Spinal cord paraganglioma: A case report

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Abstract

Paraganglioma arising in spinal cord is rare case. The patient was a 52-year-old male who complained of low back pain for one month. Lumbar myelographic study revealed an intradural extramedullary mass at L1-2 level that was diagnosed clinically as neurilemmoma. Laminectomy with tumor removal operation yielded a 2.5x2x1.8 cm well circumscribed soft mass with grayish-white and hemorrhagic cut surface. The tumor composed histologically of uniform cells and numerous delicate capillary networks that resemble both ependymoma and paraganglioma. The tumor cells immunoreacted with chromogranin and neuron-specific enorase so that it was called 'paraganglioma', finally. Immunohistochemistry was very useful in diagnosis of this entity.

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ปณิธาน วิศาลสวัสดิ์, พ.บ.
กลุ่มงานพยาธิวิทยากายวิภาค โรงพยาบาลมหาราชนครราชสีมา นครราชสีมา 30000
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Paraganglioma ในไขสันหลังเป็นโรคที่พบได้ไม่บ่อย การรายงานนี้เป็นผู้ป่วยชาย อายุ 52 ปี มีอาการปวดหลังมาประมาณ 1 เดือน ได้ตรวจมัยอีโลแกรมพบก้อนในชั้นดูราแต่อยู่นอกเนื้อไขสันหลังที่ระดับกระดูกสันหลังที่ 1-2 การวินิจฉัยทางคลินิกเป็น neurilemoma ได้รับการผ่าตัด laminectomy และนำก้อนเนื้องอกออก เป็นก้อนที่มีขอบเขตชัดเจนขนาด 2.5x2x1.8 ซม. หน้าตัดสีขาวเทาและมีเลือดออกภายใน ลักษณะทางจุลพยาธิวิทยาเข้าได้กับเนื้องอกชนิด ependymoma และ paraganglioma การวินิจฉัยแยกต้องย้อมพิเศษทางอิมมูโนฮิสโตเคมีสตรีย์ ผลเป็นบวกต่อ chromogranin และ NSE จึงให้การวินิจฉัยโรคเป็น paraganglioma การย้อมทางอิมมูโนฮิสโตเคมีสตรีย์นั้นมีประโยชน์อย่างมากในการวินิจฉัยโรคที่มีลักษณะคล้ายกันเช่นนี้

Introduction

'Paraganglioma' is the neuroendocrine neoplasm which composes largely of paraganglion chief cells[1]. Seventy per cent of tumors arise in adrenal medullar[2], so called 'adrenal medullary paragangliomas' or 'pheochromocytomas'. Extraadrenal paragangliomas can be found in various anatomical sites such as in head and neck region (commonly: carotid body, jugulotympanic, vagal, laryngeal, aorticopulmonary paragangliomas[2] and others; orbit[3-5], nasal cavity:[6, 7], nasopharynx[8], cheek[9], pineal[10], sellar regions[11], thyroid gland[12], retroperitoneum[13], gallbladder[14], spermatic cord[15, 16], prostate[17], prostatic urethra[18], uterus[19], and duodenum[2]. Paragangliomas are able to affect the central nervous system but not commonly seen. Most of those tumors occur within the spinal intradural compartment and arise from the end of the spinal column including cauda equida, filum terminale, conus medullaris, and caudal nerve roots[1]. Approximately 100 cases have been reported. We, hereby, presented an additional case that the tumor was encountered at upper lumbar level.

A case report

A 52-year-old man had suffered from lower back pain and sciatica for one month. Neurological examination revealed decreased sensation at L1-2 of both legs. Lumbar myelography showed a partial block at level L1-2 by a 2.5x2x1.8 cm. intradural extramedullary mass. The tumor was diagnosed clinically and radiologically as neurilemmoma. At laminectomy with tumor removal operation, a 2.5x2x1.8 cm, well circumscribed and soft tumor was completely removed. Its cut surface was grayish white in color with area of hemorrhage. The tumor was fixed in 10% formalin and routinely processed. Histologic examination revealed uniform cells and numerous

