Rapid Progression of Primary Glioblastoma to the Maxillofacial Area in a 29-year-old Woman

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ABSTRACT

Introduction: Glioblastoma is one of the most common and most aggressive malignant primary tumors of the central nervous system which originates in astrocyte cells accounting for ~12 to 15% of all intracranial neoplasms. Its development to extracranial areas is very rare, occurring in <2% of patients. Very few cases (<200) of extracranial metastases have been reported so far. Despite advances in treatment of GBM, the prognosis is poor with an average survival time of about 14 months.

Aim: The aim of the study is to present the spread of glioblastoma multiforme (GBM) to the extracranial area.

Case report: A 29-year-old woman suffering from severe headaches revealed a history of brain surgery due to GBM in the temporal area 5 months ago.

Conclusion: With regard to this, extracranial metastasis of GBM is rare and the nature of the lesion is not well defined; therefore, the treatment for patients is not favorable and their survival is short (after metastasis). The spread of GBM to the extracranial area is rare, only seen in 0.4 to 2% cases. The spread of the tumor is often to the lungs, pleural cavity, chest, and lymph nodes and, less frequently, to bone and liver. Glioblastomas often occur in people of 50 to 60 years, and the incidence is slightly higher in men (1–1.5). Despite extensive treatment (surgery, radiation, and chemotherapy) carried out on these patients, the lesion recurrence is high due to the nature of the infiltrative growth of GBM, and survival of patients is estimated to be about 12 months. Diagnosis of GBM is done via microscopic findings, including cell proliferation and blood vessels, cell and nucleus polymorphism, necrosis, mitotic figures, and intravascular thrombosis. The tumor markers express glial fibrillary acidic protein (GFAP) and are S100 positive and the marker KI67 has over 10% of tonality. In this article, we present the case of a 29-year-old woman who developed GBM in the maxillofacial area.

INTRODUCTION

Brain tumors include an abnormal mass in the brain that may be benign or malignant in the brain cavity or in the spinal cord. Brain tumors are not inherently fatal. However, GBM is the most common primary brain tumor of astrocytic origin that affects adults between the ages of 50 and 70. Based on the World Health Organization classification, this tumor has been identified as a grade IV tumor, which includes 5.7% of all types of brain tumors. The tumor was malignant in terms of cell structure and had numerous mitotic divisions with necrosis, which causes rapid growth and metastasis to the surrounding tissue. The spread of GBM to the extracranial area is rare, only seen in 0.4 to 2% cases. The spread of the tumor is often to the lungs, pleural cavity, chest, and lymph nodes and, less frequently, to bone and liver. Glioblastomas often occur in people of 50 to 60 years, and the incidence is slightly higher in men (1–1.5). Despite extensive treatment (surgery, radiation, and chemotherapy) carried out on these patients, the lesion recurrence is high due to the nature of the infiltrative growth of GBM, and survival of patients is estimated to be about 12 months. Diagnosis of GBM is done via microscopic findings, including cell proliferation and blood vessels, cell and nucleus polymorphism, necrosis, mitotic figures, and intravascular thrombosis. The tumor markers express glial fibrillary acidic protein (GFAP) and are S100 positive and the marker KI67 has over 10% of tonality. In this article, we present the case of a 29-year-old woman who developed GBM in the maxillofacial area.

CASE REPORT

A 29-year-old woman suffering from severe headaches, fatigue, and dizziness was referred to Imam Hospital in Ilam 8 months ago. The patient revealed a history of brain surgery due to GBM in the temporal area 5 months ago. Computed tomography (CT) and magnetic resonance imaging scans were administered to the patient for further evaluation. The CT showed a localized mass in the left temporal, which extends from the bone flap surgery to the left temporal region and then around the oculor orbit and upper part of the zygomatic arch (Fig. 1). The patient underwent surgery and the mass was completely removed. In the laboratory analysis, a gray noncapsule mass with hemorrhagic spots was observed and yellowish liquid was seen after incision.
Microscopic evaluations showed cell proliferation with an aplastic nuclear atypia (bizarre nuclei), cellular pleomorphism, coagulation necrosis, microvascular proliferation, intravascular thrombosis, and mitotic activity, which suggested a GBM diagnosis for the patient (Fig. 2). Glial fibrillary acidic protein and S100 protein were done for final verification of the lesion and the immunohistochemistry results were expressed by tumor cells (Fig. 3). After that the patient was referred to an oncologist; radiotherapy and chemotherapy using temozolamid were done. Unfortunately, the patient passed away after 2 months.

This report is prepared with the patient’s consent.

DISCUSSION

Glioblastoma multiforme is the most common aggressive brain tumor (about 15% of all intracranial tumors) in adults, with poor prognosis. Patients with GBM have an average survival time of about 14 months. The GBM metastases outside the central nervous system (CNS) are rare (occurring in <2% of all GBMs). The GBM metastasize to meninges or spinal cord through cerebrospinal fluid (CSF). The patient introduced in this study was a 29-year-old woman with development of glioblastoma in the maxillofacial space.
Tumor expansion occurs mostly in men at age 50 to 60 years. The patient in this study, a 29-year-old female, has been reported because of the rarity of the condition.

Clinical manifestations of GBMs include: headache, dizziness, ataxia, nausea, and vomiting but they are not pathognomonic for GBM and are seen in other diseases as well. Our patient had headache and dizziness.

