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CASE REPORTS

Solitary extramedullary plasmacytoma of the lung with rapid transition to multiple myeloma: A rare case report and brief literature review

KEVAN ENGLISH[1*], DIANALYN DE LEON[2], SANDRA KALDAS[3]

[1,2] Department of Internal Medicine, St. George's University School of Medicine, Saint George, Grenada
[3] Department of Internal Medicine, Ross University School of Medicine, Bridgetown, Barbados

Abstract

Introduction: Solitary extramedullary plasmacytomas (SEPs) are disease entities characterized by the local proliferation of neoplastic plasma cells, representing less than 6% of plasma cell tumors. They typically produce monoclonal immunoglobulin and are usually found in the head, neck, and, less commonly, in the lungs. SEP, in rare instances, can transition to multiple myeloma (MM) with an estimated risk between 8 and 31%.

Case Presentation: We report the case of a 72-year-old woman who sought medical attention at the emergency department due to acute onset dyspnea and syncope. Laboratory results revealed elevated creatinine, hypercalcemia, and anemia, all of which were absent at a hospitalization three months prior for tuberculosis. A chest x-ray showed a right upper lobe opacity, and a computed tomography (CT) scan demonstrated an apical lung mass with calcifications. A CT-guided needle aspiration of the mass indicated SEP. Bone marrow biopsy subsequently confirmed MM. The patient was admitted to the intensive care unit and treated with chemotherapy; however, following a complicated hospital course, she died.

Discussion: SEPs are an exceedingly rare form of malignancy with the potential for conversion to MM. Although the likelihood of transformation to MM in months is rare, we call for attention to the possibility of such transition and the clinical prognosis of patients with SEP. Prompt and aggressive treatment is essential, and this, to our knowledge, is the first case of conversion to MM in less than four months following the initial diagnosis of SEP of the lung.

Keywords: Extramedullary plasmacytoma; Multiple myeloma; Plasmacytoma; Solitary bone plasmacytoma; Solitary plasmacytoma.

What is new? What is important?

Solitary extramedullary plasmacytoma of the lung (SEPL) can very rarely progress to multiple myeloma in months, and this, to our knowledge, is the first case of such transition.
In light of this possibility, physicians should maintain a high index of clinical suspicion in patients with pulmonary opacities, as SEPL is commonly misdiagnosed as lung cancer or tuberculosis.
Delay in diagnosis leads to poor prognosis and, ultimately, death in some cases.

INTRODUCTION

Solitary plasmacytoma is a rare type of malignancy caused by the monoclonal proliferation of neoplastic plasma cells in the bone or extramedullary tissues without the defining features of multiple myeloma (MM) [1]. Solitary extramedullary plasmacytoma (SEP) comprises less than 6% of all plasma cell tumors, and more than 80% of SEP occurs in the head and neck [1,2]. Although less likely, SEP also appears in the cervix, lungs, digestive tract, and extremities [1–3]. Primary pulmonary plasmacytoma, also called solitary extramedullary plasmacytoma of the lung (SEPL), is an extreme and peculiar variant of SEP [4]. The clinical prognosis of patients with SEP varies, with some having successful treatment while others progress to MM [5]. Approximately 30% of patients with SEP convert to MM within ten years, and the average median time of progression is 24 to 41 months [5,6]. Cases regarding the transformation of SEP to MM in less than two years are sporadic [6,7], although possible, as in our case. Therefore, clinicians should maintain a high level of cognizance regarding the ambiguity of the timeline to transition and the clinical

prognosis of patients diagnosed with SEP. As a result, we stress the importance of early detection and vigilance regarding the chance of rapid progression to MM. We present the case of a rare type of neoplasm that advanced swiftly to MM in less than four months.

