Received: 6 September 2022 | Accepted: 10 January 2023

DOI: 10.1002/rcr2.1088

CASE REPORT

Respirology Case Reports OPEN ACCESS APSR WILEY

The panorama of pulmonary leiomyoma: A tale of two tumours

Ajit Nair[1,2] | **Paul Leong**[1,2]

[1]Monash Lung Sleep Allergy and Immunology, Monash Health, Melbourne, Victoria, Australia

[2]School of Clinical Sciences, Monash University, Melbourne, Victoria, Australia

Correspondence
Paul Leong, Monash Lung Sleep Allergy and Immunology, Monash Health, 246 Clayton Rd, Clayton, Melbourne VIC 3168, Australia.
Email: paul.leong@monash.edu

Associate Editor: Cameron Sullivan

Abstract

Pulmonary leiomyoma has a diverse clinical spectrum of disease. Here we describe two patients with vastly different presentations. The first case is a 23-year-old female with a chronic cough and no visible tracheal lesion on computer tomography (CT) chest imaging. Flexible bronchoscopy revealed a small tracheal nodule, with histopathology confirming pulmonary leiomyoma. The second case is a 57-year-old female with a painless abdominal mass. CT imaging revealed widespread lung 'cannonball' nodules. Percutaneous biopsy confirmed metastatic leiomyoma. After progression on surveillance and endocrine therapy, she was commenced on doxorubicin with interval radiological improvement. These cases highlight the clinical heterogeneity in this disease, and thus, complexity in devising standardized diagnostic and therapeutic protocols.

KEYWORDS

benign metastasizing leiomyoma, bronchoscopy, leiomyosarcoma, lung nodule, primary pulmonary leiomyoma

INTRODUCTION

Leiomyomas are smooth muscle tumours of mesodermal origin which are classically associated with the uterus. Pulmonary leiomyomas are rare, and there is wide heterogeneity in disease presentations.[1]

We report two cases of pulmonary leiomyoma with vastly differing manifestations: the first, with primary pulmonary leiomyoma (PPL) and the second, with benign metastasizing leiomyoma (BML).

CASE REPORT

Case 1: Complete endobronchial resection of tiny tracheal tumour

A 23-year-old woman presented with an eight-month history of persistent chronic cough. She was born in the Philippines, migrated to the United Kingdom at age 6, and subsequently moved to Australia at age 12. She was a non-smoker with no known past medical history, and her only regular medication was the oral contraceptive pill. She had no previous history or exposure to tuberculosis (TB) though her sister had completed a course of treatment for latent TB when they first arrived in Australia.

Her interferon gamma release assay was negative and sputum samples were both smear and culture negative for mycobacterial infection. She completed a short course of oral amoxicillin, then subsequently a course of varying doses of oral prednisolone over 6 months with minimal change in her cough. She was mildly clubbed, with scattered apical crackles on auscultation of her lungs, and no other significant examination findings of note.

Her initial chest radiograph showed bilateral upper lobe consolidative changes, more marked on the right side and computer tomography (CT) of her chest confirmed patchy nodular consolidation of the posterior segment of her right upper lobe and anterior segment of her left upper lobe. There was no radiological evidence of tracheal pathology.

She underwent flexible fibreoptic bronchoscopy, revealing a nodule on the posterior aspect of the distal trachea. A forceps biopsy of the nodule was taken (Radial Jaw 3, Boston Scientific), with the majority of the nodule removed.

The right upper lobe lavage sample was smear negative but polymerase chain reaction and culture positive for fully sensitive mycobacterium tuberculosis, and she subsequently completed a full course of treatment with 2 months of rifampicin, isoniazid, ethambutol, and pyrazinamide, followed by 4 months of rifampicin and isoniazid.