Radiographically, CT scan can demonstrate the tumor and its expansion. The CT view can be similar to other brain lesions, such as infarction, hemorrhage, multiple sclerosis, and brain abscesses.

Magnetic resonance imaging showed the extension and edema around of the tumor and it is much more sensitive than CT. After surgery, patient with GBM can be evaluated for recurrent tumors using positron emission tomography.

Grossly, appearance of lesion showed regions of necrosis and hemorrhage in the superficial, and it can have apparent pseudocapsule. In cut section, usually a yellow necrotic area is seen. These characteristics were also seen in our patient’s lesion.

Microscopically, it is characterized by the presence of cell types, such as karyorrhectic cells, epithelioid cells, granular cells, lipidized cells, and macrophages. Proliferation of cells with nuclear atypia and cellular pleomorphism was also seen. Mitotic activity, coagulation necrosis area, microvascular proliferation, thickened vascular walls, pseudopalisading necrosis were seen in most cases. The formation of structures of Scherer, glandular, or ribbon-like was rarely seen too.

Assessments indicate that tumor grade, tumor location, patient age (mostly younger), surgery, and shunt of CSF play an important role in the incidence of extracranial extension glioblastoma.

Glioblastoma occurred in two forms: primary (de novo) and secondary (previous low-grade astrocytomas) types. The secondary type is more common in younger ones. In this study, we present a patient with GBM together with extra-CNS metastasis that helps to know corresponding risk factors and extracranial/extra-CNS GBM metastases.

Occurrence of GBM metastases extracranial is rare (about 10% of all brain tumors) in patients before surgery. Craniotomy can be the cause of disease spread and mostly tumor cells developed during the invasive procedure. In our cases, seeding of tumor cells occurred from zygomaticotemporal suture to maxillofacial region (zygomatic process and orbital) 5 months after craniotomy. However, researchers reported cases of a scalp metastasis within the soft tissue, away from the craniotomy site, such as distal limb, pancreas, spleen, liver, and lung. In one report, anterior temporal GBM tumor invaded to sphenoparietal sinus along the greater sphenoid wing causing initial craniotomy after several months which is similar to our case.

Extracranial extension glioblastoma tumors occur rarely for several reasons: (1) the absence of lymphatic vessels in the brain; (2) brain sinus structure and number of small pores and direct pathways in the brain; and (3) the blood–brain barrier due to basement membrane structure, reduction of vascular pore, and intercellular tight connections that minimize the exchanges. With regard to these, it could be expected that when patients are undergoing craniotomy surgery, glial cells will be available for blood vessels outside brain parenchyma and can quickly spread in the extracranial area.

If the patient has a direct shunt CSF, the chance of developing glioblastoma increases. Despite these findings, there is no history of surgery or the use of cerebrospinal shunt in some patients with extracranial extension glioblastoma; in these cases, the reason for the intrusive nature of the lesions remains unknown. Glial cells, particularly astrocytes surrounding CNS blood vessels, quickly lose their structure due to disorders caused by cell division and extracellular matrix changes and become an aggressive type which can be able to cross the vessel wall.

The results of a study carried out by Muller et al showed that of 141 patients with glioblastoma, 29 patients had circulating cells, and no evidence of the lesion incidence was seen.

Some researchers believe that dissemination of glioblastomas occurs after radiotherapy for craniopharyngioma (pilocytic astrocytoma, medulloblastoma), but our case had no history of radiotherapy. Research findings by using reverse transcription-polymerase chain reaction, immunocytochemistry, and enzyme-linked immunosorbent assay indicated that the expression of vascular endothelium-derived fibronectin stimulated glioma cell migration that can be inhibited by fibronectin-blocking antibody. The findings of some studies showed that by implantation of tumor cells out of the CNS through differentiation by immune cells, tumors can be formed so it seems host immune system control plays an important role in GBM metastasis. Results of another study indicated genetic variations can be effective in GBM metastases, such as TP53 mutations, CDKN2A/p16 deletions, epidermal growth factor receptor, or amplifications and allelic losses of chromosomes 1p, 10q, and 19q.

The Malignancies Research Committee (DTAC) suggests that tumors of low-grade (I, II) glioblastoma have little propensity to develop than high-grade tumors (III, IV). Because the rarity of GBM spread extracranial prognosis is unknown and ideal treatment for GBM metastatic is still incomplete, however, research results demonstrated optimal treatment for patients with GBM.

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as surgery, radiation (54–60 Gy in 1.8–2.0 Gy), chemotherapy (temozolomide, procarbazine, vincristine), and cerebrospinal shunting.²,³,⁷ Our patient with GBM metastasis to the maxillofacial region received treatment with temozolomide + bevacizumab (in combination) and unfortunately patient passed away after 2 months.

Despite standard and advanced treatments for this tumor, the prognosis is very poor.⁴

CONCLUSION

Therefore, extracranial metastasis of GBM is rare and the nature of the lesion is not well defined; for this reason the treatment for patients is not favorable and their survival is short (after metastasis). Since the molecular and genetic factors in metastatic GBM may have a key role, these markers can be used as future therapeutic goals. We hope that further research can be done to treat these patients, leading to increased survival and improved quality of life.

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REFERENCES