CASE REPORT

A 72-year-old female presented to the emergency department (ED) with a 6-hour onset of difficulty breathing, syncope, and right shoulder pain. She also complained of generalized weakness accompanying her symptoms. Upon arrival at the ED, she was hypotensive (91/70 mmHg) and bradycardic (55 beats per minute). All other vital signs, such as respiration, temperature, and oxygen saturation, were within normal limits. Physical examination showed a woman in acute distress and mildly altered mentation. There was no superficial or systemic lymph node involvement. Regular S_1 and S_2 heart sounds were present in all valvular areas. Lungs were bilaterally clear to auscultation with a soft abdomen, non-tender to palpation in all quadrants. Extremities were symmetric with no joint swelling or pitting edema. Her medical history included pre-existing hypertension adequately treated with losartan 50 mg/day and a 3-month history of hospitalization for hemoptysis accompanied by fever, chills, and weight loss. She was given a diagnosis of tuberculosis (TB) and is actively being treated. Laboratory values, including blood gas, creatinine, hemoglobin, coagulation profile, and electrolytes, among others, were normal at that time (per hospital records). Her social history was insignificant, citing the absence of alcohol consumption and smoking.

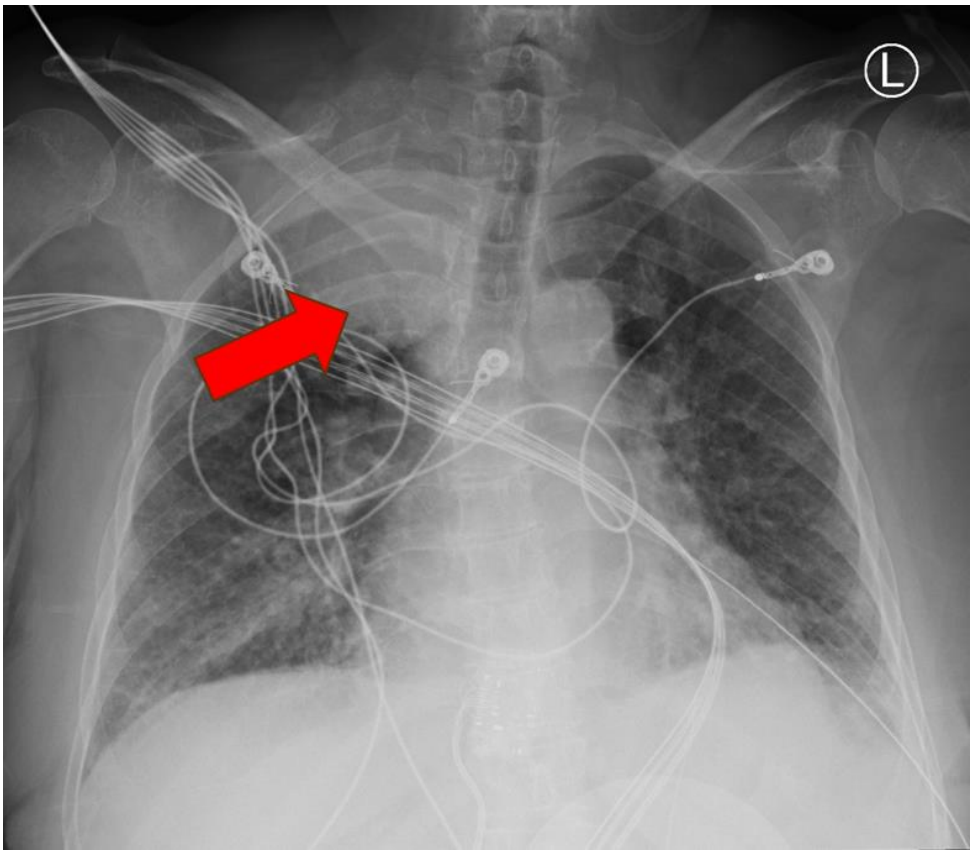

Figure 1. Frontal CXR showing a large confluent right upper zone opacity (red arrow) and an abnormal right first rib. Additionally, a patchy bilateral lower zone opacity obscures the pulmonary vessels, compatible with edema.

