

## Case Report

# Intracranial Plasma Cell Granuloma

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Plasma cell granuloma is a tumor-like disease characterized by non-neoplastic polyclonal proliferation of plasma cells and other mononuclear cells. This disease occurs most frequently in the lung and upper respiratory tract, while the involvement of the central nervous system is very rare. A 44-year-old female patient presented with nausea and progressive visual disturbance. Brain magnetic resonance imaging (MRI) revealed the mass along the right tentorium with low signal intensity in the T2 weighted image (T2WI) and fluid-attenuated inversion recovery (FLAIR) sequence, and an isosignal intensity in T1 weighted image (T1WI), the latter of which was enhanced after administration of gadolinium-diethylenetriamine penta-acetic acid (Gd-DTPA). The thickest portion of the tentorium was partially excised via the combined suboccipital and infratentorial approach. The histopathological examination indicated a diagnosis of plasma cell granuloma. Postoperative steroid therapy was administered for remnant tumor control. Although a follow up MRI scan taken 20 months after the operation showed a slight decrease in tumor size, the lesion had extended to the falx and left frontal convexity along with parenchymal edema at 32 months after the operation and the clinical status was aggravated. The mass was removed from the left frontal convexity. Radiation therapy was given, together with steroid administration.

**KEY WORDS :** Plasma cell granuloma · Central nervous system.

## INTRODUCTION

Plasma cell granuloma is a rare and unusual disease with unknown etiology and is characterized by non-neoplastic polyclonal proliferation of mature plasma cells and other mononuclear cells<sup>6</sup>. This disease is also known as inflammatory pseudotumor, xanthogranuloma, fibroxanthoma, or histiocytoma due to the predominance of plasma cells which is common to all these lesions<sup>4,16</sup>. Plasma cell granuloma occurs most frequently in the lungs and upper respiratory tract<sup>2</sup>, and a number of cases have been reported in the other organs, including the gastrointestinal tract, thyroid gland, liver, urogenital tract, lymph nodes, heart and tonsils<sup>6,10,12</sup>. However, cases with central nervous system involvement are very rare<sup>6,10,12</sup>, and limited data are available on treatment strategies. The authors report a case of plasma cell granuloma originated from the tentorium

and spread to the falx and left frontal convexity.

## CASE REPORT

A 44-year-old female patient presented with headache and nausea of insidious onset for two years. The headache had gradually increased in intensity and the patient described it as a pulling pain in the occipital area. Five months previously, she had been admitted to another hospital because of headache and nausea, and an infratentorial hemorrhage was suspected by brain CT scan. Two months later, she was re-admitted to the same hospital because the symptoms persisted. A brain MRI revealed a tumor of tentorial origin, and a meningioma or lymphoma was highly suspected. The patient was then referred to our department.

A neurological examination revealed decreased visual acuity (OD : 0.1, OS : 0.5). A routine hematological examination was within normal limits (total leukocyte count : 7,300 cells/mm<sup>3</sup>, polymorphonuclear leukocytes : 68%, lymphocytes : 26.7% eosinophils : 0.6%, monocytes : 3.1%). A brain MRI revealed an en plaque-shaped mass along the right tentorium. The mass showed an iso-signal

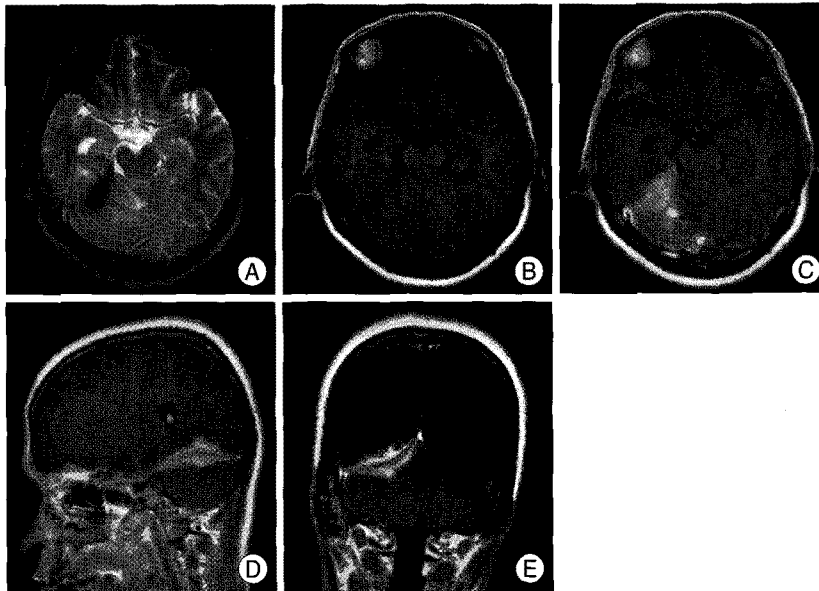
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intensity on the T1-weighted image, a low signal intensity on the T2-weighted image, and a diffuse enhancement on the gadolinium-enhanced image (Fig. 1).

