Scalp Metastasis from Glioblastoma Multiforme: A Case Report and Literature Review

ABSTRACT

Glioblastoma multiforme (GBM) is a common malignant brain tumor that rarely metastasizes extracranially, despite its aggressive clinical course. This report details the case of a young man presenting with a single subcutaneous localization of GBM that arose six months after initial surgery and recurred after excision. Only six other cases of scalp metastasis of GBM following surgery have been described in the literature, each with peculiar features. Whenever feasible, surgery is the most effective way to obtain local control of disease. However, a correct approach must be carefully planned to minimize the risks of recurrence and wound dehiscence.
Glioblastoma multiforme (GBM), a grade IV glioma, is the most common primary brain malignancy. Progression of GBM is usually very rapid and prognosis remains poor, with an average overall survival (OS) of less than 15 months, despite combined surgical, pharmacological, and radiotherapy (RT) treatment. GBM metastases are an extremely rare occurrence; however, sporadic cases have been reported over the years. Cutaneous and subcutaneous metastases may often be secondary to surgical seeding, as seen with other systemic malignancies. This report details a rare case of postsurgical subcutaneous metastasis from GBM, arising adjacent to the surgical wound.

Case Report

A 27-year-old male patient came to our attention for recurrence of a subcaneous localization of GBM. Eleven months prior, he had undergone microsurgical excision of a left temporal tumor, which was confirmed to be GBM on histopathology. Surgery was followed by the Stupp protocol and then by seven cycles of adjuvant therapy with temozolomide.

Six months after surgery, the patient presented with a rapidly growing firm subcutaneous nodule adjacent to the scar in the left frontal region. The nodule increased in volume during a two-month follow-up and showed strong enhancement on MRI. The lesion was excised under local anesthesia through a small skin incision, performed directly above the nodule. Histology revealed it to be a GBM metastasis. No metastatic dissemination to other areas of the head and neck was detected by postsurgical imaging. After a couple of months, during which chemotherapy was continued, the subcutaneous nodule recurred. At this stage, the patient was referred to our center.

After collegial evaluation by neurosurgeons, neuro-oncologists, and radiotherapists, a second surgical procedure was programmed, since radiotherapy was deemed ineffective for local disease control. Preoperative planning included a CT scan, which showed slight bone erosion under the nodule (Fig. 1). There was no clear evidence of dural involvement on MRI. Since the previous operation had been unsuccessful at achieving adequate local control, we chose to pursue a radical approach. After evaluation by a plastic surgeon, we concluded that removing the nodule with the overlying skin and attempting a reconstructive flap would cause high risk of dehiscence because of previous operations and radiotherapy. To intraoperatively visualize the full extent of infiltration, we decided to use five-aminolevulinic acid (5-ALA) fluorescence.

Under general anesthesia, the anterior third of the previous fronto-temporal flap was incised (Fig. 2). The subcutaneous nodule was visualized and resulted
strongly fluorescent under blue light (positive for 5-ALA uptake) (Fig. 3). The lesion was excised en bloc (dimensions of 4×3×2 cm), preserving the dermis. With the aid of 5-ALA fluorescence, involvement of the bone flap and of the underlying dura mater was noted; craniectomy and excision of the dura mater were thus performed. There were no signs of tumor infiltration of the brain. Duraplasty and cranioplasty were finally performed, taking care not to use any surgical instrument that had come into contact with the tumor. Histology proved the lesion to be GBM and confirmed involvement of the bone and of the dura.

At one-month follow-up, MRI documented no sign of tumor recurrence (Fig. 4). Chemotherapy with temozolomide was resumed and radiotherapy (RT) of the surgical bed was programmed.

Discussion

GBM metastases to extracranial sites are an extremely rare occurrence. Visceral localizations have sporadically been described, and only a small number of scalp metastasis have been reported in the literature. Interestingly, all of the reported cases of scalp metastases followed surgery or stereotactic biopsy, suggesting that such eventualities are iatrogenic. Some reports describe GBM seeding to scalp tissues through stereotactic biopptic procedures. To our knowledge, only six case reports are present in the literature concerning GBM scalp metastases occurring after surgery (Table I).

