

CASE REPORT

Open Access



Complete heart block ensuing from a metastatic small cell carcinoma: a case report

Pedro Pallangyo^{1,5*}, Garvin Kweka², Frederick Lyimo³, Henry Mayala⁵, Happiness J. Swai¹, Zabella Mkojera¹, Nsajigwa Misidai¹, Makrina Komba¹, Jalack Millinga⁴, Smita Bhalia⁵, Faustina Mwapinga⁴, Salma Wibonela⁴ and Mohamed Janabi⁵

Abstract

Introduction: Notwithstanding the diagnostic and therapeutic advancements, the incidence of cardiac metastases has increased in recent decades. Lung cancers are the most common primary malignant neoplasms with cardiac metastasis potential. The clinical presentation of cardiac metastases is either silent or vague, and largely depends on the infiltrated location and tumor burden. Although arrhythmias are not uncommon in metastatic cardiac tumors, complete heart block is relatively a rare manifestation. We present a case of complete heart block due to a metastatic small cell carcinoma in a 67-year-old male of African origin.

Case presentation: A 67-year-old male of African origin from rural Tanzania was referred to us for expert management. He is a retired agromechanic with over 30 years exposure to asbestos-containing brake linings. His past medical history was unremarkable, but the family-social history was evident for a heavy alcohol intake and chronic cigarette smoking. He presented with a 24-week history of progressive shortness of breath and an 8-week history of recurrent syncopal attacks coupled with a significant weight loss. He had normal echocardiographic findings, however, the electrocardiogram showed features of complete heart block. Chest X-ray showed a homogeneous opacification on the right side and computed tomography scan revealed a solid right lung mass with metastases to the liver, heart, bowels, and bone. He underwent bronchoscopy, which revealed an endobronchial mass obstructing the bronchus intermedius. Histological examination of a section of lung biopsy taken during bronchoscopy confirmed the diagnosis of a small cell carcinoma. The patient underwent dual chamber pacemaker implantation with successful sinus rhythm restoration. He made an informed refusal of chemotherapy and inevitably died 18 months post pacing.

Conclusions: Despite the advancements in medical diagnostics and management, lung cancers are often diagnosed in advanced stages, with an inevitable grave prognosis. Small cell carcinoma has the potential to metastasize to the heart, resulting in complete heart block.

Keywords: Small cell carcinoma, Oat cell carcinoma, Lung cancer, Complete heart block, Complete atrioventricular block, Third-degree heart block, Cardiac metastases, Case report

Introduction

Cardiac metastases rarely complicate the course of neoplasms. Primary tumors of the heart are very rare (~0.02%) but metastasis from various malignant neoplasms is about 40 times more common [1–3]. Diversity

*Correspondence: pedro.pallangyo@gmail.com

¹ Department of Research & Training, Jakaya Kikwete Cardiac Institute, P.O

Box 65141, Dar es Salaam, Tanzania

Full list of author information is available at the end of the article



in the clinical presentation of cardiac malignancies is often elusive, resulting in diagnostic dilemmas, delayed diagnosis, or even misdiagnosis. Owing to the unclear, nonspecific, and largely asymptomatic presentation of cardiac metastases, antemortem diagnosis is uncommon [4].

Lung cancers are the most common (~39%) primary malignant neoplasms with cardiac metastasis potential [2, 3, 5, 6]. While only about 10% of living lung cancer patients present with cardiac involvement, a detection rate of up to 35% is reported among autopsy cases [7, 8]. Dissemination of lung malignancies to the heart may occur in a number of ways including hematogenous spread, direct invasion, transvenous extension, and retrograde lymphatic spread [3, 9]. Although arrhythmias are not uncommon in metastatic cardiac tumors, complete heart block is a relatively infrequent manifestation [4]. We present a case of complete heart block (CHB) due to a metastatic small cell carcinoma in a 67-year-old male of African origin.

