

# World Journal of *Clinical Cases*

*World J Clin Cases* 2022 May 6; 10(13): 3969-4326



## Contents

Thrice Monthly Volume 10 Number 13 May 6, 2022

## REVIEW

- 3969 COVID-19 and liver diseases, what we know so far  
*Elnaggar M, Abomhaya A, Elkhattib I, Dawoud N, Doshi R*

## MINIREVIEWS

- 3981 Amputation stump management: A narrative review  
*Choo YJ, Kim DH, Chang MC*

## ORIGINAL ARTICLE

## Clinical and Translational Research

- 3989 Solute carrier family 2 members 1 and 2 as prognostic biomarkers in hepatocellular carcinoma associated with immune infiltration  
*Peng Q, Hao LY, Guo YL, Zhang ZQ, Ji JM, Xue Y, Liu YW, Lu JL, Li CG, Shi XL*

## Retrospective Cohort Study

- 4020 Role of clinical data and multidetector computed tomography findings in acute superior mesenteric artery embolism  
*Yang JS, Xu ZY, Chen FX, Wang MR, Cong RC, Fan XL, He BS, Xing W*

## Retrospective Study

- 4033 Effect of calcium supplementation on severe hypocalcemia in patients with secondary hyperparathyroidism after total parathyroidectomy  
*Liu J, Fan XF, Yang M, Huang LP, Zhang L*
- 4042 Comparison of clinical efficacy and postoperative inflammatory response between laparoscopic and open radical resection of colorectal cancer  
*He LH, Yang B, Su XQ, Zhou Y, Zhang Z*
- 4050 Three-dimensional echocardiographic assessment of left ventricular volume in different heart diseases using a fully automated quantification software  
*Pan CK, Zhao BW, Zhang XX, Pan M, Mao YK, Yang Y*
- 4064 Clinical effect of ultrasound-guided nerve block and dexmedetomidine anesthesia on lower extremity operative fracture reduction  
*Ao CB, Wu PL, Shao L, Yu JY, Wu WG*
- 4072 Correlation between thrombopoietin and inflammatory factors, platelet indices, and thrombosis in patients with sepsis: A retrospective study  
*Xu WH, Mo LC, Shi MH, Rao H, Zhan XY, Yang M*

**Observational Study**

- 4084** High plasma CD40 ligand level is associated with more advanced stages and worse prognosis in colorectal cancer

*Herold Z, Herold M, Herczeg G, Fodor A, Szasz AM, Dank M, Somogyi A*

- 4097** Metabolic dysfunction is associated with steatosis but no other histologic features in nonalcoholic fatty liver disease

*Dai YN, Xu CF, Pan HY, Huang HJ, Chen MJ, Li YM, Yu CH*

**Randomized Controlled Trial**

- 4110** Effect of Xuebijing injection on myocardium during cardiopulmonary bypass: A prospective, randomized, double blind trial

*Jin ZH, Zhao XQ, Sun HB, Zhu JL, Gao W*

**META-ANALYSIS**

- 4119** Perioperative respiratory muscle training improves respiratory muscle strength and physical activity of patients receiving lung surgery: A meta-analysis

*Yang MX, Wang J, Zhang X, Luo ZR, Yu PM*

**CASE REPORT**

- 4131** Delayed diffuse lamellar keratitis after small-incision lenticule extraction related to immunoglobulin A nephropathy: A case report

*Dan TT, Liu TX, Liao YL, Li ZZ*

- 4137** Large vessel vasculitis with rare presentation of acute rhabdomyolysis: A case report and review of literature

*Fu LJ, Hu SC, Zhang W, Ye LQ, Chen HB, Xiang XJ*

- 4145** Primitive neuroectodermal tumor of the prostate in a 58-year-old man: A case report

*Tian DW, Wang XC, Zhang H, Tan Y*

- 4153** Bilateral superficial cervical plexus block for parathyroidectomy during pregnancy: A case report

*Chung JY, Lee YS, Pyeon SY, Han SA, Huh H*

- 4161** Primary myelofibrosis with thrombophilia as first symptom combined with thalassemia and Gilbert syndrome: A case report

*Wufuer G, Wufuer K, Ba T, Cui T, Tao L, Fu L, Mao M, Duan MH*

- 4171** Late contralateral recurrence of retinal detachment in incontinentia pigmenti: A case report

*Cai YR, Liang Y, Zhong X*

- 4177** Pregnancy and delivery after augmentation cystoplasty: A case report and review of literature

*Ruan J, Zhang L, Duan MF, Luo DY*

- 4185** Acute pancreatitis as a rare complication of gastrointestinal endoscopy: A case report

*Dai MG, Li LF, Cheng HY, Wang JB, Ye B, He FY*

- 4190** Paraneoplastic neurological syndrome with positive anti-Hu and anti-Yo antibodies: A case report  
*Li ZC, Cai HB, Fan ZZ, Zhai XB, Ge ZM*
- 4196** Primary pulmonary meningioma: A case report and review of the literature  
*Zhang DB, Chen T*
- 4207** Anesthesia of a patient with congenital cataract, facial dysmorphism, and neuropathy syndrome for posterior scoliosis: A case report  
*Hudec J, Kosinova M, Prokopova T, Filipovic M, Repko M, Stourac P*
- 4214** Extensive myocardial calcification in critically ill patients receiving extracorporeal membrane oxygenation: A case report  
*Sui ML, Wu CJ, Yang YD, Xia DM, Xu TJ, Tang WB*
- 4220** Trigeminal extracranial thermocoagulation along with patient-controlled analgesia with esketamine for refractory postherpetic neuralgia after herpes zoster ophthalmicus: A case report  
*Tao JC, Huang B, Luo G, Zhang ZQ, Xin BY, Yao M*
- 4226** Thrombotic pulmonary embolism of inferior vena cava during caesarean section: A case report and review of the literature  
*Jiang L, Liang WX, Yan Y, Wang SP, Dai L, Chen DJ*
- 4236** EchoNavigator virtual marker and Agilis NxT steerable introducer facilitate transseptal transcatheter closure of mitral paravalvular leak  
*Hsu JC, Khoi CS, Huang SH, Chang YY, Chen SL, Wu YW*
- 4242** Primary isolated central nervous system acute lymphoblastic leukemia with *BCR-ABL1* rearrangement: A case report  
*Chen Y, Lu QY, Lu JY, Hong XL*
- 4249** Coexistence of meningioma and other intracranial benign tumors in non-neurofibromatosis type 2 patients: A case report and review of literature  
*Hu TH, Wang R, Wang HY, Song YF, Yu JH, Wang ZX, Duan YZ, Liu T, Han S*
- 4264** Treatment of condylar osteophyte in temporomandibular joint osteoarthritis with muscle balance occlusal splint and long-term follow-up: A case report  
*Lan KW, Chen JM, Jiang LL, Feng YF, Yan Y*
- 4273** Hepatic perivascular epithelioid cell tumor: A case report  
*Li YF, Wang L, Xie YJ*
- 4280** Multiple stress fractures of unilateral femur: A case report  
*Tang MT, Liu CF, Liu JL, Saijilafu, Wang Z*
- 4288** Enigmatic rapid organization of subdural hematoma in a patient with epilepsy: A case report  
*Lv HT, Zhang LY, Wang XT*