A routine laboratory test in the ED revealed hyperglycemia (222 mg/dL), hyponatremia (133 mmol/L), hypercalcemia (12.5 mg/dL), elevated troponin (0.101 ng/mL), elevated creatinine (4.40 mg/dL), low albumin (2.4 g/dL), high total protein (10.05 g/dL), anemia (hemoglobin 7.1 g/dL), and thrombocytosis (500×10^9/L). All other values, such as bilirubin levels, coagulation profile, liver function tests, and blood gas, were within normal limits. Blood tumor marker test showed increased levels of beta-2-microglobulin (44 mg/dL). A chest x-ray (CXR) demonstrated a massive upper lobe

opacity on the right (Figure 1). Non-contrast computed tomography (CT) of the chest subsequently highlighted a solid, round, right apical lung mass measuring approximately 8.5 × 7.2 × 6.9 cm with mixed internal density and scattered areas of calcification (Figure 2). No lymph node enlargement was found in the mediastinum. For detection of metastasis, an 18-fluorodeoxyglucose positron emission tomography (FDG-PET) scan was performed, which was largely unremarkable with no pathological findings. The patient was admitted to the intensive care unit (ICU) from the ED. A CT-guided needle aspiration of the mass was then ordered. Histopathology revealed a dense infiltration of mature anaplastic plasma cells on routine hematoxylin and eosin stain. Pathological biopsy indicated SEP. A bone marrow aspirate (myeloid: 7%; monocytes: 2%; lymphocytes: 6%; plasma cells: 78%; erythroid precursors: 7%) later showed increased numbers of plasma cells with prominent nucleoli, while the core biopsy revealed sheets of plasma cells. Flow cytometry demonstrated abnormal plasma cells that were CD38, CD45 (myeloma cells), CD56, and CD138 positive, while the CD19 tumor marker was negative. The patient was further evaluated with serum electrophoresis, which showed an M-protein spike (3.5 g/dL).

She was ultimately diagnosed with MM. A medical oncologist was consulted and initiated a standard chemotherapy regimen including bortezomib (Velcade®), thalidomide (Thalomid®), and prednisone for the treatment of high-risk MM. Following a complicated one-month hospital course in the ICU, the patient died as a result of septic shock.

