

Extramedullary Solitary Plasmacytoma of the Sphenoid Sinus: Radiological Evaluation and Review of the Literature

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Citation

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Abstract

Extramedullary plasmacytomas are solitary focus plasma cell neoplasms arising in extraosseous tissues. Although the diagnosis of plasmacytomas requires evidence of no underlying multiple myeloma, these tumors can be an early presentation of, or progress to, multiple myeloma. They are infrequent tumors with no specific imaging findings, and are often initially misdiagnosed as other tumor entities. The correct diagnosis requires certain histopathologic and hematologic criteria to be fulfilled. In this case report we present a 74-year-old woman without known history of malignancy, with radiological evidence of a mass in the sphenoid sinus, extending to the clivus and the cavernous sinus on both sides, and entrapping both internal carotid arteries. The sphenoid sinus tumor proved to be an extramedullary focus of plasma cell tumor and the patient was subsequently diagnosed with multiple myeloma.

INTRODUCTION

Extramedullary plasmacytoma is a rare malignant tumor of monoclonal plasma cells(1-3). The current classification of plasma cell dyscrasias require absence of multiple myeloma findings in order patients to be diagnosed with extramedullary plasmacytoma(1-4). Nevertheless, it has been well described that this tumor may either appear as a sequel of or convert to plasma cell myeloma(2,4). Eighty to ninety percent of extramedullary plasmacytomas occur in the submucosal tissues of the head and neck, especially the aerodigestive tract(1-8,13,14), their incidence peaks earlier in life compared to multiple myeloma(3), and they are significantly more common in men than women(3,4).

CASE REPORT

A 74-year-old woman was referred to our department after presenting in the ophthalmology clinic of our hospital with headache and diplopia. Her previous medical and family history were unremarkable. The patient did not refer loss of weight or night sweats, fever or symptoms from the respiratory or digestive tract, but upon questioning she reported fatigue. On general physical examination there were no pathological findings. Ophthalmologic examination revealed right abducens nerve ophthalmoplegia and hypesthesia in the area of the right maxillary nerve distribution. The patient underwent blood test that revealed

normocytic anemia with normal white blood cell count and increased erythrocyte sedimentation rate.

An MRI examination showed a lobulated mass in the sphenoid sinus that extended to the clivus and invaded the cavernous sinus on both sides, entrapping both internal carotid arteries (figures 1-3). Moreover, there were skull foci having pathological MR signal. Following the MRI exam, X-rays of the skull, the spine and the long bones of the extremities were performed, but they did not reveal any pathology. Subsequently, further serum biochemical tests were ordered that showed calcium levels within normal range and creatinine level of 126 μ mol/L. Serum protein electrophoresis demonstrated a monoclonal immunoglobulin spike. At that time all other laboratory examinations were normal. The patient underwent an endonasal biopsy of the tumor, which was histologically shown to be an extramedullary plasma cell tumor. She was treated with radiotherapy for the sphenoid sinus tumor focus and with systemic chemotherapy.

DISCUSSION

Schridde and Weir first described plasmacytomas in 1905(15), over half a century after Otto Kahler defined multiple myeloma (also known as Kahler disease). Both plasmacytomas and multiple myeloma belong in the plasma

cell dyscrasias, the classification of which has been revised in 2008 by the World Health Organization (WHO). Normal plasma cells are terminally differentiated cells originating from B lymphocytes (figure 4), they secrete immunoglobulins(3,8,9) and are situated in the red pulp of the spleen, the medullary cords of the lymph nodes and the bone marrow(9). Although older classification systems of plasma cell tumors grouped multiple myeloma as a type of plasmacytoma(4), the 2008 WHO classification of plasma cell dyscrasias categorize only solitary tumors under the plasmacytoma group (table 1)(3,9,12).

