Adult Intracranial Gliofibroma: A Case Report and Review of the Literature

Ho Kang, M.D.,1 Jin Wook Kim, M.D.,1 Young-Bem Se, M.D.,1 Sung-Hye Park, M.D.2
Departments of Neurosurgery,1 Pathology,2 Seoul National University Hospital, Seoul, Korea

Gliofibroma is an extremely rare biphasic tumor with an astrocytic and benign mesenchymal component, which commonly occurs within the first two decades of life. The exact biological behavior of the tumor is not fully understood. Therefore, it is not listed as a distinct entity in the current World Health Organization classification of central nervous system tumors. Here, we describe a rare case of gliofibroma, which was located on the medial temporal lobe of a 61-year-old woman. Preoperatively, we misdiagnosed it as a meningioma because it was a well-demarcated and well-enhanced extra-axial mass with calcification and bony destruction. On the histopathological and immunohistochemical examination, the tumor consisted of a mixture of glial tissue and mesenchymal tissue and it was finally diagnosed as a gliofibroma. To our knowledge, this case of intracranial gliofibroma is in the oldest patient ever reported.

Key Words: Gliofibroma · Intracranial tumor.
abnormality on intraoperative neuromonitoring during surgery. Immediately after surgery, she presented right peripheral-type facial palsy Grade IV according to the House-Brackmann grading system and mild hypesthesia along the dermatome of the trigeminal nerve maxillary branch.

The tumor tissue was fixed in formalin and embedded in paraffin. Hematoxylin and eosin stain, the Masson trichrome stain and a few immunohistochemical stain using several monoclonal antibody were performed. Under the light microscope, the tumor was seen composed of spindle-shaped cells with prominent blood vessels and abundant intercellular collagen deposits (Fig. 2A, B). Spindle-shaped cells were presumed to be glial cells (Fig. 2C). Mitotic count was less than 1 per 10 high-power fields. There was no necrosis, prominent nucleoli, or microvascular proliferation. Immunostaining by antibody Ki-67 was almost negative, because the labeling index was below 0.5% (Fig. 2D).

The other specific immunohistochemical staining was negative for epithelial membrane antigen, and positive for vimentin and S-100.

Electromicroscopy revealed individual tumor cells surrounded by abundant collagen and nuclei of tumor cells were oval to elongated (Fig. 2E). Ultimately, the tumor was diagnosed as a gliofibroma.

The patient received no additional radiotherapy or chemotherapy, and was regularly followed up until 4 years after surgery. Although she had recovered facial motor function to House-Brackmann Grade II palsy, facial hypesthesia never fully recovered. Until the last serial follow up MR, there had been no tumor growth.

**DISCUSSION**

The detailed clinical information for a total of 32 patients published to date is shown in Table 1. Although there is no clear con-
sensus about this rare tumor concerning tumorigenesis, biological behavior, and prognosis, some common characteristics in the clinical, radiological, and histopathological aspects were found.

First, gliofibromas have a tendency to affect children more than adults despite unknown predilection age. Among 32 patients, only six (19%) including our patient were over 20 years old. There were only three middle-aged patients more than 40 years old. A female predominance of 2 : 1 has been noted by analysis of previous reports. Furthermore, the majority of gliofibromas, with the exception of five cases in the infratentorial area and seven cases in the spinal cord, had a supratentorial location, although the tumor has been described as arising in both supratentorial and infratentorial areas.

Second, some reports described radiological characteristics of gliofibromas, although no specific radiological features allowed a preoperative diagnosis of gliofibroma. CT shows a well-demarcated mass with heterogeneous or homogeneous contrast enhancement. On MR images, gliofibromas appear to have various signal intensities including iso- to hyperintense on T1WI, and hypo- to hyperintense on T2WI. T2WI in our case showed an isointense mass with partially hyperintense regions. In particular, such low signal intensity on T2WI is thought to result from the reflection of the dense connective tissues as one of the peculiar characteristics in gliofibromas. Because these radiological

