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

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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...
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 (►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. 1](image1.jpg)  
**Fig. 1** Magnetic resonance imaging with contrast showing recurrence of a cerebellar medulloblastoma with metastatic subependymal nodules.

![Fig. 2](image2.jpg)  
**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.
Discussion

MB usually affects male children and it is considered uncommon in the adult age. The World Health Organization classification includes four types: classic, large cell/anaplastic, desmoplastic-nodular, and MB with extensive nodularity. Large cell anaplastic subtype is the most aggressive type with a high tendency for leptomeningeal spread. 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). Classifying MB based on the molecular profiling is more accurate and has a considerable prognostic value.

Metastasis of MB usually occurs through CSF in most cases, while hematogenous spread is extremely rare. Several studies have documented the spread of MB locally to different brain regions as the ventricular system, the occipital pole, and subarachnoid space. 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. Chose et al reported a case of MB spreading to the mediastinum. 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. 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. Adjuvant chemotherapy is of reported benefit for pediatric patients, but its value for adult patients is still undetermined. 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

<table>
<thead>
<tr>
<th>Year of publication</th>
<th>Type of study</th>
<th>Total number of patients</th>
<th>Clinical picture</th>
<th>CSF shunt</th>
<th>Treatment</th>
<th>Histopathological type</th>
<th>Genetic phenotype</th>
<th>Postoperative survival period</th>
<th>Time to develop metastases</th>
<th>Postoperative survival period</th>
<th>Time to develop metastases</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makeever and King 1966</td>
<td>Case report</td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td>NM</td>
<td>Classic MB</td>
<td>NM</td>
<td>40 days</td>
<td>40 days</td>
<td>20</td>
<td></td>
<td></td>
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<tr>
<td>Smith et al 1969</td>
<td>Case series</td>
<td>8</td>
<td>No</td>
<td>No</td>
<td>NM</td>
<td>Classic MB</td>
<td>NM</td>
<td>4.83 months</td>
<td>4.83 months</td>
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</tr>
<tr>
<td>Komatsu et al 1980</td>
<td>Case report</td>
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<td>No</td>
<td>No</td>
<td>NM</td>
<td>Desmoplastic MB</td>
<td>NM</td>
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<td>4 months</td>
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<tr>
<td>Kato et al 1997</td>
<td>Case report</td>
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<td>No</td>
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<td>NM</td>
<td>Classic MB</td>
<td>NM</td>
<td>2 months</td>
<td>2 months</td>
<td>23</td>
<td></td>
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<tr>
<td>Ghose et al 2014</td>
<td>Case report</td>
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<td>NM</td>
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<td>10 years</td>
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</table>

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