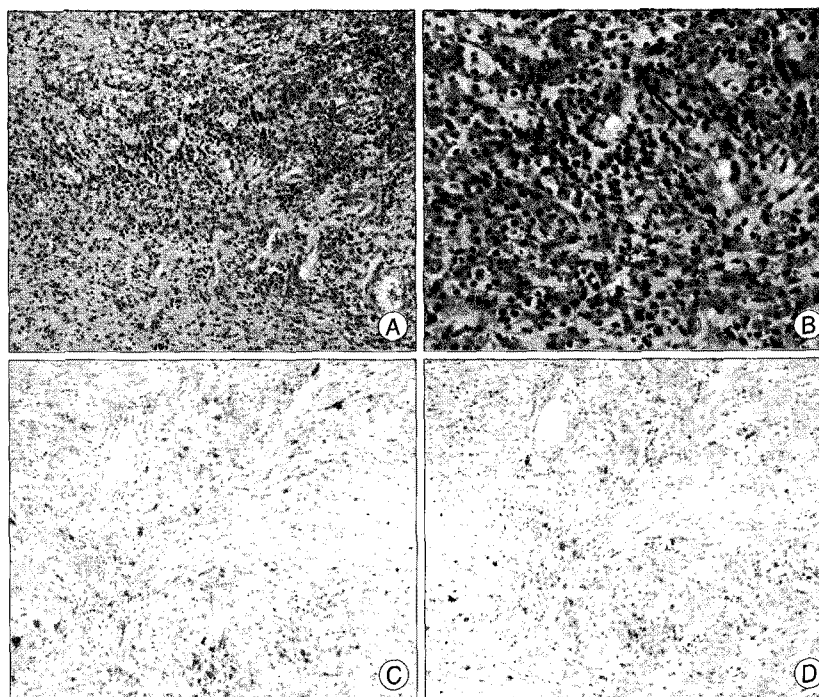
An operation was performed using the right combined suboccipital and infratentorial approach. Upon dural

opening, the occipital cortex and cerebellar hemisphere were found to be normal, and could be easily separated from the tentorium by gentle retraction. The exposed tentorium was markedly thickened by the mass, which occupied the entire right tentorium. Grossly, it was grayish-white, non-suckable, elastic, and completely avascular, and it seemed to be a meningioma. The thickest portion of the tentorium was partially excised. A histopathological examination revealed a tumor composed of dense fibrocollagenous tissue with heavy infiltrates of lymphocytes, plasma cells, and neutrophils. Special stains for bacteria, fungi, and acid-fast organisms were all negative. Immunohistochemical studies of the plasma cells and lymphocytes revealed the presence of both kappa- and lambda-type light chains, demonstrating the polyclonal nature of the plasma cells (Fig. 2). On the basis of these findings, a histological diagnosis of plasma cell granuloma was confirmed.

The patient was discharged 2 weeks after the operation, and oral prednisolone (20 mg/day) was administered on the outpatient basis. A brain MRI scan taken 20 months later showed a decrease in the lesion size; hence, steroid therapy was discontinued. Twelve months later, the patient suffered from a generalized tonic-clonic seizure, and a follow up MRI scan showed that the lesion of the right tentorium had remained virtually unchanged, the mass in the falx and left tentorium had enlarged, and another new lesion had developed in the left frontal convexity. Additionally, edema was noted in the parenchyma of the left frontal hemisphere, suggesting a possible parenchymal invasion by the tumor (Fig. 3). A neurological examination revealed mild right hemiparesis. A stereotactic surgery was performed to take specimen from the edematous brain parenchyma using the stereotactic head frame, while craniectomy was performed on the left frontal convexity.