Case presentation

A 67-year-old male of African origin from the Kilimanjaro region north of Tanzania was referred to us for expert management. He is a retired agromechanic with over 30 years exposure to asbestos-containing brake linings. His past medical history was unremarkable, but the family-social history was evident for a heavy alcohol intake (5 units/day) and chronic cigarette smoking

(20 pack years). He presented with a 24-week history of progressive shortness of breath and an 8-week history of recurrent syncopal attacks. Such complaints were associated with awareness of heart beat, easy fatigability, light headedness, dry cough, and weight loss (~15 kg in 6 months). There was a negative history of fever, night sweats, chest pain, visual disturbances, recurrent headaches, bone pain, vomiting, or diarrhea.

General examination revealed a wasted (BMI 17.6 kg/m²) man. He had a sinus bradycardia of 32 beats/minute and blood pressure of 117/66 mmHg on cardiovascular examination. Respiratory examination revealed features suggestive of right lung consolidation. Other systems were essentially normal. He underwent a number of hematological, biochemical, and serological tests, which revealed a normocytic normochromic anemia [hemoglobin (Hb) 11.1 g/dL] but otherwise normal. His echocardiography (ECHO) was essentially normal, however the electrocardiogram (ECG) showed features in keeping with the diagnosis of CHB, Fig. 1. Chest X-ray (CXR) showed a homogeneous opacification on the right side, and CT scan revealed a solid right lung mass with metastases to the heart, liver, bowels, and bone; Figs. 2, 3, 4, 5 and 6. Furthermore, he underwent bronchoscopy, which revealed an endobronchial mass occluding the bronchus intermedius. Histological examination of a section of lung biopsy taken during bronchoscopy confirmed the diagnosis of small cell carcinoma, Fig. 7. Correspondingly, a histological section of heart

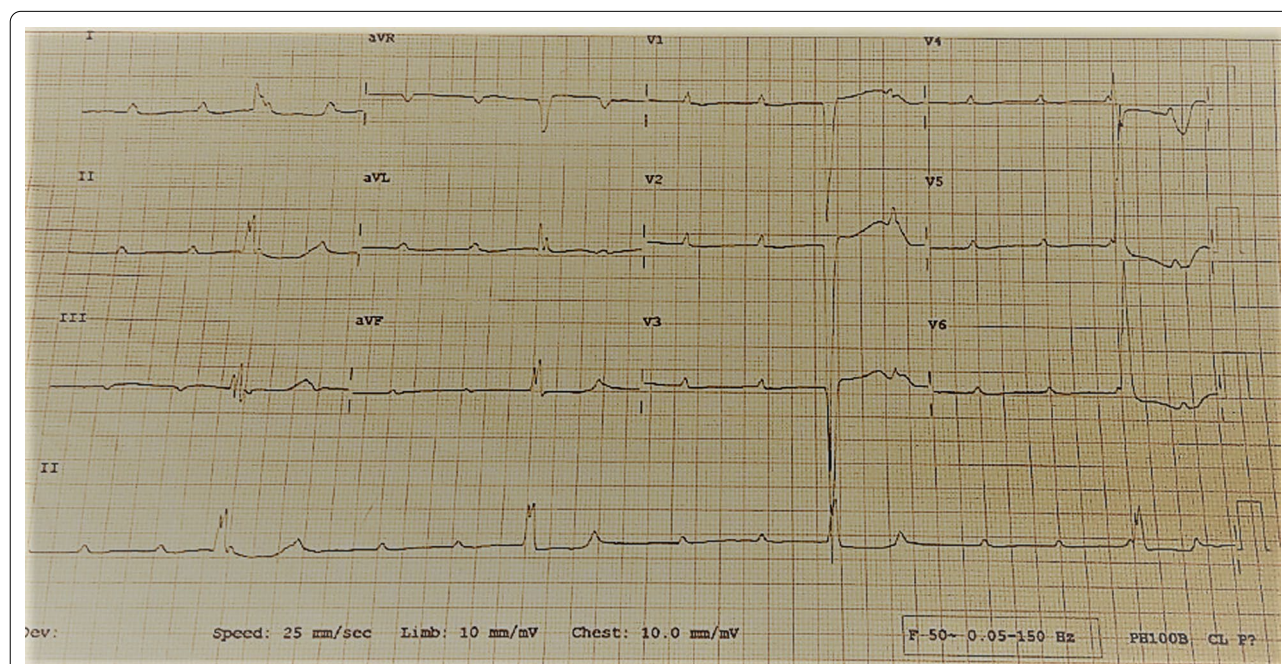


Fig. 1 Electrocardiogram showing AV dissociation in keeping with diagnosis of complete heart block



