

Symptomatic Vertebral Hemangioma Treated by Radiotherapy

— A Case Report —

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Vertebral hemangiomas are rarely symptomatic and have been treated by surgical managements in patients with symptoms. A case of symptomatic vertebral hemangioma which was treated by radiotherapy successfully is presented.

Key Words: Hemangioma, Skeletal system, Radiotherapy

INTRODUCTION

Vertebral hemangiomas are benign vascular tumors and are rarely symptomatic. When they are accompanied with symptoms of myelopathy and/or radiculopathy secondary to compression of nerve roots or spinal cord, they can be treated with either decompressive laminectomy^{1,2)} or embolization followed by vertebral body resection^{3~7)}, but with serious morbidity and mortality. Alternative to these surgical managements, radiotherapy^{1,8,9)} has been considered for the treatment of symptomatic vertebral hemangioma.

We describe a case, in which a vertebral hemangioma was treated with radiotherapy exclusively and became asymptomatic after radiotherapy.

Case Report

This 22-year-old man has been suffering from low back pain radiating into right leg for 3 months prior to admission to Capital Armed Forces General Hospital. There was no past history of trauma on back. Physical and neurological examination showed that there was tenderness over the L 3-4 area. He felt severe pain when he woke up from his bed. Motor and sensory functions were intact except slightly increased knee and ankle jerk. Straight leg raising test also was positive.

Plain x-ray films of the lumbar spine demonstrated vertical striations and contour bulging of left lateral cortex of L3 body. Left pedicle of L3 was asymmetrically enlarged and had dense fuzzy margin (Fig. 1). Computed tomography of L3 showed diffuse involvement of body with honey-comb or polka-dot appearance and disruption of

cortex (Fig. 2). Whole body bone scan with ^{99m}Tc-MDP showed increased uptake in L3 vertebra (Fig. 3).

Patient received radiation therapy through pos-

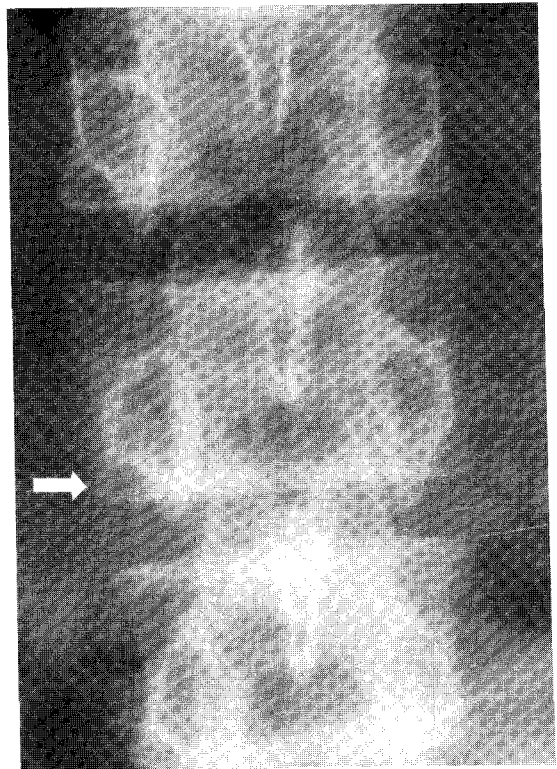


Fig. 1. Radiograph of anteroposterior lumbar spine shows vertical striation in vertebral body and contour bulging of left lateral cortex (arrow) of L3. Left pedicle of L3 is asymmetrically enlarged and has dense fuzzy margin.

