OPEN

Sellar Solitary Plasmacytoma Progressing to Multiple Myeloma

A Case Report and Literature Review

Chang-Zhen Jiang, MD, Qing-Song Lin, MD, Xi-Yue Wu, MD, Chen-Yang Wang, MD, and De-Zhi Kang, PhD

Abstract: Sellar plasmacytoma is a rare cause of sellar lesions. Preoperative diagnosis remains a challenge.

We present a 34-year-old Chinese woman with a 25-day history of headache and diplopia. A physical examination revealed incomplete left abducens nerve palsy.

The initial diagnosis was invasive pituitary adenoma. The patient's condition deteriorated suddenly the day before the arranged operating date, with the hemoglobin level declining from 113 g/L to 70 g/L. The operation was cancelled and further studies confirmed the diagnosis of sellar solitary plasmacytoma that progressed to multiple myeloma. After undergoing radiotherapy, high-dose chemotherapy, and autologous peripheral blood stem cell transplantation, complete remission was achieved on 4 years follow-up.

We reviewed the pertinent literature and reached the following conclusions: sellar plasmacytomas with development of multiple myeloma on follow-up more likely happened in men than in women; and if the sellar plasmacytoma does not compress the cranial nerve, transsphenoidal resection should be cautious because the systemic treatment with radiotherapy, chemotherapy, and autologous peripheral blood stem cell transplantation may be more effective with little invasion.

(*Medicine* 93(11):e58)

Abbreviations: APBSCT = autologous peripheral blood stem cell transplantation, CT = computed tomography scanning, MM = multiple myeloma, MRI = magnetic resonance imaging, RT = radiotherapy.

Editor: Maria Kapritsou.
Received: May 5, 2014; revised: June 22, 2014; accepted: July 1, 2014.
From the Department of Neurosurgery, First Affiliated Hospital of Fujian Medical University, Fuzhou, Fujian, China (C-ZJ, Q-SL, X-YW, C-YW, D-ZK).
Correspondence: De-Zhi Kang, Department of Neurosurgery, First Affiliated Hospital, Fujian Medical University, 20 Chazhong Road, Fuzhou 350005, Fujian, People's Republic of China (e-mail: lqs1210305061@163.com).
C-ZJ and Q-SL contributed equally to this paper.
This work is financially supported by the Key Clinical Specialty Discipline Construction Program of Fujian, People's Republic of China.
The authors have no conflicts of interest to disclose.

ISSN: 0025-7974
DOI: 10.1097/MD.0000000000000058

INTRODUCTION

Plasmacell neoplasm is characterized by the neoplastic proliferation of a single clone of plasma cells, which can present as a single lesion (solitary plasmacytoma) or as multiple lesions (multiple myeloma, MM).[1] Plasmacytomas are infrequently located in the brain and occur usually in the leptomeninges with or without parenchymal involvement.[2] And sellar plasmacytoma mimics other sellar mass clinically and radiologically, especially the pituitary adenoma, which leads to high misdiagnosis preoperatively and even postoperatively.[3] However, therapy strategies and prognosis differ from each sellar mass. We present an illustrative case of a patient with sellar plasmacytoma suddenly progressing to MM and review the pertinent literature.

METHODS

To identify studies for inclusion in this review, 2 authors independently searched PubMed, the Cochrane Central Database of Controlled Trials, and Embase for relevant studies published up to November 2013. The search was limited to studies conducted in humans. No language restriction was imposed. Search terms were individualized for each database. Search terms used included ["plasmacytoma" OR "multiple myeloma" OR "solitary plasmacytoma" OR "Plasma cell neoplasm"] AND ["sellar lesion" OR "sella turcica" OR "sellar mass" OR "sellar" OR "sellar tumor" OR "skull" OR "cranial"]. We also searched the proceedings of major relevant conferences, trial databases, the reference lists of identified trials, and major reviews. Informed consent was obtained from the patient.