Multiple myeloma is the most common primary malignancy of skeletal tissue. It is the clinical syndrome of plasma cell myeloma(3) that is the neoplastic proliferation of plasma cells in the bone marrow, associated with production of monoclonal immunoglobulin in levels high enough to reach and be detectable in the serum or/and urine(3,11,12). Plasma cell myeloma originates from clonal plasma cells that in the bone marrow interact with the extracellular matrix, adhere to the stromal cells and trigger the plasma cell proliferation(11) and the production of monoclonal immunoglobulin(3). It occurs most often in males during their eighties and is more common in developed countries(3,11). Lytic bone lesions is the most common radiological finding, which explains the bone pain that is the presenting symptom in 70% of the patients with symptomatic plasma cell myeloma(3,11,12) (table 2).

Extramedullary plasmacytomas are isolated plasma cell neoplasms of soft tissues that need certain laboratory and imaging pre-requisites to be diagnosed(3). They result from neoplastic proliferation of single clone plasma cells that, as a result, produce one type of immunoglobulin(8). Hence, a plasmacytoma is a single growth of proliferating plasma cells present either in bone as a solitary bone plasmacytoma or outside bone tissue, in which case it is called extramedullary or soft tissue plasmacytoma(3). For the diagnosis of skeletal or soft tissue plasmacytoma to be established, there are certain criteria that need to be met, which include i) normal skeletal X-ray, ii) normal humeri, spine, pelvis and proximal femurs MRI, iii) normal bone marrow biopsy, iv) no laboratory signs of anemia, hypercalcemia or compromise of renal function, and v) no or low levels of the involved monoclonal immunoglobulin with normal levels of the rest of the antibodies(3,12). The incidence of extramedullary plasmacytomas is only 0.04-3 cases in 100,000(4), accounting for 1% of head and neck

tumors(4). They most often (80%) occur in the aerodigestive soft tissues of the head and neck, and in particular in the nasal fossa, paranasal sinuses (especially the maxillary sinus), and the nasopharynx(1-8,13). Solitary plasmacytomas occur most often in males in their seventies(1-9,11-29) (table 2).

Although there is no known agreement on whether extramedullary plasmacytoma and plasma cell myeloma are two different diseases or different stages of the same entity, there have been published cases of patients with multiple myeloma that have developed extramedullary plasmacytoma(24). It is generally accepted however, that it is more often, although still uncommon, extramedullary plasmacytoma to progress to plasma cell myeloma. Rarely, it can also be the presenting form of plasma cell dyscrasia in a patient with multiple myeloma(4,16). Extramedullary plasmacytoma progresses in symptomatic plasma cell myeloma less frequently compared to its osseous counterpart(3,4), with one to three patients developing multiple myeloma within 10 years of being diagnosed with extramedullary plasmacytoma(17). The survival rate in these patients is very poor(4,24). Although extramedullary plasmacytoma most often appears in the aerodigestive tract of the head and neck(1-9,14, 16-18), involvement of the sphenoid sinus is rare, occurring only in 6.7% of the 175 patients that D'Aguillo et al reviewed(4) and recently described by Pagella et al to be only 2%(24).

The imaging examinations of patients with a suspected plasma cell dyscrasia include X-rays of the axial skeleton(3,11) and magnetic resonance imaging of the spine, humeri, pelvis and proximal femurs (3). Extramedullary plasmacytomas are detected in computed tomography scans and MRI imaging studies. CT demonstrates the tumor mass, which is often expansile and is always well-enhanced (27-31). However, CT is mainly useful for the imaging of bony lesions that may be present and occur due to plasma cell myeloma or/and due to the slow-growing extramedullary plasmacytoma that causes bone remodelling and that can extend to the neighbouring bone, leading to bone erosion(27-30). MRI is superior to CT for the imaging and the characterization of the soft tissue mass. The extramedullary plasmacytoma appears in T1 weighted MR images as a mass with intermediate signal intensity and in T2 weighted MR images as a moderate-to-high signal intensity mass(29). Because of the moderately to very high vascularity of the tumor(3), after the administration of

