Case Report

Solitary Intracranial Plasmacytoma Located in the Clivus: A Diagnostic and Theraputic Challenge

Yunguang Liu, MD, PhD;[1] Jingxin Qiu, MD, PhD[2]*

[1]*Department of Pathology, Sate University of New York at Buffalo, Buffalo, NY*
[2]*Department of Pathology, Roswell Park Cancer Institute, Buffalo, NY*

Solitary intracranial plasmacytoma (SIP) is a rare entity. To date, only 20 cases of SIP have been reported in English literature. Occasionally, SIP is comprised of atypical plasma cells which may not be plasma cell-appearing at all. As a result, pathologic diagnosis is extremely challenging, especially on frozen sections. A recent case demonstrating this profile is reported here. The patient was a 40-year-old white male who originally presented with diplopia. MRI revealed an enhancing non-infiltrating mass (5 x 4 x 3 cm) within the clivus. A transnasal endoscopic biopsy was done. Frozen sections showed sheets of pleomorphic cells with abundant eosinophilic cytoplasm and round/oval nuclei with stippled chromatin. On touch prep, naked nuclei with homogenous/salt and pepper chromatin, mild crush artifacts and rare plasmacytoid cells were noted. A frozen section diagnosis of "unclassified neoplasm, defer to permanent sections" was made. Immunohistochemical analysis on permanent sections showed that tumor cells were positive for CD138, CD56, kappa light chain, BCL-1 and negative for chromogranin A and lambda light chain. The Ki67 proliferation index was 5-10%. The immunostaining pattern was consistent with plasmacytoma. A subsequent complete work up for systemic disease revealed normal bone marrow biopsy, normal flow cytometry, and negative skeletal survey. The patient did have a serum M-spike of 0.75 g/dL but his quantitative immunoglobulins, kappa or lamda free light chains and beta-2 microglobulin were within normal limits. The patient was treated by radiation therapy accompanied by high-dose dexamethasone. However, four months post-radiation, repeat MRI showed a similar mass in the same area. His serum M-spike had dropped to 0.3 g/dL during his radiation therapy, but persisted at this level subsequently. The diagnosis of persistent residual plasmacytoma was reached. The patient underwent gamma knife radiosurgery and tolerated the procedure well. This case demonstrated that SIP should be considered as one of the differential diagnoses for intracranial tumor of unknown origin.
[N A J Med Sci. 2012;5(4):232-234.]

Key Words: *Solitary intracranial plasmacytoma (SIP), frozen diagnosis, immunohistochemistry, radio-unresponsive, persistent residual plasmacytoma, gamma knife radiosurgery*

INTRODUCTION

Isolated plasmacytomas may arise from either bones or extraosseous tissue. Extraosseous plasmacytomas, also known as extramedullary plasmacytoma (EMP), are commonly found in the upper respiratory tract, including the nasal cavity, nasopharynx and sinuses.[1-4] Very rarely, isolated plasmacytoma can occur within the cranium, which is also called solitary intracranial plasmacytoma (SIP). To date, only 20 cases of SIP have been reported in English literature.[5] Similar to other plasmacytomas, SIPs are composed of neoplastic plasma cells; however occasionally, the morphology of these plasma cells on frozen sections may not be plasmacytoid, presenting a diagnostic challenge to the pathologist. Here we report such a case with discussion of differential diagnoses, management and prognosis of SIP.

Received 07/21/2012; Revised 09/08/2012; Accepted 09/10/2012
***Corresponding Author:** Department of Pathology, Roswell Park Cancer Institute, Buffalo, NY 14263. (Email: Jingxin.qiu@roswellpark.org)

CASE REPORT

The patient was an otherwise healthy 40-year-old white male, presenting with cloudiness of vision and horizontal binocular diplopia. A T1-weighted sagittal MRI revealed a large expansile, homogeneously enhancing, well-defined, non-infiltrating mass within the clivus with extension anteriorly into the posterior aspect of the sphenoid sinus, inferiorly to the anterior arch of C1 and superiorly to the level of the pituitary fossa (**Figure 1**). A transnasal endoscopic biopsy was performed. Frozen sections showed sheets of pleomorphic cells with abundant eosinophilic cytoplasm and round/oval nuclei with stippled chromatin (**Figure 2A**). On touch prep, naked nuclei with homogenous/salt and pepper chromatin, mild crush artifacts and rare plasmacytoid cells were noted (**Figure 2B**). A frozen section diagnosis of "unclassified neoplasm, defer to permanent sections" was made. On permanent sections, the neoplastic cells showed a striking plasmacytoid configuration (**Figure 2C**). To further characterize the neoplasm, immunohistochemical studies