CASE REPORT

A previously healthy 34-year-old woman was referred to our department on February 2010 with a 25-day history of headache and diplopia. A physical examination revealed incomplete left abducens nerve palsy. No systemic symptoms and signs were detected. Blood tests revealed normal biochemical, pituitary hormonal, and hematological parameters on admission. Magnetic resonance imaging (MRI) showed an irregular intrasellar mass with suprasellar and parasellar extension. Relatively low intensity on T1-weighted images and iso-intensity on T2-weighted images, with nonuniform enhanced characteristics were found (Figure 1). Computed tomography (CT) scanning of the brain showed diffuse and irregular bony destruction of the sellar area (Figure 2). The initial diagnosis was invasive pituitary adenoma. The clinical situation deteriorated suddenly the day before the arranged operating date, with progressing pale and severe retro-orbital pain of the left eye. Emergency blood test revealed moderate anemia (hemoglobin 70 g/L, reference 110–155 g/L), hypercalcemia (3.20 mmol/L, reference 2.25–2.75 mmol/L), and renal impairment. The operation was cancelled immediately. A bone

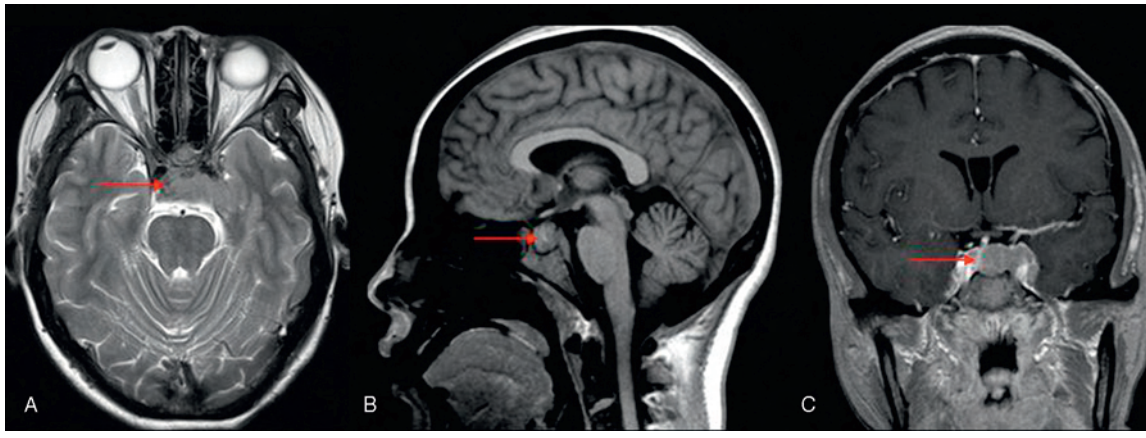

FIGURE 1. T2-weighted images of (A) axial view and T1-weighted images of (B) sagittal view of the MRI scan reveal an irregular mass in the sella turcica with soft tissue intensity. The mass extends into the parasella somewhat heterogeneously enhanced by Gd on (C) coronal view (arrows).

scan showed sellar hypermetabolic lesion and proliferative changes throughout the skeleton (Figure 3). λ Serum light chain (3.3 g/L, reference 0.9–2.1 g/L) was high, and the ratio of k/λ serum light chain was 0.55, below the reference range (1.47–2.95). Urine test of Bence-Jones proteins was positive. Serum beta-2 microglobulin level was high (9.97 mg/L, reference 1.28–1.95 mg/L). A final diagnosis of sellar solitary plasmacytoma progressing to MM (λ type) was made. Localized irradiation (40–50 Gy) for sellar plasmacytoma and high-dose vincristine, adriamycin, dexamethasone chemotherapy (vincristine, doxorubicin, and dexamethasone) followed by autologous peripheral blood stem cell transplantation (APBSCT) were undertaken. The patient was followed up for 4 years with no symptoms or signs, and bone marrow aspiration revealed complete remission. Brain MRI revealed that the sellar tumor mass had significantly shrunk (Figure 4).

DISCUSSION

We present a 34-year-old Chinese woman with initial diagnosis of invasive pituitary adenoma. The day before the scheduled date of surgery, she suddenly felt pale and had a severe headache; subsequent workups confirmed the diagnosis of sellar solitary plasmacytoma that progressed to MM suddenly. If the operation was carried out, moderate anemia might manifest as excessive bleeding during the operation, which would result in improper treatment. Fortunately, after correction of the diagnosis, the patient underwent radiotherapy (RT) for sellar plasmacytoma and high-dose chemotherapy and APBSCT for MM, and was alive with complete remission on a 4-year follow-up.