contrast agent, the mass shows moderate to marked enhancement(29). Besides the role of imaging in the process of diagnosing multiple myeloma and/or extramedullary plasmacytoma, clinical symptomatology, blood examinations, biopsy and histopathology can only provide the definite diagnosis. Nevertheless, MRI is crucial in the follow-up of patients that have been treated for extramedullary plasmacytoma, permitting for the control of the tumor size(30). Regarding biopsy it should be noted that i) bone marrow involvement may be patchy, therefore a negative bone marrow biopsy in patients with clinical signs of disease should not be considered as absence of plasma cell myeloma(3,11), ii) biopsy of an extramedullary plasmacytoma should be undertaken only when feasible and when dissemination of malignant cells can be avoided(19), and iii) extramedullary plasmacytomas usually grow in the submucosa and therefore deep biopsy, open biopsy, or complete tumor excision is often required for histological confirmation of the diagnosis(2).

Although there are still controversies regarding the preferred treatment option of extramedullary plasma cell tumors, most authors suggest that depending on the tumor size and location, radiation therapy is the gold standard of therapy, with surgery being preferable only for tumors that can be safely removed(1,2,4,31-33). Nevertheless, it should be kept in mind that radiotherapy in patients with extramedullary plasmacytoma increases the incidence of progression or conversion to multiple myeloma(2,4,23). Other prognostic factors related to increased risk of soft tissue plasmacytoma to multiple myeloma include tumor mass equal or greater than 5 cm, positive monoclonal protein, and ≥ 2 microglobulin levels in blood serum exam(23). Adjuvant chemotherapy is only considered for the treatment of patients with disseminated or recurrent disease(4). Since multiple myeloma is an incurable disease(11), patients with suspected extramedullary plasmacytoma require systematic clinical and diagnostic approach. Patients diagnosed and treated for extramedullary plasmacytoma need to be closely followed up with life-long observation.

Table 1

2008 World Health Organization Plasma Cell Dyscrasias Classification. McKenna RW, Kyle RA, Kuehl WM, Grogan TM, Harris NL, Coupland RW: Plasma cell neo-plasms. In: Swerdlow SH, Campo E, Harris NL, Jaffe ES, Pileri SA, Stein H, Thiele J, Vardiman JW, ed. WHO classification of tumours of haematopoietic and lymphoid tissues, Lyon: IARC Press; 2008:200-213(10)

WORLD HEALTH ORGANIZATION CLASSIFICATION OF PLASMA CELL NEOPLASMS
Monoclonal gammopathy of undetermined significance
Plasma cell myeloma (asymptomatic myeloma, nonsecretory myeloma, plasma cell leukemia)
Plasmacytoma (solitary osseous, extramedullary)
Immunoglobulin deposition diseases (primary amyloidosis, systemic light- and heavy-chain deposition diseases)
Osteosclerotic myeloma (Polyneuropathy, Organomegaly, Endocrinopathy, Monoclonal gammopathy, Skin changes syndrome)

Table 2

Comparison of plasma cell myeloma and extramedullary plasmacytoma(3,4,11,12).

	PLASMA CELL MYELOMA (SYMPTOMATIC)	EXTRAMEDULLARY PLASMACYTOMA
Incidence (per 100,000 per year in the USA)	6	0.04-3
Peak years of age	65-70	70-80
Males : Females	~ 3:2	~ 4:1
Survival rate	5-year, 35%	10-year, 70%
Commonest symptoms and signs	> Bone pain > Lytic lesions in axial skeleton > Hypercalcemia, impaired renal function tests	>Swelling, pain, nasal discharge, epistaxis, airway obstruction, neuropathies. >Mass in head and neck aerodigestive tract >Normal peripheral blood cell count, calcium and renal function tests.
Monoclonal M-protein	In 100% of cases (required for the diagnosis)	in 14-25% of cases

Figure 1

Axial T1W and T2W images demonstrating the lobulated mass in the sphenoid sinus. The tumor mass invades the cavernous sinus on both sides entrapping their contents.