- 4294** Spinal canal decompression for hypertrophic neuropathy of the cauda equina with chronic inflammatory demyelinating polyradiculoneuropathy: A case report  
*Ye L, Yu W, Liang NZ, Sun Y, Duan LF*
- 4301** Primary intracranial extraskeletal myxoid chondrosarcoma: A case report and review of literature  
*Zhu ZY, Wang YB, Li HY, Wu XM*
- 4314** Mass brain tissue lost after decompressive craniectomy: A case report  
*Li GG, Zhang ZQ, Mi YH*

**LETTER TO THE EDITOR**

- 4321** Improving outcomes in geriatric surgery: Is there more to the equation?  
*Goh SSN, Chia CL*
- 4324** Capillary leak syndrome: A rare cause of acute respiratory distress syndrome  
*Juneja D, Kataria S*



**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Kai Zhang, PhD, Professor, Department of Psychiatry, Chaohu Hospital of Anhui Medical University, Hefei 238000, Anhui Province, China. zhangkai@ahmu.edu.cn

**AIMS AND SCOPE**

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

**INDEXING/ABSTRACTING**

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for WJCC as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Xu Guo; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

May 6, 2022

**COPYRIGHT**

© 2022 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/GerInfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



## Primary pulmonary meningioma: A case report and review of the literature

Dan-Bin Zhang, Tao Chen

**Specialty type:** Radiology, nuclear medicine and medical imaging

**Provenance and peer review:** Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0  
Grade B (Very good): B  
Grade C (Good): C  
Grade D (Fair): 0  
Grade E (Poor): 0

**P-Reviewer:** Soriano-Ursúa MA, Mexico; Sultana N, Bangladesh

**Received:** September 14, 2021

**Peer-review started:** September 14, 2021

**First decision:** January 22, 2022

**Revised:** January 28, 2022

**Accepted:** March 14, 2022

**Article in press:** March 14, 2022

**Published online:** May 6, 2022



**Dan-Bin Zhang, Tao Chen**, Department of Radiology, The First Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou 310003, Zhejiang Province, China

**Corresponding author:** Tao Chen, Doctor, Department of Radiology, The First Affiliated Hospital, Zhejiang University School of Medicine, No. 79 Qingchun Road, Hangzhou 310003, Zhejiang Province, China. [wmuchentao@zju.edu.cn](mailto:wmuchentao@zju.edu.cn)

### Abstract

#### BACKGROUND

Primary pulmonary meningioma (PPM) is a rare disease that is usually benign. The most common presentation of PPM is isolated pulmonary nodules or masses, so the disease can mimic any other lung tumor on imaging, especially lung cancer or metastasis.

#### CASE SUMMARY

A 47-year-old asymptomatic woman presented with a well-defined, lobulated pulmonary mass with calcification in the left lower lobe. The mass measured 69 mm × 57 mm × 61 mm and was found during a chest computed tomography (CT) performed for physical examination. Contrast-enhanced CT and positron emission tomography (PET)/CT revealed mild enhancement of the mass, with accumulation of 18-fluoro-2-deoxy-D-glucose (<sup>18</sup>F-FDG). Transbronchial biopsy suggested a provisional diagnosis of low-grade neuroendocrine tumor. Subsequent enhanced head magnetic resonance imaging revealed no positive lesions. An open cuff resection of the left lower lobe and wedge resection of the lingual segment were performed. Histopathological and immunohistochemical examination revealed that the mass was a PPM.

#### CONCLUSION

PPM should be considered in the differential diagnosis of isolated pulmonary masses found incidentally on CT and should be diagnosed based on a combination of radiological and histological features. Surgical resection is currently the main treatment strategy. No recurrence of benign PPMs has been reported after complete resection.

**Key Words:** Primary pulmonary meningioma; Contrast-enhanced computed tomography; Positron emission tomography; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** Primary pulmonary meningioma (PPM) is a rare tumour that usually presents as an asymptomatic solitary pulmonary mass. Limited knowledge of the disease can make diagnosis difficult. Here, we present the case of a 47-year-old woman with PPM.

**Citation:** Zhang DB, Chen T. Primary pulmonary meningioma: A case report and review of the literature. *World J Clin Cases* 2022; 10(13): 4196-4206

**URL:** <https://www.wjgnet.com/2307-8960/full/v10/i13/4196.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v10.i13.4196>

## INTRODUCTION

Primary ectopic meningiomas are rare tumors that occur in the head, neck, skin, peripheral nerves, bone, retroperitoneum, and lungs. They account for approximately 2% of meningiomas[1,2]. Primary pulmonary meningiomas (PPMs) are rare. Since the first case report in 1982 by Kemnitz *et al*[3], only 67 cases of PPMs have been reported domestically in the medical literature. Among these cases, only five were malignant meningiomas, and PPMs were more likely to be benign.

PPMs usually appear as isolated pulmonary nodules that are accidentally detected on chest radiographs or computed tomography (CT). Despite advancements in radiological examination such as enhanced CT and positron emission tomography (PET), it remains difficult to assess indeterminate isolated pulmonary nodules or masses, and many benign PPMs are misdiagnosed. The present paper reports a rare case of PPM. We also summarized the clinical imaging characteristics of PPMs in the literature to provide a reference for PPM diagnosis.

## CASE PRESENTATION

### Chief complaints

A 47-year-old woman had a pulmonary mass on physical examination 1 mo ago.

### History of present illness

The patient was hospitalized due to chest CT findings of a pulmonary mass in the left lower lobe of the lung upon physical examination 1 mo prior.

### History of past illness

The patient had a free previous medical history.

### Personal and family history

The patient had no personal and family history.

### Physical examination

Physical examination revealed no obvious positive signs.

### Laboratory examinations

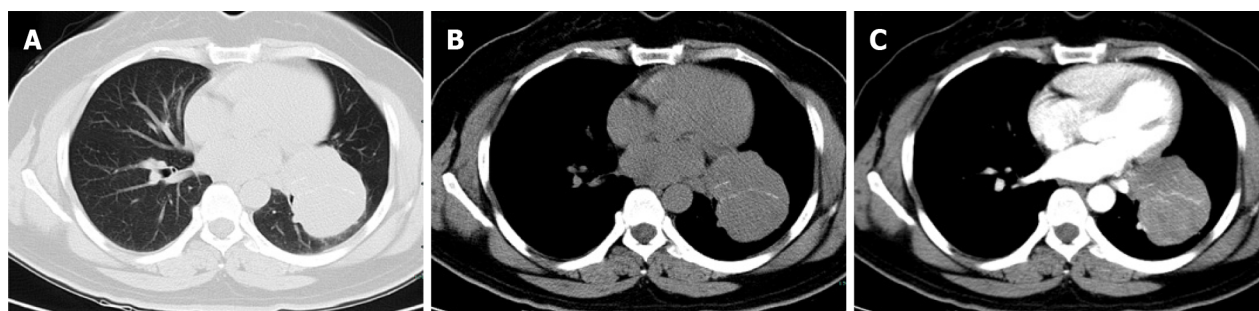
All tumor marker results were within the normal range.

