Article published online: 2024-05-27

An Adult Case of Medulloblastoma with Multiple Lung Metastatic Lesions—Case Report and Literature Review

Mohammed A. Azab[1]

[1] Cairo University Hospital/University of Utah, Cleveland Clinic Foundation, Cleveland, Ohio, United States

Asian J Neurosurg 2024;19:286–289.

Address for correspondence Mohammed A. Azab, MD, Cairo University Hospital/University of Utah, Cleveland Clinic Foundation, Cleveland, Ohio 10446, United States (e-mail: mohammed.azab@kasralainy.edu.eg).

Abstract

Medulloblastoma (MB) cerebelli is a common brain tumor of the childhood. MB commonly spreads through cerebrospinal fluid; however, there are several reported cases of extracranial spread. The most common sites of extracranial metastasis are bones and bone marrow followed by peritoneum, liver, and lungs. Here, we report a case of pulmonary metastatic lesions of adult cerebellar MB that were discovered 1 year after the primary surgical treatment. We also tried to highlight similar reported cases in the literature.

Keywords

- medulloblastoma
- adult
- leptomeningeal spread
- lung metastasis

Introduction

Medulloblastoma (MB) is a common malignant brain tumor that arises from primitive undifferentiated cells.[1,2] In the pediatric age, it accounts for about more than 15% of all brain tumors.[3] The most common presenting symptoms are headache, nausea, and vomiting.[2] Leptomeningeal seeding or direct extension of the tumor are common ways of intracranial tumor spread. Cerebrospinal fluid (CSF) drop metastases are commonly encountered in MB; besides, it can spread in the basal cisternae and the ventricles.[4] Although it is rare, metastasis outside the central nervous system can occur. Nelson was the first to report a case of extracranial metastasis in a patient with MB.[5] Several cases of extracranial metastasis to different organs as lymph nodes, skull bones, vertebrae, and peritoneum have been reported.[6–8] About 20 to 40% of newly diagnosed MB cases and 70% of cases with recurrent disease develop metastatic lesions.[9,10] High toxicity therapies and whole craniospinal axis irradiation are essential treatment modalities to prevent the extracranial spread of MB. Despite the rare incidence of extracranial metastasis in cases diagnosed with MB, we report a case with a coincident ventricular subependymal and lung metastasis.

Case Presentation

In August 2020, a previously healthy 20-year-old adult presented to the emergency department at King Khalid General Hospital with a 1-month history of headache and vomiting. The patient complained of acute onset of diplopia. Fundus examination showed papilledema grade 3. Computerized tomography (CT) scan showed a posterior fossa lesion with hydrocephalic changes. A ventriculoperitoneal shunt was inserted. Magnetic resonance imaging (MRI) was done and revealed posterior fossa midline lesion. He underwent subtotal resection in September. Postoperatively, the patient recovered uneventfully. Pathology revealed desmoplastic MB with features consistent with atypia. One year after surgical resection, the patient presented to the emergency room with refractory low back pain resistant to treatment. MRI spine showed multiple nodular lesions at the level of L5–S1 suggestive of

article published online
May 27, 2024

DOI https://doi.org/10.1055/s-0044-1787080.
ISSN 2248-9614.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

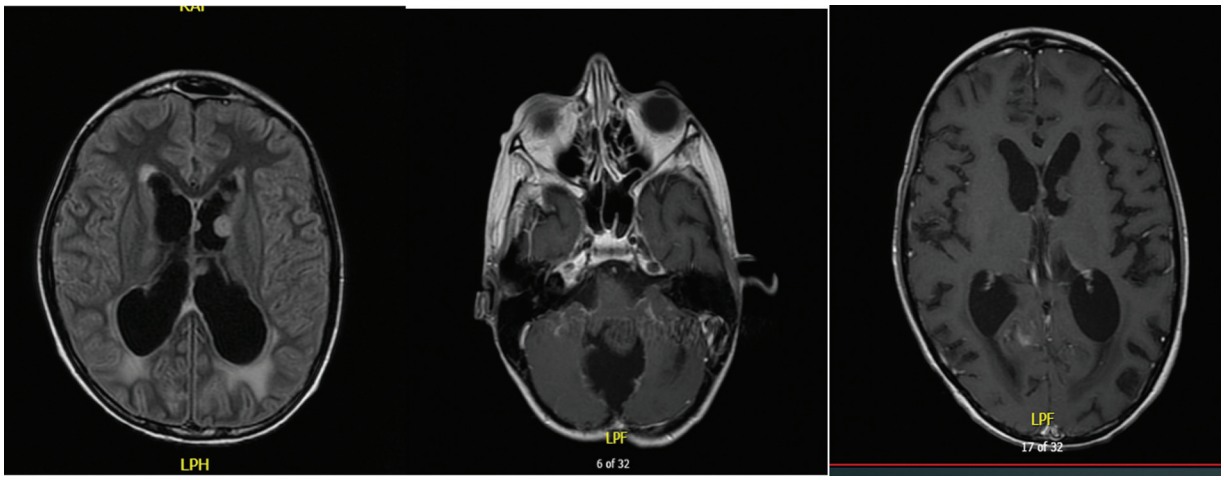

Fig. 1 Magnetic resonance imaging with contrast showing recurrence of a cerebellar medulloblastoma with metastatic subependymal nodules.