Table 1. Clinical findings of gliofibroma published in the literature

| Author/reference | Year | Age (years)/sex | Location | Surgery | Adjuvant therapy | FU/clinical outcome |
|------------------|------|-----------------|----------|---------|------------------|--------------------|
| Intracranial gliofibromas | | | | | | |
| Friede | 1978 | 3.9/F | Medulla oblongata | Autopsy | Ch+RT | 3 m/died |
| Reinhardt and Nahser | 1984 | 16/F | Rt temporal lobe | GTR | None | 6 m/alive |
| Bonin et al. | 1990 | 32/F | 4th ventricle | Biopsy | NA | NA |
| Snipes et al. | 1991 | 2 m/F | Thalamus/posterior fossa | PR | None | 16 m/alive |
| Vazquez et al. | 1991 | 11 m/F | Rt temporal lobe | PR | None | 2 yr/alive |
| Schober et al. | 1992 | 18/M | Rt frontal lobe | GTR | NA | NA |
| Iglesias et al. | 1992 | 1.2/F | Lt frontoparietal lobe | GTR | None | 18 m/alive |
| Rushing et al. | 1993 | 6 m/F | 4th ventricle | GTR | None | 2 yr/alive |
| Cerda-Nicolas and Kepe | 1993 | 9/M | Lt frontoparietal lobe | GTR | NA | 5.5 m/alive |
| Caldemeyer et al. | 1995 | 8/M | Temporal lobe | Biopsy | Ch | NA |
| Prayson | 1996 | 3 m/M | Lt frontotemporal lobe | PR | None | 3 m/alive |
| Mölenkamp et al. | 1998 | NA | NA | NA | NA | NA |
| Sharma et al. | 1998 | 10/M | Temporal lobe | GTR | None | 3 m/alive |
| Kim et al. | 2003 | 25/M | Lt parietal lobe | GTR | None | 2 m/alive |
| Suarez et al. | 2004 | NA | NA | Biopsy | Ch | 3 yr/alive |
| Erguvan-Onal et al. | 2005 | 16/M | Lt parietal lobe | GTR | None | 14 m/alive |
| Deb et al. | 2006 | 15/NA | Brain stem | GTR | None | NA |
| Goyal et al. | 2007 | 8/M | Rt temporoparietaloccipital lobe | PR | Ch+RT | 1 yr/alive |
| Sarkar et al. | 2009 | 3 m/F | Lateral ventricles | Biopsy | None | 10 yr/alive |
| Altamirano et al. | 2011 | 7/F | Thalamus/mesencephalon | PR | Ch+RT | 4 m/alive |
| Gargano et al. | 2013 | 10.7/F | Lt frontoparietal lobe | GTR | Ch+RT | 2 yr/alive |
| Present case | 2015 | 61/F | Rt medial temporal lobe | PR | None | 4 yr/alive |
| Spinal gliofibromas | | | | | | |
| Budka and Sunder-Plasmann et al. | 1980 | 45/F | Spinal cord | GTR | | 1 yr/alive |
| Iglesias et al. | 1984 | 11 d/M | Spinal cord | GTR | None | 4 yr/alive |
| Vazquez et al. | 1991 | 9/F | Spinal cord | PR | RT | 19 m/alive |
| Sharma et al. | 1998 | 24/F | Spinal cord | PR | None | 2 yr/alive |
| Matsumura et al. | 2002 | 12/F | Spinal cord | GTR | NA | 2.9 yr/alive |

*After second surgery. NA : not available, Rt : right, Lt : left, d : days, m : months, yr : years, GTR : gross total resection, PR : partial resection, Ch : chemotherapy, RT : radiotherapy*
findings include an extra-axial location, preoperative radiological misdiagnosis as a meningioma has been reported, as was the case in our patient.

The most peculiar characteristics of gliofibromas are in the histopathological findings. Gliofibromas have peculiar ‘biphasic’ features composed of glial and mesenchymal components. In our patient, the tumor clearly showed a similar biphasic appearance of mixed fibrillar astrocytes and mesenchymal components. For this reason, gliofibromas should be distinguished from other collagen-producing CNS neoplasms such as gliosarcomas and desmoplastic infantile astrocytomas or gangliogliomas (DIA/DIG). However, gliofibromas can be distinguished in several histopathological aspects. Although DIA/DIG have a prominent desmoplastic component similar to gliofibromas, it is usually a benign cystic tumor located on the brain surface and it has no mesenchymal component. Moreover, gliofibromas can be distinguished from gliosarcoma by the absence of a clear-cut malignant mesenchymal component.

Although there are some exceptional cases, the majority of gliofibromas have a benign histology such as no necrosis, no microvascular proliferation, and a very low MIB-1 labeling index like fibromas. It has a benign histology such as no necrosis, no microvascular proliferation, and a very low MIB-1 labeling index like fibromas. It should be distinguished from gliosarcoma by the absence of a clear-cut malignant mesenchymal component.

Radical surgical resection as an initial management seems to be the treatment of choice. Most of the published cases with gliofibroma presented a benign tumor nature, indolent clinical course, and showed no definite evidence of disease progression. However, some cases with a poor outcome have also been reported. Though some patients underwent adjuvant treatments such as radiation therapy or chemotherapy, the role of radiation therapy and chemotherapy is still controversial, and the prognosis of this rare tumor is not clearly understood. In our case, there was no disease progression during 4 years of follow-up, even if partially resected. However, long-term follow-up and more accumulated clinical experiences should be mandatory to understand this rare tumor.

CONCLUSION

In this report, we presented a case of intracranial gliofibroma in a 61-year-old woman. It is a rare tumor mostly reported from pediatric patients. Also, it has characteristic biphasic microscopic morphology. We believe this case adds support to understanding more fully the nature and biological behavior of this rare tumor.