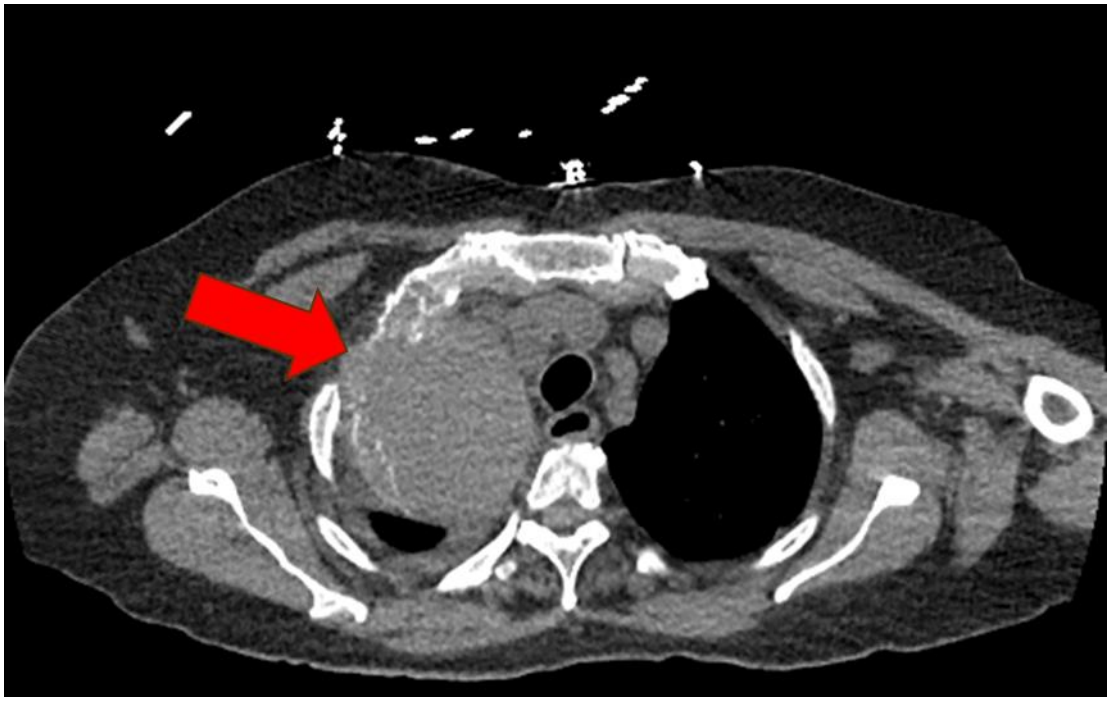

Figure 2. Axial non-contrast CT scan of the chest showing a destructive, expanded tumor (red arrow) of the right first rib with mixed internal density and scattered areas of calcification, especially along the superior aspect of the mass.

DISCUSSION

Plasma cell neoplasms (PCNs) are a group of mature B-cell disorders characterized by excessive production of monoclonal heavy-chain immunoglobulins [8]. PCN is generally divided into four categories: MM, solitary plasmacytoma of the bone, plasma cell leukemias, and SEP [8,9]. SEP is typically located in the soft tissues of the head and the neck with little to no bone marrow involvement [2,10]. It usually affects older people (50 to 80) with a median age of 55 years and a male-to-female ratio of 1.4:1 [11]. The exact etiology is unclear, but chronic stimulation, viral infection, inhalation of chemicals, and genetic disorders of the reticuloendothelial system are thought to be triggers [6]. Patients generally present with localized submucosal masses and the accompanying symptoms according to location [12]. The related symptoms are commonly due to the compression and obstruction of local structures [12]. SEPL presents with non-specific manifestations

such as cough, dyspnea, wheezing, shoulder pain, and hemoptysis [4]. Other locations, such as the cervix, may present with abdominal pain and vaginal bleeding [3].

The diagnostic process of SEP usually begins with imaging, such as CT or FDG-PET scan [13]. A CT-guided percutaneous needle core biopsy is required for a definitive diagnosis, and a bone marrow evaluation is necessary to differentiate between MM [2,6,11]. On bone marrow exam, patients with SEP should have fewer than 5% plasma cells with no dyscrasia and a normal skeletal survey [14]. Additionally, unlike MM, SEP may not possess serum M protein or Bence-jones light chains in the urine and thus should be performed [4]. The absence of laboratory features such as anemia, hypercalcemia, and elevated creatinine makes MM much less likely [15].

Treatments regarding SEPL have yet to be well established [2]. According to Wang *et al.*, lung resection with or without radiotherapy is the most effective approach [2]. At the same time, Mandal et al. mention that combining surgical management with localized radiotherapy results in complete disease regression despite the progress to MM in more than 50% of patients within two years [6]. Chemotherapy is considered in patients with lung masses larger than 5 cm, and there have been two previously reported cases of treatment with melphalan and prednisolone [11]. Additionally, one case reported the use of bortezomib, cyclophosphamide, and dexamethasone in combination with radiotherapy, and three cases highlighted the use of only radiotherapy in the treatment of SEPL [14,16–18].

SEP can be located in various body areas, as mentioned above. However, SEPL is extremely rare [11]. It has the ability to proceed into overt MM, and about 40% of previously reported cases have ultimately made the transition [11,16]. The average median time of progression to MM is 2 to 3 years [19,20]. Throughout our comprehensive literature review, only a single case of SEP with the transition to MM in under two years has been identified. According to Yang *et al*., their report was a case of SEP of the lumbar vertebrae with progression to MM in under two months [5]. The unique finding in our case was the transition of SEPL to MM in less than four months. Our patient was hospitalized three months prior for hemoptysis, fever, and weight loss. Based on the clinical history provided by her normal laboratory results at the time of her prior hospital admission, it is safe to assume she was incorrectly diagnosed with TB. In fact, SEPL is very commonly misdiagnosed as lung cancer or TB [2]. The combination of our laboratory findings (elevated creatinine, anemia, and hypercalcemia), which was not present at the time of her hospitalization for TB with bone marrow biopsy, confirmed that this was a case of rapid transition to MM from SEPL.