Histopathology showed an $8 \times 6 \times 2$ mm nodule with smooth muscle fibres in stroma and focally nodular contour,

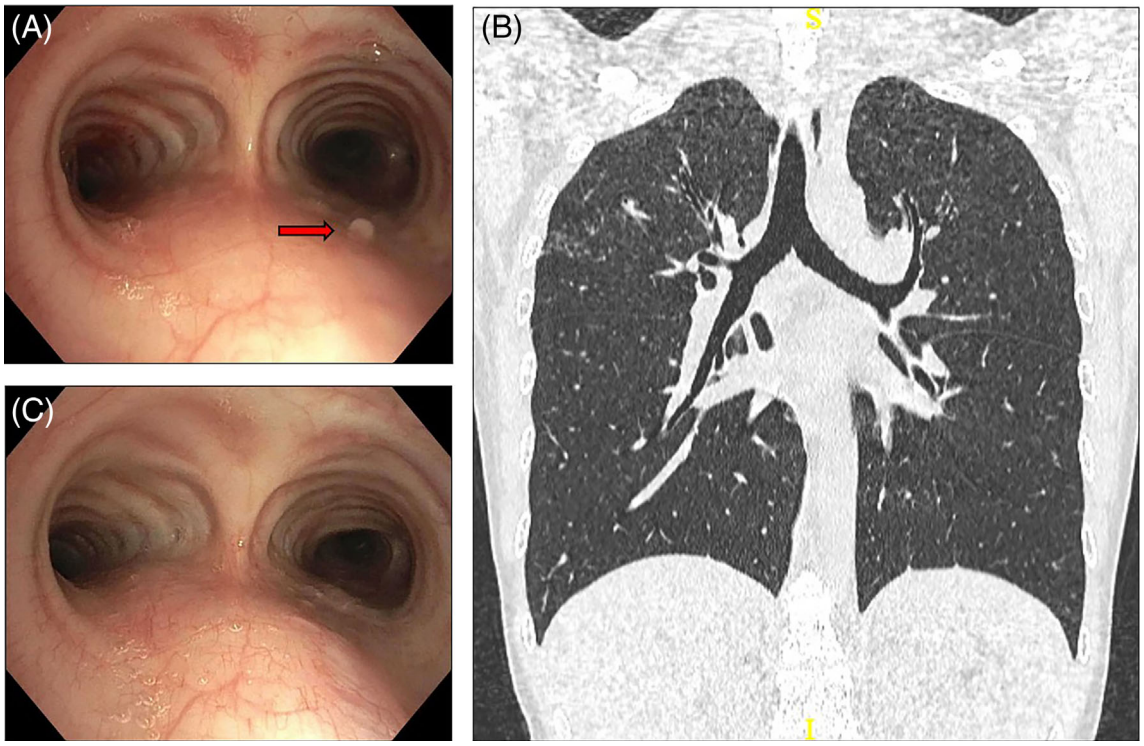

FIGURE 1 (Case 1) (A) Initial bronchoscopy, (B) Coronal CT image, and (C) 6 month follow up bronchoscopy

consistent with PPL. She underwent repeat surveillance bronchoscopy 6 months after nodule removal. There was no macroscopic evidence of recurrence and general bronchial washings from both her right and left main bronchi were PCR, smear, and culture negative for TB. The patient currently undergoes regular bronchoscopic surveillance through our service and remains well (Figure 1).

Case 2: Cannonball metastases

A 57-year-old woman was referred to our health service after presenting to her GP with a painless right abdominal mass that had been gradually increasing in size over a three-month period, on a background of a previous subtotal hysterectomy and bilateral salpingo-oophorectomy in 2013 for suspected uterine fibroids. Part of the cervix was not removed due to adhesions from endometriosis. Histopathology showed leiomyoma with focal myxoid change, excluding leiomyosarcoma, and no further routine surveillance was organized. She was born in Vietnam and migrated to Australia thirty years ago. She was a lifelong non-smoker with no other known co-morbidities and took no regular medication.

On examination, there was a hard palpable non-tender mass in the right lower quadrant of the abdomen and her lungs were clear to auscultation bilaterally. Pelvic ultrasound revealed a large 13.4 cm adnexal mass and a staging CT scan revealed multiple widespread lung nodules up to 4 cm in size (Figure 2A, B).

