World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

BENIGN METASTASIZING PULMONARY LEIOMYOMA: AN UNCOMMON CAUSE OF MULTIPLE PULMONARY NODULES A CASE REPORT

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World Journal of Advanced Research and Reviews, 2026, 32(02), 1574–1578

Publication history: Received on 02 October 2026; revised on 08 November 2026; accepted on 10 November 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.32.2.2867

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ABSTRACT

Introduction: Benign metastasizing pulmonary leiomyoma (BMPL) is a rare condition typically occurring in women with a history of uterine leiomyomas. Its radiological presentation is often nonspecific, leading to diagnostic challenges.

Case Presentation: We report the case of a 52-year-old hypertensive woman with a prior history of uterine fibroid surgery in 2018, who presented with a five-month history of productive cough. Chest imaging revealed multiple bilateral pulmonary nodules and micronodules with regular margins. Extensive infectious, immunological, and neoplastic work-up was negative. Transthoracic lung biopsy with immunohistochemical analysis demonstrated a benign metastasizing leiomyoma (SMA positive, ER positive, PR positive, low Ki-67 index).

Discussion: BMPL should be considered in women presenting with multiple pulmonary nodules and a history of uterine leiomyoma. Immunohistochemistry plays a key role in confirming the diagnosis and excluding major differential diagnoses.

Conclusion: BMPL is a rare but important diagnostic consideration with generally favorable prognosis. Recognition of this entity helps avoid unnecessary aggressive treatments. Long-term surveillance is recommended.

Keywords: Benign Metastasizing Leiomyoma, Pulmonary Nodules, Immunohistochemistry, Uterine Fibroid

1 INTRODUCTION

Benign metastasizing pulmonary leiomyoma (BMPL) is an uncommon condition characterized by the presence of histologically benign smooth muscle tumors in the lungs of women with a prior history of uterine leiomyomas. Despite its benign histologic appearance, the tumor demonstrates the ability to disseminate to distant sites, most commonly the lungs, creating a diagnostic paradox.

The clinical presentation is often asymptomatic or nonspecific, and lesions are frequently discovered incidentally on chest imaging. Because imaging findings are not pathognomonic, the differential diagnosis is broad and includes granulomatous diseases, metastatic malignancy, and sarcoidosis.

We report a case of BMPL diagnosed in our institution and discuss its clinical, radiological, and pathological features in light of the current literature.

2 CASE PRESENTATION

A 52-year-old woman, housewife, with no history of smoking or occupational exposure, and no prior tuberculosis, was followed for arterial hypertension for 8 years treated with irbesartan/hydrochlorothiazide and amlodipine.

Her medical history was notable for uterine fibroid surgery performed in 2018. Histopathological examination at that time confirmed two benign uterine leiomyomas.

She presented with a five-month history of productive cough with whitish sputum. There was no initial hemoptysis, dyspnea, fever, weight loss, or other systemic symptoms. She reported symptoms suggestive of gastroesophageal reflux. Her general condition remained preserved.

On admission the patient was hemodynamically stable, oxygen saturation: 98% on room air, heart rate was at 80 bpm, respiratory examination was unremarkable, she had no peripheral lymphadenopathy, the remainder of the physical examination was normal

Chest X-ray showed bilateral parenchymal nodules and micronodules.

Chest CT scan revealed multiple bilateral intra-parenchymal and subpleural nodules of variable size with smooth margins, **t**he largest lesion measured 20 × 19 mm, with one cavitated nodule**,** scattered bilateral pulmonary micronodules**,** small mediastinal and axillary lymph nodes without pathological enlargement and no pleural or pericardial effusion.

Follow-up high-resolution CT performed 3 months later showed near stability of the thoracic lesions and the abdominopelvic CT was unremarkable.

The diagnosis initially pursued were pulmonary metastases from malignant tumors, granulomatosis with polyangiitis, sarcoidosis, infectious nodular diseases (tuberculosis, fungal infection) and pulmonary lymphangioleiomyomatosis (LAM).

