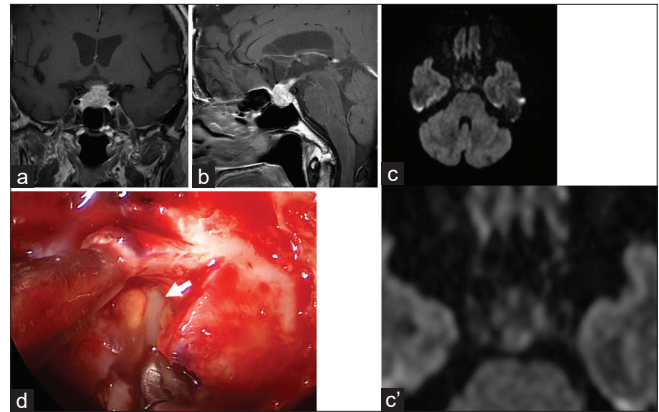


Figure 1: Brain magnetic resonance imaging scans. (a) Coronal postgadolinium T1-weighted image, (b) sagittal postgadolinium T1-weighted image, (c) axial diffusion-weighted image, and (c') the enlarged pituitary part of diffusion-weighted image of c. (a-c') Magnetic resonance imaging showing pituitary enlargement with heterogeneous enhancement and thickened pituitary stalk compressing the optic chiasma. There is no high signal on diffusion-weighted imaging, indicating lack of diffusion restriction. (d) Yellow and creamy pus observed intraoperatively (arrow).

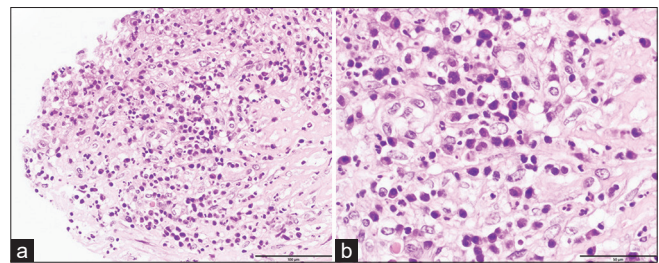


Figure 2: The pathological result shows a predominance of polymorphonuclear leukocytes, but no tumor cells. (a) 200x and (b) 400x.

switched from broad-spectrum antibiotics to appropriate antibiotics; her visual function gradually recovered, while the improvement of pituitary function was not observed, and she was discharged. Written and informed consent was obtained from the patient for the publication of this manuscript and its accompanying images.

DISCUSSION

PA can be a life-threatening condition and is associated with high mortality rates.^[10,13] Therefore, prompt diagnosis and treatment are crucial. However, the diagnosis of PA remains difficult because of its rarity, lack of specificity in its clinical manifestations,^[2,7,22] and confounding by other, more frequent sellar cystic lesions showing similar radiological appearances of rim enhancement, such as pituitary adenoma with cystic degeneration, Rathke's cleft cyst, and cystic craniopharyngioma.^[26] It can be difficult to distinguish a brain abscess from a cystic or necrotic brain

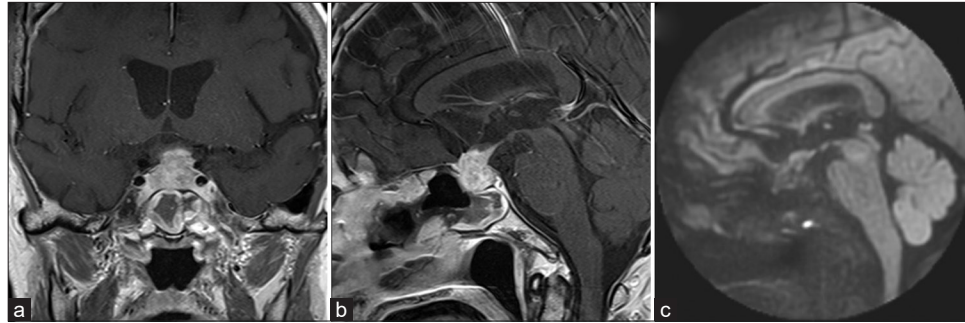


Figure 3: Brain magnetic resonance imaging scans. (a) Coronal postgadolinium T1-weighted image, (b) sagittal postgadolinium T1-weighted image, (c) sagittal diffusion-weighted image. (a-c) Postoperative magnetic resonance imaging showing no apparent change from preoperative magnetic resonance imaging (MRI) scan. There is no high signal on diffusion-weighted imaging as same as preoperative MRI scan.

