



Case Report

Primary Pulmonary Choriocarcinoma Presenting with Pulmonary Embolism and Hypomagnesemia-Induced Arrhythmia: A Rare and Diagnostically Challenging Case

Iyamu Collins Osaro* , Okugbo Stanley Ukadike , Obanovwe Efemena

Division of Cardiothoracic & Vascular Surgery, University of Benin Teaching Hospital, Benin City, Nigeria

Abstract

Background: Choriocarcinoma is a germ cell tumour with highly malignant clinical behaviour. Its non-gestational, or primary subtype is associated with a poor prognosis and marked angioinvasiveness. Primary pulmonary choriocarcinoma (PPC) is exceedingly rare malignancy with no clinical guidelines developed for its treatment and the data on its symptomatology and optimal management remain limited. We report a 37-year-old woman who presented with sudden onset right-sided chest pain, dyspnoea, and cough. Computed tomography scan of the chest demonstrated a right-sided lung mass, and an initial percutaneous needle biopsy suggested a poorly differentiated lung carcinoma. She underwent right pneumonectomy, and postoperative histology of the resected mass confirmed pulmonary choriocarcinoma. While awaiting chemotherapy, she developed clinical features of pulmonary embolism and a malignant arrhythmia that markedly worsened her prognosis despite treatment. A dramatic clinical turnaround was experienced following intravenous magnesium sulphate correction of an incidentally detected hypomagnesemia. She commenced the etoposide, methotrexate, actinomycin D, cyclophosphamide and vincristine (EMA-CO) regimen with a suboptimal response, and was subsequently transitioned to bleomycin, etoposide and cisplatin (BEP), on which she demonstrated marked clinical improvement. This case illustrates the diagnostic difficulty inherent in the evaluation of patients with primary pulmonary choriocarcinoma thus emphasizing the need to consider this rare entity in cases of lung masses, the central role of surgical resection within a multidisciplinary treatment strategy, and the often under-recognized contribution of hypomagnesemia to cardiovascular instability in critically ill oncology patients.

Keywords

Primary Pulmonary Choriocarcinoma, Pneumonectomy, Pulmonary Embolism, Hypomagnesemia, Beta Human Chorionic Gonadotropin, Case Report

1. Introduction

Choriocarcinoma is a germ cell tumour composed of syncytiotrophoblastic and cytotrophoblastic elements that characteristically secretes human chorionic gonadotropin (β -hCG). [1] While gonadal choriocarcinoma metastasizes to the lungs

in 45-87% of cases, primary pulmonary choriocarcinoma (PPC)—arising de novo within the lung parenchyma without a demonstrable gonadal or other extrapulmonary primary—is exceedingly rare, and some authors have questioned whether

*Correspondence: Iyamu Collins Osaro (dr Collinsiyamu@gmail.com)

Received: 29 August 2026; Accepted: 15 September 2026; Published: 29 September 2026



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it constitutes a genuine, distinct clinicopathological entity. [2-4] The paucity of reported cases has precluded the development of a standardized treatment protocol. [2] The medical literature contains only a handful of reported cases of primary pulmonary.

choriocarcinoma, thus emphasizing the extraordinary rarity of this condition. [5] The absence of specific clinical or radiological features frequently delays diagnosis [6] just as the overlapping imaging and pathological features between PPC and metastatic tumors pose significant diagnostic difficulties. [7]. While the progressive elevation of serum β -hCG serves as a critical biomarker for choriocarcinoma, β -hCG testing is frequently overlooked in clinical practice especially in males [7].

A combined surgical and chemotherapeutic approach has been associated with the most favourable outcomes reported to date. [2] We present a case managed at our institution in Nigeria, with particular attention to the surgical decision-making, the unusual cardiovascular complications encountered, and the eventual therapeutic course, and we discuss the lessons relevant to surgeons and oncologists managing this rare disease in a resource-constrained setting.

2. Case Presentation

2.1. History and Examination

A 37-year-old woman, para 5 (three living children and two miscarriages, the most recent occurring one month prior to presentation), presented with right-sided chest pain, progressive dyspnoea, and cough. She denied tobacco or alcohol use and had no history of hypertension or chronic heart failure. She had undergone myomectomy five years earlier. Examination revealed clinical features of a right pleural effusion, for which closed-tube thoracostomy was performed; this drained serosanguinous fluid.

2.2. Investigations

Contrast-enhanced computed tomography scan (CT) of the chest demonstrated a mass involving the middle and lower lobes of the right lung (Figures 1 and 2). CT-guided percutaneous biopsy was reported as a poorly differentiated lung carcinoma, and she was accordingly worked up for bilobectomy or pneumonectomy.