Figure 3. The subcutaneous nodule (a) as seen on the surgical field; (b) as seen under blue light (400 nm) through the intraoperative microscope. Pink hue given from 5-ALA fluorescence is evident.

Figure 4. (a) Preoperative and (b) postoperative MRI.

Figueroa et al. describe the case of a 34-year old male presenting with a large scalp metastasis near the surgical wound. An incision biopsy was performed and, once diagnosis of GBM was confirmed, the nodule was excised. The residual defect was corrected with a fasciocutaneous scalp flap. At the time of death, three months after the operation, multiple cutaneous scalp metastases had recurred. Santos et al. describe a long-term GBM survivor with multiple cutaneous and subcutaneous metastases along the surgical incision, occurring three years after the first craniotomy and 18 months after the second. Allan reports multiple scalp metastases in a 60-year old male, who was not eligible for surgical treatment. Jain et al. detail the case of a 49-year-old male with a single nodule adjacent to the scar that was excised surgically. Saad et al. report the only pediatric case present in the literature. A 13-year-old boy with GBM developed metastases to the skin and soft tissues of the temporal area, the leptomeninges, the lungs, and the liver. Surgery of the metastases was deemed unfeasible, and, therefore, chemotherapy alone was continued until clinically reasonable. Finally, Mentrikoski and colleagues describe the case of an ulcerated cutaneous/subcutaneous nodule; in the same paper, the case of a 41-year-old male with two scalp lesions deriving from an anaplastic oligodendroglioma is presented.

Due to paucity of reported cases, no general implication can be drawn with certainty. No single definite clinical or histologic characteristic seems to occur in all reported cases. Although no secondary lesion was detected before six months from surgery, there does not appear to be a typical time of presentation. As for clinical management, a
A correct approach must be planned to minimize the risk of wound dehiscence due to inadequate vascularity. Complete wound healing is essential to perform adjuvant RT, especially when the area has already undergone previous RT. In consideration of the rapid growth rate of GBM, even in extracranial localizations, surgery must be timely. As always, the goal must be maximal safe resection of the lesion, which can be achieved with the help of all of the instruments the surgeon usually has available. In our case, we decided to use 5-ALA fluorescence, which proved to be extremely valuable.

Table I
Reported cases of GBM scalp metastasis

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>N° of scalp mts</th>
<th>Time of occurrence</th>
<th>Treatment</th>
<th>Follow-up</th>
<th>Reference</th>
</tr>
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<tbody>
<tr>
<td>60</td>
<td>M</td>
<td>Multiple</td>
<td>12 mo</td>
<td>Palliation</td>
<td>Deceased after 2 mo</td>
<td>8</td>
</tr>
<tr>
<td>34</td>
<td>M</td>
<td>Multiple</td>
<td>7 mo</td>
<td>Surgery</td>
<td>Multiple recurrences at 3 mo (death)</td>
<td>9</td>
</tr>
<tr>
<td>49</td>
<td>M</td>
<td>Single</td>
<td>10 mo</td>
<td>Surgery</td>
<td>Deceased after 2 mo</td>
<td>10</td>
</tr>
<tr>
<td>58</td>
<td>F</td>
<td>Single</td>
<td>11 mo</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>13.5</td>
<td>M</td>
<td>Single</td>
<td>6 mo</td>
<td>Palliation</td>
<td>Deceased after 4 mo</td>
<td>12</td>
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<tr>
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<td>Multiple</td>
<td>38 mo</td>
<td>Surgery</td>
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<td>13</td>
</tr>
<tr>
<td>27</td>
<td>M</td>
<td>Single</td>
<td>6 mo</td>
<td>Surgery</td>
<td>-</td>
<td>Index case</td>
</tr>
</tbody>
</table>

*Time of occurrence refers to primary surgical procedure.

**CONCLUSION**

Subcutaneous metastases of GBM are a rare occurrence that can represent a clinical and surgical challenge. Even if extremely rare, diagnosis must be timely to allow for radical surgical excision. To achieve a maximal resection with good wound healing, accurate preoperative planning should be carried out. Moreover, we underline the importance of using the most correct surgical technique to avoid tumor seeding whenever dealing with GBM.

**AUTHORS’ DISCLOSURES**

The authors have no conflicts of interest to disclose.

**REFERENCES**