A review in 2012 collated all reported cases of plasmacytoma involving the sella turcica to that date by Khan et al.[4] We add to these cases already reported in the literature, with

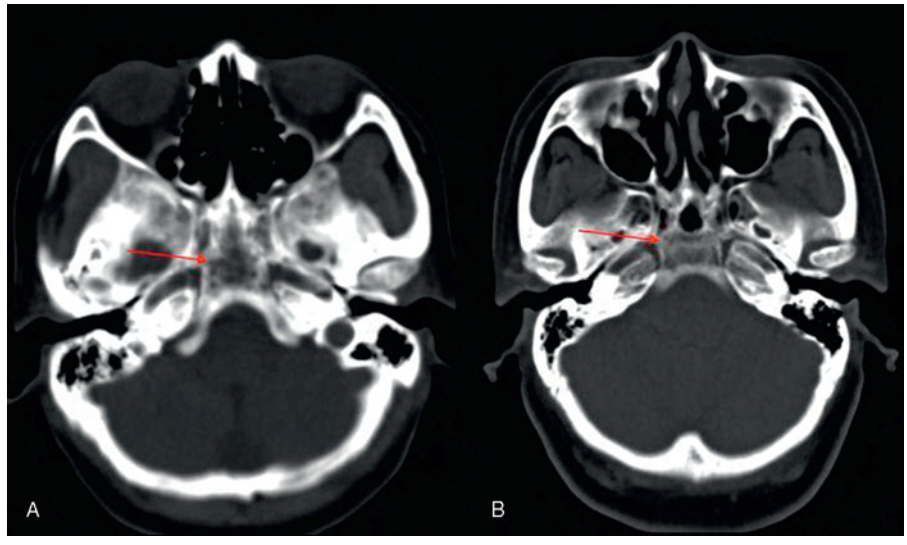

FIGURE 2. Bone window of an (A) axial CT scan demonstrates the bony irregular destruction of the sphenoid compared to the normal (B) image of the skull (arrows).

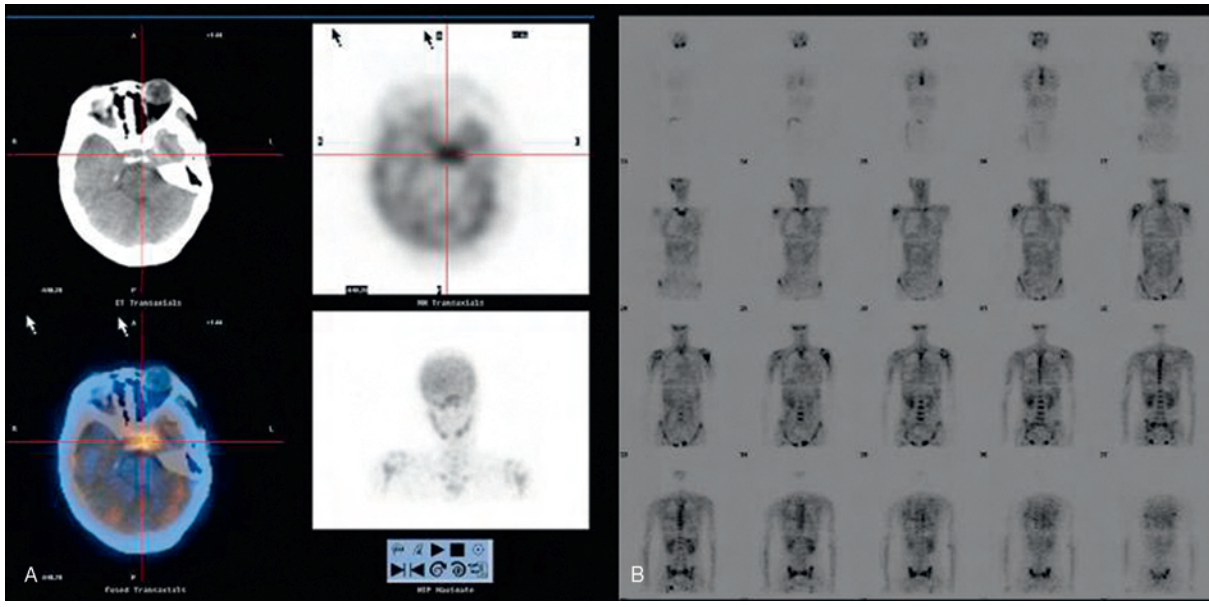

FIGURE 3. Single-photon emission CT scan of the entire body shows the presence of a hypermetabolic mass lesion in the sella turcica (A) and changes of proliferation throughout the skeleton, which exhibited strong FDG uptake (B).

that our patient, to review a total of 31 cases (Tables 1–3). In this review, we conclude the features of sellar plasmacytoma with or without association with MM.