2.3. Operative Findings and Immediate Postoperative Course

At thoracotomy, findings included: (a) 2 litres of serosanguinous pleural effusion; (b) an extensive tumour involving the right middle and lower lobes, infiltrating the base of the upper lobe and extending to, and adherent to, the mediastinum and part of the right hemidiaphragm; (c) a friable, necrotic and

haemorrhagic tumour; and (d) involvement of the right mediastinal and interlobar lymph nodes. Given the extent of disease, a right pneumonectomy was performed. She was managed postoperatively in the intensive care unit, made a satisfactory recovery, and was discharged home.

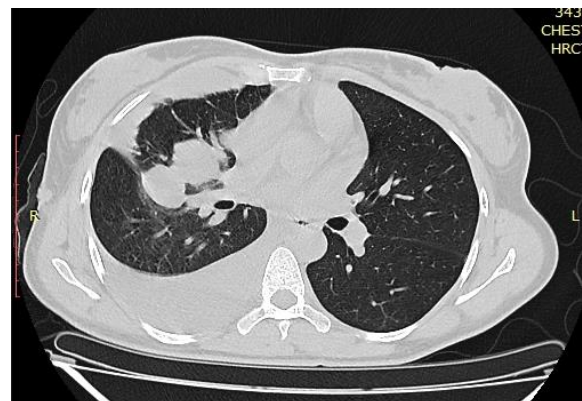


Figure 1. Contrast-enhanced CT chest showing a mass involving the right middle and lower lobes.



Figure 2. Corresponding CT image demonstrating the extent of the right-sided lung mass.

2.4. Histopathological Diagnosis and Oncological Work-up

Histological examination of the resected specimen revealed pulmonary choriocarcinoma, confirmed by immunohistochemistry. Transvaginal and abdominal ultrasonography were normal, excluding a gonadal or uterine primary. Serum β -hCG was markedly elevated at 266,400 mIU/mL. She was worked up for bleomycin, etoposide and cisplatin (BEP) chemotherapy. Liver function tests were mildly deranged, and she developed a refractory anaemia, with haematocrit rising only from 23.7% to 26% despite transfusion of six units of blood.

2.5. Clinical Course During Chemotherapy

She subsequently became dyspnoeic with an irregularly ir-

regular pulse, raising suspicion of atrial fibrillation with pulmonary embolism. Electrocardiography showed sinus tachycardia with an S1Q3T3 pattern (S wave in lead I, Q wave in lead III, inverted T wave in lead III), and D-dimer was elevated at 1561 ng/mL (reference range 0-500). Echocardiography demonstrated severe pulmonary hypertension, mild pericardial effusion, and a dilated aortic root; she was too haemodynamically unstable to undergo CT pulmonary angiography.

In view of an ECOG performance status of 2 and the presence of arrhythmia, BEP chemotherapy was commenced at a 50% dose reduction. She remained tachycardic (heart rate 180 beats/min) and dyspnoeic, and was started on digoxin, anticoagulation, and heart failure therapy. Her condition deteriorated further, with episodes of apnoea culminating in transient loss of consciousness, necessitating intubation and mechanical ventilation in the intensive care unit. Vital signs at this time were blood pressure 160-210/100-140 mmHg and an irregularly irregular pulse rate of 160-180 beats/min.

On the fourth day of intensive care admission, serum magnesium was checked and found to be low at 1.3 mg/dL. Correction with an intravenous magnesium sulphate infusion produced a marked improvement in her haemodynamic parameters within 24 hours, and she was extubated the following day. Her vital signs subsequently stabilized (pulse rate 80-100 beats/min, blood pressure 110/70 mmHg, oxygen saturation 98% on room air), and she was discharged home over the following days.

BEP chemotherapy was discontinued in favour of the EMA-CO regimen (etoposide, methotrexate, actinomycin D, cyclophosphamide and vincristine), of which she completed six courses; however, the response was suboptimal, with fluctuating β -hCG values. Treatment was therefore reverted to BEP, on which she has subsequently demonstrated marked clinical and biochemical improvement. She remains on follow-up.

3. Discussion

Choriocarcinoma is an aggressive, highly malignant tumour classified as gestational or non-gestational. [8] In gestational trophoblastic neoplasia, choriocarcinoma is the most aggressive histological subtype and frequently metastasizes to the lungs. Non-gestational, or primary choriocarcinoma is considerably less common, carries a poorer prognosis, and is markedly angioinvasive. [9] It arises predominantly in the retroperitoneum, mediastinum, and intracranium, and only rarely in the ovary, stomach, bladder, or lung. [8-10] Unlike other extragonadal germ cell tumours, primary pulmonary choriocarcinoma occurs more frequently in women and in elderly men. Its histogenesis remains uncertain; proposed mechanisms include origin from an ectopic primordial germ cell during embryonic lung development, high-grade trophoblastic transformation of a non-trophoblastic lung tumour, and the hypothesis that primary pulmonary choriocarcinoma and pulmonary giant cell carcinoma represent a single biological entity. [1, 2, 6, 10]

The clinical presentation of PPC is variable and typically includes dyspnoea, cough, chest pain, and haemoptysis. Affected men may present with gynaecomastia, loss of libido, and testicular atrophy secondary to elevated β -hCG. [6, 11] Our patient's presentation—chest pain, dyspnoea and cough—was consistent with this pattern; features of feminization were, naturally, not applicable given her sex.