### Imaging examinations

Contrast-enhanced chest CT revealed a 6.9 cm diameter mass with a well-circumscribed margin in the left lower lobe of the lung. The adjacent left lower lobar bronchus and lingual segment of the left upper lobar bronchus were compressed by the mass. The lesion was confined to the lung parenchyma and showed striated calcification. After contrast enhancement, the mass showed mild homogeneous enhancement, from a pre-contrast attenuation of 40 HU to a postcontrast attenuation of 60 HU (Figure 1).

On 18-fluoro-2-deoxy-D-glucose (FDG) PET imaging, the standardized uptake value (SUV) of the mass increased unevenly, with a maximum value of 4.4, which suggested malignant lesion (Figure 2). No other lesions were detected on PET/CT. Moreover, enhanced magnetic resonance imaging (MRI) of the brain showed no evidence of intracranial tumors or metastases. Bronchoscopy revealed partial obstruction of the lower left lobe by the mass and narrowing of the lingual opening in the upper left lobe. A subsequent transbronchial biopsy result suggested a low-grade neuroendocrine tumor (Figure 3).





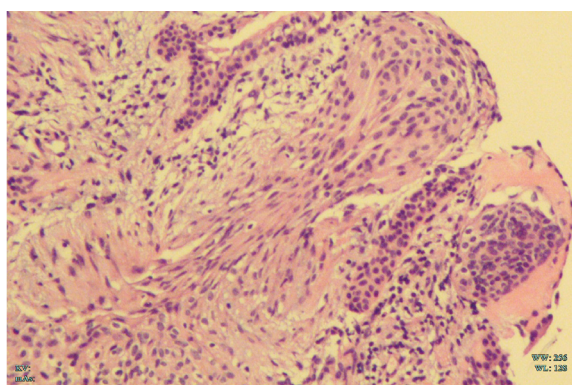
DOI: 10.12998/wjcc.v10.i13.4196 Copyright ©The Author(s) 2022.

**Figure 1** Contrast-enhanced chest computed tomography images of (A, B) unenhanced and (C) enhanced scan. A 6.9-cm diameter well-circumscribed mass in the left lower lobe of the lung shows mild homogeneous enhancement.



DOI: 10.12998/wjcc.v10.i13.4196 Copyright ©The Author(s) 2022.

**Figure 2** Positive uptake by the mass on  $^{18}\text{F}$ -fluorodeoxyglucose-positron emission tomography suggesting malignancy.



DOI: 10.12998/wjcc.v10.i13.4196 Copyright ©The Author(s) 2022.

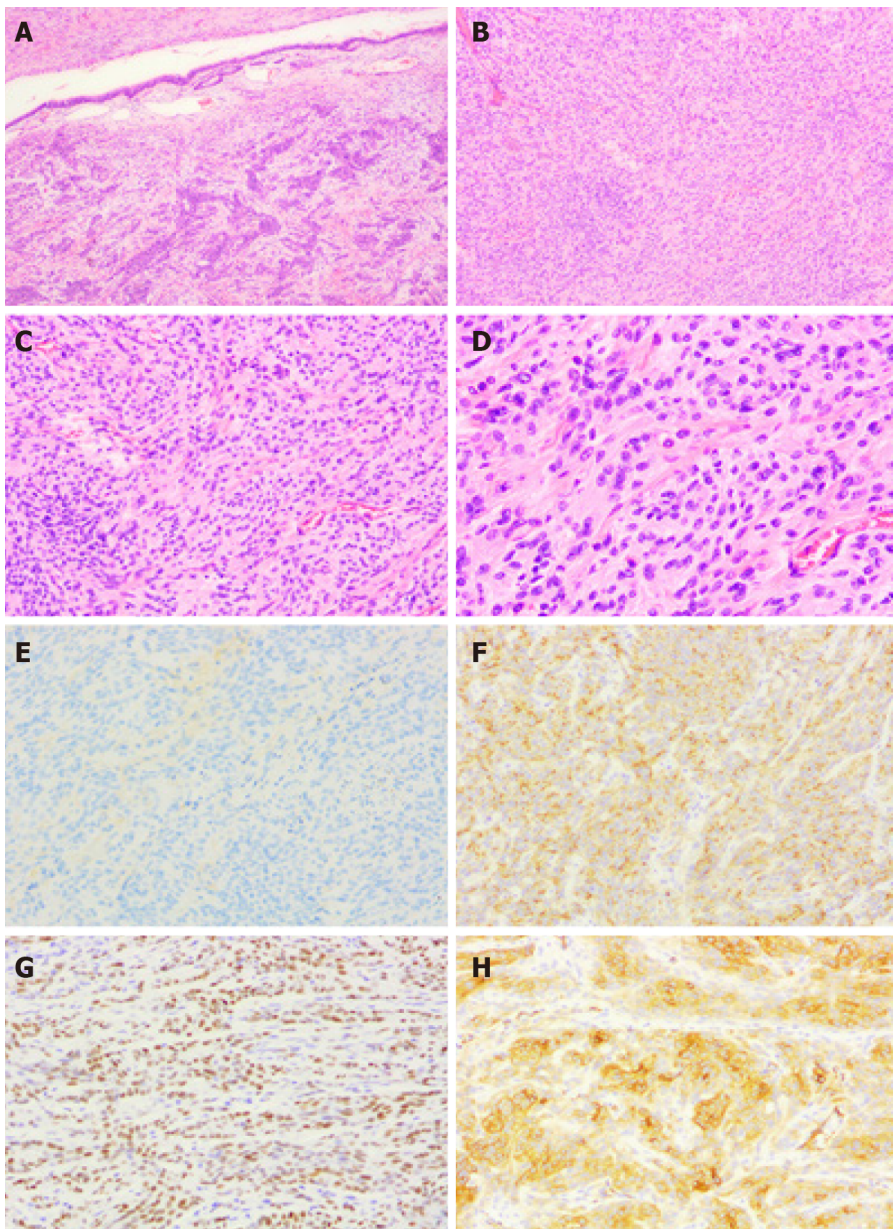
**Figure 3** The transbronchial biopsy result: Hematoxylin and eosin staining showed that a few nested epithelioid cells and abnormal cells were observed in the tissue (200 $\times$ ).

---

## FINAL DIAGNOSIS

---

The final diagnosis of the presented case was PPM.