were performed. The tumor cells are positive for CD138, CD56, Bcl-1, and kappa light chain, and negative for lambda light chain and chromogranin A (**Figure 3**). Tumor cells also lack expression of CD20 and HHV-8 (not shown). ISH study performed for EBV (EBER) is also negative (not shown). The proliferation index, assessed with Ki67 antibody, was 5-10%, indicating that the active proliferation of the tumor was low. The immunostaining patterns favored a kappa-light-chain-restricted plasmacytoma over other differential diagnoses (B-cell lymphoma, neuroendocrine tumor and NK/T cell tumor). To rule out systemic disease, a subsequent complete work up was performed. The patient's CBC was unremarkable. His bone marrow biopsy and aspirate smear showed no increase in plasma cells and flow cytometry revealed no evidence of plasma cell dyscrasia. A full skeletal survey was negative. He had a serum M-spike of 0.75 g/dL at that time, but his quantitative immunoglobulins, kappa or lamda free light chains and beta-2 microglobulin were within normal limits. The patient received radiation therapy accompanied by high-dose dexamethasone. Four months post-radiation, although the patient was asymptomatic, a surveillance MRI showed a similar mass in the same area and PET scan showed increased FDG uptake. His serum M-spike had dropped to 0.3 g/dL during his radiation therapy, but persisted at this level subsequently. The diagnosis of persistent residual plasmacytoma was reached. The patient underwent gamma knife radiosurgery and tolerated the procedure well. Three months after the surgery, the patient's M-spike was undetectable. In summary, the morphological features, immunohistochemical studies and the complete work up results support the diagnosis of SIP.

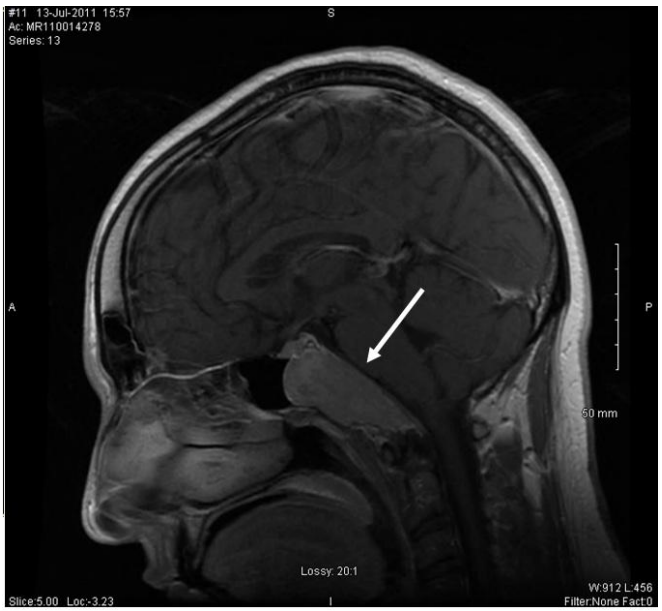

Figure 1. Sagittal T1-enhanced MRI shows a large expansible, homogeneously enhancing, well-defined, non-infiltrating mass (printed by the arrow) within the clivus with extension anteriorly into the posterior aspect of the sphenoid sinus, inferiorly to the anterior arch of C1 and superiorly to the level of the pituitary fossa.