For the etiological Work-up, a bronchoscopy was performed which showed diffuse grade II inflammatory mucosa**, n**o endobronchial tumor or granuloma

For the Procedures performed, Bronchial biopsies and the cytology showed no signs of malignancy in the histopathological examination, bronchoalveolar lavage

For the microbiology the mycobacterial testing performed on bronchial aspirates were negative, the Fungal studies including Aspergillus where also negative

Additional Investigations were conducted including Tumor markers (CA 19-9, CA 15-3, CA 125, AFP, CEA) were normal**,** Hydatid and aspergillus serologies were negative, the Viral serologies where negative**.,** the angiotensin-converting enzyme level: normal (63)

The Thyroid function and the cervical ultrasounds were normal. A mammography was also performed, showed nodules classified as BI-RADS 2, pelvic ultrasound and gynecological examination were also normal.

Pulmonary function tests were within normal limits, the FEV1/FVC: 89%, FVC: 91% predicted, the total lung capacity was at 98%

The Six-minute walk distance was at 81% predicted 475 m without desaturation, CT-guided transthoracic lung biopsy was performed and complicated by moderate hemoptysis, which resolved with hemostatic therapy.

The Immunohistochemical analysis showed:

- SMA (AML): positive
- Estrogen receptors (ER): diffusely positive
- Progesterone receptors (PR): diffusely positive
- Ki-67 proliferation index: low (≈2%)

- CD34, cytokeratin, chromogranin, synaptophysin, S100, HMB45: negative

The pathological concluded to a morphological and immunohistochemical features consistent with benign metastasizing leiomyoma.

The patient was discharged with a cough relief treatment with the decision of a conservative surveillance strategy.

3 DISCUSSION

Benign metastasizing pulmonary leiomyoma (BMPL) is a rare entity characterized by the presence of histologically benign smooth muscle tumors occurring at distant sites, most commonly the lungs, in women with a history of uterine leiomyomas. Since its first description by Steiner in 1939, fewer than several hundred cases have been reported in the literature, highlighting its rarity.

BMPL typically affects women of reproductive or perimenopausal age, often several years after hysterectomy or myomectomy. The interval between uterine surgery and pulmonary detection varies widely, ranging from months to decades. In many cases, patients are asymptomatic, and lesions are discovered incidentally.

When symptoms are present, they are usually nonspecific and include cough, dyspnea, or chest discomfort. Our patient presented with a long history of chronic cough that was initially dry and refractory to symptomatic treatment, which ultimately prompted thoracic imaging. This presentation underscores the insidious nature of BMPL and the potential for delayed diagnosis.

The pathophysiology of BMPL remains controversial. Three principal hypotheses have been proposed, Hematogenous dissemination of benign uterine smooth muscle cells (most widely accepted), Low-grade leiomyosarcoma misdiagnosed as benign leiomyoma or a Multicentric smooth muscle proliferation under hormonal stimulation

The strong and diffuse expression of estrogen and progesterone receptors observed in our patient supports the concept of hormone-sensitive tumor growth. Molecular studies in recent literature demonstrating identical clonality between uterine and pulmonary lesions.

Radiologically, BMPL most commonly manifests as multiple well-defined pulmonary nodules, bilateral distribution, slow growth pattern and the absence of significant lymphadenopathy.

Less common patterns such as solitary nodules, miliary spread, or cystic lesions have also been described.

In our case, the CT scan showed multiple bilateral intra-parenchymal and subpleural nodules with smooth margins. Notably, follow-up imaging at two months demonstrated lesion stability, a feature consistent with the typically indolent course reported in the literature.

The diagnosis of BMPL is challenging because imaging findings are nonspecific. The main differential diagnoses include pulmonary metastases from malignant tumors, granulomatosis with polyangiitis, sarcoidosis, infectious nodular diseases (tuberculosis, fungal infection) and pulmonary lymphangioleiomyomatosis (LAM)

In our patient, the absence of systemic inflammatory features, negative infectious work-up, normal ACE level, and lack of extrapulmonary involvement made granulomatous and infectious etiologies unlikely.

Importantly, the immunohistochemical profile (SMA positive, ER/PR positive, low Ki-67, cytokeratin negative, HMB45 negative) was decisive in excluding carcinoma, melanoma, neuroendocrine tumors, and LAM.