DOI: 10.12998/wjcc.v10.i13.4196 Copyright ©The Author(s) 2022.

**Figure 4 Histological features of primary pulmonary meningioma.** A-D: Macroscopically, primary pulmonary meningioma (PPM) showed as spindle or oval cells organized in bundles and whorls on hematoxylin-eosin staining (25×; 50×; 100×; 200×); E-H: Immunohistochemically (200×), PPM showed negativity for E: Cytokeratin, positive for F: Epithelial membrane antigen; G: Progesterone receptor; H: Somatostatin Receptor 2 (SSTR2).

## TREATMENT

Considering the CT and PET features of the mass and the results of transbronchial biopsy, an open cuff resection of the left lower lobe and wedge resection of the lingual segment were performed. Gross examination revealed a 6.5 cm, off-white, tenacious texture mass. Microscopic examination revealed a tumor with focal bronchial cartilage involvement, no pleural involvement, and fusiform nests of cells arranged in fascicles or whorls. Immunohistochemistry showed positivity for epithelial membrane antigen (EMA), progesterone receptor (PR), somatostatin receptor 2 (SSTR2), D2-40, and CD34, and negativity for S-100, cytokeratin (CK), glial fibrillary acidic protein, CgA, SOX10, and SMA; the Ki-67 index was about 5%-10% positive (Figure 4). These morphological and immunohistochemical features were suggestive of a PPM. Preoperative contrast-enhanced chest CT, contrast-enhanced brain MRI, and PET-CT did not reveal evidence of intracranial or spinal meningioma.

Table 1 Patient characteristics

No.	Ref.	Age (Gender)	Symptom	Size (cm)	Histology	Follow-up
1	Kemnitz <i>et al</i> [3]	59 (F)	Weakness, loss of appetite, weight loss	4.0	B	30
2	Chumas <i>et al</i> [14]	58 (F)	None	4.0	B	12
3	Zhang <i>et al</i> [15]	58 (F)	None	2.5	B	18
4	Kodama <i>et al</i> [16]	53 (M)	None	2.6	B	84
5	Drlicek <i>et al</i> [17]	41 (M)	None	2.5	B	72
6		62 (F)	None	6.0	B	72
7	Flynn <i>et al</i> [18]	63 (F)	Coughing	3.0	B	44
8		74 (F)	None	1.7	B	37
9	Maiorana <i>et al</i> [19]	68 (M)	None	1.8	B	24
10	Kaleem <i>et al</i> [20]	45 (F)	None	1.2	B	10
11	Lockett <i>et al</i> [21]	65 (M)	None	0.8	B	5
12	Ueno <i>et al</i> [22]	61 (F)	None	0.4-1.5	B	36
13	de Perrot <i>et al</i> [5]	57 (F)	None	0.9	B	30
14	Prayson <i>et al</i> [23]	51 (M)	None	6.5	M	10
15	Spinelli <i>et al</i> [24]	71 (F)	Bronchitis	1.5	B	96
16	Falleni <i>et al</i> [7]	59 (M)	None	2.5	B	30
17	Cesario <i>et al</i> [25]	56 (M)	None	2.0	B	72
18	CURA <i>et al</i> [26]	58 (F)	None	2.0	B	N
19	Comin <i>et al</i> [27]	33 (M)	Hemoptysis and thoracic pain	2.0	B	47
20	Rowsell <i>et al</i> [28]	51 (M)	None	4.0	B	8
21	Picquet <i>et al</i> [9]	54 (F)	None	1.4	B	6
22	Kaneda <i>et al</i> [29]	59 (F)	None	1.4	B	14
23	van der Meij <i>et al</i> [30]	40 (F)	Dyspnea, coughing dysphagia	5.0	M	40
24	Meirelles <i>et al</i> [31]	48 (M)	None	1.5	B	N
25	Incarbone <i>et al</i> [32]	24 (M)	Hemoptysis	2.4	B	42
26	Izumi <i>et al</i> [33]	18 (F)	Hemoptysis on exertion	3.3	B	15
27	Weber <i>et al</i> [4]	108 (F)	Asthenia, lack of appetite, loss of weight and anxiety	15.0	M	N
28	Lepanto <i>et al</i> [10]	60 (F)	None	1.6	B	12
29	Kim <i>et al</i> [34]	61 (F)	Chest pain	2.5	B	84
30	Jiang <i>et al</i> [35]	63 (F)	None	3.5	B	N
31	Juan <i>et al</i> [11]	55 (M)	None	4.5	B	6
32	Oide <i>et al</i> [36]	44 (M)	None	2.0	B	N
33	Huang <i>et al</i> [37]	44 (F)	Chest pain	2.5	B	6
34	Žulpaitė <i>et al</i> [38]	43 (F)	None	4.5	M	24
35	Hong <i>et al</i> [39]	54 (M)	Cough and sputum	1.6	B	24
36	Luo <i>et al</i> [40]	65 (F)	Cough	3.5	B	N
37	Xu <i>et al</i> [41]	65 (F)	Chest pain and tightness	0.7	B	N
38	Ohashi <i>et al</i> [42]	60 (F)	None	2.0	B	36
39	Bae <i>et al</i> [43]	43 (F)	None	1.9	B	26
40	Cimini <i>et al</i> [13]	80 (M)	None	1.4	B	N
41		80 (M)	None	1.2	M	N

42	Wang <i>et al</i> [44]	64 (F)	None	3.4 (cystic nodules 0.8-2)	B	N
43	Fujikawa <i>et al</i> [12]	62 (F)	None	0.8	B	20
45	Han <i>et al</i> [6]	64 (F)	None	0.6	B	28
44		75 (F)	None	0.6	B	2
46	Gürçay <i>et al</i> [45]	55 (F)	Cough	2.0	B	N
47	Jiang <i>et al</i> [8]	70 (M)	None	1.5	B	N
48	Bas <i>et al</i> [46]	57 (M)	Cough	1.0	B	N
49	Oh <i>et al</i> [47]	54 (M)	None	0.5-1.3	B	24
50	Present report	46 (F)	None	6.9	B	3

F: Female; M: Male; None: No symptoms; B: Benign; M: Malignant; N: Not reported.

## OUTCOME AND FOLLOW-UP

The patient was disease-free after 3 mo of follow-up.

## DISCUSSION

A total of 68 patients diagnosed with PPM were reported in the English literature from 1982 to 2021. All of these patients received histological assessment confirming PPM. Eighteen cases were excluded because (1) They underwent no radiological examination; or (2) They received no radiological evaluation of the CNS negative for meningioma. Ultimately, 50 patients (including the case reported above) were included in the analysis.