The absence of osteolytic lesions on both CXR and FDG-PET scans also added a peculiar finding to an already rare case. There have been reported cases of MM without bone lesions in patients, although uncommon [21,22,23]. As this is the first case of SEPL with the transition to MM in less than four months, as far as we know, we recommend additional evaluation, such as a CT scan of the chest, if a pulmonary opacity with inconclusive features is found. A high index of clinical suspicion by clinicians is crucial to proceed with an accurate work-up and limit misdiagnosis probabilities. Prompt diagnosis and treatment may prevent the quick progression of SEPL to MM and highlight the importance of timely diagnosis.

CONCLUSION

In summary, we report an extremely rare presentation of SEPL and its apparent possibility of a rapid transition to MM. This case highlights the attention that should be given to various differential diagnoses of pulmonary opacities, especially in older patients. A high index of clinical suspicion for SEP is required for accurate diagnosis and treatment. As a result of the possibility of SEPL transitioning to MM in a short period, such as in this case, early detection and prompt treatment may reduce disease progression and increase the survivability of these patients.

Introducere: Plasmocitoamele extramedulare solitare (SEP) sunt entități patologice caracterizate prin proliferarea locală a plasmocitelor neoplazice, reprezentând mai puțin de 6% din tumorile plasmocitelor. De obicei produc imunoglobulină monoclonală și se găsesc de obicei la nivelul capului, gâtului și, mai rar pulmonar. În cazuri rare, cu un risc estimat între 8 și 31%, SEP se poate transforma în mielom multiplu (MM).

Prezentare de caz: Raportăm cazul unei femei în vârstă de 72 de ani care a solicitat asistență medicală la secția de urgență din cauza dispneei și sincopei cu debut acut. Rezultatele de laborator au evidențiat valori crescute ale creatininei, hipercalcemie și anemie, toate care au fost absente la spitalizarea anterioară din pricina tuberculozei cu trei luni înainte. Radiografia toracică a relevat o opacitate a lobului superior drept, iar tomografia computerizată (CT) a vizualizat o masă pulmonară apicală cu calcificări. Puncția aspirație cu ac ghidată CT a indicat SEP. Biopsia măduvei osoase a confirmat ulterior diagnosticul de MM. Pacienta a fost internată în secția de terapie intensivă și tratată cu chimioterapie; cu toate acestea, în urma evoluției cu complicații, pacienta a decedat.

Discuție: SEP sunt o formă extrem de rară de malignitate cu potențial de conversie la MM. Deși probabilitatea transformării în MM în luni este rară, solicităm atenția asupra posibilității unei astfel de tranziții și asupra prognosticului clinic al pacienților cu SEP. Tratamentul prompt și agresiv este esențial, iar acesta, după cunoștințele noastre, este primul caz de conversie la MM în mai puțin de patru luni de la diagnosticul inițial de SEP pulmonar.

Correspondence to: Kevan English, MD, Department of Internal Medicine, St. George's University School of Medicine, Saint George, Grenada, kenglish@sgu.edu, ORCID: 0009-0006-8893-5696

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Consent for publication: The study was designed in compliance with the ethical guidelines of the 1975 Declaration of Helsinki. Informed consent was obtained.

Authors' contributions: K.E wrote the manuscript. D.L and S.K reviewed and edited the manuscript. K.E subsequently revised and made corrections to the article. All authors read and approved the final manuscript.

Abbreviations

SEP: Solitary extramedullary plasmacytoma
MM: Multiple myeloma
CT: Computed tomography
SEPL: Solitary extramedullary plasmacytoma of the lung
ED: Emergency department
TB: Tuberculosis
CXR: Chest x-ray
FDG-PET: 18-Fluorodeoxyglucose positron emission tomography
ICU: Intensive care unit
PCN: Plasma cell neoplasm

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