Radiology Case Reports 18 (2023) 4239–4242

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Unilateral metastatic pulmonary calcification in context of ipsilateral central pulmonary embolism ☆

Alexandre Semionov[a,*], *Ilan Azuelos*[b], *Arielle Mendel*[c]

[a] *Department of Diagnostic Radiology, Montreal General Hospital, McGill University Health Centre, 1650 Cedar Ave, Montreal, QC H3G 1A4, Canada*

[b] *Department of Medicine, Division of Respiratory Medicine, McGill University Health Centre, Montreal, QC, H4A 3J1, Canada*

[c] *Department of Medicine, Division of Rheumatology, McGill University Health Centre, Montreal, QC, H4A 3J1, Canada*

ARTICLE INFO

Article history:
Received 15 July 2023
Revised 19 August 2023
Accepted 23 August 2023

Keywords:
Unilateral metastatic pulmonary calcification
Pulmonary embolism

ABSTRACT

We report a case of unilateral left metastatic pulmonary calcification (MPC) in a 30-year-old woman with systemic lupus erythematosus, acute nephritis, and left main pulmonary artery pulmonary embolism. Unilateral MPC is rare and is mostly seen in the context of ipsilateral pulmonary embolism. The proposed mechanism is the promotion of calcium salts precipitation by focal alkalosis resulting from reduced blood flow to the lung affected by the pulmonary arterial obstruction.

Introduction

Metastatic pulmonary calcification (MPC) refers to pulmonary parenchymal deposition of calcium salts, usually in the setting of hypercalcemia [1,2]. It appears as lung parenchymal opacities and calcifications on computed tomography. Matching Tc-99m-methylene diphosphonate uptake on bone scintigraphy is considered confirmatory of the diagnosis [3]. Most commonly MPC is bilateral, diffuse, with upper lobes predominance [2]. Cases of unilateral MPC are very rare and are usually associated with pulmonary vascular obstruction [4]. Here we report a case of unilateral left lung MPC in a young woman with systemic lupus erythematosus nephritis and acute ipsilateral central pulmonary embolism.

Case report

A 30-year-old woman, recently diagnosed with systemic lupus erythematosus nephritis, confirmed with renal biopsy, was admitted to our institution due to worsening renal function and fluid overload, requiring diuresis and optimization

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

* Corresponding author.
E-mail address: alexandre.semionov@mail.mcgill.ca (A. Semionov).

https://doi.org/10.1016/j.radcr.2023.08.102

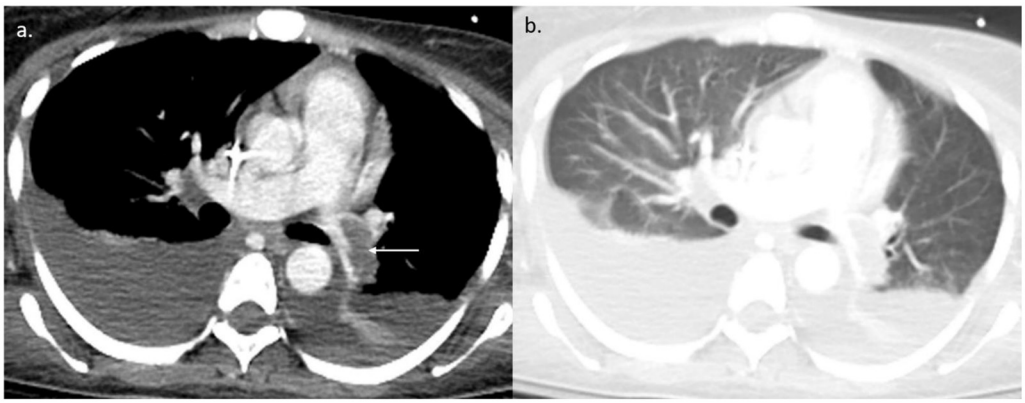

Fig. 1 – A 30-year-old woman with systemic lupus erythematosus, was admitted for acute renal failure and fluid overload. CT abdomen the level of lung bases in mediastinal (A) and lung (B) windows demonstrate a filling defect in the left main pulmonary artery, in keeping with a pulmonary embolism (arrow). There are bilateral pleural effusions and associated lower lobes atelectasis. Visualized lung parenchyma is otherwise unremarkable.