### Patient characteristics

The study group comprised 50 patients: 19 men and 31 women. The age range was 18–108 years (median age: 58.0 years). Thirty-five patients were asymptomatic and only occasionally showed pulmonary nodules or masses on chest CT or X-ray. Thirteen patients had respiratory symptoms, including chest pain, chest tightness, hemoptysis, cough, and sputum. In addition, two patients had non-specific symptoms[3,4]. There were nine patients with a history of malignancy: two had suffered lung adenocarcinoma[5,6], two colorectal cancer[7,8], two breast cancer[9,10], one buccal cancer[11], one papillary thyroid carcinoma[12], and one thymoma and kidney cancer[13] (Table 1)[14-47].

### Radiological characteristics

Most PPMs were benign, and only five cases were malignant[4,13,23,30,38]. Benign PPMs were generally well-circumscribed on radiological studies, with diameters ranging from 0.4 to 6 cm (median: 2 cm). The five malignant PPMs ranged in diameter from 1.5 to 15 cm (median: 6.4 cm). On chest CT scan, benign PPMs usually appear as isolated, rounded, solid, well-defined nodules or masses, with or without lobulation. Five cases were lobulated[24,31,32,37,40], two manifested as ground glass density [11,45], and two showed burrs on the edges[6]. In addition, one recent study reported that the PPM showed multiple cystic lesions with a solid component[44]. The CT features of the lesions were not described in the remaining eight cases (Table 2)[14-47].

The CT enhancement patterns were described in 11 patients: six cases showed homogeneous enhancement, one showed heterogeneous enhancement[39], two showed mild enhancement[37,44], one showed mild concentric enhancement[8], and one showed no significant enhancement[13].

<sup>18</sup>F-fluorodeoxyglucose-PET was performed in 12 patients, including our reported case. The PET scans of four patients showed no accumulation of <sup>18</sup>F-FDG in lung lesions[8,10,45,46]. Seven patients showed metabolically active lesions suspicious for malignancy, with a reported SUV range from 2.46 to 12.9 in seven cases. No other extra-pulmonary sites with increased FDG uptake were detected in any of the patients.

The prognosis of benign PPM resection is good, with almost no recurrence or metastasis. Follow-up was reported in 35 benign cases, ranging from 2 to 96 mo (median: 24 mo). However, two malignant PPMs relapsed[23,30]. The above summary is presented in Table 3.

Primary ectopic pulmonary meningiomas are very rare, and only 67 cases (including our report) of PPM have been reported in the English language medical literature. The present study reported a case with very complete clinical procedure and imaging data, including preoperative enhanced CT examination, PET-CT examination, bronchoscopy biopsy, and postoperative pathological results. There were rare signs of calcification on CT, false positives on PET-CT and errors in our biopsy results. This



**Table 2 Radiological characteristics**

No.	Ref.	Location	CT feature	Enhancement feature	PET/CT
1	Kemnitz <i>et al</i> [3]	RL-P	Well-circumscribed	N	N
2	Chumas <i>et al</i> [14]	RL-P	Well-circumscribed	N	N
3	Zhang <i>et al</i> [15]	LU-P	Well-circumscribed	N	N
4	Kodama <i>et al</i> [16]	LU-P	N	N	N
5	Drlicek <i>et al</i> [17]	LL-N	Well-circumscribed	N	N
6		LL-N	N	N	N
7	Flynn <i>et al</i> [18]	LU-C	Well-circumscribed	N	N
8		LL-P	Well-circumscribed	N	N
9	Maiorana <i>et al</i> [19]	N-P	Well-circumscribed	N	N
10	Kaleem <i>et al</i> [20]	LL-P	Well-circumscribed	N	N
11	Lockett <i>et al</i> [21]	LL-P	Well-circumscribed	N	N
12	Ueno <i>et al</i> [22]	Bil-N	N	N	N
13	de Perrot <i>et al</i> [5]	RL-P	Well-circumscribed	N	N
14	Prayson <i>et al</i> [23]	RU-P	Smooth margins and focal necrosis	N	N
15	Spinelli <i>et al</i> [24]	N-P	Lobulated margins	N	N
16	Falleni <i>et al</i> [7]	LU-P	Well-circumscribed	N	N
17	Cesario <i>et al</i> [25]	LU-P	Well-circumscribed	N	N
18	CURA <i>et al</i> [26]	RU-C	Well-circumscribed	Enhancement	High uptake (no value)
19	Comin <i>et al</i> [27]	LU-P	N	N	N
20	Rowsell <i>et al</i> [28]	RL-C	N	N	N
21	Picquet <i>et al</i> [9]	LL-P	Well-circumscribed	N	N
22	Kaneda <i>et al</i> [29]	N-P	Well-circumscribed	N	N
23	van der Meij <i>et al</i> [30]	RH-C	N	N	N
24	Meirelles <i>et al</i> [31]	RL-C	Lobulated margins	N	High uptake (12.9)
25	Incarbone <i>et al</i> [32]	RU-P	Lobulated margins	N	High uptake (10.14)
26	Izumi <i>et al</i> [33]	LU-C	Well-circumscribed	N	N
27	Weber <i>et al</i> [4]	RL-C	N	N	N
28	Lepanto <i>et al</i> [10]	LL-P	N	N	Low uptake (1.2)
29	Kim <i>et al</i> [34]	RU-P	Well-circumscribed	Homogeneous enhancement	N
30	Jiang <i>et al</i> [35]	LU-P	Well-circumscribed	N	N
31	Juan <i>et al</i> [11]	LU-P	Ground-glass opacity	N	N
32	Oide <i>et al</i> [36]	LU-P	Well-circumscribed	N	N
33	Huang <i>et al</i> [37]	RL-P	Calcifications, mild peripheral lobulation	Mild enhancement	N
34	Žulpaite <i>et al</i> [38]	LU-P	N	Homogeneous enhancement	N
35	Hong <i>et al</i> [39]	LU-P	Well-circumscribed	Heterogeneous enhancement	N
36	Luo <i>et al</i> [40]	RL-P	Heterogeneous lobulated	N	N
37	Xu <i>et al</i> [41]	RL-P	Well-circumscribed	N	N
38	Ohashi <i>et al</i> [42]	RL-P	N	N	N



39	Bae <i>et al</i> [43]	RL-C	Oval-shaped	Well-enhancement	Mildly high uptake (2.48)
40	Cimini <i>et al</i> [13]	RU-P	N	No significant enhancement	High uptake (4.63)
41		LU-N	N	Enhancement	Mildly high uptake (2.46)
42	Wang <i>et al</i> [44]	RL-N	Multiple thin-, smooth-walled cysts or cystic nodules with solid component	Mild enhancement	N
43	Fujikawa <i>et al</i> [12]	LL-P	Well-circumscribed	N	N
45	Han <i>et al</i> [6]	RL-P	Burrs on the edges	N	N
44		RL-P	Burrs on the edges	N	N
46	Gürçay <i>et al</i> [45]	RU-P	Peripheral ground-glass	N	Low uptake (1.89)
47	Jiang <i>et al</i> [8]	RL-P	Well-circumscribed	Mild centripetal enhancement	Low uptake (0.6)
48	Bas <i>et al</i> [46]	LL-P	Well-circumscribed	N	Low uptake (no value)
49	Oh <i>et al</i> [47]	scattered	Well-circumscribed	N	Mildly high uptake (3.1)
50	Present report	LL-C	Well-circumscribed	Mild homogeneous enhancement	High uptake (4.4)

RL: Right lower lobe; RU: Right upper lobe; LL: Left lower lobe; LU: Left upper lobe; P: Peripheral or subpleural; C: Centrilobar; N: Not reported.

suggests that we need to be cautious when excluding PPM only through auxiliary examination or even needle biopsy in clinical work.