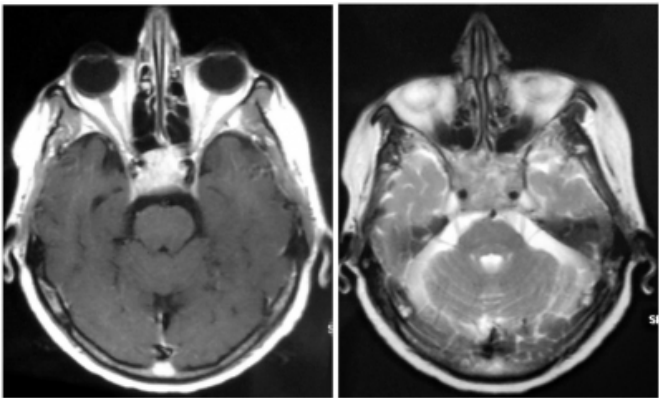


Figure 2

Sagittal T1WI showing the inhomogeneous, lobulated mass with high intensity signal, expanding to the clivus, and the pathological signal foci of the diploe of the bones of the cranium.

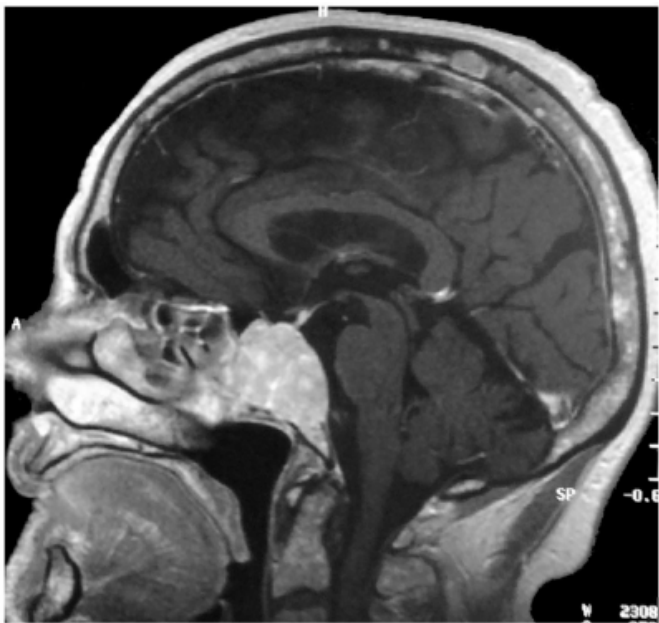


Figure 3

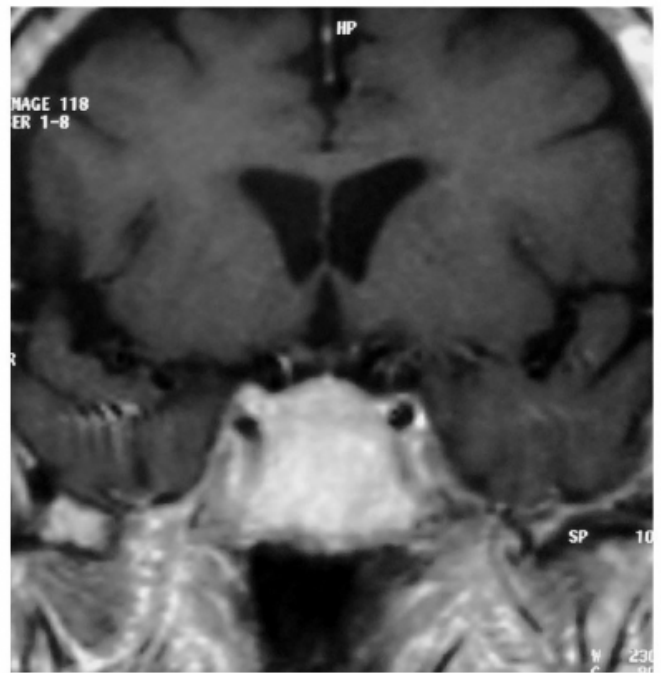


Figure 3

Coronal T1WI section demonstrating the large, high intensity mass in the sphenoid sinus and its relations to the cavernous sinuses and their contents.