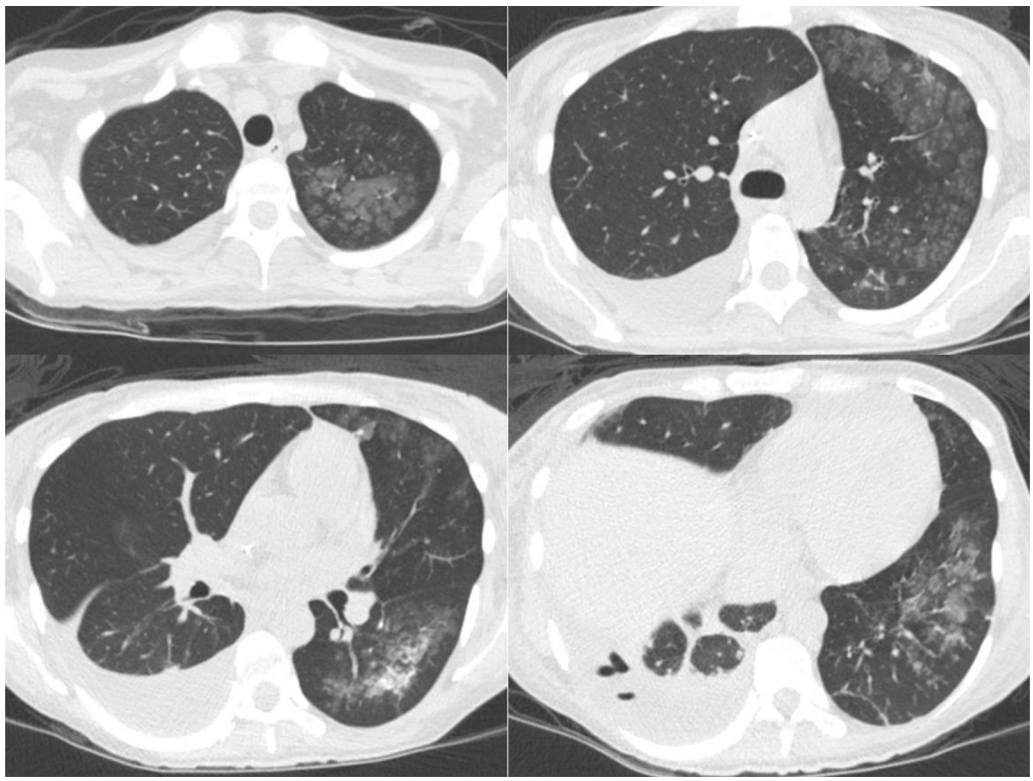

Fig. 2 – CT chest performed 4 weeks later demonstrates left upper and lower lobes predominantly ground-glass parenchymal opacities with denser nodular components in the left lower lobe. The right lung is free of similar abnormality.

of immunosuppressant therapy for nephritis. Her hospital stay was complicated by an abdominal wall and retroperitoneal hematoma, which got infected, requiring drainages and a course of antibiotic therapy.

Lower thoracic cuts on the abdominal CT chest performed during the second week of hospitalization showed incidental pulmonary embolism involving distal left main pulmonary artery (Fig. 1A). Other than atelectasis associated with bilateral pleural effusions, the visualized lung parenchyma was unremarkable (Fig. 1B).

Follow-up CT chest, performed 4 weeks later, showed unilateral left lung pulmonary parenchymal ground-glass opacities with predominantly “feathery” or “fluffy” appearance in the left upper lobe, and denser, nodular components in the left lower lobe (Fig. 2), yielding a putative diagnosis of MPC.