She underwent CT-guided percutaneous biopsy of both the pelvic mass and a right lower lobe lung nodule. Histopathology from the pelvic mass showed a smooth muscle tumour consistent with leiomyoma. The pulmonary nodule demonstrated a low-grade smooth muscle tumour with no mitoses, consistent with pulmonary BML. Both specimens were oestrogen-receptor (ER) and progesterone-receptor (PR) positive. She subsequently underwent a laparotomy to remove the pelvic mass, as well as a cervicectomy. Histopathology of the pelvic mass showed leiomyoma admixed with leiomyosarcoma. The recommendation from the gynaecological malignancy multidisciplinary team was for radiological surveillance.

The surveillance CT scan 6 months later demonstrated interval progression however the patient remained asymptomatic. Medroxyprogesterone 200 mg twice daily was commenced as an endocrine therapy. Re-staging CT 3 months post commencement showed further progression. Medroxyprogesterone was ceased, and single agent doxorubicin was commenced. Follow-up CT after three cycles of doxorubicin demonstrated interval improvement and she is planned for three further cycles (Figure 2C, D).

DISCUSSION

First described by Forkel[2] in 1910, pulmonary leiomyomas are benign tumours of mesodermal origin that arise from smooth muscle[3] and have a diverse spectrum of clinical presentations despite being relatively uncommon.

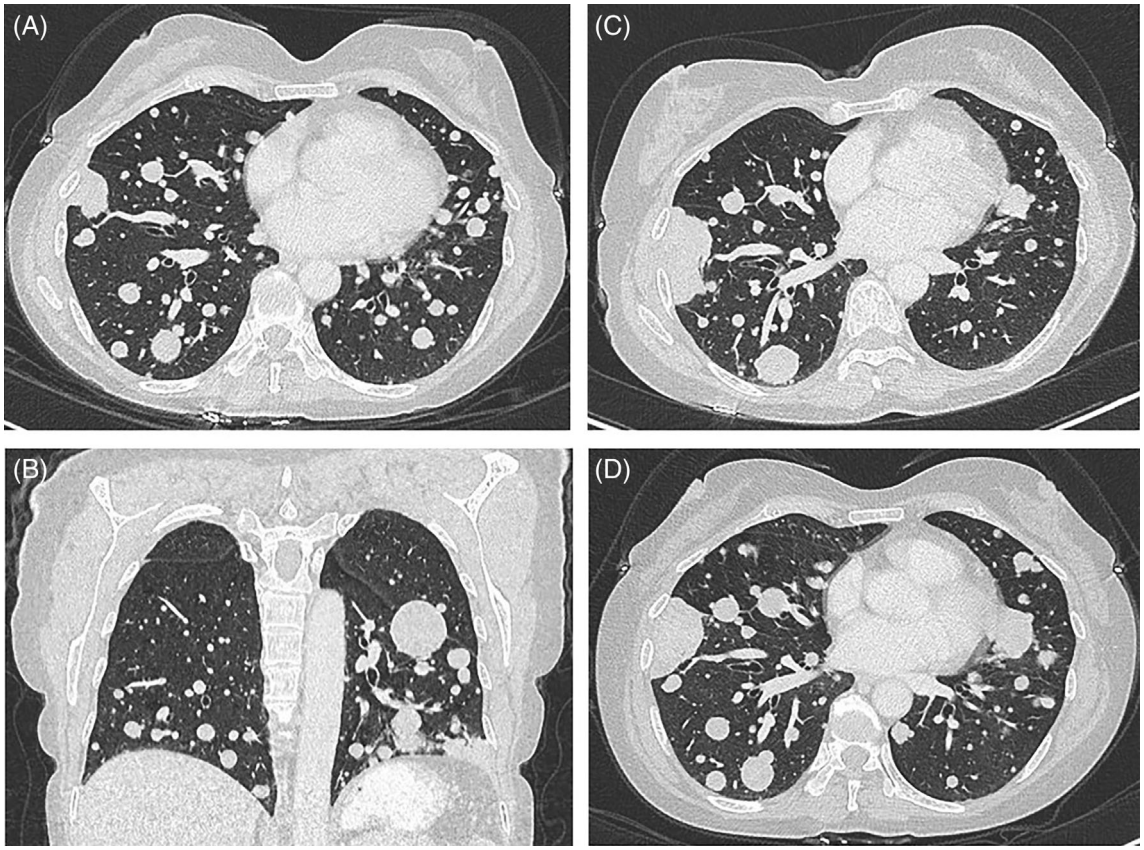

FIGURE 2 (Case 2) (A) Axial and (b) coronal CT images at diagnosis, (C) axial CT image after laparotomy, before doxorubicin, (D) Axial CT image at the same level as (C) following three cycles of doxorubicin demonstrating overall improvement