Table 1: Summary of rim enhancement and diffusion restriction in reports of PAs.

	Number of patients	Rim enhancement	Diffusion restriction
Takayasu <i>et al.</i> , 2006	1	Yes	Yes
Takao <i>et al.</i> , 2006	1	Yes	Yes
Anik <i>et al.</i> , 2007	1	Yes	Yes
Taguchi <i>et al.</i> , 2012	1	Yes	Yes
Huang <i>et al.</i> , 2015	5	Yes (5/5)	Yes (2/5) No (3/5)
Medic Stojanoska <i>et al.</i> , 2016	1	Yes	Yes
Strickland <i>et al.</i> , 2018	1	Yes	Yes
Sherrod <i>et al.</i> , 2021	1	Yes	Yes
The present case	1	No	No
Total	13	12 (92.3%)	9 (69.2%)

PAs: Pituitary abscess

tumor on conventional MRI images. Several practical methods have been reported in conventional MRI, such as focusing on the significantly lower signal of the abscess capsule in T2WI,^[8,27] and that the capsule on the ventricular side of the abscess is less well developed than the capsule on the cortical side of the abscess.^[6] However, these characteristics are not always present in all abscesses. Furthermore, hypointense rims may also appear in cases of brain tumors such as metastases.^[8]

DWI is useful for the differential diagnosis of PA, other sellar cystic lesions,^[1,9,12,16,18-21] as well as cerebral abscesses.^[25] So far, the evaluation of PA on DWI has been reported in 12 cases, summarized in [Table 1].^[1,9,12,16,18-21] The finding of diffusion restriction is not always observed; Huang *et al.* reported that three of five patients with PA lacked this finding.^[9] In contrast, all of the above-mentioned 12 cases manifested with rim enhancement. Nonetheless, neither rim enhancement nor diffusion restriction was observed in the present case, which, to the best of our knowledge, is the first such case to be reported. These findings were probably not picked up by imaging because it captures the late stages of the PA once it liquefies, as discussed by Wang *et al.*^[24] Therefore, our case may have been in the early stages of the abscess before liquefaction.

The development of PA is thought to be due to hematogenous dissemination^[3] or by the direct extension of an adjacent infection such as sphenoid sinusitis,^[4] meningitis,^[22] and cavernous sinus thrombosis.^[3]

Intracranial infections caused by *Moraxella* are very rare, and there have been few reports of intracerebral abscesses caused by *M. catarrhalis*.^[14,23] *M. catarrhalis* commonly causes otitis media and sinusitis in children and bronchitis and pneumonia in the elderly with chronic obstructive pulmonary disease.^[11]

To the best of our knowledge, this is the first case of PA affected by *M. catarrhalis*. In our case, the atypical MRI findings of PA, in addition to the abscess stage, may be related to this rare organism.

CONCLUSION

PA is rare and potentially life threatening if not promptly treated. However, its correct diagnosis is challenging. Our case reveals that PA can present without rim enhancement and diffusion restriction and *M. catarrhalis* can be an organism of PA. Therefore, even if PA is not suggested preoperatively, it is necessary to consider it as a possible diagnosis. Finally, intraoperative rapid histopathological

