Received: 1 July 2021 | Accepted: 30 July 2021

DOI: 10.1002/rcr2.829

CASE REPORT

Respirology Case Reports OPEN ACCESS APSR WILEY

Bilateral pleural metastases of a primary central nervous system neuroblastoma in an adult: First case in the world

Lobna Loued[1] | Asma Migaou[1] | Mabrouk Abdelaaly[2] | Ahlem Bellalah[3] | Nesrine Fahem[1] | Rania Kaddoussi[1] | Ahmed Ben Saad[1] | Samah Joobeur[1] | Saoussen Cheikh Mhamed[1] | Naceur Rouatbi[1]

[1]Pneumology Department, Fattouma Bourguiba Hospital of Monastir, Monastir, Tunisia

[2]Radiology Department, Fattouma Bourguiba Hospital of Monastir, Monastir, Tunisia

[3]Pathology Department, Fattouma Bourguiba Hospital of Monastir, Monastir, Tunisia

Correspondence
Lobna Loued, Pneumology Department, Fattouma Bourguiba Hospital of Monastir, Avenue Farhat Hached, Monastir 5000, Tunisia.
Email: louedlobna@gmail.com

Associate Editor: David Lam

Abstract

Primary central nervous system neuroblastoma (PCNS-NBL) is a rare and aggressive malignant tumour. Pleural metastases of PCNS-NBL have not been documented before. We report a case of a 30-year-old male patient, with a history of PCNS-NBL treated with surgery, radiation and chemotherapy. Three years later, he presented an aggravated dyspnoea with impaired general condition. The different investigations confirmed that his PCNS-NBL has relapsed with bone, lymph nodes and bilateral pleural metastases. Because of the disseminated disease and the poor general condition of the patient, only symptomatic treatment measures were preconized. The patient died 3 months later following cardiorespiratory arrest. To the best of our knowledge, this is the first case reporting bilateral pleural metastases of a PCNS-NBL in a young adult.

KEYWORDS

case report, first in the world, pleural metastases, primary central nervous system neuroblastoma

INTRODUCTION

Primary central nervous system neuroblastoma (PCNS-NBL) is an uncommon and highly aggressive malignant tumour. Only 150 cases of primary cerebral neuroblastoma were reported in the literature.[1] Neuroblastoma is the most frequent extracranial tumour in childhood,[1] although PCNS-NBL is rare in general and exceptional in adults. To the best of our knowledge, there was no other case of pleural metastasis of PCNS-NBL reported before.

Herein, we describe an unusual case of a PCNS-NBL, relapsed with bone, lymph nodes and bilateral pleural metastases, 3 years after surgery, radiation and chemotherapy.

CASE REPORT

A 30-year-old male patient presented in May 2020 to the emergency department for aggravated dyspnea. On examination, the patient was in poor general condition with visual impairment and right hemiparesis. Pulmonary examination showed decreased breath sounds in both lung fields. The chest radiograph revealed bilateral massive pleural effusion. The patient had a history of a cerebral tumour diagnosed 3 years prior. The histology of the tumour resection confirmed a PCNS-NBL. After surgery, the patient underwent a cerebrospinal irradiation followed by a course of four sessions of chemotherapy based on etoposide and cisplatin. Chemotherapy was interrupted because of drug-induced haematotoxicity, in particular neutropenia and deep anemia requiring several transfusions.

The cytobiochemical analysis of the pleural fluid showed an exudative liquid with 100% lymphocytes. The cytology of the right-side fluid, and the histology of the left-side pleural biopsy confirmed the presence of bilateral malignant neuroblastoma metastases, with infiltration with small rounded cells and high immunostaining with Ki-67 (Figure 1). A full-body scan revealed no sign of local cerebral recurrence, generalized cerebral atrophy, bilateral pleural thickening with