PPLs of the tracheobronchial tree either originate from smooth muscle fibres of the bronchial wall or vessels.[4] As seen in our first patient, in two thirds of cases, PPL arises in the proximal airways[5] as an endobronchial lesion. These can cause features of airway obstruction including, cough, wheeze, and post-obstructive pneumonia. Less commonly PPL can occur in the peripheral airways and extend distally, manifesting as a parenchymal lesion.[5] Exceedingly rarely, pulmonary leiomyoma can present with pain arising from chest wall and pleural involvement.[6]

Though there are no published guidelines, the most common recommendation for PPL is that resection is indicated, providing histological confirmation, maintaining airway patency, and ameliorating symptoms. Bronchoscopic interventions are preferred but surgical resection can be considered depending on technical factors including wide based lesions, and location including distal or parenchymal tumours.[7] The prognosis following complete resection is generally favourable.

PPL should be differentiated from BML, a rare condition first reported by Paul Steiner in 1939.[8] BML refers to the coexistence of histologically benign uterine tumour and distant metastases of the same composition,[9] with lungs being the most common site of metastasis.[10]

The exact mechanism of BML pathogenesis remains unclear and hypotheses include metastatic spread leiomyoma with low-grade sarcomatous change,[11] and multifocal proliferation of extrauterine smooth muscle tissue due to hormonal stimulation.[12] Most BMLs are ER and PR positive.[13] BMLs are histologically highly differentiated.[11] Malignant transformation of uterine leiomyoma to leiomyosarcoma is uncommon.[14] Malignant transformation of pulmonary BML is even rarer, with only two cases reported in the literature to our knowledge.[14]

There is a little data to guide BML management. European Society for Medical Oncology clinical guidelines suggest observation, followed by consideration of hormonal therapy for progressive disease.[15] Progression suggests metastatic pulmonary leiomyosarcoma or malignant transformation of pulmonary BML, for which anthracycline-based chemotherapy is recommended.[15] Total hysterectomy may be indicated in BML for diagnostic clarity and therapeutic benefit should there be any suspicion of uterine leiomyosarcoma, though majority of patients with BML would have already had this prior.[10] Surgical resection may be offered for solitary pulmonary lesions.

In conclusion, our cases highlight the diverse clinical spectrum of pulmonary leiomyoma. Acquisition of histopathology is the diagnostic gold standard. Coupled with the rarity of pulmonary leiomyoma, standardized treatment protocols are a complex proposition, and any diagnostic or therapeutic approach must be individualized.

AUTHOR CONTRIBUTIONS

Ajit Nair performed the literature review, wrote the first draft, revised the manuscript, and approved the final version of the work for publication. Paul Leong conceptualized the study, performed clinical care and procedures, revised the draft and approved the final version of the work.

ACKNOWLEDGMENT

The authors would like to thank the patients and staff at our institution; and would like to acknowledge Dr John Politis' early clinical involvement in these cases.

FUNDING INFORMATION

No funding to declare.

CONFLICT OF INTEREST

The authors have no Conflicts of Interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study

ETHICS STATEMENT

The authors declare that appropriate written informed consent was obtained for the publication of this manuscript and accompanying images.

