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Letter to Editor

Intracranial collision tumor of glioma and metastatic small cell lung cancer: A case report

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To the Editor,

A collision tumor is a rare entity consisting of two distinct tumors in the same anatomic location. It is critical for pathologists to identify the different components in collision tumors, especially when two tumors need different treatment strategies.[1]

Herein, we report a rare case of intracranial collision tumor with confirmed metastatic small cell lung cancer (SCLC) and low-grade glioma. A 55-year-old male patient, presented with progressive dizziness and gait disturbance for one month. Imaging examinations identified a mass measuring 25 mm in the right temporal lobe. A surgical resection was performed. Upon microscopic examination, the tumor was found to consist of numerous small cells. The tumor cells had scant cytoplasm, as “oat-like” or “lymphocyte-like”, and frequent mitoses could be observed (Fig. 1a). Additionally, there was a moderate proliferation of glial cells in the surrounding tissue. A malignant small blue round cell tumor was considered, and metastasis could not be ruled out. The immunohistochemistry showed that tumor cells were positive for CK, TTF-1, synaptophysin, INSM1, p53, and were negative for vimentin, GFAP, Olig2, NeuN, CD3, and CD20 (Fig. 1b–e). The Ki-67 index was 80 %. Accordingly, lymphoma, glioma, and soft tissue tumors were dismissed, and metastatic SCLC was diagnosed, with further assistance of CT scanning.

During the evaluation of immunostaining, we noticed that NeuN was completely absent in surrounding brain tissues, in which glial cells were positive for GFAP and Olig2 (Fig. 1d and e). In addition, despite the mild hypercellularity of glial cells, microcystic changes and perivascular pseudorosettes were evident focally (Fig. 1a). These histological features are common diagnostic clues for the low-grade glioma. Therefore, we conducted further glioma-related genetic testing to exclude the presence of a low grade glioma. To our surprise, the *IDH1* R132H mutation (Fig. 1f) and *MGMT* promoter methylation were detected, and no other glioma-related gene alterations were detected, such as 1p/19q co-deletion, *CDKN2A/B* deletion, *TERT* mutations, *IDH2* mutations, etc. The *IDH1* R132H mutation is the hallmark genetic alteration in the tumorigenesis of glioma, and is the most prevalent mutation in glioma.[2] Although *IDH1* R132H can also be identified in other types of cancer such as acute myeloid leukemia and chondrosarcoma, to date, no reports have shown SCLC harboring this mutant. The MGMT promoter methylation, a common genetic alteration in both SCLC and glioma, has no diagnostic roles but can serve as a predictive biomarker of benefit from temozolomide chemotherapy.[3] Based on the genetic and histological data, a diagnosis of astrocytoma, IDH-mutant, WHO grade 2, was confirmed. The final diagnosis was revised as an intracranial collision tumor of low-grade astrocytoma and metastatic SCLC. According to the diagnosis, temozolomide was added to the chemo-radiotherapy strategy. The patient was followed up for nine months post-surgery without recurrence.

In this case, the mere histological features and immunohistochemical staining were insufficient to definitively distinguish between a coincidental collision tumor, and a reactive proliferation resulting from tumor metastasis. Molecular pathology testing provided crucial evidence in this scenario to ascertain the nature of the lesion.

Author contributions

Tangbo Zhang: Conceptualization, Methodology and Writing-Original draft preparation. Liang Wang: Visualization, Investigation and Editing.

Availability of data and materials

The datasets supporting the conclusions of this article are included within the article.

Ethical approval and consent to participate

Ethical approval for this study was obtained from the institutional ethics review boards of China Medical University. Writing consent to participate was provided by the patient's guardian for the present research.

Patient consent for publication

Informed consent was obtained from the patient's guardian for the publication of this case and any accompanying images. The copies of the written consents are available for review by the Editor-in-Chief of this journal.