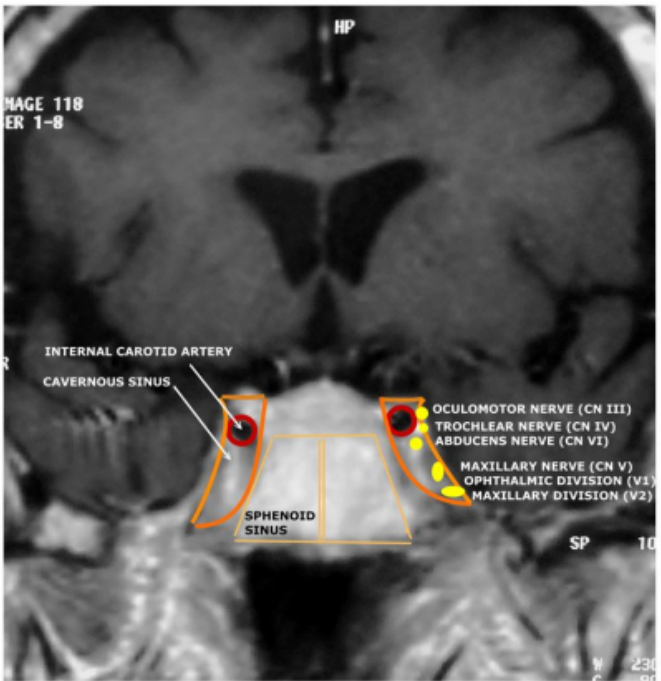
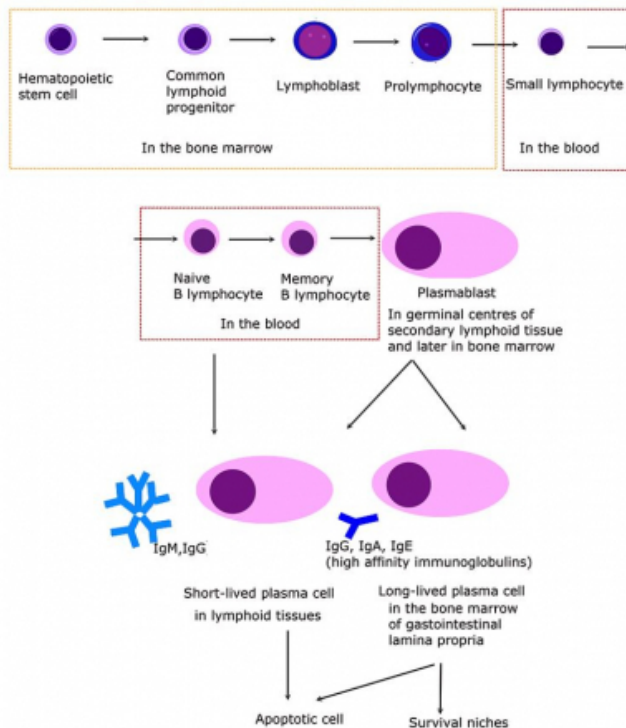


Figure 4

Plasma cell line(9,17)