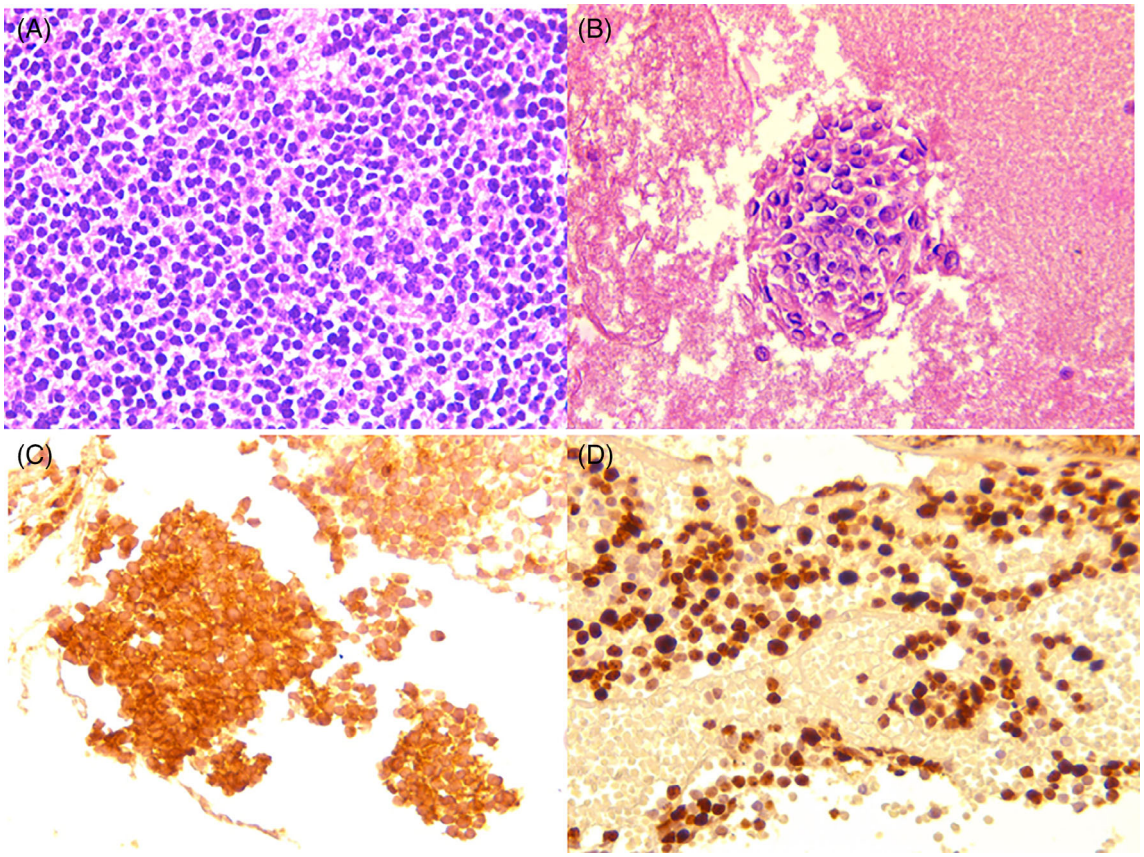

FIGURE 1 Bilateral pleural metastases of cerebral neuroblastoma. (A) Infiltration of the pleura by a high cellular proliferation arranged in a sheet of small rounded cells in a fibrillar matrix (haematoxylin and eosin [HE] ×400). (B) Cytological examination of pleural fluid showed a cluster of small cells with a high nucleus/cytoplasm ratio (HE ×400). (C) Intense immunostaining with synaptophysin. (D) A high level of Ki-67 immunostaining