In order to confirm MPC diagnosis, a full-body bone scan was performed next. It showed Tc-99m-methylene diphosphonate (MDP) uptake in the locations of pulmonary parenchymal opacities seen on CT (Fig. 3), thus confirming the diagnosis.

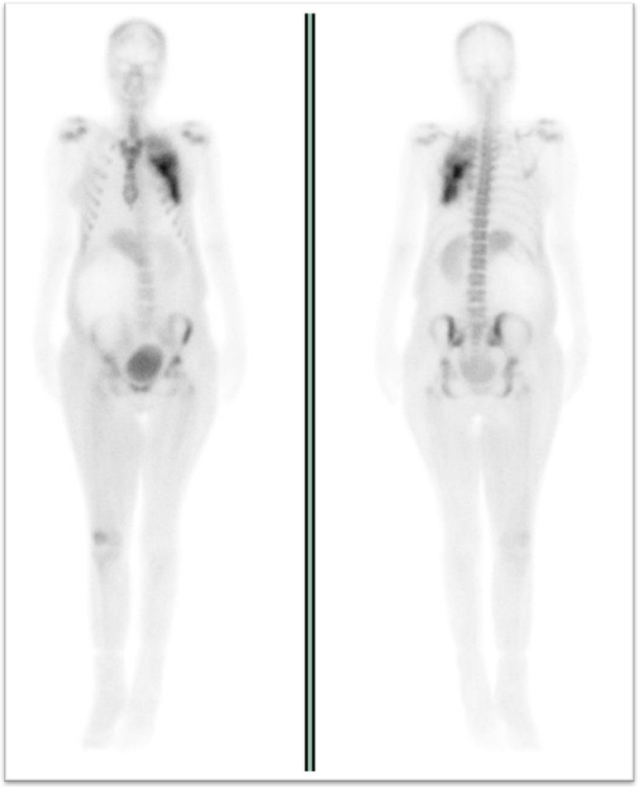

Fig. 3 – Bone scintigraphy demonstrates Tc-99m-methylene diphosphonate (MDP) uptake in the left lung, in the areas of pulmonary abnormalities seen on previous CT.

Follow-up CTPA performed 8 months later, demonstrated near-resolution of the left pulmonary embolism with residual left main pulmonary calcified nonocclusive web, and regression of the left lung opacities and interval partial calcification of the residual nodularity (Fig. 4). At the time of the most recent follow-up, the patient had no respiratory symptoms.

Discussion

MPC is a relatively uncommon manifestation of hypercalcemia, usually seen in the setting of renal failure or disseminated malignancy. It refers to the deposition of calcium salts in lung parenchyma. On CT imaging, MPC usually appears as ground-glass or solid nodular or airspace opacites, which may undergo calcification [1,2]. Increased MDP uptake in the pulmonary opacities on bone scintigraphy is considered confirmatory of MPC diagnosis [3].

Here we report a case of unilateral left MPC in a young woman with a recent diagnosis of systemic lupus erythematosus (SLE), acute nephritis, and left main pulmonary artery PE. Sequential chest CT demonstrated acute development of left lung ground-glass and mixed-density “fluffy” airspace opacities, which progressed over the span of 4 weeks and underwent partial macroscopic calcification. A bone scan performed around week 4, showed MDP uptake in the affected lung parenchyma, confirming initial diagnosis of MPC. Eight months follow-up CT chest showed near resolution of the PE, with residual intravascular non-obstructing bands, and regression of pulmonary patchy opacities with multiple macroscopic calcifications.