Histologically, BMPL consists of well-differentiated smooth muscle cells without atypia, necrosis, or significant mitotic activity. Immunohistochemistry typically demonstrates positive smooth muscle markers (SMA, desmin), strong ER and PR expression and ow proliferative index (Ki-67 usually <5%)

The profile observed in our patient (Ki-67 ≈ 2%) is highly consistent with previously reported cases and supports the benign biological behavior.

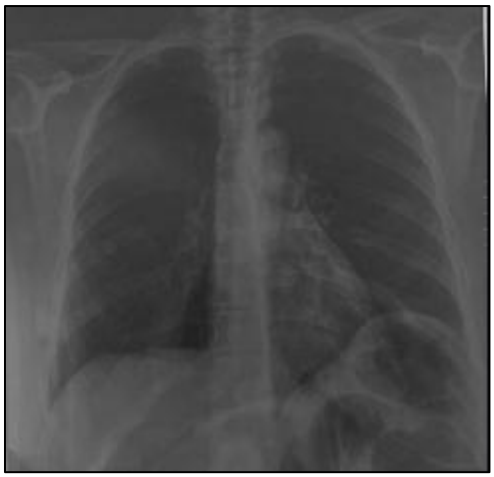


Figure 1: Chest X-ray (frontal view) showing diffuse bilateral nodules and micronodules

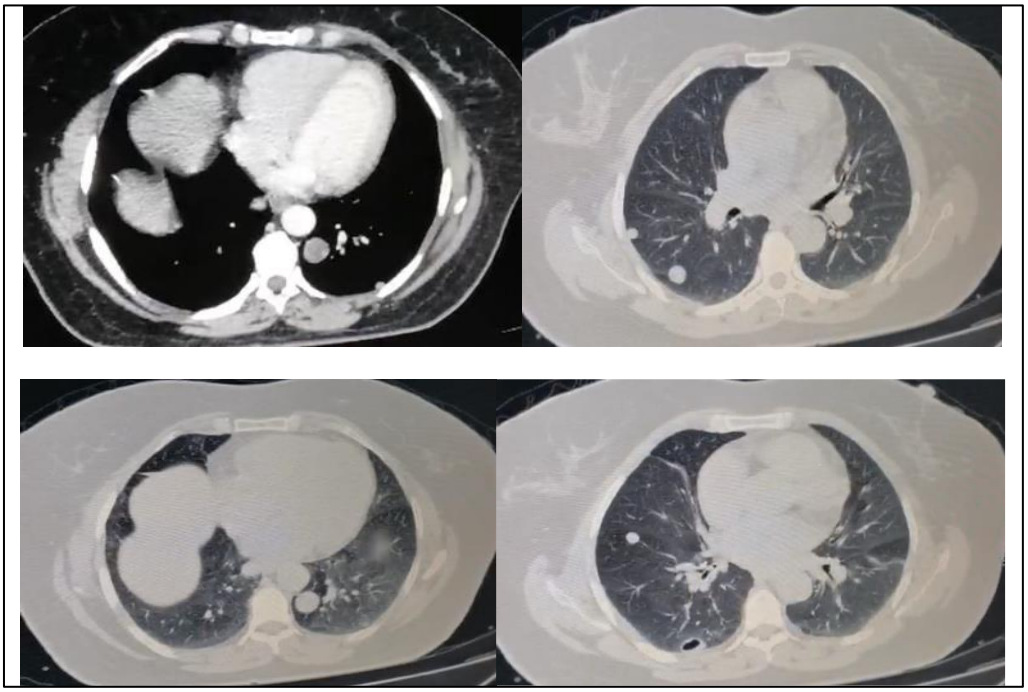


Figure 2: Thoracic CT scan: Axial view (parenchymal and mediastinal windows) showing dense bilateral well-defined intraparenchymal and subpleural nodules with sharp contours, some nodules are cavitated, and show heterogeneous enhancement after contrast medium injection

There is no standardized treatment strategy for BMPL. Management depends on symptoms, tumor burden, and hormonal status; Reported approaches include active surveillance, particularly in asymptomatic patients with stable disease, hormonal therapy (oophorectomy, GnRH analogs, aromatase inhibitors) and surgical resection in selected localized cases.