The pathogenesis of PPMs remains unclear. One hypothesis is that the tumors develop from multipotent mesenchymal cells. Another states that PPMs originate from minute pulmonary meningothelial nodules that are occasionally found in approximately 1% of autopsies and excised lung specimens[48]. However, the incidence of meningiomas is much lower than that of meningeal epithelial nodules. Moreover, previous genotypic comparisons have failed to demonstrate pulmonary meningeal epithelial nodules or intracranial meningiomas, further supporting the hypothesis[49].

To date, approximately 90% of PPMs reported in the literature have been benign, while five have been malignant[4,13,23,30,38]. Most patients with PPM have no obvious symptoms, while some have respiratory or non-specific symptoms. Clinical symptoms may be related to the lesion location. As previously reported, benign PPMs are usually located in the peripheral pulmonary region, with no involvement of the bronchi, blood vessels, or pleura. Some PPM patients have a known history of malignancy[8], so a comprehensive and careful evaluation of pulmonary lesions must be carried out to avoid the misdiagnosis of metastasis.

Radiologically, PPMs usually appear as isolated, solid, and well-defined parenchymal coin-like lesions, ranging in size from 0.4 to 6.5 cm. Approximately 74.0% of PPMs are less than 3 cm in diameter. The lesions may present with burrs, lobulation, ground-glass density, or calcification, but these features are uncommon. Furthermore, one study reported a PPM presenting as multiple cystic lesions[44]. PPMs have diverse enhancement CT manifestations. They usually show different degrees of enhancement, or even no significant enhancement. Hence, the pattern of lesion enhancement may not help to determine whether the lesion is benign or malignant. On  $^{18}\text{F}$ -FDG PET, most PPMs exhibit high or mildly high metabolic activity, as in our reported case. Only four PPMs showed low uptake of  $^{18}\text{F}$ -FDG[8,10,45, 46]. However, one recent study reported a patient with both benign and malignant PPMs, both characterized by increased glucose uptake[13]. This suggests that the malignancy of PPMs may not be related to  $^{18}\text{F}$ -FDG uptake.

Pathological identification is necessary to allow PPM diagnosis; however, diagnosis can sometimes be difficult using needle biopsy alone[32]. False positives are sometimes reported, in addition to negative reports. For instance, in the case reported by Žulpaitė *et al*[38], a false positive diagnosis of paraganglioma was given based on preoperative transthoracic needle biopsy. The present patient was misdiagnosed as having low-grade neuroendocrine tumor based on preoperative bronchoscopic biopsy.

## CONCLUSION

In conclusion, the accurate diagnosis of PPM is challenging because the tumors are rare and show variable radiological manifestations. A single  $^{18}\text{F}$  FDG PET or contrast-enhanced CT examination may not be sufficient to evaluate patients with PPM. Surgical resection is the main treatment strategy, and no relapse has been reported in benign cases after complete resection. In clinical practice, attention should

**Table 3 Clinical and imaging characteristics of primary pulmonary meningioma patients**

Variables		Number	Ratio (%)
Gender ( <i>n</i> = 50)	Female	31	62.0
	Male	19	38.0
Age ( <i>n</i> = 50)	≤ 40 yr	4	8.0
	40–60 yr	26	52.0
	≥ 60 yr	20	40.0
Symptoms ( <i>n</i> = 50)	No	35	70.0
	Yes	15	30.0
Size ( <i>n</i> = 50)	≤ 3 cm	37	74.0
	> 3 cm	13	26.0
Histology ( <i>n</i> = 50)	Benign	45	90.0
	Malignant	5	10.0
Site ( <i>n</i> = 47)	RL	15	31.9
	RU	6	12.8
	LL	10	21.3
	LU	13	27.7
	Other	3	6.4
Location ( <i>n</i> = 45)	Peripheral	36	80.0
	Centrilobar	9	20.0
Main CT features ( <i>n</i> = 38)	Well-circumscribed	27	71.1
	Lobulated	5	13.2
	Burrs	2	5.3
	Ground-glass density	2	5.3
	Calcification	2	5.3
PET/CT ( <i>n</i> = 12)	High uptake	8	66.7
	Low uptake	4	33.3

RL: Right lower lobe; RU: Right upper lobe; LL: Left lower lobe; LU: Left upper lobe.

be paid to common isolated pulmonary nodule or mass, especially in asymptomatic patients. PPM should be considered in the differential diagnosis of lung diseases.

## FOOTNOTES

**Author contributions:** Zhang DB was responsible for collecting the medical history of the patient and drafting the paper; Chen T reviewed the literature and revised the manuscript; all authors read and approved the final manuscript.

**Informed consent statement:** Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

**Conflict-of-interest statement:** All authors declare no conflict of interest related to this study.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license

their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: China

ORCID number: Dan-Bin Zhang 0000-0002-4897-6358; Tao Chen 0000-0001-5013-323X.