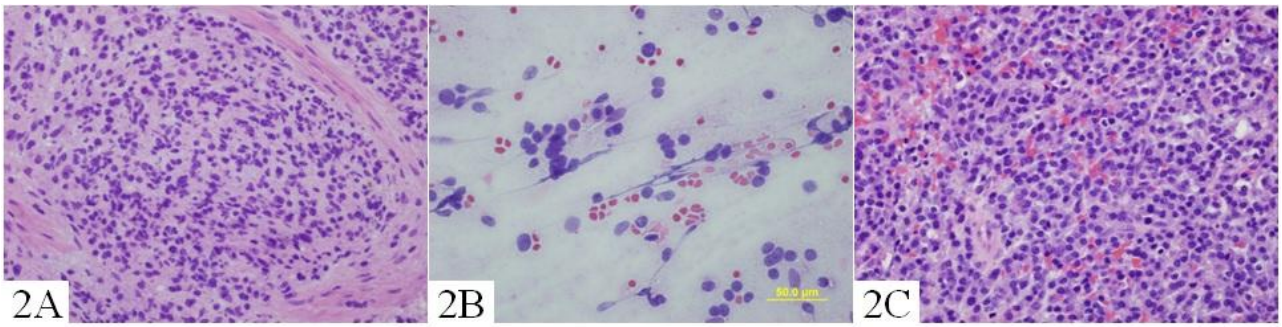

Figure 2. A. Frozen sections (40X) showed sheets of pleomorphic cells with abundant eosinophilic cytoplasm and round/oval nuclei with stippled chromatin. **B.** Touch prep (40X) showed naked nuclei with homogenous/salt and pepper chromatin, mild crush artifacts and rare plasmacytoid cells. **C.** Permanent sections (40X) showed a striking plasmacytoid configuration.

DISCUSSION

Plasmacytoma is a localized clonal proliferation of plasma cells arising from bone or extraosseous soft tissues. Due to architectural and cytological variations of plasmacytoma, the diagnosis of this entity may be difficult, and further complicated by freezing artifacts and rare locations. About 90% of EMPs arises from the head and neck[6-7] and 80% of head and neck EMPs occurs in the upper aerodigestive tract.[8] SIP is extremely rare with only 20 cases reported in the literature and only a few case soccurred in the clivus.[5]

The diagnosis of SIP requires demonstration of monoclonality and/or an aberrant plasma cell phenotype without evidence of systemic disease. Light chain restriction strongly supports plasma cell clonality, ruling out the reactive plasmacytosis and plasma cell granuloma. Aberrant expression of CD56 and/or cyclin D1 also support a neoplastic origin. Negative CD20 staining rules out B cell lymphomas with marked plasmacytic differentiation (marginal zone lymphoma and lymphoplasmacytic lymphoma).