Fig. 2 Chest x-ray (PA view) displaying consolidation on right middle to lower lung zones with areas showing bronchograms

muscle tissue revealed similar findings to lung biopsy. The patient underwent dual chamber pacemaker implantation with successful sinus rhythm restoration. He made an informed refusal of chemotherapy and inevitably died in his home village 18 months post pacing. We received the death information from his son via a phone call, and an autopsy was not practical.

Discussion

Despite its occurrence among patients with a wide tumor spread, cardiac metastasis is an uncommon phenomenon in clinical practice [1–3]. Tumors can spread to the heart by (i) direct extension, (ii) through the bloodstream, (iii) through the lymphatic system, and (iv) by intracavitary diffusion (that is through the inferior vena cava or the pulmonary veins) [3, 9]. The clinical presentation of cardiac metastases is either silent or vague, and largely depends on the infiltrated location and tumor burden [4, 10]. Seldom, cardiac involvement with neoplasm may manifest with dramatic life-threatening consequences including tamponade, myocardial infarction, stroke, and cardiogenic shock [1, 2, 4, 11]. Furthermore, malignant infiltration of the cardiac conduction system may result in numerous life-threatening arrhythmias including atrial fibrillation, ventricular tachycardia, and various

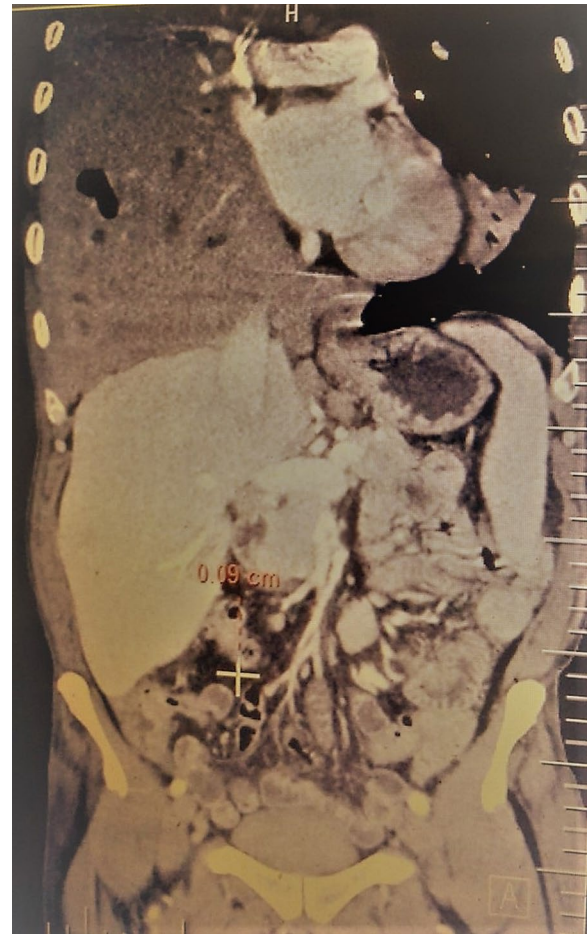


Fig. 3 Computed tomography chest and abdomen (coronal reformatted view) displaying a mass-like dense consolidation of the right lung and an ill-defined heterogeneously hypodense lesion at the caudate lobe of the liver suggestive of liver metastasis



Fig. 4 Computed tomography scan showing an intracardiac mass



Fig. 5 Computed tomography scan at the level of kidney displaying hyperdensity at the left pedicle suggestive of bone metastasis