Incidence

Sellar mass is the third highest incidence of brain tumor, and pituitary adenoma occupies most of the lesion revolving the region. The presentation of plasmacytoma as a cranial or intracranial lesion is quite sparse, and it is even more rare a presentation that revolves the sella.[32] No instance that was reported in the series of Silverstein and Doniger[33] of 273 patients with MM regarded the sella turcica.

Pathology

The origin of sellar plasmacytoma may be the surrounding bone or the mucosa within the petrous or the sphenoid bone.[10] The electron microscopic study reveals the characteristic of extramedullary plasmacytoma is the parallel and convolutional r-ER in cytoplasm, and that may help to differentiate it from round-cell pituitary adenoma.[34]

Clinical Manifestation

In the series of the 31 cases mentioned above, the mean age was 56.7 years, ranging from 34 years to 75 years. The ratio between men and women was 15/16, it seems that sellar plasmacytomas with the development of MM on follow-up more likely happened in men than in women (men 6; women 3). Without the development of MM, sellar plasmacytomas seem to happen more often in women than in men (men 2; women 7); however, a high risk of developing MM or another isolated plasmacytoma was reported by

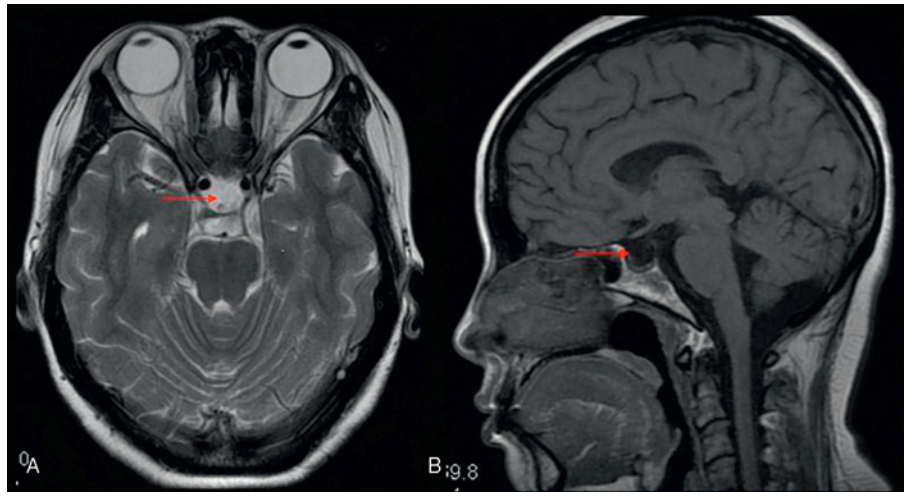

FIGURE 4. T2-weighted images of (A) axial view and T1-weighted images of (B) sagittal view of the MRI scan reveal that the sellar tumor mass had shrunk (arrows).

TABLE 1. Reports of Sellar Plasmacytoma Associated With Overt or Silent MM at Presentation

Age, y	Gender	Presenting Symptoms	Cranial Nerve Involved	Treatment Modalities	Outcome	Reference
70	F	Headache	None	RT and chemotherapy	Alive-22 mo follow-up	Yaman et al, 2008[2]
57	F	Headache, numbness	Right 5	RT, chemotherapy, and PBSCT	Alive-10 mo follow-up	Sinnott et al, 2006[5]
47	M	Ptosis	Left 3, 4	Not known	Not documented	Hornedo et al, 1982[6]
73	F	Diplopia	Left 3, 6	Not known	Not documented	Vallat et al, 1981[7]
57	M	Headache, diplopia	Left 4	RT and chemotherapy	Died-18 mo follow-up	Kerty and Nakstad, 1984[8]
62	M	Headache, diplopia	Left 6	Not known	Not documented	Dhanani et al, 1990[9]
75	F	Headache, diplopia	Right 3, 4, 6	RT and chemotherapy	Alive-16 mo follow-up	Kanoh et al, 1996[10]
61	M	Diplopia, ptosis, headache	Left 3, 4	Chemotherapy and PBSCT	Alive-8 y follow-up	Fukai et al, 2010[3]
58	M	Diplopia	Bilateral 4, 6	RT and chemotherapy	Alive-follow-up period not clear	Rivera et al, 2010[11]
68	F	Headache and diplopia	Not known	RT and chemotherapy	Died-6 mo follow-up	Azarpira et al, 2011[12]
45	F	Diplopia, left eye ptosis	Left 6	RT, chemotherapy, and PBSCT	Alive-14 mo follow-up	Khan et al, 2012[4]
60	M	Headache, diplopia	Not known	RT, chemotherapy	Died-1 mo follow-up	Udiawar et al, 2012[13]
63	M	Headache and diplopia	Bilateral 6, right 3	Chemotherapy	Died-5 mo follow-up	Weilbaecher et al, 2004[14]