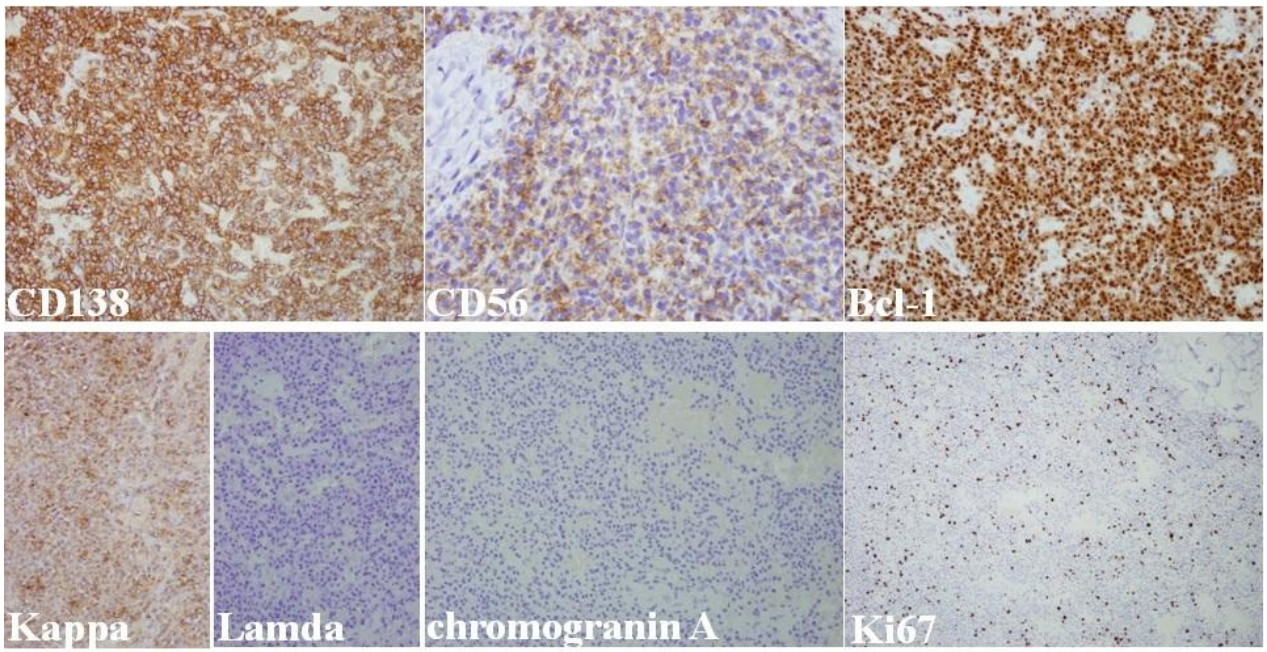

Figure 3. Immunohistochemical studies show that tumor cells are positive for **CD138** (20x), **CD56** (40x), **Bcl-1** (20x), and **Kappa** (20x), and negative for **Lamda** (20x) and **chromogranin A** (20x). About 5-10% of tumor cells are **Ki67** positive (10x).

If low level of monoclonal protein in serum or urine is detected, normal levels of uninvolved immunoglobulins are required to confirm the absence of systemic involvement.[1] The prognosis of EMPs is better than that of solitary bone plasmacytoma (SBP), due to a higher local control rate by radiotherapy and a less likelihood of progression to plasma cell myeloma.[3,9] The skull base including the clivus is rich in marrow, whether the plasmacytoma arising from this region belong to EMP or SBP has not been clearly defined.[10] Schwartz et al[11] have shown that the most powerful predictor for developing plasma cell myeloma among SIP was cranial base location and the expression of CD56 had no value in predicting patients' outcome.

To conclude, the diagnosis of SIP could be challenging, especially on frozen sections, due to the freezing artifacts and rarity of this entity. SIP might be radio-insensitive and close follow-up of the patient is warranted.

CONFLICT OF INTEREST

The Authors have no conflicts of interest to disclose.

REFERENCES

1. Liebross RH, Ha CS, Cox JD, Weber D, Delasalle K, Alexanian R. Clinical course of solitary extramedullary plasmacytoma. Radiother Oncol. 1999;52(3):245-249.
2. Galieni P, Cavo M, Pulsoni A, et al. Clinical outcome of extramedullary plasmacytoma. Haematologica. 2000;85(1):47-51.
3. Dimopoulos MA, Kiamouris C, Moulopoulos LA. Solitary plasmacytoma of bone and extramedullary plasmacytoma. Hematol Oncol Clin North Am. 1999;13(6):1249-1257.
4. Alexiou C, Kau RJ, Dietzfelbinger H, et al. Extramedullary plasmacytoma: tumor occurrence and therapeutic concepts. Cancer. 1999;85(11):2305-2314.
5. Liu ZY, Qi XQ, Wu XJ, Luo C, Lu YC. Solitary intracranial plasmacytoma located in the spheno-clival region mimicking chordoma: a case report. J Int Med Res. 2010;38(5):1868-1875.
6. Wax MK, Yun KJ, Omar RA. Extramedullary plasmacytomas of the head and neck. Otolaryngol Head Neck Surg. 1993;109(5):877-885.
7. Susnerwala SS, Shanks JH, Banerjee SS, Scarffe JH, Farrington WT, Slevin NJ. Extramedullary plasmacytoma of the head and neck region: clinicopathological correlation in 25 cases. Br J Cancer. 1997;75(6):921-927.
8. Liu TR, Yang AK, Chen FJ, et al. Extramedullary plasmacytoma in the head and neck: a report of 10 cases and literature review. Ai Zheng. 2005;24(6):714-717.
9. Mayr NA, Wen BC, Hussey DH, et al. The role of radiation therapy in the treatment of solitary plasmacytomas. Radiother Oncol. 1990;17(4):293-303.
10. Wein RO, Popat SR, Doerr TD, Dutcher PO. Plasma cell tumors of the skull base: four case reports and literature review. Skull Base. 2002;12(2):77-86.
11. Schwartz TH, Rhiew R, Isaacson SR, Orazi A, Bruce JN. Association between intracranial plasmacytoma and multiple myeloma: clinicopathological outcome study. Neurosurgery. 2001;49(5):1039-1044; discussion 1044-1035.