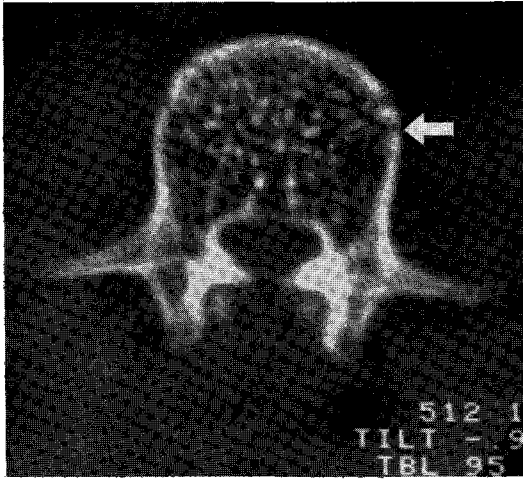


Fig. 2. CT scan of L3 shows diffuse involvement of body with honeycomb or polka-dot appearance. Note disrupted cortex (open arrows)

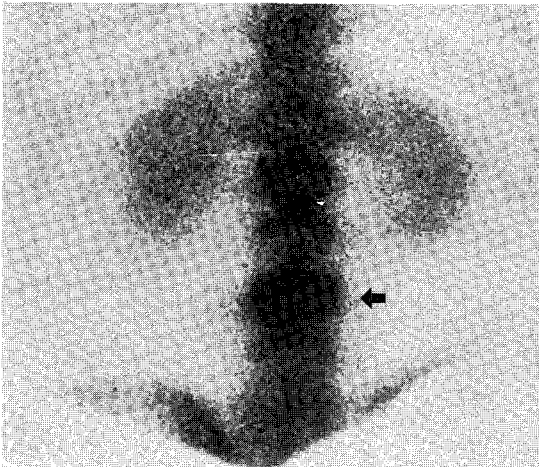


Fig. 3. Whole body bone scan with ^{99m}Tc -MDP shows increased uptake in L3 (arrow).

terior field (field size 6×7 cm) including the involved vertebra plus half of the adjacent vertebral bodies from Co-60 teletherapy unit. With conventional fractionation schedule, 2 Gy (200 rads) daily, 5 treatments per week, total tumor dose of 40 Gy was delivered over 4 weeks, and doses were calculated at 4 cm depth.

During radiotherapy, low back pain subsided gradually and at the conclusion of scheduled treat-

ment, he reported no more pain. Follow up CT scan and whole body bone scan 6 weeks after radiotherapy revealed no interval changes.

DISCUSSION

Hemangiomas are slow-growing vascular tumor which, in bones, are most commonly found in the calvarium and vertebral bodies. Within the spinal column, the thoracic vertebrae¹⁰⁾ are most frequently involved. Histopathologically, they consist of thin-walled, blood-filled vessels and sinuses lined by endothelium and interspersed among the longitudinally oriented trabeculae of bone. In 1867, Virchow¹¹⁾ described the first case of vertebral hemangioma and Perman¹²⁾, in 1926, followed by Bailey and Bucy¹³⁾ in 1930, described the characteristic vertically striated radiographic image associated with vertebral hemangioma. The majority of vertebral hemangiomas are clinically silent and are common incidental findings at autopsy with the incidence of 11%¹⁴⁾ but they are rarely symptomatic. A review of literature reveals about 200 reported cases of symptomatic vertebral hemangiomas. When myelopathy do occur, it may be caused by four basic mechanisms: 1) an epidural soft tissue mass compressing the spinal cord¹⁵⁾ 2) expansion of the involved vertebra to compress the spinal cord¹⁶⁾ 3) a compression fracture^{2,6)} 4) epidural hemorrhage from hemangioma¹⁷⁾.

The diagnosis of vertebral hemangiomas can often be made by the characteristic appearance on simple x-ray^{12,13)} films. The vertebra carries vertical striations or honeycomb pattern and are most commonly seen in the vertebral body but may be present throughout all elements. On CT scans a polka-dot pattern is documented because the vertical trabeculae are imaged in cross section¹⁸⁾. J.D. Laredo et al¹⁹⁾, reviewed to find radiographic and computed tomographic criteria by which to distinguish asymptomatic lesions from those compressing the spinal cord. Six features were seen significantly more often in compressive vertebral hemangiomas, and included location between T3 and T9, involvement of entire vertebral body, extension to the neural arch, an expanded cortex with indistinct margins, an irregular honeycomb pattern, and soft tissue mass. Besides these CT and simple x-ray findings, recently MR imaging²⁰⁾ must be added. The hemangiomas continued to show a distinctive appearance of increased signal on both T1- and T2-weighted images at least in the osseous portions of the tumor, and this shortened T1 reflects the

fatty components of the tumors as evidenced by the chemical shift and histopathologic findings.