S-Editor: Ma YJ

L-Editor: A

P-Editor: Ma YJ

## REFERENCES

- 1 Kershisnik M, Callender DL, Batsakis JG. Extracranial, extraspinal meningiomas of the head and neck. *Ann Otol Rhinol Laryngol* 1993; **102**: 967-970 [PMID: 8285520 DOI: 10.1177/000348949310201211]
- 2 Muzumdar DP, Vengsarkar US, Bhatjiwale MG, Goel A. Diffuse calvarial meningioma: a case report. *J Postgrad Med* 2001; **47**: 116-118 [PMID: 11832603]
- 3 Kemnitz P, Spormann H, Heinrich P. Meningioma of lung: first report with light and electron microscopic findings. *Ultrastruct Pathol* 1982; **3**: 359-365 [PMID: 7157498 DOI: 10.3109/01913128209018558]
- 4 Weber C, Pautex S, Zulian GB, Pusztaszeri M, Lobrinus JA. Primary pulmonary malignant meningioma with lymph node and liver metastasis in a centenarian woman, an autopsy case. *Virchows Arch* 2013; **462**: 481-485 [PMID: 23443940 DOI: 10.1007/s00428-013-1383-7]
- 5 de Perrot M, Kurt AM, Robert J, Spiliopoulos A. Primary pulmonary meningioma presenting as lung metastasis. *Scand Cardiovasc J* 1999; **33**: 121-123 [PMID: 10225315 DOI: 10.1080/14017439950141948]
- 6 Han D, Deng H, Liu Y. Primary pulmonary meningiomas: report of two cases and review of the literature. *Pathol Res Pract* 2020; **216**: 153232 [PMID: 33045659 DOI: 10.1016/j.prp.2020.153232]
- 7 Falleni M, Roz E, Dessy E, Del Curto B, Braidotti P, Gianelli U, Pietra GG. Primary intrathoracic meningioma: histopathological, immunohistochemical and ultrastructural study of two cases. *Virchows Arch* 2001; **439**: 196-200 [PMID: 11561761 DOI: 10.1007/s004280000387]
- 8 Jiang M, Chen P, Huang R, Zhang J, Zheng J. A case report of primary pulmonary meningioma masquerading as lung metastasis in a patient with rectal carcinoma: role of <sup>18</sup>F-FDG PET/CT. *J Cardiothorac Surg* 2021; **16**: 153 [PMID: 34051819 DOI: 10.1186/s13019-021-01546-3]
- 9 Picquet J, Valo I, Jousset Y, Enon B. Primary pulmonary meningioma first suspected of being a lung metastasis. *Ann Thorac Surg* 2005; **79**: 1407-1409 [PMID: 15797095 DOI: 10.1016/j.athoracsur.2003.10.071]
- 10 Lepanto D, Maffini F, Petrella F, Colandrea M, Putzu C, Barberis M, Paganelli G, Viale G. Atypical primary pulmonary meningioma: a report of a case suspected of being a lung metastasis. *Ecancermedicalscience* 2014; **8**: 414 [PMID: 24761155 DOI: 10.3332/ecancer.2014.414]
- 11 Juan CM, Chen ML, Ho SY, Huang YC. Primary Pulmonary Meningioma Simulating a Pulmonary Metastasis. *Case Rep Pulmonol* 2016; **2016**: 8248749 [PMID: 27974986 DOI: 10.1155/2016/8248749]
- 12 Fujikawa R, Arai Y, Otsuki Y, Nakamura T. A case of a primary pulmonary meningioma mimicking a metastasis from a papillary thyroid carcinoma due to a size reduction after radioactive iodine therapy. *Surg Case Rep* 2020; **6**: 57 [PMID: 32221747 DOI: 10.1186/s40792-020-00823-y]
- 13 Cimini A, Ricci F, Pugliese L, Chiaravallotti A, Schillaci O, Floris R. A Patient with a Benign and a Malignant Primary Pulmonary Meningioma: An Evaluation with 18F Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography and Computed Tomography with Iodinated Contrast. *Indian J Nucl Med* 2019; **34**: 45-47 [PMID: 30713380 DOI: 10.4103/ijnm.IJNM\_101\_18]
- 14 Chumas JC, Lorelle CA. Pulmonary meningioma. A light- and electron-microscopic study. *Am J Surg Pathol* 1982; **6**: 795-801 [PMID: 7168461 DOI: 10.1097/0000478-198212000-00011]
- 15 Zhang FL, Cheng XR, Zhang YS, Ding JA. Lung ectopic meningioma. A case report. *Chin Med J (Engl)* 1983; **96**: 309-311 [PMID: 6413150]
- 16 Kodama K, Doi O, Higashiyama M, Horai T, Tateishi R, Nakagawa H. Primary and metastatic pulmonary meningioma. *Cancer* 1991; **67**: 1412-1417 [PMID: 1991305 DOI: 10.1002/1097-0142(19910301)67:5<1412::Aid-cnecr2820670523>3.0.Co;2-v]
- 17 Drlicek M, Grisold W, Lorber J, Hackl H, Wuketich S, Jellinger K. Pulmonary meningioma. Immunohistochemical and ultrastructural features. *Am J Surg Pathol* 1991; **15**: 455-459 [PMID: 2035740 DOI: 10.1097/0000478-199105000-00005]
- 18 Flynn SD, Yousem SA. Pulmonary meningiomas: a report of two cases. *Hum Pathol* 1991; **22**: 469-474 [PMID: 1709609 DOI: 10.1016/0046-8177(91)90133-a]
- 19 Maiorana A, Ficarra G, Fano RA, Spagna G. Primary solitary meningioma of the lung. *Pathologica* 1996; **88**: 457-462 [PMID: 8988660]
- 20 Kaleem Z, Fitzpatrick MM, Ritter JH. Primary pulmonary meningioma. Report of a case and review of the literature. *Arch Pathol Lab Med* 1997; **121**: 631-636 [PMID: 9199633]
- 21 Lockett L, Chiang V, Scully N. Primary pulmonary meningioma: report of a case and review of the literature. *Am J Surg Pathol* 1997; **21**: 453-460 [PMID: 9130993 DOI: 10.1097/0000478-199704000-00012]
- 22 Ueno M, Fujiyama J, Yamazaki I, Uchiyama T, Ishikawa Y, Satoh Y. Cytology of primary pulmonary meningioma. Report of the first multiple case. *Acta Cytol* 1998; **42**: 1424-1430 [PMID: 9850654 DOI: 10.1159/000332179]