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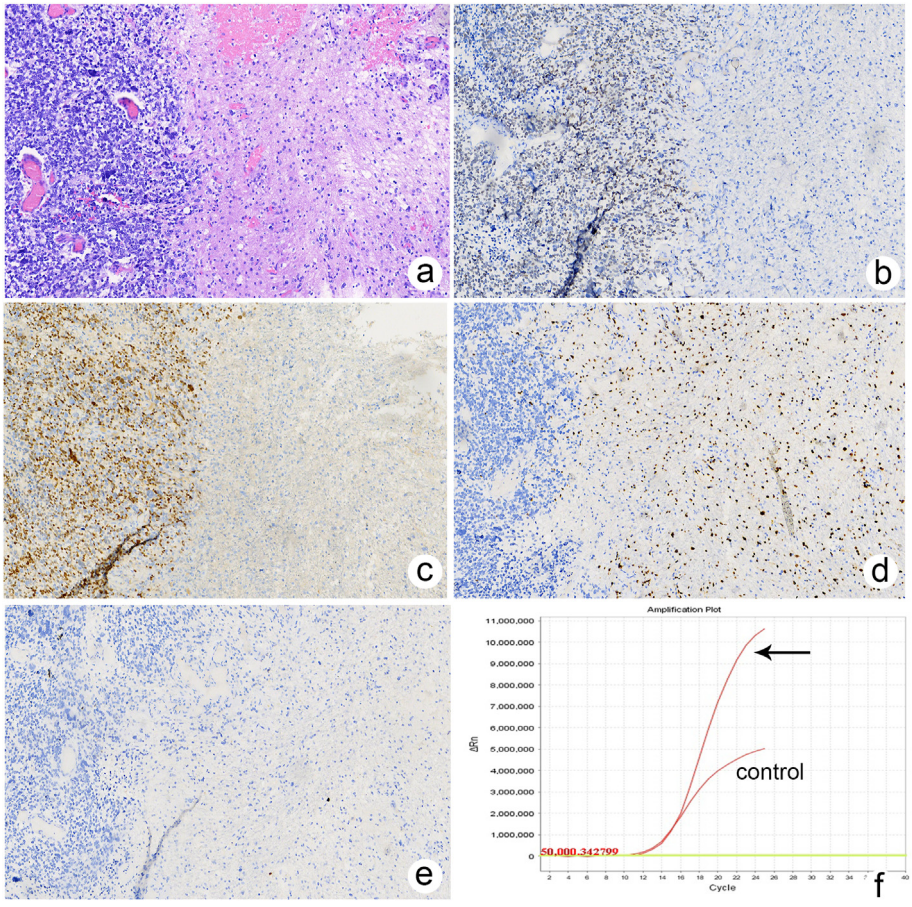

Fig. 1. The histological features, immnostains, and genetic analysis of the collision tumors.
Metastatic SCLC is observed to collide with a glioma, with the SCLC situated on the left side and the glioma on the right (a). TTF-1 (b) and INSM1 (c) were positive in metastatic SCLC, while they were not reactive in the glioma component. Olig2 (d) was diffusely expressed in the glioma, but not in metastatic SCLC. NeuN (e) was totally absent in both regions. Quantitative reverse-transcript Polymerase chain reaction revealed *IDH1* R132H mutations (f, arrow).

Declaration of competing interest

The authors declare that they have no competing interests.

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Not applicable.

Abbreviation

SCLC	small cell lung cancer
CT	Computed Tomography
CK	Cytokeratin
TTF-1	Thyroid Transcription Factor-1
GFAP	Glial Fibrillary Acidic Protein
Olig-2	Oligodendrocyte Lineage Transcription Factor 2
INSM1	Insulinoma-associated protein 1
IDH1	isocitrate dehydrogenase isoform 1
IDH2	isocitrate dehydrogenase isoform 2
NeuN	neuronal nuclei
MGMT	O(6)-Methylguanine-DNA Methyltransferase
TERT	Telomerase Reverse Transcriptase

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