Most patients exhibit slow progression or long-term stability. Rare cases of progression have been described, particularly in hormonally active states.

In our patient, given the absence of respiratory impairment and the radiological stability at two months, a conservative surveillance strategy was considered appropriate.

Recent reviews emphasize the strong hormonal dependence of BMPL, the generally indolent clinical course, the importance of avoiding overtreatment and the need for prolonged follow-up.

Our case aligns well with these observations and highlights the importance of considering BMPL in the etiological work-up of multiple pulmonary nodules in women with a history of uterine fibroids.

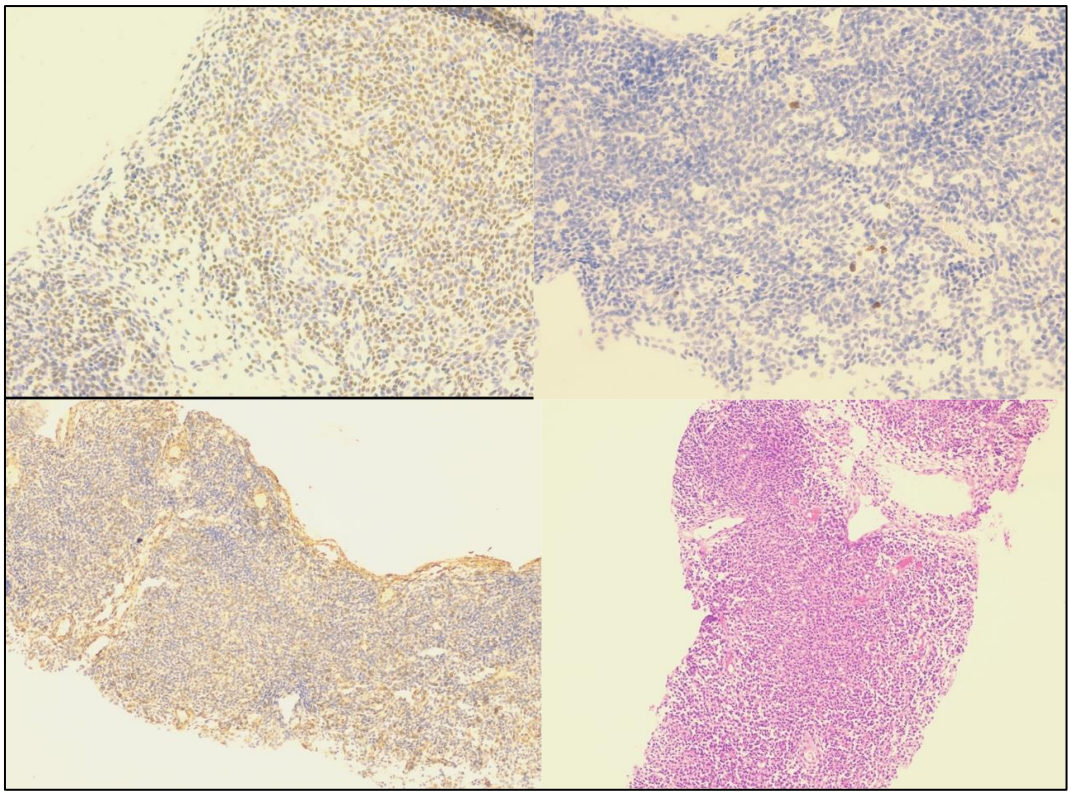


Figure 3: Anatomopathological and immunohistochemical images showing round cells. Immunohistochemical analysis showing SMA positive, Estrogen receptors diffusely positive, Progesterone receptors: diffusely positive compatible with a Benign Metastasizing Pulmonary Leiomyoma

4 CONCLUSION

Benign metastasizing pulmonary leiomyoma is an uncommon but important diagnostic entity that should be considered in women presenting with multiple pulmonary nodules and a history of uterine leiomyomas. The diagnosis relies heavily on histopathology and immunohistochemistry. Although the clinical course is usually indolent, long-term radiological surveillance remains essential. Early recognition is crucial to prevent misdiagnosis and unnecessary aggressive treatments.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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