ORCID

Ajit Nair https://orcid.org/0000-0002-8127-0218
Paul Leong https://orcid.org/0000-0002-7409-9328

REFERENCES

1. Arleo EK, Schwartz PE, Hui P, McCarthy S. Review of leiomyoma variants. Am J Roentgenol [Internet]. 2015;205(4):912–21. https://doi.org/10.2214/AJR.14.13946
2. Forkel W. Ein Fall von Fibromyom der Lunge. Z Krebsforsch [Internet]. 1909;8(2):390–3. https://doi.org/10.1007/BF02015238
3. Allan JS. Rare solitary benign tumors of the lung. Semin Thorac Cardiovasc Surg. 2003;15(3):315–22.
4. Savu C, Melinte A, Gibu A, Varban S, Duaconu C, Socea B, et al. Primary leiomyoma of the visceral pleura: an unexpected occurrence. In Vivo [Internet]. 2021;35(4):2457–63. https://pubmed.ncbi.nlm.nih.gov/34182531
5. Abu-Hishmeh M, Kobbari G, Shakil F, Epelbaum O. Primary pulmonary leiomyoma: a first for peripheral diagnostic bronchoscopy? J Bronchology Interv Pulmonol [Internet]. 2020;27(4):e54–e56. Available from: https://journals.lww.com/bronchology/Fulltext/2020/10000/Primary_Pulmonary_Leiomyoma__A_First_for.16.aspx
6. Yazicioglu A, Subasi M, Turkkan S, Yekeler E. Chest wall leiomyomas: a case report and review of the literature, 2016.
7. Park JS, Lee M, Kim HK, Choi YS, Kim K, Kim J, et al. Primary leiomyoma of the trachea, bronchus, and pulmonary parenchyma: a single-institutional experience. Eur J Cardiothorac Surg [Internet]. 2012 Jan;41(1):41–5. Available from:. https://pubmed.ncbi.nlm.nih.gov/21767960
8. Steiner PE. Metastasizing fibroleiomyoma of the uterus: report of a case and review of the literature. Am J Pathol [Internet]. 1939;15(1):89–110.7. Available from:. https://pubmed.ncbi.nlm.nih.gov/19970436
9. Abramson S, Gilkeson RC, Goldstein JD, Woodard PK, Eisenberg R, Abramson N. Benign metastasizing leiomyoma. Am J Roentgenol [Internet]. 2001;176(6):1409–13. https://doi.org/10.2214/ajr.176.6.1761409
10. Barnaś E, Książek M, Raś R, Skręt A, Skręt- Magierło J, Dmoch- GE. Benign metastasizing leiomyoma: a review of current literature in respect to the time and type of previous gynecological surgery. PLoS One [Internet]. 2017;12(4):e0175875. https://doi.org/10.1371/journal.pone.0175875
11. Awonuga AO, Shavell VI, Imudia AN, Rotas M, Diamond MP, Puscheck EE. Pathogenesis of benign metastasizing leiomyoma: a review. Obstet Gynecol Surv [Internet]. 2010;65(3):189–95. Available from:. https://journals.lww.com/obgynsurvey/Fulltext/2010/03000/Pathogenesis_of_Benign_Metastasizing_Leiomyoma__A.22.aspx
12. Cho KR, Woodruff JD, Epstein JI. Leiomyoma of the uterus with multiple extrauterine smooth muscle tumors: a case report suggesting multifocal origin. Hum Pathol. 1989;20(1):80–3.
13. Rivera JA, Christopoulos S, Small D, Trifiro M. Hormonal manipulation of benign metastasizing leiomyomas: report of two cases and review of the literature. J Clin Endocrinol Metab. 2004;89(7):3183–8.
14. Song KS, Keum DY, Hwang IS. Malignant transformation of pulmonary benign metastasizing leiomyoma. Korean J Thorac Cardiovasc Surg. 2017;50:59–63.
15. Casali PG, Abecassis N, Bauer S, Biagini R, Bielack S, Bonvalot S, et al. Soft tissue and visceral sarcomas: ESMO-EURACAN clinical practice guidelines for diagnosis, treatment and follow-up. Ann Oncol [internet]. 2018;29:iv51–67. https://doi.org/10.1093/annonc/mdy096

How to cite this article: Nair A, Leong P. The panorama of pulmonary leiomyoma: A tale of two tumours. Respirology Case Reports. 2023;11:e01088. https://doi.org/10.1002/rcr2.1088