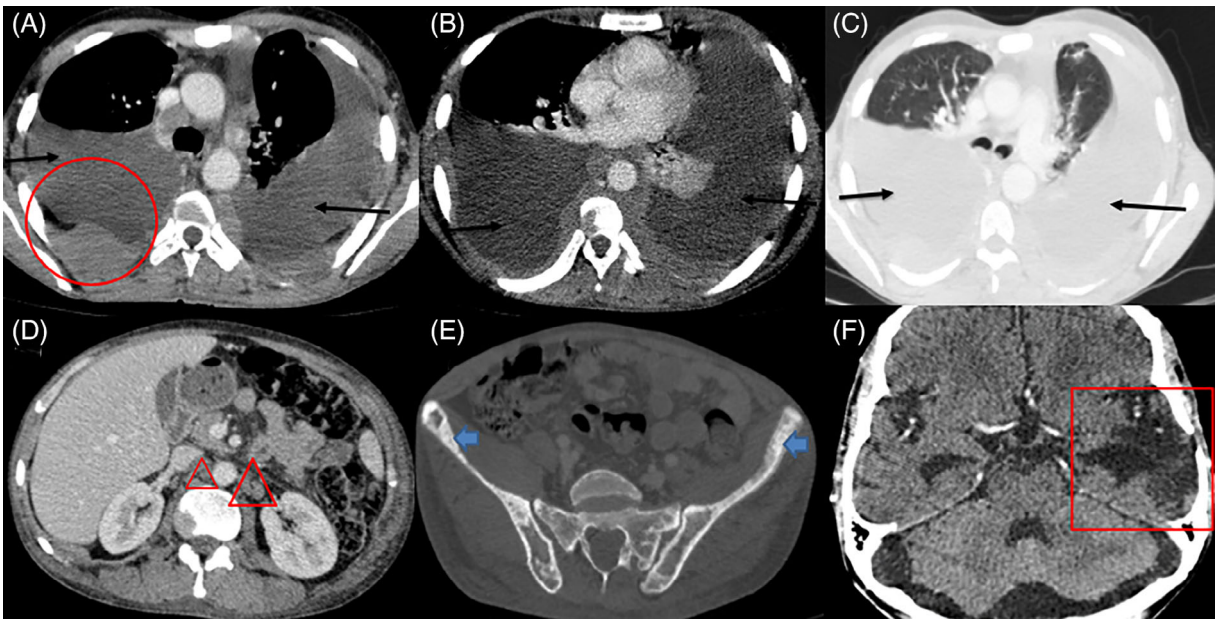

FIGURE 2 Computed tomography (CT) scan. (A, B) Axial CT slices after the injection of contrast product in the mediastinal window. (C) Axial CT slice after the injection of contrast product in the parenchymal window. (D) Axial CT slice after the injection of contrast product at the height of the kidneys. (E) Axial CT slice after the injection of contrast product in a bone window in the pelvis. (F) Axial CT slice of the brain after the injection of contrast product in the parenchymal window. Tumour thickening of the pleural layers (red circle) with bilateral pleurisy (black arrows) associated with multiple adenopathies (red triangles) and bone metastases (blue arrows). There was no parenchymal abnormality of the lungs. The brain control shows a left temporal porencephalic cavity without tumour recurrence on the cerebral level (red rectangle)

bilateral pleurisy, multiple lymphadenopathy and multiple bone lesions (Figure 2).

Considering the poor general condition of the patient and the diffuse metastases, we opted for symptomatic measures with analgesics and iterative thoracocentesis. The patient died in July 2020 following acute respiratory failure.

DISCUSSION

PCNS-NBL is a rare entity. The annual age-adjusted incidence of PCNS-NBL was 0.37 per 1,000,000 persons in 1973 and decreased to 0.12 in 2013.[1] PCNS-NBL rarely occurs in adults; in fact, Lu et al.[1] found that 74.3% of patients were younger than 20 years.

PCNS-NBL is included in a group of rare, poorly differentiated embryonal neoplasm of neuroectodermal origin. It is characterized by poorly differentiated neuroepithelial cells with a fibrillar matrix, Homer Wright rosettes, necrosis and calcifications. Immunohistochemically, the cells can show weak expression of synaptophysin or glial fibrillary acidic protein but Ki-67 immunolabelling is high.[2]

Pleural effusion in neuroblastoma is relatively frequent when the tumour is primarily located in the chest wall, but to our knowledge, this is the first case reported in the world of bilateral pleural metastases of a PCNS-NBL.