- 23 **Prayson RA**, Farver CF. Primary pulmonary malignant meningioma. *Am J Surg Pathol* 1999; **23**: 722-726 [PMID: [10366156](#) DOI: [10.1097/00000478-199906000-00013](#)]
- 24 **Spinelli M**, Claren R, Colombi R, Sironi M. Primary pulmonary meningioma may arise from meningotheial-like nodules. *Adv Clin Path* 2000; **4**: 35-39 [PMID: [10936897](#)]
- 25 **Cesario A**, Galetta D, Margaritora S, Granone P. Unsuspected primary pulmonary meningioma. *Eur J Cardiothorac Surg* 2002; **21**: 553-555 [PMID: [11888783](#) DOI: [10.1016/s1010-7940\(01\)01174-5](#)]
- 26 **Cura M**, Smoak W, Dala R. Pulmonary meningioma: false-positive positron emission tomography for malignant pulmonary nodules. *Clin Nucl Med* 2002; **27**: 701-704 [PMID: [12352110](#) DOI: [10.1097/00003072-200210000-00003](#)]
- 27 **Comin CE**, Caldarella A, Novelli L, Janni A. Primary pulmonary meningioma: report of a case and review of the literature. *Tumori* 2003; **89**: 102-105 [PMID: [12729374](#) DOI: [10.1177/030089160308900123](#)]
- 28 **Rowell C**, Sirbovan J, Rosenblum MK, Perez-Ordóñez B. Primary chordoid meningioma of lung. *Virchows Arch* 2005; **446**: 333-337 [PMID: [15714337](#) DOI: [10.1007/s00428-004-1192-0](#)]
- 29 **Kaneda Y**, Miyoshi T, Hiratsuka M, Yamamoto S, Kato F, Maki K, Hayashi H, Shiraishi T, Iwasaki A, Iwasaki H, Nabeshima K, Shirakusa T. [Primary pulmonary meningioma; report of a case]. *Kyobu Geka* 2005; **58**: 512-515 [PMID: [15957430](#)]
- 30 **van der Meij JJ**, Boomars KA, van den Bosch JM, van Boven WJ, de Bruin PC, Seldenrijk CA. Primary pulmonary malignant meningioma. *Ann Thorac Surg* 2005; **80**: 1523-1525 [PMID: [16181912](#) DOI: [10.1016/j.athoracsur.2004.04.015](#)]
- 31 **Meirelles GS**, Ravizzini G, Moreira AL, Akhurst T. Primary pulmonary meningioma manifesting as a solitary pulmonary nodule with a false-positive PET scan. *J Thorac Imaging* 2006; **21**: 225-227 [PMID: [16915069](#) DOI: [10.1097/01.rti.0000203639.66629.68](#)]
- 32 **Incarbone M**, Ceresoli GL, Di Tommaso L, Cappuzzo F, Inzillo F, Infante M, Alloisio M. Primary pulmonary meningioma: report of a case and review of the literature. *Lung Cancer* 2008; **62**: 401-407 [PMID: [18486986](#) DOI: [10.1016/j.lungcan.2008.03.031](#)]
- 33 **Izumi N**, Nishiyama N, Iwata T, Nagano K, Tsukioka T, Hanada S, Suehiro S. Primary pulmonary meningioma presenting with hemoptysis on exertion. *Ann Thorac Surg* 2009; **88**: 647-648 [PMID: [19632430](#) DOI: [10.1016/j.athoracsur.2008.12.058](#)]
- 34 **Kim YY**, Hong YK, Kie JH, Ryu SJ. Primary pulmonary meningioma: an unusual cause of a nodule with strong and homogeneous enhancement. *Clin Imaging* 2016; **40**: 170-173 [PMID: [26452726](#) DOI: [10.1016/j.clinimag.2015.08.004](#)]
- 35 **Jiang GY**, Zhang Y, Yu JH, Lin XY, Fan CF, Sun CL, Xu HT, Wang EH. Primary pulmonary meningioma: a case report and a review of the literature. *J Clin Exp Pathol* 2016; **9**: 4467-4472
- 36 **Oide T**, Hiroshima K, Shibuya K, Nakatani Y. Primary Pulmonary Meningioma Presenting as a Coin Lesion. *Intern Med* 2017; **56**: 2073-2074 [PMID: [28768984](#) DOI: [10.2169/internalmedicine.56.8481](#)]
- 37 **Huang S**, Chen L, Mao Y, Tong H. Primary pulmonary meningioma: A case report. *Medicine (Baltimore)* 2017; **96**: e6474 [PMID: [28489736](#) DOI: [10.1097/MD.00000000000006474](#)]
- 38 **Žulpaitė R**, Jagelavičius Ž, Mickys U, Janilionis R. Primary Pulmonary Meningioma With Rhabdoid Features. *Int J Surg Pathol* 2019; **27**: 457-463 [PMID: [30563401](#) DOI: [10.1177/1066896918819257](#)]
- 39 **Hong S**, Jiang J, Zhou F, Liu J. Computed tomography findings of primary pulmonary meningioma: A case report. *Medicine (Baltimore)* 2018; **97**: e9651 [PMID: [29480880](#) DOI: [10.1097/MD.00000000000009651](#)]
- 40 **Luo JZ**, Zhan C, Ni X, Shi Y, Wang Q. Primary pulmonary meningioma mimicking lung metastatic tumor: a case report. *J Cardiothorac Surg* 2018; **13**: 99 [PMID: [30285886](#) DOI: [10.1186/s13019-018-0787-5](#)]
- 41 **Xu KK**, Tian F, Cui Y. Primary pulmonary meningioma presenting as a micro solid nodule: A rare case report. *Thorac Cancer* 2018; **9**: 874-876 [PMID: [29718593](#) DOI: [10.1111/1759-7714.12639](#)]
- 42 **Ohashi-Nakatani K**, Shibuki Y, Fujima M, Watanabe R, Yoshida A, Yoshida H, Matsumoto Y, Tsuchida T, Watanabe SI, Motoi N. Primary pulmonary meningioma: A rare case report of aspiration cytological features and immunohistochemical assessment. *Diagn Cytopathol* 2019; **47**: 330-333 [PMID: [30548187](#) DOI: [10.1002/dc.24126](#)]
- 43 **Bae SY**, Kim HS, Jang HJ, Chung WS, Kim H, Kim YH, Lee JH, Bang SS. Primary Pulmonary Chordoid Meningioma. *Korean J Thorac Cardiovasc Surg* 2018; **51**: 410-414 [PMID: [30588452](#) DOI: [10.5090/kjtc.2018.51.6.410](#)]
- 44 **Wang X**, Li P, Zhou P, Fu Y, Lai Y, Che G. Intrapulmonary metastasis from primary pulmonary meningioma presenting as multiple cystic lesions: a case report. *BMC Pulm Med* 2019; **19**: 8 [PMID: [30621651](#) DOI: [10.1186/s12890-018-0773-7](#)]
- 45 **Gürçay N**, Öztürk A, Demirağ F, İncekara F. Primary pulmonary meningioma mimicking pulmonary metastasis: A rare case report. *Türk Gogus Kalp Damar Cerrahisi Derg* 2020; **28**: 699-701 [PMID: [33403148](#) DOI: [10.5606/tgkdc.dergisi.2020.19370](#)]
- 46 **Bas A**, Valiyev E, Ozkan ND, Tombul I, Yonat S, Sayan M, Kurul IC. A Rare Entity: Primary Pulmonary Meningioma. *Türk Patoloji Derg* 2021 [PMID: [34514565](#) DOI: [10.5146/tjpath.2021.01535](#)]
- 47 **Oh JH**, Cho HS, Hwang HS, Ji W. Primary pulmonary meningioma presenting as multiple lung nodules: A case report. *Thorac Cancer* 2022; **13**: 141-143 [PMID: [34878222](#) DOI: [10.1111/1759-7714.14270](#)]
- 48 **Gaffey MJ**, Mills SE, Askin FB. Minute pulmonary meningotheial-like nodules. A clinicopathologic study of so-called minute pulmonary chemodectoma. *Am J Surg Pathol* 1988; **12**: 167-175 [PMID: [2830799](#) DOI: [10.1097/00000478-198803000-00001](#)]
- 49 **Ionescu DN**, Sasatomi E, Aldeeb D, Omalu BI, Finkelstein SD, Swalsky PA, Yousem SA. Pulmonary meningotheial-like nodules: a genotypic comparison with meningiomas. *Am J Surg Pathol* 2004; **28**: 207-214 [PMID: [15043310](#) DOI: [10.1097/00000478-200402000-00008](#)]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

**Telephone:** +1-925-3991568

**E-mail:** [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)

**Help Desk:** <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