F = female, M = male, PBSCT = peripheral blood stem cell transplant, RT = radiotherapy.

Holland et al.[35] The chief complaints included headache (71.0%) and diplopia (61.3%) in most of the patients. Other complaints included visual loss or blurred vision (12.9%), ptosis (9.7%), facial pain or numbness (9.7%), and hearing loss (3.2%). The cranial nerves in most of the reported cases were affected (82.1%). The most commonly affected nerve was the abducens nerve (46.4%), followed by the oculomotor nerve (35.7%), the trochlear nerve (32.1%), the optic nerve (7.1%), and trigeminal nerve (7.1%). Some may manifest with multiple metastatic deposits and have an aggressive course.[4] The majority of the patients had intact anterior pituitary function, as in our own patient.

Classification

According to the report of Khan et al,[4] sellar plasmacytomas are divided into 3 categories: the first category includes patients with primary MM, who secondarily

TABLE 2. Reports of Sellar Plasmacytoma With Development of MM on Follow-up

Age, y	Gender	Presenting Symptoms	Cranial Nerve Involved	Treatment Modalities	Outcome	Reference
62	F	Headache, visual loss	1	RT	Not documented	Poon et al, 1979[15]
42	M	Headache, blurred vision	Left 3, 4	RT and chemotherapy	Not documented	Harrison et al, 1987[16]
42	M	Headache	Left 3, 4	RT	Not documented	Bitterman et al, 1986[17]
65	M	Headache, diplopia	Left 3, Right 3, 4	RT	Not documented	Sanchez et al, 1977[18]
64	F	Diplopia	Bilateral 3, 4, 6	RT	Died-37 mo follow-up	Urbanski et al, 1980[19]
47	M	Diplopia	Left 3	RT and chemotherapy	Died-19 mo follow-up	Vaquero et al, 1982[20]
44	M	Headache, visual loss	None	Not known	Not documented	Estopinan et al, 1987[21]
65	M	Headache	None	RT	Alive-14 mo follow-up	Pitini et al, 2008[22]
34	F	Headache, diplopia	Left 6	RT, chemotherapy, and APBSCT	Alive-4 y follow-up	Our patient

APBSCT = autologous peripheral blood stem cell transplantation, F = female, M = male, RT = radiotherapy.

TABLE 3. Reports of Sellar Plasmacytoma without Development of MM on Follow-up

Age, y	Gender	Presenting Symptoms	Cranial Nerve Involved	Treatment Modalities	Outcome	Reference
66	M	Headache, diplopia	Left 6	RT	Alive-18 mo follow-up	Evans et al, 1985[23]
51	F	Diplopia	Not known	RT and chemotherapy	Alive-symptomatic at 7 and 8 y	Bindal et al, 1995[24]
34	F	Headache, facial pain	None	RT	Alive-2 y follow-up	Jaquet et al, 1991[25]
50	F	Diplopia	Right 6	RT	Not documented	Losa et al, 1992[26]
58	F	Headache, diplopia, facial numbness	Right 5, Left 6, 7	RT	Alive-12 mo follow-up	Juneau et al, 1992[27]
53	F	Headache	None	RT	Alive-7 y follow-up	Mandagere et al, 1998[28]
57	F	Headache, diplopia, visual loss	Right 6, 1	Not known	Not documented	Weber et al, 1999[29]
65	F	Headache, hearing loss	Left 8	RT	Alive-9 y follow-up	McLaughlin et al, 2004[30]
62	M	Diplopia	Right 6	RT and chemotherapy	Not documented	Oishi et al, 2006[31]

F = female, M = male, RT = radiotherapy.

developed a plasmacytoma (Table 1); the second category includes patients who manifest with a sellar plasmacytoma initially and progress to MM on follow-up (Table 2); the third category includes patients who present with a solitary sellar plasmacytoma without evidence of MM (Table 3).