Diagnostic criteria for PPC comprise: (1) absence of a gynaecological malignancy; (2) an isolated or predominant pulmonary lesion after exclusion of a gonadal primary; (3) markedly elevated β -hCG that normalizes following surgery or chemotherapy; and (4) histopathological confirmation. The principal differential diagnosis is β -hCG-producing giant cell carcinoma of the lung, which shares morphological features with PPC but is strongly immunoreactive for TTF-1, an epithelial marker that is characteristically negative in PPC. [2] Our patient had no antecedent gynaecological malignancy, and pelvic imaging excluded a uterine or ovarian lesion. Markedly elevated β -hCG improved in parallel with her clinical response to chemotherapy, and the histological diagnosis was confirmed by immunohistochemistry, excluding giant cell carcinoma.

Pulmonary embolism secondary to malignancy is common, but involvement of the pulmonary artery by choriocarcinoma itself is rare, with fewer than fifteen cases reported in the literature as of 2023; diagnosis and treatment remain challenging. [8] Our patient's presentation was suspicious for pulmonary embolism and was supported by an elevated D-dimer; however, she was too unstable to undergo CT pulmonary angiography or positron emission tomography to further characterize the possibility of pulmonary artery choriocarcinoma.

Hypomagnesemia is a recognized, though frequently under-recognized, cause of serious cardiac arrhythmia and can aggravate hypertension. [12, 13] It has been strongly implicated in the pathogenesis of cardiac arrhythmias due to its role in myocardial excitability and membrane stabilization. [14] Because magnesium is abundant in green leafy vegetables, cereals, nuts, and drinking water, clinically significant deficiency is uncommon under normal circumstances. It is known that serum magnesium acts as a natural calcium antagonist, hence its deficiency promotes afterdepolarizations and increased automaticity in cardiac myocytes, predisposing to both atrial and ventricular arrhythmias. [14] Magnesium deficiency may occur with high-dose diuretic therapy for hypertension or heart failure, chronic kidney disease requiring haemodialysis, and proton-pump-inhibitor therapy for gastro-oesophageal reflux disease. [12, 13] In this patient, persistent haemodynamic instability refractory to standard measures prompted evaluation of serum magnesium, which revealed a marked deficiency; correction produced a rapid and sustained clinical improvement. This observation underscores the importance of actively excluding magnesium deficiency in patients with refractory cardiovascular dysfunction, particularly in the critical care setting. [15]

At the moment, there are no standardized guidelines that

emphasize the appropriate combination of treatment modalities like surgery, chemotherapy or radiotherapy in the management of patients with PPC. Systematic reviews and case reports have however relied on achieving remissions by a combination of surgery and chemotherapy regimens [16] Our index patient had both surgery and chemotherapy. There are also no randomized trials that have compared chemotherapeutic regimens for PPC to establish the superiority of one regimen over another. Both BEP and EMA-CO have been used with variable success. [17] Our patient responded favourably to BEP following a suboptimal response to EMA-CO. Because of the undifferentiated nature of the tumour, PPC characteristically responds poorly to radiotherapy. [6]

4. Conclusion

Primary pulmonary choriocarcinoma is a rare and diagnostically elusive malignancy that should be considered in patients presenting with a lung mass and markedly elevated β -hCG once gestational and gonadal sources have been excluded. From a surgical standpoint, anatomical resection remains central both to histological confirmation and to disease control, and it should be undertaken within a multidisciplinary framework that incorporates oncological chemotherapy. Clinicians managing such patients, particularly during the perioperative and critical care periods, should maintain a high index of suspicion for thromboembolic complications and should not overlook correctable metabolic derangements, such as hypomagnesemia, as contributors to otherwise unexplained cardiovascular instability. Continued reporting of cases such as this remains essential to inform the eventual development of evidence-based management guidelines for this rare disease, particularly in resource-limited settings such as ours in Nigeria.

Abbreviations

PPC	Primary Pulmonary Choriocarcinoma
β -hCG	Human Chorionic Gonadotropin
EMA-CO	Etoposide, Methotrexate, Actinomycin D, Cyclophosphamide and Vincristine
BEP	Bleomycin, Etoposide and Cisplatin
CT	Computerised Tomography
ECOG	Eastern Cooperative Oncology Group

Author Contributions

Iyamu Collins Osaro: Conceptualization, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing

Okugbo Stanley Ukadike: Data curation, Methodology, Supervision, Validation, Writing – review & editing

Obanovwe Efemena: Investigation, Project administration, Visualization, Writing – original draft

Conflicts of Interest

The authors declare that they have no competing interests.

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