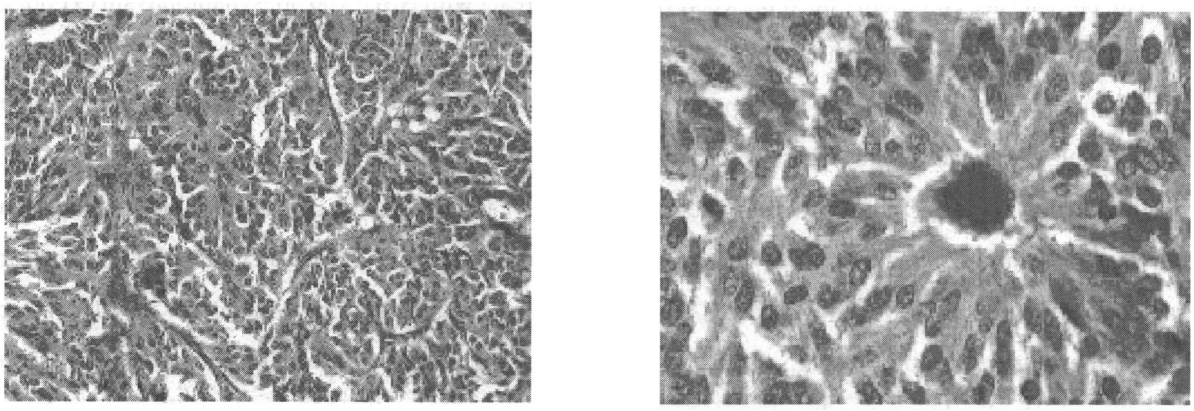

Fig. A. Histopathology (H&E stain 40x และ 100x)

delicate capillary networks (Fig. A). The findings from hematoxylin and eosin stained slides resembled both ependymoma and paraganglioma. The tumor was immunohistochemically stained with anti-chromogranin, anti-neuron specific enorase antibodies, S100 protein and GFAP. The tumor was diagnosed as paraganglioma, as most of the cells immunoreacted with chromogranin (Fig. B) and NSE. The patient was finally seen without any residue 12 months after the operation.

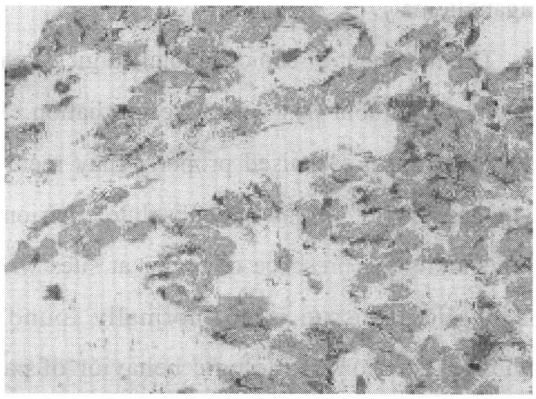

Fig. B. Immunohistochemistry reacted chromogranin

Discussion

Spinal cord paraganglioma was first mentioned by Miller et al in 1970[20] and first described by Lerman et al in 1972[21]. The preceeding reports were isolated cases until 1983 Boker et al collected 7 cases of such tumor and literally reviewed the other 11 cases[22]. Two biggest series of spinal cord paragangliomas were those of Sonneland PR et al[23], who, in 1986, did the clinicopathologic study of 31 paragangliomas of the cauda equina region with special reference to immunocytology and ultrastructure and of Moran et al[24], who studied the clinicopathology and immunohistochemistry of 30 spinal cord paragangliomas in 1997.

Spinal cord paragangliomas are usually encountered at the end of the spinal column below L1 vertebral level. Less common sites include cervical[24, 25] and thoracic[24, 26] regions. Our case has the tumor at the L1-2 vertebral level that is the end point of the spinal column so that the tumor may arise from conus medullaris, filum terminale, cauda equina or caudal nerve root.

The patients are commonly aged between fifth to seventh decade of life with equal male and female preponderance[22-24]. As the patient in this report, most patients of spinal paragangliomas present with back pain radiating down the leg, motor or sensory deficits, and urinary or fecal incontinence[1, 22, 24]. The clinical presentation depends on the level of affected spinal cord and the degree of compression. Only a few patients have high blood pressure due to secretion of catecholamine from tumors[22, 24]. The tumors always appear neuroradiologically and angiographically as vascular mass with contrast enhancement however the rare findings are non-specific filling defect and myelographic block[23, 27].