drop metastases. MRI brain was also done and revealed increase in the residual tumor size and newly discovered subependymal metastatic nodules (►**Fig. 1**). Brain radiation therapy of 36 Gy followed by an additional dose of 55.8 Gy to his intracranial disease was initiated. A total of eight cycles of cisplatin, vincristine, and lomustine were started. Six months later, there was a progressive increase in the radiological size of the cerebellar lesion with marked increase in the size of the subependymal nodules. We then started bevacizumab, irinotecan, and temozolomide as salvage therapy for relapsing MB that was not effective in reducing the size of the lesions on MRI.

The neurological status continued to worsen and the patient was admitted to the intensive care unit in a regional hospital based on family needs. Two days after admission, oxygen saturation started to drop and reached 85. CT chest was done and revealed multiple chest lesions highly suggestive of being metastatic l (►**Fig. 2**). A CT-guided biopsy revealed the alveolar spaces invaded by small round blue cells characteristic of MB with areas of hemorrhage (►**Fig. 3**). The patient is now intubated on mechanical ventilation. After several discussions with the patient's family, they refused further therapeutic options and the patient died 1 week later.

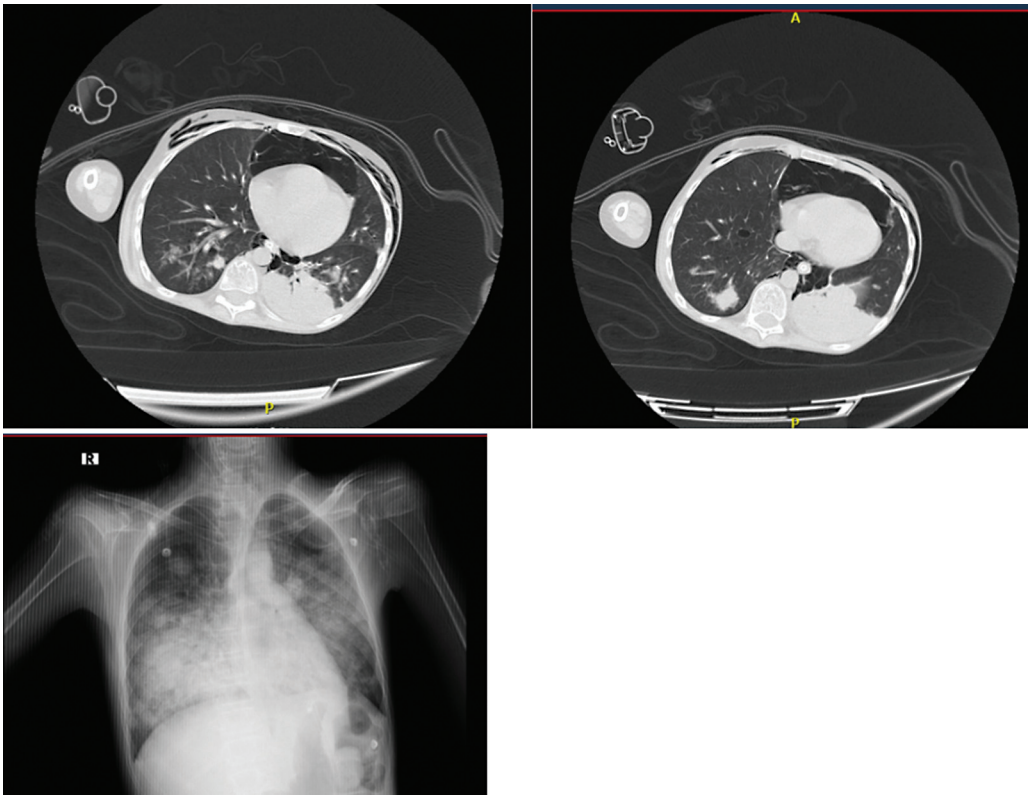

Fig. 2 Computed tomography and X-ray chest showing right lower lobe apical and posterior basal segments multiple nodules of varying sizes in the setting of cerebellar medulloblastoma highly suggestive of metastasis.