For the treatment of myelopathy due to vertebral hemangiomas, surgical managements such as decompressive laminectomy¹⁾, posterior spinal fusion²⁾, vertebral body resection⁵⁻⁷⁾ with or without preoperative embolization have been used. Embolization alone has been reported on occasion to relieve symptoms of myelopathy^{3,4)}. Although effective in relieving symptoms, surgical management is hazardous because hemorrhage from the involved bone may be profuse and difficult to control. For this reason, radiotherapy has been considered to be an alternative^{1,8,9)} either exclusive or partial, treatment of symptomatic vertebral hemangioma, however, there are few reports in the literatures. Then what is the radiobiological rationale in the treatment of vertebral hemangiomas by radiotherapy? It is a known long term effect of ionizing radiation which causes radiation-induced vasculitis by damaging the endothelium of vessel wall then leads to further impairment of circulation by obliterating the abnormal vessels. This effect applies to treatment of conditions such as arteriovenous malformation in central nervous system^{2,11)} and liver hemangiomas²²⁾. As to the appropriate tumor dose and fractionation schedule in the management of symptomatic vertebral hemangioma is not still clear in the literature. According to Casaret²³⁾, radiosensitivity of endothelial cells of blood vessels is intermediate and are able to tolerate greater doses than those given to angiomas of children's skin.

Glanzmann et al²⁴⁾, who treated 62 patients in 36 years, the largest series in the literatures, recommended doses of about 4,000 rads (40 Gy) 150-200 rad per day, 5 times per week. Perhaps 4,000 rad may be the best dose because 1) it is the maximum possible dose because it is close to the tolerance dose of the spinal cord and 2) the greater the dose, the more the vascular damage in the tumor. Sergio et al⁹⁾, reported 9 cases of vertebral hemangiomas treated with radiotherapy. More than 75% of patients had permanent significant improvement or freedom of symptoms related to the angiomas. But their 8 patients did not have important neurological symptoms but history of low back pain radiating to legs prior to the treatment. Only 1 patient who presented with paraplegia received surgery and postoperative radiotherapy. She was complete symptom-free during follow up. McAllister et al¹⁾, reported 8 cases with severe neurological deficits

which were demonstrated on myelography. Of them, 5 patients received surgery and postoperative radiotherapy and 2 patients were treated radiotherapy alone and they were all symptom-free regardless of treatment methods done. The radiographic appearance of vertebral hemangiomas treated successfully with radiation does not seem to change even after longterm follow up¹⁾. In our cases, we examined follow up CT scan and whole body bone scan, but we could not find interval change. Even though there is no literature about follow up radiologic change with MR imaging after radiation therapy of vertebral hemangioma we can expect no difference because same increased signal intensity of vertebral body was demonstrated on T1-weighted image²⁵⁾ after radiation therapy to vertebrae incidentally due to other malignancies. It can be concluded that myelopathy as well as radiculopathy, can be treated with radiotherapy alone with safety and without other complications. Because malignant degeneration of primary hemangiomas is not known to occur, it seems that long-term follow up may not be necessary except for evaluation of possible late complications.