The tumor sizes are not exceeding 5 cm.[23, 24] They are described as well circumscribed or encapsulated masses with homogeneous slightly hemorrhagic cut surfaces and tan-brown in color[1, 24]. Spinal cord paragangliomas are histologically similar to those of other areas and compose of uniform cells with demarcated border called 'chief cells' arranged in large lobules or nests termed 'zellbalen'[1]. The other cellular component is 'sustentacular cells' that are inconspicuously seen in Hematoxylin and eosin stained section and tend to form a flattened, nearly uniform layer[1]. The features include cellular pleomorphism, mitosis, prominent vascular channel, hyalinization, ganglion cell, spindle cell and oncocytic change whereas melanin pigment is occasionally seen[1, 24]. In this case, the tumor is histologically supposed to be paraganglioma.

Chromogranin and synaptophysin are the most important neuroendocrine markers to confirm the diagnosis of paraganglioma[24]. Chief cells immunoreact with NSE (100%), synaptophysin (91%), glial fibrillary acid protein (GFAP, 30%), keratin (21%), and neurofilament protein (13%)[24]. Sustentacular cells stain well with S100 protein (95%) and GFAP[1, 24]. In this case, the tumor chief cells immunoreacted with chromogranin, NSE and negative GFAP. The tumor sustentacular cells immuoreacted with S100 protein.

The differential diagnoses of spinal cord paraganglioma include myxopapillary ependymona, meningioma, nerve sheath tumor, metastatic carcinoma, melanoma and sarcoma[1, 24]. The resemblance of paraganglioma and myxopapillary ependymoma can be especially observed if the paraganglioma expresses a pseudopapillary pattern. Strongly positive immunoreactivity for NSE, generally diffuse form, provides presumptive evidence of the paraganglionic nature of the lesion since ependymomas are generally negative. Positive intracytoplasmic neurosecretory granules, demonstrated by 'Grimelius method', is reliable and non-expensive method to excludes ependymoma. Reactivity for chromogranin is specific, strong, and present in large population of cells. Diffuse GFAP reactivity, a feature of ependymoma, excludes paraganglioma[1].

The treatment of choice is total surgical resection with or without post-operative irradiation. The tumors that are not excised properly may recur or locally aggress[1, 23, 25]. The only absolute criterion of malignancy is the presence of tumor at sites where paraganglionic tissue is not normally found[28]. Reliable prediction of biologic behavior of paragangliomas on the basis of histopathologic features is notoriously difficult[2]. The clinically malignant tumors

usually have the following characters: necrosis, vascular invasion, high mitotic rate, coarse nodularity of primary tumor, absence of hyaline globule, and large size: but these attributes were not prognostically significant in the statistical model used[2]. Decreasing in number of sustentacular cells and in expression of neuropeptides detected by immunohistochemistry have suggested aggressive or malignant paragangliomas[2].

In conclusion, a case of spinal cord paraganglioma at L1-2 vertebral level was reported. The rarity of this entity results in the diagnostic difficulty both clinically and radiologically. The pathological diagnosis is not easy because the tumor is histologically similar to myxopapillary ependymoma. Immunohistochemistry and necessary is very useful and pecessavy for diagnosis.