A recent review listed bone, bone marrow, liver and skin as the most common sites of metastasis of relapsed PCNS-NBL.[3] In our case, the patient had a relapse with bone, lymph nodes and bilateral pleural metastases 3 years after surgery and adjuvant radio-chemotherapy.

While significant advances in the treatment of extracranial neuroblastoma are made, the therapeutic modalities and survival of PCNS-NBL remain poorly understood because of its rarity. Surgery with the aim of complete tumour resection is the first line of treatment for PCNS-NBL whenever possible.[4] Adjuvant chemotherapy and radiation are frequently prescribed. Multiple chemotherapeutic drugs are considered, the most commonly prescribed are vincristine, lomustine, cisplatin and etoposide.[5] In our case, the patient underwent surgical resection of the cerebral tumour, followed by cerebrospinal radiotherapy, but the chemotherapy was interrupted due to haematological side effects.

The prognosis of PCNS-NBL is poor; the 5-year survival rate is 56.7%.[1] It is difficult to establish predictive factors of survival because it is an uncommon disease; however, younger age, especially infants, ganglioneuroblastoma subtype and surgical treatment were significantly correlated with improved survival, whereas distant metastasis tended to be a negative prognostic factor.[1]

In conclusion, PCNS-NBL is a rare and aggressive malignant tumour. The therapeutic measures are limited and no guidelines are available. To our knowledge, we reported the first case of bilateral pleural metastasis of PCNS-NBL in a young adult patient with a fatal outcome.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Lobna Loued had full access to the case files and takes responsibility for the integrity of the data in the manuscript. Mabrouk Abdelaaly performed and interpreted the imaging. Ahlem Bellalah interpreted the histology of the brain and pleural samples. Asma Migaou, Nesrine Fahem and Rania Kaddoussi helped with the review of the literature. Ahmed Ben Saad, Sameh Joobeur Saoussen Cheikh Mhammed and Naceur Rouatbi contributed substantially to the writing of the manuscript.

ETHICS STATEMENT

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

ORCID

Lobna Loued https://orcid.org/0000-0001-6921-9658
Ahmed Ben Saad https://orcid.org/0000-0001-9841-9210

REFERENCES

1. Lu X, Zhang X, Deng X, Yang Z, Shen X, Sheng H, et al. Incidence, treatment, and survival in primary central nervous system neuroblastoma. World Neurosurg. 2020;140:e61–72.
2. Louis DN, Perry A, Reifenberger G, von Deimling A, Figarella-Branger D, Cavenee WK, et al. The 2016 World Health Organization classification of tumors of the central nervous system: a summary. Acta Neuropathol. 2016;131(6):803–20.
3. Luo LY, Kramer K, Cheung NV, Kushner BH, Modak S, Basu EM, et al. Reduced-dose craniospinal irradiation for central nervous system relapsed neuroblastoma. Pediatr Blood Cancer. 2020;67(9):e28364.
4. Bianchi F, Tamburrini G, Gessi M, Frassanito P, Massimi L, Caldarelli M. Central nervous system (CNS) neuroblastoma. A case-based update [published correction appears in Childs Nerv Syst. 2019 Mar 8]. Childs Nerv Syst. 2018;34(5):817–23.
5. Lannering B, Rutkowski S, Doz F, Pizer B, Gustafsson G, Navajas A, et al. Hyperfractionated versus conventional radiotherapy followed by chemotherapy in standard-risk medulloblastoma: results from the randomized multicenter HIT-SIOP PNET 4 trial. J Clin Oncol. 2012;30(26):3187–93.

How to cite this article: Loued L, Migaou A, Abdelaaly M, Bellalah A, Fahem N, Kaddoussi R, et al. Bilateral pleural metastases of a primary central nervous system neuroblastoma in an adult: First case in the world. Respirology Case Reports. 2021;9:e0829. https://doi.org/10.1002/rcr2.829