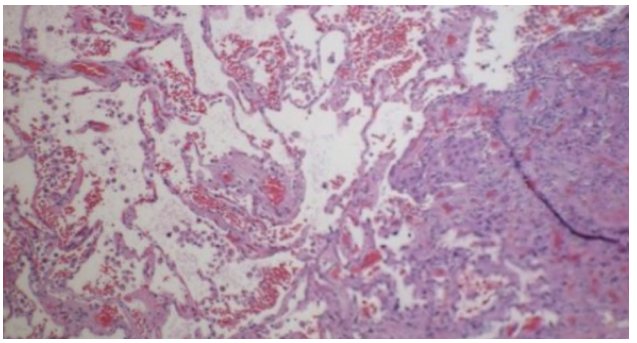

Fig. 3 Computed tomography-guided biopsy of a lung lesion demonstrating the alveolar architecture invaded by round blue tumor cells with areas of hemorrhage characteristic of medulloblastoma.

Discussion

MB usually affects male children and it is considered uncommon in the adult age.[11,12] The World Health Organization classification includes four types: classic, large cell/anaplastic, desmoplastic-nodular, and MB with extensive nodularity.[2] Large cell anaplastic subtype is the most aggressive type with a high tendency for leptomeningeal spread.[2] According to Chang's staging system, the extent of metastasis is categorized into M0 (no metastasis), M1 (presence of MB cells in the CSF), M2 (cerebellar or cerebral subarachnoid space or third or lateral ventricle nodular seeding), M3 (spinal subarachnoid space metastasis), and M4 (metastases outside the craniospinal axis).[13] Classifying MB based on the molecular profiling is more accurate and has a considerable prognostic value.[13]

Metastasis of MB usually occurs through CSF in most cases, while hematogenous spread is extremely rare.[14] Several studies have documented the spread of MB locally to different brain regions as the ventricular system, the occipital pole, and subarachnoid space.[15–17] In this case, we observed intraventricular metastatic nodules and CSF seeding affecting multiple spine levels and the cauda equina. Moreover, after treatment for 1 year, the patient developed several lung lesions that are mostly metastatic. Ghose et al reported a case of MB spreading to the mediastinum.[18] Kochbati et al reported only one case of MB with hepatic metastasis, while Mazloom et al reported pulmonary metastases only in 6% of cases with MB.[9,19] We explored the literature to highlight cases diagnosed with MB with lung metastases (►**Table 1**).

The cure rate for patients with disseminated MB remains poor; nevertheless, approximately 80% of patients with localized MB will be cured following craniospinal radiation therapy and chemotherapy.[24] Adjuvant chemotherapy is of reported benefit for pediatric patients, but its value for adult patients is still undetermined.[11] Therapeutic options for extracranial metastasis in cases with MB still need further research to evaluate the possible benefit of salvage therapy and improve the outcome.

Conclusion

MB is a common pediatric brain tumor, while it is not frequently reported in adults. In this article, we describe

Table 1 Similar cases in literature of MB with lung metastasis

	Year of publication	Type of study	Total number of patients	Number of patients with lung metastatic lesions	CSF shunt	Clinical picture	Treatment	Histopathological type	Genetic phenotype	Postoperative survival period	Time to develop metastases	Reference
Makeever and King	1966	Case report	1	1	Yes	NM	NM	Classic MB	NM	40 days	40 days	20
Smith et al	1969	Case series	8	2	NM	NM	NM	Classic MB	NM	4–83 months	NM	21
Komatsu et al	1980	Case report	1	1	NM	NM	NM	NM	NM	4 months	2.5 years	22
Kato et al	1997	Case report	1	1	No	Dyspnea	NM	Desmoplastic MB	NM	2 months	13 months	23
Ghose et al	2014	Case report	1	1	No	Left true vocal cord paralysis	3 cycles of cisplatin and irinotecan	Classic MB	NM	10 years	10 years	18

Abbreviations: CSF, cerebrospinal fluid; MB, medulloblastoma; NM, not mentioned.

an adult case of MB with massive lung metastases. Further research should be directed to help in early diagnosis of these lesions and prognosis assessment.

Ethical Approval
The research article was approved by the IRB at the Saudi Ministry of Health and the approval number is SA1409.

Patients' Consent
Oral and written informed consent were taken from the patient.

Funding
None.

Conflict of Interest
None declared.