REFERENCES

1. McAllister VL, Kendall BE, Bull JWD: Symptomatic vertebral hemangiomas. *Brain* 98:71-80, 1975
2. Greenspan A, Klein MJ, Bennett AJ, et al: Hemangioma of the T6 vertebra with a compression fracture, extradural block and spinal cord compression. *Skeletal Radiol* 10:183-188, 1983
3. Hekster REM, Luyendijk W, Tan JI: Spinal cord compression caused by vertebral hemangioma relieved by percutaneous catheter embolization. *Neuroradiology* 3:160-164, 1972
4. Gross CE, Hodge CJ, Jr, Binet EE, et al: Relief of spinal block during embolization of vertebral body hemangioma. Case report. *J Neurosurg* 45:327-330, 1976
5. Hemmy DC, McGee DM, Armbrust FH, et al: Resection of a vertebral hemangioma after preoperative embolization. Case report. *J Neurosurg* 47:282-285, 1977
6. Graham JJ, Young WC: Vertebral hemangioma with compression fracture and paraparesis treated with preoperative embolization and vertebral resection. *Spine* 9:97-101, 1984
7. Tony Feuerman, Paul S Dwan, Ronald F Young: Vertebrectomy for treatment of vertebral hemangioma without preoperative embolization. Case report. *J Neurosurg* 65:404-406, 1986
8. Vrinder Mohan SK, Gupta SM, et al: Symptomatic vertebral hemangiomas. *Clin Radiol* 31:575-579,

- 1980
9. Sergio L. Farza, Werner R. Schlupp, Honorio Chiminzio Jr: Radiotherapy in the treatment of vertebral hemangiomas. *Int J Radiat Oncol Biol Phys* 11:387-390, 1985
 10. Wilmer D: Radiology of bone tumors and allied disorders. Philadelphia Saunders, 664, 1982
 11. Virchow R: "Die Krankhaften Geschwülste". Berlin: Hirschwald, vol. 3:306-496, 1867
 12. Perman F: On hemangiomas in the spinal column. *Acta chir Scand* 61:91-105, 1926
 13. Bailey P, Bucy PC: Carvenous hemangioma of the vertebrae. *JAMA* 92:1748-1751, 1929
 14. Schmorl G, Junghanns H: The human spine in health and disease, New York, Grune & Stratton 325, 1971
 15. Healy M, Herz DA, Pearl L: Spinal hemangiomas. *Neurosurgery* 13:689-691, 1983
 16. Bell RL: Hemangioma of a dorsal vertebral with collapse and compression myelopathy. *J Neurosurg* 12:570-576, 1955
 17. Kosary IA, Braham J, Shacked I, et al: Spinal epidural hematoma due to hemangioma of vertebra. *Surg Neurol* 7:61-62, 1977
 18. Price HI, Batnitzky S: Computed tomographic findings in benign diseases of the vertebral column. *CRC Crit Rev Diagn Imaging* 24 (1):39-89, 1985
 19. Jean-Denis Laredo, Daniel Reizine, et al: Vertebral hemangiomas, radiologic evaluation. *Radiology* 161:183-189, 1986
 20. Jeffrey S Ross, Thomas J Masryk, et al: Vertebral hemangiomas, MR imaging. *Radiology* 165:165-169, 1987
 21. Wolkov HB, Bagshaw MA: Radiation therapy in the management of vascular malformations of the central nervous system. *Int J Radiat Oncol Biol Phys* 8 (suppl 1):91, 1982
 22. Okazaki N, et al: Radiotherapy of hemangioma carnosum of the liver. *Gastroenterology* 73:353, 1977
 23. Casaret G in Harris RJC: Cellular basis and etiology of late somatic effects of ionizing radiations. New York, Academic Press, 1963
 24. Glantzmann C, Rust M, Horst W: Radiotherapy bei Angiomen der Wirbelsäule ergebnisse bei 62 patients aus dem zeitraum 1939-1975 *Strahlentherapie* 153:522-525, 1977
 25. Ruth G. Ramsey, Charles E. Zacharias: MR imaging of the spine after radiation therapy, easily recognizable effects. *AJR* 144:1131-1135, 1985

= 국문초록 =

추골혈관종의 방사선 치료

— 증례 보고 —

국군수도병원 방사선과

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추골 혈관종은 대개의 경우 증상이 없으며, 증상이 있는 환자의 치료는 주로 외과적인 방법에 의해 행하여졌다. 저자들은 신경학적인 증상이 동반된 추골 혈관종 환자에서 방사선치료후 증상의 호전을 보인 예를 경험하였기에 보고하는 바이다.