Diagnosis

Most cases were misdiagnosed preoperatively as the radiological appearance was undistinguishable from other pituitary masses. Even after surgery, some extreme rarity without systemic manifestations can lead to misdiagnosis.[20] The typical manifestation of sellar plasmacytomas include headache, cranial nerve palsy, and sellar bony destruction without gross anterior pituitary hormonal imbalance.[4,29] When the development of MM takes place, evidence of anemia, hypercalcemia, renal dysfunction, Bence-Jones proteinuria, plasma cell infiltration of the bone marrow biopsy, and positive serum protein electrophoresis detection may strengthen the diagnosis.

According to the subgroup of the Guidelines Working Group of the UK Myeloma Forum,[36] recommended diagnostic criteria for sellar solitary plasmacytoma are as follows: a single sellar mass of the clonal plasma cells; histologically normal marrow aspirates and trephine biopsies; normal results on skeletal surveys, including the radiology of long bones; anemia, hypercalcemia, or renal impairment due to plasma dyscrasia; and high-serum or urinary level of monoclonal immunoglobulins. When the last 2 points are taken together, it should be diagnosed as sellar plasmacytoma associated with MM.

Differentiation of the cause of a sellar mass is important because treatment and prognosis differ accordingly. The most common lesion of the sella remains pituitary adenoma. Other entities include gliomas, meningiomas, craniopharyngiomas, Rathke's cleft cysts, epidermoids, chordomas, germ cell tumors, metastatic tumors, vascular lesions and granulomatous, and infectious or inflammatory processes.[37–39] Most sellar plasmacytomas mimic the clinical and radiological characteristics of pituitary adenoma and lead to misdiagnosis at admission. However, cranial nerve palsies occur at a later stage of the development of pituitary adenoma, which presents more often with pituitary hormone imbalance. On contrast, oculomotor impairments of sellar plasmacytoma present at the initial presentation, some isolated oculomotor symptoms progress rapidly, and sellar bony destructions with minimally disturbed anterior pituitary function are always revealed. Fukai et al[3] considered the lack of sellar enlargement, the lateral extension into the cavernous sinus, and the bony erosion differed from that of pituitary adenoma. Furthermore, total body exploration, with positron emission tomography, might be helpful for making a differential diagnosis. However, histopathological examination is required for a definitive diagnosis, especially the "gold standard method" of immunohistochemical analysis.[2]

Treatment

The most important step in the management of these patients is correct diagnosis. Transsphenoidal resection of the sellar mass should be made to establish the diagnosis and release the symptoms.[3] Once the diagnosis of sellar plasmacytoma is made, RT is the most common treatment.[5] And close follow-up and RT are the primary treatments designed to prevent the progression of solitary plasmacytoma to MM.[40,41] Once the diagnosis of sellar plasmacytoma with MM is made, systemic treatment must begin immediately. Prompt and appropriate RT and chemotherapy followed by APBSCT may improve the outcomes with a median survival of 5 years.[42] In these 31 cases, 92.4% of patients underwent RT either alone or with other modalities. Chemotherapy was administered to 57.7% of the patients. APBSCT was received by 15.4% of the patients, including our own patient.

Prognosis

Approximately 50% of plasmacytomas progress to overt MM in 10-year follow-up, and 10% of them recur with a plasmacytoma.[2] Recent studies using interphase fluorescent in-situ hybridization indicate that all MM cells harbor chromosome abnormalities.[43] Monosomy of chromosome 13,

which presents in 85% of all MMs, is associated with an adverse prognosis.[44]

CONCLUSION

Sellar plasmacytomas with the development of MM on follow-up are more likely to happen in men than in women. If the sellar plasmacytoma does not compress the cranial nerve, transsphenoidal resection should be cautious, because the systemic treatment with RT, chemotherapy, and APBSCT may be more effective with little invasion.