Fig. 6 Computed tomography scan at the level of iliac bones showing circumferential mucosal thickening with heterogeneous enhancement suggestive of bowel metastasis

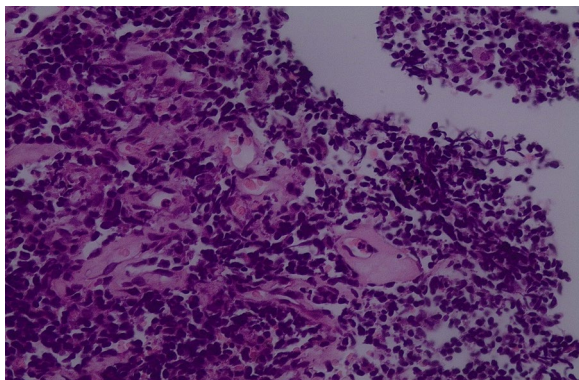


Fig. 7 Histological section of the mass displaying a diffuse proliferation of small to intermediate sized cells with very scant cytoplasm and round to oval hyperchromatic nuclei

degrees of atrioventricular blocks (including CHB) [12]. Notwithstanding the attributed morbidity and mortality to cardiac metastases, diagnosis is often reached during autopsy [1–11].

In spite of the improved diagnostic and therapeutic modalities, the incidence of cardiac metastases has increased in recent decades [1]. Specific physical or laboratory tests to detect cardiac metastases in a diffuse tumor state are lacking. A two-dimensional echocardiography (ECHO) may be useful in the detection of a cardiac involvement, however, the differentiation of a metastatic mass from a vegetation, thrombus, myxoma, or a primary cardiac tumor may be challenging [1]. This often necessitates the use of other imaging modalities such as computed tomography (CT) or magnetic resonance imaging (MRI) for better characterization of intracardiac masses. Additionally, a 3D or 4D doppler/duplex ultrasound would have been helpful in this scenario but owing to its high cost it was unavailable for use. Furthermore, electrocardiographic (ECG) findings, though generally nonspecific, may be pivotal in detecting arrhythmias and conduction defects [1].

To the best of our knowledge following an extensive literature search, this is the first ever case of complete heart block secondary to a small cell carcinoma to be documented in the literature. Other metastatic lung neoplasms that have been associated with CHB include anaplastic carcinoma, bronchogenic carcinoma, and squamous cell carcinoma [10, 13–15]. Despite several diagnostic limitations in a resource-limited setting such as ours, we are delighted to have reached the definitive diagnosis during the patient's lifetime. Regrettably, like with many other malignant neoplasms, a diagnosis was reached in the extensive stage of the disease and arguably the prognosis would have remained somewhat similar even if this patient had agreed to chemotherapy.

Conclusions

Despite its rarity, small cell carcinoma has the potential to metastasize to the heart, resulting in a complete heart block. Despite the remarkable advancements in medical diagnostics and management, lung cancers are often diagnosed in advanced stages with an inevitable grave prognosis. Timely pacing is crucial for restoration of a sinus rhythm and will somewhat improve the quality of life; however, the overall prognosis from the underlying tumor remains poor.

Abbreviations

BMI: Body mass index; CHB: Complete heart block; CT: Computed tomography; CXR: Chest X-ray; ECG: Electrocardiogram; ECHO: Echocardiography; Hb: Hemoglobin; MRI: Magnetic resonance imaging.

Acknowledgements

The authors are grateful to the staff of the Jakaya Kikwete Cardiac Institute for their hard work in daily patient care.

Authors' contributions

PP and GK took the history and performed the physical examination. FL interpreted the imaging films. MK, HJS, ZM, NM, JM, FM, SW, SB, HM, and MJ participated in clinical management of the patient during hospitalization. PP wrote the initial draft of the manuscript. All authors reviewed and contributed to the final version of this case report. All authors read and approved the final manuscript.

Funding

Not applicable.

Availability of data and materials

Not applicable.