References

- Weber DM. Solitary Bone and Extramedullary Plasmacytoma. *ASH Education Book* 2005;1:373-376
- Alexiou C, Kau RJ, Dietzfelbinger H, Kremer M, Speiß JC, Schar-zenstaller B, Arnold W. Extramedullary Plasmacytoma Tumor Oc-curence and Therapeutic Concepts. *Cancer* 1999;85(11):2305-2314
- Rosai J. Plasma Cell Dyscrasias. In: Juan Rosai. *Rosai and Acker-man's Surgical Pathology*, 10th ed, ch 23. Elsevier Inc, 2011
- D'Aguillo C, Soni RS, Gordhan C, Liu JK, Baredes S, Anderson Eloy J. Sinonasal extramedullary plasmacytoma: a systematic review of 175 patients. *International Forum of Allergy & Rhinology*. Advance online publication 13 Dec 2013. DOI: 10.1002/alr.21254
- Rawat DS, Grover M, Verma PC. Extramedullary Plasmacytoma of Nasal Cavity: A Rare Entity. *Clinical Rhinology: An International Jour-nal* 2010;3(1):39-41
- Özdemir S, Tarkan Ö, Tuncer Ü, Sürmelioglu Ö, Doğrusöz M, Ergin M. A case of extramedullary plasmacytoma in the sphenoid sinus with unilateral loss of vision. *Journal of Cranio-Maxillo-Facial Surgery* 2013;41(2):140-143
- Broek V, Stadnik T, Meurs A, Maes J, Van Camp B, Schots R. Ex-tramedullary Plasmacytoma of the Cavernous Sinus. *Leukemia and Lymphoma* 2002;43(8):1691-1693
- Asraf MJ, Aarpira N, Khademi B, Abedi E, Hakimzadeh A, Valibeigi B. Extramedullary Plasmacytoma of the Nasal Cavity Report of Three Cases With Review of the Literature. *Iranian Red Crescent Medical Journal* 2013;15(4):363-366
- Heather A, Mingos W. *Plasma Cells*. In: eLS. John Wiley & Sons Ltd, Chichester. <http://www.els.net> [doi: 10.1038/npg.els.0004030]
- McKenna RW, Kyle RA, Kuehl WM, Grogan TM, Harris NL, Coupland RW: Plasma cell neoplasms. In: Swerdlow SH, Campo E, Harris NL, Jaffe ES, Pileri SA, Stein H, Thiele J, Vardiman JW, ed. WHO classification of tumours of haematopoietic and lymphoid tis-sues, Lyon: IARC Press 2008:200-213
- Pingali SR, Haddad RY, Saad A. Current Concepts of Clinical Man-agement of Multiple Myeloma. *Disease-a-Month* 2012;58(4):195-207.
- Campo E, Swedlow SH, Harris NL, Pileri S, Stein H, Jaffe ES. The 2008 WHO classification of lymphoid neoplasms and beyond: evolving concepts and practical applications. *Blood* 2011;117(19):5019-5032
- Ibric Cioranu C, Petrescu Seceleanu V, Melescanu Imre M, Nicolae V, Ibric Cioranu S. Maxillary Solitary Recurrent Plasmacytoma: A Case Report. *Chirurgia* 2013;108(5):732-735
- Mayr NA, Wen B-C, Hussey DH, Burns CP, Staples JJ, Doornbos JF, Vigliotti AP. The role of radiation therapy in the treatment of soli-tary plasmacytomas. *Radiotherapy and Oncology* 1990;17(4):293-303.
- Schridde H. Weitere Untersuchungen uber die Kornelungen der Plasmazellen. *Centralbl Allg Pathol Pathol Anat.* 1905;16:433-435
- Bachmeyer C, Levy V, Carteret M, Laccourreye O, Danel C, Le Tourneau A, Zittoun R, Grateau G. Sphenoid Sinus Localization of Multiple Myeloma Revealing Evolution From Benign Gammopathy. *Head & Neck* 1997;19(4):347-350
- Bataille R, Jégo G, Robillard N, Barillé-Nion S, Harousseau JL, Moreau P, Amiot M, Pellat-Deceunynck C. The phenotype of nor-mal, reactive and malignant plasma cells. Identification of "many and multiple myelomas" and of new targets for myeloma therapy. *Haematologica* 2006;91(9):1234-1240
- Chang Y-L, Chen P-Y, Hung S-H. Extramedullary plasmacytoma of the nasopharynx: A case report and review of the literature. *Oncology Letters* 2014;7(2):458-460
- Jaswal A, Biswas G, Sikder B, Das A, Nandi TK. Extramedullary plasmacytoma of maxillary sinus in 10-year-old girl: A rare presentation. *International Journal of Pediatric Otorhinolaryngology* 2008;3(3):143-146
- Cao X, Luan S, Sun L, Yang B, Shen C, Bao W. Impaired vision associated with a solitary intracranial plasmacytoma. *Journal of Clini-cal Neuroscience* 2010;17(9):1215-1217
- Ko, S, Huang S-Y, Liu C-Y. Extramedullary plasmacytoma mas-querading as Tolosa-Hunt syndrome: a case report. *BMJ Case Reports* 2009: published online 17 March 2009, doi:10.1136/bcr.08.2008.0804
- Chalazonitis AN, Tzovara J, Ghiatas A. Extramedullary plasmacy-toma of the sphenoid sinus. *Images in Clinical Radiology*. *JBR-BTR* 2005;88(6):343
- Guo S, Zhang L, Wang Y, Sun B, Zhang L, Zhang J, Wang G, Zhang Y. Prognostic factors associated with solitary plasmacytoma. *OncoTargets and Therapy* 2013;6:1659-1666
- Zhang J, Zhong Y. Clinical analysis of 36 multiple myeloma pa-tients with extramedullary plasmacytoma invasion of the spinal canal. *Hematol Oncol*. Advance online publication, 7 Jan 2014. Doi: 10.1002/hon.2126
- Pagella F, Canzi P, Matti E, Benazzo M. Sudden clinical course of an unusual ENT tumour: clinical pictures of extramedullary plasmacytoma secondary to multiple myeloma. *Acta Otorhinolaryngol Ital* 2013;33(5):347-349.
- Ampil FL, Borski TG, Nathan CAO, Mulcahy G, Walker