**Fig. 1.** Magnetic resonance images show a mass along the right tentorium. The mass shows a low signal intensity on the T2-weighted image (A), an iso-signal intensity on the T1-weighted image (B), and a diffuse enhancement on the enhanced images after administration of Gd-DTPA (C, D and E).

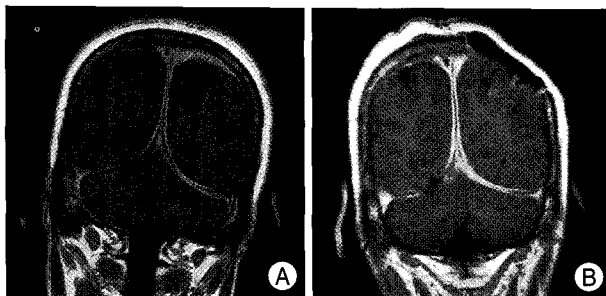


**Fig. 2.** Excised tentorium shows thick fibrous tissue with dense inflammatory cell infiltration, capillary proliferation, and focal hemorrhage (A) (H & E,  $\times 100$ ). The inflammatory cells are heterogeneous and consist mainly of plasma cells (black arrow), neutrophils and some lymphocytes (B) (H & E,  $\times 400$ ). With immunohistochemical staining, the infiltrating plasma cells are immunoreactive for kappa (C) and lambda (D) (kappa and lambda immunostaining  $\times 400$ ).

The skull bone had thickened and was adherent to the underlying dura. The dura mater had also thickened and was adhering to the cerebral cortex; it was excised after careful dissection. A stereotactic biopsy was done on the center of the edematous brain parenchyme. Histopathologically, the dural mass showed the same findings as that of the right tentorial mass. The parenchymal biopsy specimen showed no cellular abnormalities except the edematous changes. Whole brain radiation therapy was performed (4,500 cGy) and an oral steroid (prednisolone 20 mg/day) was administered. On discharge, the patient did not have any neurological deficit, and a brain MRI taken 4 months later showed that the lesion from the convexity was a completely excised without any interval changes in the falx and tentorium (Fig. 3).

## DISCUSSION

Plasma cell granuloma is an uncommon disease with the first case reported in 1973 by Bahadori and Liebow<sup>2)</sup>. Most cases reported thereafter have had the involvement of the lungs or upper respiratory tract and other organ systems. West et al.<sup>17)</sup>, were the first to describe patient with primary



**Fig. 3.** Magnetic resonance image taken 32 months later shows a decrease in lesion size of right tentorium, but mass had spread to the falx and left tentorium and another lesion had developed in the left frontal convexity (A). Follow up magnetic resonance imaging four months after the second operation show a totally excised convexity lesion with no interval changes in the falx and tentorium (B).

intracranial plasma cell granuloma and since then, about 60 cases have been reported in the literature<sup>11)</sup>. In particular, only 4 cases of plasma cell granuloma involving the falx or tentorium have been reported. Among these, only one patient was treated by total excision of the mass, but recurred 5 years later. The other three patients were treated by subtotal or partial excision of the mass followed by adjuvant therapy (Table 1).

The exact pathogenesis of this lesion remains unclear. However, a number of hypotheses have been postulated. Some authors propose that the immunological response could be triggered by a viral infection, since the Epstein-Barr virus has been associated with up to 40% of plasma cell granuloma cases<sup>1,16)</sup>. Some articles, in discussing associations with Sjögren syndrome, suggests an auto-immune pathogenesis<sup>5)</sup>. In our case, there was neither any evidence of autoimmune or immunodeficiency disorder nor any medical history of lung disease.