References

1 Ostrom QT, Gittleman H, Truitt G, Boscia A, Kruchko C, Barnholtz-Sloan JS. CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2011–2015. Neuro oncol 2018 20(suppl_4):iv1–iv86. Erratum in: Neuro Oncol. 2018
2 Giordana MT, Schiffer P, Lanotte M, Girardi P, Chio A. Epidemiology of adult medulloblastoma. Int J Cancer 1999;80(05):689–692
3 Johnston DL, Keene D, Kostova M, et al. Incidence of medulloblastoma in Canadian children. J Neurooncol 2014;120(03):575–579
4 Roberts RO, Lynch CF, Jones MP, Hart MN. Medulloblastoma: a population-based study of 532 cases. J Neuropathol Exp Neurol 1991;50(02):134–144
5 Duffner PK, Cohen ME. Extraneural metastases in childhood brain tumors. Ann Neurol 1981;10(03):261–265
6 Varan A, Sari N, Akalan N, et al. Extraneural metastasis in intracranial tumors in children: the experience of a single center. J Neurooncol 2006;79(02):187–190
7 Rickert CH. Extraneural metastases of paediatric brain tumours. Acta Neuropathol 2003;105(04):309–327
8 Campbell AN, Chan HS, Becker LE, Daneman A, Park TS, Hoffman HJ. Extracranial metastases in childhood primary intracranial tumors. A report of 21 cases and review of the literature. Cancer 1984;53(04):974–981
9 Mazloom A, Zangeneh AH, Paulino AC. Prognostic factors after extraneural metastasis of medulloblastoma. Int J Radiat Oncol Biol Phys 2010;78(01):72–78
10 Pasquier B, Pasquier D, N'Golet A, Panh MH, Couderc P. Extraneural metastases of astrocytomas and glioblastomas: clinicopathological study of two cases and review of literature. Cancer 1980;45(01):112–125
11 Fellay CN, Frappaz D, Sunyach MP, Franceschi E, Brandes AA, Stupp R. Medulloblastomas in adults: prognostic factors and lessons from paediatrics. Curr Opin Neurol 2011;24(06):626–632
12 Thomas A, Noël G. Medulloblastoma: optimizing care with a multidisciplinary approach. J Multidiscip Healthc 2019;12:335–347
13 Remke M, Hielscher T, Northcott PA, et al. Adult medulloblastoma comprises three major molecular variants. J Clin Oncol 2011;29(19):2717–2723
14 Eberhart CG, Cohen KJ, Tihan T, Goldthwaite PT, Burger PC. Medulloblastomas with systemic metastases: evaluation of tumor histopathology and clinical behavior in 23 patients. J Pediatr Hematol Oncol 2003;25(03):198–203
15 Mobark NA, Al-Harbi M, Mosleh O, Santagata S, Snuderl M, Abedalthagafi M. A case of molecularly profiled extraneural medulloblastoma metastases in a child. BMC Med Genet 2018;19(01):10
16 Packer RJ, Gajjar A, Vezina G, et al. Phase III study of craniospinal radiation therapy followed by adjuvant chemotherapy for newly diagnosed average-risk medulloblastoma. J Clin Oncol 2006;24(25):4202–4208
17 Kumar S, Handa A, Jha DK, Choudhary A. Supratentorial metastasis of medulloblastoma in adults. Asian J Neurosurg 2016;11(03):320
18 Ghose A, Morris JC, Breneman JC, Essell J, Wang J, Benzaquen S. Medulloblastoma in an adult with late extraneural metastases to the mediastinum. J Investig Med High Impact Case Rep 2014;2(02):2324709614532798
19 Kochbati L, Bouaouina N, Hentati D, et al. Medulloblastoma with extracentral nervous system metastases: clinical presentation and risk factors [in French]. Cancer Radiother 2006;10(03):107–111
20 Makeever LC, King JD. Medulloblastoma with extracranial metastasis through a ventriculovenous shunt. Report of a case and review of the literature. Am J Clin Pathol 1966;46(02):245–249
21 Smith DR, Hardman JM, Earle KM. Metastasizing neuroectodermal tumors of the central nervous system. J Neurosurg 1969;31(01):50–58
22 Komatsu S, Sato T, Katakura R, Sakurai Y, Wada T, Namiki T. [Pulmonary metastasis from cerebellar medulloblastoma–report of a case and review of the cases in the literature (author's transl)]. No Shinkei Geka 1980;8(02):187–191
23 Kato S, Aoki H, Tamura K, Hayashi H, Miyata H, Hori T, Ohama E. Massive lung metastasis from cerebellar medulloblastoma: a report on one case and review of literature. Yonago Acta Med 1997;40:63–72
24 Paulino AC, Mazloom A, Teh BS, et al. Local control after craniospinal irradiation, intensity-modulated radiotherapy boost, and chemotherapy in childhood medulloblastoma. Cancer 2011;117(03):635–641