- M, Chin HW, Stucker FJ. Cavernous Sinus Involvement by Extramedullary Plasmacytoma of the Sphenoid Sinus. *Leukemia and Lymphoma* 2002;43(10):2037-2040
27. Ooi GC, Chim J COS, Au W-Y, Khing PL. Radiologic Manifestations of Primary Solitary Extramedullary and Multiple Solitary Plasmacytomas. *AJR* 2005;186(3):821-827
28. Oh D, Kim CK, Park BK, Ha H. Primary extramedullary plasmacytoma in retroperitoneum: CT and integrated PET/CT findings. *European Journal of Radiology Extra* 2007;62(2):57-61
29. Ching AS-C, Khoo JB-K, Chong CF-H. CT and MRI Imaging of Solitary Extramedullary Plasmacytoma of the Nasal Tract. *Am J Neuroradiol* 2002;23(10):1632-1636
30. Vogl TJ, Steger W, Grevers G, Blazer J, Mack M, Felix R. MR Characteristics of Primary Extramedullary Plasmacytoma in the Head and Neck. *Am J Neuroradiol* 1996;17(7):1349-1354
31. dos Anjos Corvo MA, Granato L, Ikeda F, de Próspero JD. Ex-tramedullary nasal plasmacytoma: Literature review and a rare case report. *International Archives of Otorhinolaryngology* 2013;17(2):213-217
32. Sasaki R, Yasuda K, Abe E, Uchida N, Kawashima M, Uno T, Fujiwara M, Shioyama Y, Kagami Y, Shibamoto Y, Nakata K, Takada Y, Kawabe T, Uehara K, Nibu K, Yamada S. Multi-Institutional Analysis of Solitary Extramedullary Plasmacytoma of the Head and Neck Treated With Curative Radiotherapy. *Int J Radiation Oncology Biol Phys* 2012;82(2):626-634
33. Creach KM, Foote RL, Neben-Wittich MA, Kyle RA. Radiotherapy for extramedullary plasmacytoma of the head and neck. *Int J Radiation Oncology Biol Phys* 2009;73(3):789-794

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