REFERENCES

1. Dimopoulos M, Terpos E, Comenzo RL, et al. International myeloma working group consensus statement and guidelines regarding the current role of imaging techniques in the diagnosis and monitoring of multiple Myeloma [Review]. *Leukemia*. 2009;23:1545–1556.
2. Yaman E, Benekli M, Coskun U, et al. Intrasellar plasmacytoma: an unusual presentation of multiple myeloma [Case Reports Review]. *Acta Neurochirurgica*. 2008;150:921–924.
3. Fukai J, Nohgawa M, Uematsu Y, et al. Immunoglobulin D multiple myeloma involving the sella manifesting as oculomotor palsy: case report [Case Reports]. *Neurosurgery*. 2010;67:E505–E506.
4. Khan IS, Javalkar V, Thakur JD, et al. Intrasellar plasmacytoma: an illustrative case and literature review [Case Reports Review]. *J Clin Neurosci*. 2012;19:210–213.
5. Sinnott BP, Hatipoglu B, Sarne DH. Intrasellar plasmacytoma presenting as a non-functional invasive pituitary macro-adenoma: case report & literature review [Case Reports Review]. *Pituitary*. 2006;9:65–72.
6. Hornedo J, Calvo F, Aramburu P, et al. [Extramedullary IgD lambda plasmacytoma mimicking a pituitary chromophobe adenoma] [Case Reports]. *Med Clin*. 1982;79:377–379.
7. Vallat M, Vallat JM, Loubet A, et al. [Plasmacytoma with pituitary localization. Report of a case] [Case Reports]. *Bull Soc Ophtalmol Fr*. 1981;81:355–356.
8. Kerty E, Nakstad PH. Plasmacytoma masquerading as a pituitary tumour. *J Neurol Neurosurg Psychiatry*. 1984;47:99–100.
9. Dhanani A-NN, Bilbao JM, Kovacs K. Multiple myeloma presenting as a sellar plasmacytoma and mimicking a pituitary tumor: report of a case and a review of the literature. *Endor Pathol*. 1990;1:245–248.
10. Kanoh T, Okuda T, Hayashi M, et al. [Multiple myeloma presenting as parasellar syndrome and cranial nerve palsies] [Case Reports]. *[Rinsho Ketsueki]*. 1996;37:260–264.
11. Rivera J, Alves S, Bianchi CC, et al. An unusual collision tumor comprising a prolactinoma and a plasmocytoma originating from the sellar region [Case Reports]. *Pituitary*. 2010;13:189–193.
12. Azarpira N, Vasei M, Rasekhi A. Plasma cell tumors with neurologic symptoms: cytological findings [Case Reports]. *Diagn Cytopathol*. 2012;40:248–251.
13. Udiawar M, Bejnariu C, Davies S. Metastatic haematological malignancy presenting as a sellar mass [Case Reports]. *BMJ*. 2012;1–5.
14. Weilbaecher C, Patwardhan RV, Fowler M, et al. Metastatic lesions involving the sella: report of three cases and review of the literature [Case Reports]. *Neurol India*. 2004;52:365–368.
15. Poon MC, Prchal JT, Murad TM, et al. Multiple myeloma masquerading as chromophobe adenoma [Case Reports]. *Cancer*. 1979;43:1513–1515.
16. Harrison LBSS, Schnall S, Cardinale FS, et al. Multiple myeloma presenting as a pituitary tumor. *Int J Radiat Oncol Biol Phys*. 1987;13:653–654.
17. Bitterman P, Ariza A, Black RA, et al. Multiple myeloma mimicking pituitary adenoma [Case Reports]. *Comput Radiol*. 1986;10:201–205.
18. Sanchez JA, Rahman S, Strauss RA, et al. Multiple myeloma masquerading as a pituitary tumor [Case Reports Letter]. *Arch Pathol Lab Med*. 1977;101:55–56.
19. Urbanski SJ, Bilbao JM, Horvath E, et al. Intrasellar solitary plasmacytoma terminating in multiple myeloma: a report of a case including electron microscopical study [Case Reports]. *Surg Neurol*. 1980;14:233–236.
20. Vaquero J, Areitio E, Martinez R. Intracranial parasellar plasmacytoma [Case Reports]. *Arch Neurol*. 1982;39:738.
21. Estopinan V, Riobo P, Fernandez G, et al. [Intrasellar plasmacytoma simulating a pituitary adenoma] [Case Reports Letter]. *Med Clin*. 1987;89:128.
22. Pitini V, Arrigo C, Alafaci C, et al. Extramedullary plasmacytoma presented as a non-functional invasive pituitary macro-adenoma [Case Reports]. *J Neuro Oncol*. 2008;88:227–229.
23. Evans PJ, Jones MK, Hall R, et al. Pituitary function with a solitary intrasellar plasmacytoma [Case Reports]. *Postgrad Med J*. 1985;61:513–514.
24. Bindal AK, Bindal RK, van Loveren H, et al. Management of intracranial plasmacytoma. *J Neurosurg*. 1995;83:218–221.
25. Jacquet G, Vuillier J, Viennet A, et al. [Solitary plasmacytoma simulating pituitary adenoma] [Case Reports Review]. *Neurochirurgie*. 1991;37:67–71.
26. Losa M, Terreni MR, Tresoldi M, et al. Solitary plasmacytoma of the sphenoid sinus involving the pituitary fossa: a case report and review of the literature [Case Reports Review]. *Surg Neurol*. 1992;37:388–393.
27. Juneau P, Schoene WC, Black P. Malignant tumors in the pituitary gland [Case Reports]. *Arch Neurol*. 1992;49:555–558.
28. Mandagere KA, Schimke RN, Kyner JL, et al. An unusual sellar mass–solitary plasmacytoma. *Endocr Pract*. 1998;4: 382–386.
29. Weber J, Jaksche H. Solitary plasmacytoma of the pituitary area [Case Reports]. *Acta Neurochir*. 1999;141:219–220.
30. McLaughlin DM, Gray WJ, Jones FG, et al. Plasmacytoma: an unusual cause of a pituitary mass lesion. A case report and a review of the literature [Case Reports Review]. *Pituitary*. 2004;7:179–181.
31. Oishi T, Kasai H, Sakurai Y, et al. Extramedullary plasmacytoma extensively affecting the sella turcica and paranasal sinuses [Case Reports]. *Clin Neuropathol*. 2006;25:44–47.
32. Sautner D, Saeger W, Ludecke DK. Tumors of the sellar region mimicking pituitary adenomas. *Exp Clin Endocrinol*. 1993;101:283–289.
33. Silverstein A, Doniger DE. Neurologic complications of myelomatosis. *Arch Neurol*. 1963;9:534–544.
34. Sawamura M, Kurabayashi H, Murakami H, et al. Ultrastructure of plasma cells in a patient with J chain disease. *Am J Hematol*. 1993;43:63–65.
35. Holland J, Trenkner DA, Wasserman TH, et al. Plasmacytoma. Treatment results and conversion to myeloma. *Cancer*. 1992;69:1513–1517.
36. Soutar R, Lucraft H, Jackson G, et al. Guidelines on the diagnosis and management of solitary plasmacytoma of bone and solitary extramedullary plasmacytoma [Guideline Practice Guideline Research Support, Non-U.S. Gov't]. *Brit J Haematol*. 2004;124:717–726.