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References

1. Burger PC, Scheithauer BW. Tumors of the central nervous system. In: Rosai J, editor. Atlas of tumor pathology, 3rd series, fascicle 10. Washington, D.C.: Armed forces institute of pathology, 1994: 317-20.
2. Lack EE. Paragangliomas. In: Sternburg SS, editor. Diagnostic surgical pathology, 3rd ed , vol 1. Philadelphia: Lippincott Willium & Wilkins, 1999: 625-48.
3. Fisher ER, Hazard JB. Nonchromaffin paraganglioma of the orbit. Cancer 1952; 5:521-4.
4. Thacker WC, Duckworth JK. Chemodectoma of the orbit. Cancer 1969; 23: 1233-8.
5. Thorbeck RV, Valentin OIM, Morales MR. Nonchromaffin paraganglioma of the orbit. Zentralb Chir 1986; 111: 46-9.
6. Veda N, Yoshida A, Fukunishi R, Fujita H, Yanagihara N. Nonchromaffin paraganglioma in the nose and paranasal sinuses. Acta Pathol Jpn 1985; 35: 489-95.
7. Walson DJ. Nasal paraganglioma. J Laryngol Otol 1988; 102: 526-9.
8. Schuller DE, Lucas JG. Nasopharyngeal paraganglioma: report of a case and review of literature. Arch Otolaryngol 1982; 108: 667-70.
9. DeLozier HL. Chemodectoma of the cheek: a case report. Ann Otol Rhinol Laryngol 1983; 92: 109-12.
10. Smith Wt, Hughes B, Ermocilla R. Chemodectoma of the pineal region, with observation of the pineal body and chemoreceptor tissue. J Pathol Bacteriol 1966; 92: 69-76.
11. Bilbao JM, Horvath E, Kovacs K, Singer W, Hudson AR. Intrasellar paraganglioma associated with hypopituitarism. Arch Pathol Lab Med 1978; 102: 95-8.
12. Buss DH, Marshall RB, Baird FG, Myers RT. Paraganglioma of the thyroid gland. Am J Surg Pathol 1980; 4: 589-93.
13. Fries JG, Chamberlin JA, Extra-adrenal pheochromocytoma: literature review and report of a cervical pheochromocytoma. Surgery 1968; 63: 268-79.
14. Miller TA, Weber TR, Appelman HD. Paraganglioma of the gallbladder. Arch Surg 1972; 105: 637-9.
15. Eusebi V, Massarelli G. Pheochromocytoma of the spermatic cord: report of a case. J Pathol 1971; 105: 283-4.
16. Bacchi CE, Schmidt RA, Brandao M, Scapulatempo R, Costa JCM, Schmitt FC. Paraganglioma of the spermatic

cord: report of a case with immunohistochemical and ultrastructural studies. Arch Pathol Lab Med 1990; 114: 899-901.

17. Nielsen VM, Skovgaard N, Kvist N. Pheochromocytoma of the prostate. Br J Urol 1987; 59: 478-9.
18. Altavilla G, Cavazzini L, Russo R. Secreting benign paraganglioma of the prostatic urethra. Tumori 1983; 69: 79-82.
19. Young TW, Thrasher TV. Nonchromaffin paraganglioma of the uterus. Arch Pathol Lab Med 1982; 106: 608-9.
20. Miller CA, Torack RM. Secretory ependymoma of the filum terminale. Acta Neuropathol (Berl) 1970; 15: 240-50.
21. Lerman RI, Kaplan ES, Daman L. Ganglioneuroma-paraganglioma of the intradural filum terminale. J. Neurosurg. 1972; 36: 652-8.
22. Boker DK, Wassmann H, Solymosi L. Paragangliomas of the spinal canal. Surg Neurol 1983; 19: 461-8.
23. Sonneland PR, Scheithauer BW, LeChago J, Crawford BG, Onofrio BM. Paraganglioma of the cauda equina region. Clinicopathologic study of 31 cases with special reference to immunocytology and ultrastructure. Cancer 1986; 15: 58: 1720-35.
24. Moran CA, Rush W, Mena H. Primary spinal paragangliomas: a clinicopathological and immunohistochemical study of 30 cases. Histopathology 1997; 31: 167-73.
25. Blade DA, Hardy RW, Cohen M. Cervical paraganglioma with subsequent intracranial and intraspinal metastases. J Neurosurg 1991; 75: 320-3.
26. Constsatini S, Soffer D, Siegel T, Shalit MN. Paraganglioma of the thoracic spinal cord with cerebrospinal metastasis. Spine 1989; 14: 643-5.
27. Aggarwal S, Deck JH, Kucharczyk W. Neuroendocrine tumor (paraganglioma) of the cauda equina: MR and pathologic findings. Am J Neuroradiol 1993; 14: 1003-7.
28. Neville AM. The adrenal medulla. In: Symington T, editor. Functional pathology of the human adrenal gland. Baltimore: Williams&Wilkins, 1969; 217-34.