The factors that determine calcium deposition in normal lung parenchyma in the setting of hypercalcemia are complex, but tissue alkalosis is postulated to play an important role. This is probably the reason that lung apices are most frequently involved by MPC, presumably due to their relatively greater ventilation-to-perfusion ratio, lead-

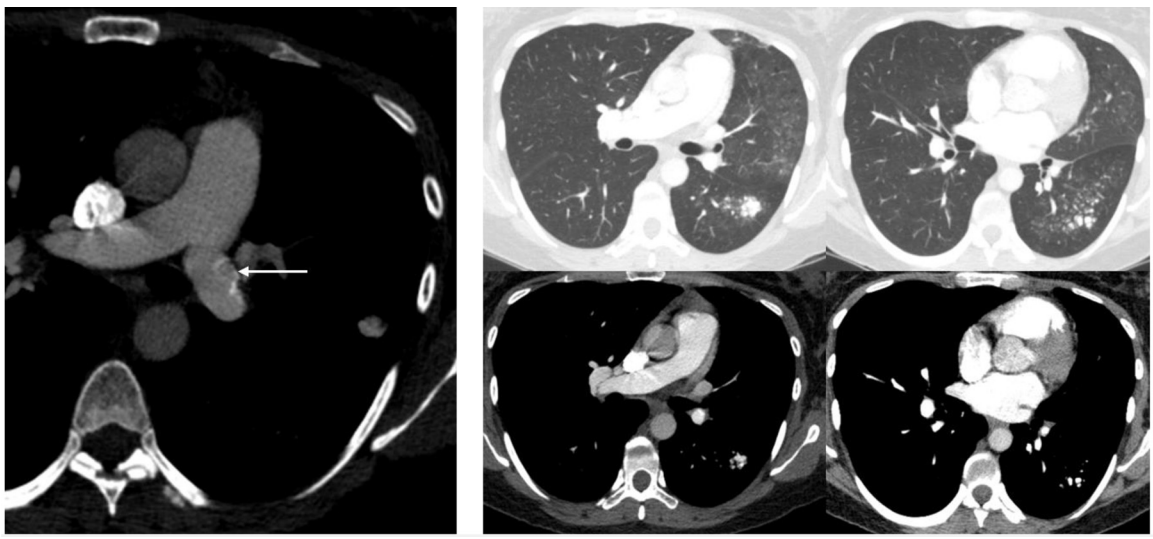

Fig. 4 – Follow-up CT pulmonary angiography performed 8 months following initial imaging, demonstrates near-resolution of the left pulmonary embolism with residual left main pulmonary calcified web, and regression of the left lung opacities and interval partial calcification of the residual nodularity.

ing to decreased CO2 pressure and resulting relative tissue alkalinity [1,2,4].

Unilateral MPC is rare and, as in our case, has been previously reported mostly in the context of ipsilateral pulmonary embolism [4]. The proposed mechanism of this phenomenon is the promotion of calcium salt precipitation by focal alkalosis of the lung parenchyma resulting from reduced blood flow to the portion of the lung affected by the pulmonary arterial obstruction [4].

In conclusion, unilateral MPC is rare and when seen, it should prompt a search for ipsilateral pulmonary embolism.

Patient consent

Informed consent for publication of their case was obtained from the patient.

REFERENCES

[1] Levin D, Hartman T. Metastatic pulmonary calcification. In: Hartman T, editor. Pearls and pitfalls in thoracic imaging: variants and other difficult diagnoses. Cambridge: Cambridge University Press; 2011. p. 56–7. doi:10.1017/CBO9780511977701.

[2] Belém LC, Zanetti G, Souza AS Jr, Hochhegger B, Guimarães MD, Nobre LF, et al. Metastatic pulmonary calcification: state-of-the-art review focused on imaging findings. Respir Med 2014;108(5):668–76 Epub 2014 Feb 6. PMID: 24529738. doi:10.1016/j.rmed.2014.01.012.

[3] Rosenthal DI, Chandler HL, Azizi F, Schneider PB. Uptake of bone imaging agents by diffuse pulmonary metastatic calcification. AJR Am J Roentgenol 1977;129(5):871–4 PMID: 410253. doi:10.2214/ajr.129.5.871.

[4] Bloodworth J, Tomashefski JF Jr. Localised pulmonary metastatic calcification associated with pulmonary artery obstruction. Thorax 1992;47(3):174–8 PMID: 1519194; PMCID: PMC1021006. doi:10.1136/thx.47.3.174.