findings are useful for determining the correct diagnosis of PA and instituting appropriate surgical treatment.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Anik Y, Koc K, Anik I, Meric M, Demirci A. Diffusion weighted MRI of primary pituitary abscess. Case report. *Neuroradiol J* 2007;20:282-6.
- Burdette JH, Elster AD, Ricci PE. Acute cerebral infarction: Quantification of spin-density and T2 shine-through phenomena on diffusion-weighted MR images. *Radiology* 1999;212:333-9.
- Dutta P, Bhansali A, Singh P. Pituitary abscess: Report of four cases and review of literature. *Pituitary* 2006;9:267-73.
- Dalan R, Leow MK. Pituitary abscess: Our experience with a case and a review of the literature. *Pituitary* 2008;11:299-306.
- Erdogan G, Deda H, Tonyukuk V. Magnetic resonance imaging and computerized tomography images in a case of pituitary abscess. *J Endocrinol Invest* 2001;24:887-91.
- Falcone S, Post MJ. Encephalitis, cerebritis, and brain abscess: Pathophysiology and imaging findings. *Neuroimaging Clin N Am* 2000;10:333-53.
- Gao L, Guo X, Tian R, Wang Q, Feng M, Bao X, et al. Pituitary abscess: Clinical manifestations, diagnosis and treatment of 66 cases from a large pituitary center over 23 years. *Pituitary* 2017;20:189-94.
- Haimes AB, Zimmermann RS, Morgello S, Weingarten K, Becker RD, Jennis R, et al. MR imaging of brain abscess. *AJR Am J Roentgenol* 1989;152:1073-85.
- Huang KT, Bi WL, Smith TR, Zamani AA, Dunn IF, Laws ER Jr. Intrasellar abscess following pituitary surgery. *Pituitary* 2015;18:731-7.
- Kotani H, Abiru H, Miyao M, Kakimoto Y, Kawai C, Ozeki M, et al. Pituitary abscess presenting a very rapid progression: Report of a fatal case. *Am J Forensic Med Pathol* 2012;33:280-3.
- Levinson W. *Medical Microbiology and Immunology*. New York: McGraw Hill; 1998.
- Medic Stojanoska M, Kozic D, Bjelan M, Vulekovic P, Vuckovic N, Vukovic B, Kovacev Zavisic B. Pituitary abscess with unusual clinical course. *Acta Clin Croat* 2016;55:650-4.
- Obrador S, Blazquez MG. Pituitary abscess in a craniopharyngioma. Case report. *J Neurosurg* 1972;36:785-9.
- Ramakrishna R, Nair MN, Huber B, Sekhar LN. A rare case of recurrent frontal osteoma complicated by mucopyocele with an unusual organism, *Moraxella catarrhalis*. *World Neurosurg* 2014;82:240.e13-9.
- Sabbah P, Bonardel G, Herve R, Marjou F, Hor F, Pharaboz C, et al. CT and MRI findings in primitive pituitary abscess: A case report and review of literature. *J Neuroradiol* 1999;26:196-9.
- Sherrod BA, Makarenko S, Iyer RR, Eli I, Kestle JR, Couldwell WT. Primary pituitary abscess in an adolescent female patient: Case report, literature review, and operative video. *Childs Nerv Syst* 2021;37:1423-8.
- Simmonds M. On embolic processes in the pituitary gland. *Virchows Arch Path Anat* 1914;217:226-39.
- Strickland BA, Pham M, Bakhsheshian J, Carmichael J, Weiss M, Zada G. Endoscopic endonasal transsphenoidal drainage of a spontaneous candida glabrata pituitary abscess. *World Neurosurg* 2018;109:467-70.
- Taguchi Y, Yoshida K, Takashima S, Tanaka K. Diffusion-weighted MRI findings in a patient with pituitary abscess. *Intern Med* 2012;51:683.
- Takao H, Doi I, Watanabe T. Diffusion-weighted magnetic resonance imaging in pituitary abscess. *J Comput Assist Tomogr* 2006;30:514-6.
- Takayasu T, Yamasaki F, Tominaga A, Hidaka T, Arita K, Kurisu K. A pituitary abscess showing high signal intensity on diffusion-weighted imaging. *Neurosurg Rev* 2006;29:246-8.
- Vates GE, Berger MS, Wilson CB. Diagnosis and management of pituitary abscess: A review of twenty-four cases. *J Neurosurg* 2001;95:233-41.
- Viagappan GM, Cudlip S, Lee PY, Kitchens N, Bell BA. Brain abscess caused by infection with *Moraxella catarrhalis* following a penetrating injury. *J Infect* 1998;36:130-1.
- Wang Z, Gao L, Zhou X, Guo X, Wang Q, Lian W, et al. Magnetic resonance imaging characteristics of pituitary abscess: A review of 51 cases. *World Neurosurg* 2018;114:e900-12.
- Xu XX, Li B, Yang HF, Du Y, Li Y, Wang WX, et al. Can diffusion-weighted imaging be used to differentiate brain abscess from other ring-enhancing brain lesions? A meta-analysis. *Clin Radiol* 2014;69:909-15.
- Zhang X, Sun J, Shen M, Shou X, Qiu H, Qiao N, et al. Diagnosis and minimally invasive surgery for the pituitary abscess: A review of twenty nine cases. *Clin Neurol Neurosurg* 2012;114:957-61.
- Zimmerman RD, Weingarten K. Neuroimaging of cerebral abscesses. *Neuroimaging Clin North Am* 1991;1:1-16.

How to cite this article: Kawano T, Shinojima N, Hanatani S, Araki E, Mikami Y, Mukasa A. Atypical pituitary abscess lacking rim enhancement and diffusion restriction with an unusual organism, *Moraxella catarrhalis*: A case report and review of the literature. *Surg Neurol Int* 2021;12:617.