Declarations**Ethics approval and consent to participate**

Ethical clearance was sought from the Directorate of Research of Jakaya Kikwete Cardiac Institute.

Consent for publication

Written informed consent was obtained from the patient's next of kin for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Research & Training, Jakaya Kikwete Cardiac Institute, P.O. Box 65141, Dar es Salaam, Tanzania. ²Department of Internal Medicine, Muhimbili National Hospital, P.O. Box 65000, Dar es Salaam, Tanzania. ³Department of Radiology, Muhimbili National Hospital, P.O. Box 65000, Dar es Salaam, Tanzania. ⁴Department of Nursing, Jakaya Kikwete Cardiac Institute, P.O. Box 65141, Dar es Salaam, Tanzania. ⁵Department of Adult Cardiology, Jakaya Kikwete Cardiac Institute, P.O. Box 65141, Dar es Salaam, Tanzania.

Received: 28 July 2021 Accepted: 23 December 2021

Published online: 10 February 2022

References

1. Reynen K, Köckeritz U, Strasser RH. Metastases to the heart. *Ann Oncol*. 2004;15:375–81.
2. Bussani R, De-Giorgio F, Abbate A, *et al*. Cardiac metastases. *J Clin Pathol*. 2007;60:27–34.
3. Son JW, Hong GR. Unusual left ventricular endocardial metastasis from primary lung cancer. *J Cardiovasc Ultrasound*. 2012;20(3):157–60.
4. Goldberg AD, Blankstein R, Padera RF. Tumors metastatic to the heart. *Circulation*. 2013;128:1790–4.
5. Al-Mamgani A, Baartman L, Baaijens M, *et al*. Cardiac metastases. *Int J Clin Oncol*. 2008;13:369–72.
6. Butany J, Leong SW, Carmichael K, *et al*. A 30-year analysis of cardiac neoplasms at autopsy. *Can J Cardiol*. 2005;21:675–80.
7. Spaggiari L, D'Aiuto M, Veronesi G, *et al*. Extended pneumonectomy with partial resection of the left atrium, without cardiopulmonary bypass, for lung cancer. *Ann Thorac Surg*. 2005;79(1):234–40.
8. Che GW, Liu LX, Zhang EY, *et al*. Left ventricular metastasis from a primary lung carcinoma. *Chin Med J (Engl)*. 2007;120(24):2323–4.
9. Cheruvu B, Cheruvu P, Boyars M. An unusual case of metastasis to the left side of the heart: a case report. *J Med Case Rep*. 2011;5:23.
10. Mocini D, Longo R, Colivicchi F, *et al*. A complete atrioventricular block secondary to myocardial metastases of lung cancer. A case report. *Ital Heart J*. 2005;6(11):931–2.
11. Garg N, Moorthy N, Agrawal SK, *et al*. Delayed cardiac metastasis from phyllodes breast tumor presenting as cardiogenic shock. *Tex Heart Inst J*. 2011;38:441–4.
12. Huang HL, Hung CY, Chin CH, *et al*. Primary cardiac lymphoma with complete atrioventricular block. *Acta Cardiol Sin*. 2011;27:56–9.
13. Pettit SJ, Roditi G, Davidson S. Complete heart block caused by a cardiac metastasis: a rare presentation of lung cancer. *Scot Med J*. 2007;52(3):53–53.
14. Buckberg GD, Fowler NO. Complete atrioventricular block due to cardiac metastasis of bronchogenic carcinoma. *Circulation*. 1961;24(3):657–61.
15. Morio S, Hara Y, Yamaga T, Yoshino Y, Nakamoto S, Sugiyoma N. A case report of complete heart block by metastatic cardiac involvement from lung cancer. *Kyobu Geka*. 1989;42(11):944–7.
16. Kasai T, Kishi K, Kawabata M, *et al*. Cardiac metastasis from lung adenocarcinoma causing atrioventricular block and left ventricular outflow tract obstruction. *Chest*. 2007;131(5):1569–72.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