37. Rennert J, Doerfler A. Imaging of sellar and parasellar lesions [Review]. *Clin Neurol Neurosurg*. 2007;109:111–124.

38. Freda PU, Post KD. Differential diagnosis of sellar masses [Review]. *Endocrinol Metab Clin North Am*. 1999;28:81–117.

39. Kaltsas GA, Evanson J, Chrisoulidou A, et al. The diagnosis and management of parasellar tumours of the pituitary [Review]. *Endocr Relat Cancer*. 2008;15:885–903.

40. Liu ZY, Qi XQ, Wu XJ, et al. Solitary intracranial plasmacytoma located in the spheno-clival region mimicking chordoma: a case report [Case Reports]. *J Int Med Res*. 2010;38:1868–1875.

41. Mitsos A, Georgakoulias N, Jenkins A. Intracranial plasmacytoma presenting as chronic subdural haematoma [Case Reports]. *Brit J Neurosurg*. 2004;18:647–649.

42. Attal M, Harousseau JL, Stoppa AM, et al. A prospective, randomized trial of autologous bone marrow transplantation and chemotherapy in multiple myeloma. Intergroupe Francais du Myelome. [Clinical Trial Comparative Study Multicenter Study Randomized Controlled Trial Research Support, Non-U.S. Gov't]. *N Engl J Med*. 1996;335:91–97.

43. Huang SY, Yao M, Tang JL, et al. Clinical significance of cytogenetics and interphase fluorescence in situ hybridization analysis in newly diagnosed multiple myeloma in Taiwan [Research Support, Non-U.S. Gov't]. *Ann Oncol*. 2005;16:1530–1538.

44. Chang H, Qi C, Yi QL, et al. P53 gene deletion detected by fluorescence in situ hybridization is an adverse prognostic factor for patients with multiple myeloma following autologous stem cell transplantation [Research Support, Non-U.S. Gov't]. *Blood*. 2005;105:358–360.