Intracranial plasma cell granuloma must be differentiated from other lesions in the CNS, especially those which contain plasma cells and show lymphocytic infiltration. The differential diagnoses include plasmacytoma, meningioma with plasma cell-lymphocytic infiltration, tuberculosis, sarcoidosis, and Wegener's granulomatosis<sup>4,8,16)</sup>. An immunohistochemical analysis is useful in differentiating plasmacytoma from plasma cell granuloma. In our case, the plasma cells showed immunoreactivity to both kappa- and lambda-type light chains, indicating a polyclonal origin and ruling out plasmacytoma, which is characterized by atypical monoclonal plasma cells<sup>4,10)</sup>. Recently, polymerase chain reaction (PCR) is increasingly being used to rapidly determine the clonality of the cells<sup>15)</sup>. An intracranial plasma cell granuloma may be easily overlooked and interpreted as a meningioma or a meningitis on the basis of radiological findings, because these conditions are characterized by extra-axial localization and a very strong contrast enhancement on computed tomography(CT) or MRI<sup>16)</sup>. The

lesion in our patient was radiologically diagnosed as a meningioma because of its strong dural enhancement and dural tail sign. Histologically, it is very difficult to differentiate a meningioma with plasma cell-lymphocytic infiltration from a plasma cell granuloma. These lesions may be distinguished from plasma cell granulomas by the presence of meningotheial cells on histopathologic examination of a meningioma<sup>10,16)</sup>. In our patient, however, no meningotheial component

**Table 1.** Reported cases of intracranial plasma cell granuloma involving tentorium and falx

No	Authors	S/A	Location	Treatment	Outcome
1	Hsiang et al. <sup>13)</sup> (1994)	M/57	Falx	TE	Recurrence at 5 years
2	Le Marc'hadour et al. <sup>14)</sup> (1994)	M/30	Tentorium	PE + steroid	No recurrence at 2 months
3	Hirohata et al. <sup>12)</sup> (1996)	M/57	Tentorium	PE + steroid + irradiation	No recurrence at 6 years
4	Dwarakanath et al. <sup>8)</sup> (2003)	M/52	Tentorium	STE	No recurrence at 6 months
5	Present case (2008)	F/44	Tentorium	PE + steroid	Recurrence at 2.7 years

PE : Partial Excision, S/A : Sex/Age, STE : SubTotal Excision, TE : Total Excision.

could be identified by histopathological examination. Tuberculomas, which still constitute 20-40% of intracranial space-occupying lesions in Asian countries<sup>7,8</sup>, appear similar to plasma cell granulomas in neuroimaging studies. They also should be distinguished from plasma cell granuloma on the basis of their histopathological features, namely a caseous necrosis surrounded by epithelial cells, lymphocytes, and multinucleated giant cells<sup>3</sup>. The existence of these entities should be borne in mind in the differential diagnosis of plasma cell granuloma.

The treatment for intracranial plasma cell granuloma is variable, ranging from complete surgical excision to radiotherapy and chemotherapy<sup>4,8,10-12</sup>. Although limited data are available on the most effective treatment regimes for plasma cell granuloma, there is a consensus that total surgical excision is the most effective therapeutic options in cases where the plasma cell granulomas are accessible<sup>10,12</sup>. When the tumor appears to be locally aggressive or is surgically inaccessible, steroid therapy or radiation therapy that is administered after partial resection or biopsy can be an alternative method for reducing the tumor size and its recurrence rate<sup>4,6,8-11</sup>. Our patient was initially treated with prednisolone (20 mg/day) after the partial excision of the tumor. A follow up brain MRI after the steroid therapy showed a decrease in the lesion size. Nonetheless, there is no consensus on the dosages, duration, and criteria for discontinuing steroid therapy in intracranial plasma cell granuloma patients. Radiation therapy is also used in cases wherein the tumor recurs after surgical resection, in cases of residual tumor, or in case of tumors unresponsive to steroid therapy<sup>4,8</sup>. However, the risk of ionizing radiation must be considered for this non-neoplastic disease. Extensive study of the treatment options along with extensive clinical investigations are required.

## CONCLUSION

The authors report a rare case of intracranial plasma cell granuloma involving the tentorium, falx, and convexity dura. Despite its rarity, intracranial plasma cell granuloma should be considered as a differential diagnosis for an intracranial mass occurring in an area where meningiomas commonly arise. Total excision is the treatment of choice,

wherever possible. Steroid therapy and additional radiation therapy may be beneficial for unresectable or recurrent lesions.

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