References

1. Altamirano E, Jones MC, Drut R: Gliofibroma. Comunicación de un caso pediátrico y revisión de la bibliografía. Patol Rev Latinoam 49: 221-225, 2011
2. Bonnin JM, Warner JC, Turner MS: I Cystic gliofibroma of the fourth ventricle. J Neuropathol Exp Neurol 49: 261, 1990. Abstract. DOI:
3. Budka H, Sunder-Plassmann M: Benign mixed glial-mesenchymal tumour ("gliofibroma") of the spinal cord. Acta Neurochir (Wien) 55: 141-145, 1980
4. Caldemeyer KS, Zimmerman RA, Azzarelli B, Smith RR, Moran CC: Gliofibroma: CT and MRI. Neuroradiology 37: 481-485, 1995
5. Cerda-Nicolás M, Kepes JJ: Gliofibromas (including malignant forms), and gliosarcomas: a comparative study and review of the literature. Acta Neuropathol 85: 349-361, 1993
6. Deh P, Sarkar C, Garg A, Singh VP, Kale SS, Sharma MC: Intracranial gliofibroma mimicking a meningoïd: a case report and review of literature. Clin Neurol Neurosurg 108: 178-186, 2006
7. Erguvan-Onal R, Ateş O, Oral C, Aydin NE, Koçak A: Gliofibroma: an incompletely characterized tumor. Tumori 90: 157-160, 2004
8. Friede RL: Gliofibroma. A peculiar neoplasia of collagen forming glial-like cells. J Neuropathol Exp Neurol 37: 300-313, 1978
9. Gargano P, Zuccaro G, Lubieniecki F: Intrasellar gliofibroma: a case report and review of the literature. Case Rep Pathol 2014: 165025, 2014
10. Goyal S, Puri T, Gunababaham G, Sharma MC, Sarkar C, Julka PK, et al.: Gliofibroma: a report of three cases and review of literature. Acta Oncol 46: 1202-1204, 2007
11. Iglesias JR, Richardson EP Jr, Collia E, Santos A, Garcia MC, Redondo C: Prenatal intramedullary gliofibroma. A light and electron microscope study. Acta Neuropathol 62: 230-234, 1984
12. Kim Y, Suh YL, Sung C, Hong SC: Gliofibroma: a case report and review of the literature. J Korean Med Sci 18: 625-629, 2003
13. Matsumura A, Takano S, Nagata M, Anno I, Nose T: Cervical intramedullary gliofibroma in a child: a case report and review of the literature. Pediatr Neurosurg 36: 105-110, 2002
14. Mølenskamp G, Riemann B, Kuwert T, Sträter R, Kurlmann G, Schöber O, et al.: Monitoring tumor activity in low grade glioma of childhood. Klin Padiatr 210: 239-242, 1998
15. Nomura M, Hasegawa M, Kita D, Yamashita J, Minato H, Nakazato Y: Cerebellar gliofibroma with numerous psammoma bodies. Clin Neurol Neurosurg 108: 421-425, 2006
16. Prayson RA: Disseminated spinal cord astrocytoma with features of gliofibroma: a review of the literature. Clin Neuropathol 32: 298-302, 2013
17. Prayson RA: Gliofibroma: a distinct entity or a subtype of desmoplastic astrocytoma? Hum Pathol 27: 610-613, 1996
18. Reinhardt V, Nahser HC: Gliofibroma originating from temporoparietal hamartoma-like lesions. Clin Neuropathol 3: 131-138, 1984
19. Rushing EJ, Rorke LB, Sutton L: Problems in the nosology of desmoplastic tumors of childhood. Pediatr Neurosurg 19: 57-62, 1993
20. Sarkar R, Yong WH, Lazareff JA: A case report of intraventricular gliofibroma. Pediatr Neurosurg 45: 210-213, 2009
21. Schober R, Bayindir C, Canbolat A, Urich H, Wechsler W: Gliofibroma: immunohistochemical analysis. Acta Neuropathol 83: 207-210, 1992
22. Sharma MC, Gaikwad S, Mehta VS, Dhar J, Sarkar C: Gliofibroma: mixed glial and mesenchymal tumour. Report of three cases. Clin Neurol Neurosurg 100: 153-159, 1998
23. Snipes GJ, Steinberg GK, Lane B, Horoupian DS: Gliofibroma. Case report. J Neurosurg 75: 642-646, 1991
24. Suarez CR, Raj AB, Bertolone SJ, Coventry S: Carboplatinum and vincristine chemotherapy for central nervous system gliofibroma: a case report and review of the literature. J Pediatr Hematol Oncol 26: 756-760, 2004
25. Vanquez M, Miller DC, Epstein F, Allen JC, Budzilovich GN: Glioneurofibroma: renaming the pediatric "gliofibroma": a neoplasm composed of Schwann cells and astrocytes. Mod Pathol 4: 519-523, 1991