Intraosseous schwannoma of thoracic 12 vertebra without spinal canal involvement

Ahmet Cetinkal · Cem Atabey · Serdar Kaya ·
Ahmet Colak · Ali Kivanç Topuz

Received: 30 December 2008 / Accepted: 13 February 2009 / Published online: 3 March 2009
© Springer-Verlag 2009

Abstract Schwannomas are of common tumors of the nerve sheath cells. They present as well-circumscribed masses attached to the peripheral nerves, cranial nerves, or spinal nerve roots. Intraosseous localization of these tumors is rare. The presented case is a 55-year-old female patient, the very first case of intraosseous schwannoma of Th12 vertebra without spinal canal involvement. She was admitted with a progressive back pain and seldom pain and numbness in the right leg for 1 year. Preoperative findings on computed tomography and magnetic resonance images of the lesion resembled that of any primary tumor of the bone. The patient was operated on via posterior approach and the tumor was removed totally. Histopathological examinations revealed schwannoma. Our case emphasizes the heterogeneous presentation of the nerve sheath cell tumors in the differential diagnosis of the primary vertebral column tumors.

Keywords Intraosseous schwannoma · Spine · Thoracic vertebra

Introduction

Schwannomas are typically soft tissue tumors along sensory nerves which lie in the head, neck, mediastinum, and retroperitoneum or along the cranial nerves [11]. Intraosseous

schwannomas are rare benign neoplasms that account for less than 0.2% of primary bone tumors [3, 9]. They arise from the intraosseous nerve sheath cells and most commonly occur in the mandible [5]. Vertebral involvement is extremely rare [2]. Despite the challenge of surgery, the tumor can be completely removed and recurrence is infrequent. We report a pure intraosseous Th12 schwannoma without spinal canal involvement, with its imaging findings, histological features and surgical aspects.

Case report

A 55-year-old female who had progressive back pain and seldom pain and numbness in the right lower extremity for 1 year was admitted to our department. Physical and neurological examinations were insignificant. Magnetic resonance (MR) images demonstrated a contrast enhancing, lobulated and encapsulated extradural mass lesion with dimensions of $3 \times 2 \times 1.5$ cm, involving the pedicle, lamina and the body of Th12 vertebra. Tumor did not have any extension into the spinal canal (Fig. 1a–d).

Patient was operated via posterior approach. After Th12 right hemilaminectomy the tumor was totally removed from the vertebral body using ultrasonic surgical aspirator. Tumor was found to be totally intraosseous. It was grayish in color and no extension of neoplastic transformation was detected in the neighboring bony structure.

Histopathologic examination showed a well-circumscribed lesion composed of hypocellular areas (Antoni A) alternating with hypercellular areas (Antoni B) and foci of Verocay bodies were evident (Fig. 2a). Within the stroma microcysts, thick-walled vessels and inflammatory cells were also seen. Additionally, immunohistochemical staining with S100 protein was diffusely positive, whereas glial

A. Cetinkal · C. Atabey (✉) · S. Kaya · A. Colak ·
A. K. Topuz
Department of Neurosurgery,
GATA Haydarpaşa Training Hospital,
Üsküdar, 34668 Istanbul, Turkey
e-mail: acetinkal@yahoo.com

Fig. 1 Preoperative sagittal T1 weighted MRI (**a**), sagittal T2 weighted MRI (**b**) and axial postcontrast T1 weighed MRI (**c, d**)

Fig. 2 H&E (**a**), S100 immunostain (**b**)

Fig. 3 **a, b** Postoperative axial postcontrast T1 weighted MR images

fibrillary acidic protein (GFAP) and smooth muscle actin (SMA) were negative (Fig. 2b). With these findings histopathological diagnosis was depicted as intraosseous schwannoma.

Postoperatively, the patient was free of preoperative complaints and had an uneventful course with no neurological deficit. At the latest one-year follow-up, she was asymptomatic and MR and computed tomography (CT)

images did not reveal any evidence of recurrent tumor (Figs. 3a, b; 4a–d).

Discussion

A wide variety of benign and malignant neoplasms can involve the spine and cause expansion of the vertebra.

Fig. 4 Postoperative axial CT (a, b), sagittal reconstructed CT (c) and coronal reconstructed CT (d) images

Intraosseous schwannomas are rare benign neoplasms which account for less than 0.2% of primary bone tumors, and they are most commonly seen in the mandible, possibly because of the long course of the sensory nerves within this bone [3, 9]. Other reported sites include ulna, humerus' femur, sacrum, tibia, ribs, patella, scapula, maxilla, the small bones of the hands and vertebral bodies [1–4, 10, 11]. The first case of intraosseous schwannoma of a lumbar vertebral body has been reported by Dickson et al. [4].

Three mechanisms have been postulated by which a nerve sheath tumor involves the bone: (a) an extraosseous tumor causing secondary erosion, (b) tumor arising centrally within the bone (intraosseous schwannoma), and (c) tumor arising in the nutrient canal and growing in a dumbbell-shaped configuration [5].

Schwannomas and neurofibromas are the most common nerve sheath tumors found in the spine. They usually

present as intradural, extramedullary tumors (70–75%) but less commonly also intradural + extradural (15%), extradural (15%), and intramedullary (<1%) tumors are reported [5]. Schwannomas are typically lobulated, encapsulated masses. On MR imaging, they are well-defined, enhancing tumors and cystic, hemorrhagic, or necrotic degeneration may be observed [5, 9].

Vertebral intraosseous schwannomas gradually increase in size, there occurs pressure erosion on the pedicle and the vertebral body, resulting in widening of the foramen and scalloping of the vertebra, but extensive vertebral destruction is unusual [10]. Likewise, intraosseous tumor causes enlargement of the involved pedicle and occupies the vertebral body usually free from the abutting neural tissue.

Previously reported cases of spinal intraosseous schwannomas in the literature has caused spinal cord compression, pedicle erosion, remarkable widening of the

neural foramina, vertebral body scalloping and extravertebral spread. The present case is a pure intraosseous schwannoma of Th12 vertebra and showed no extravertebral or spinal canal involvement. The spinal cord was eccentrically shifted to other side in the spinal canal by virtue of the enlarged pedicle. During surgery, lesion was found to be completely surrounded by bony tissue and that makes the present case the first case of pure intraosseous schwannoma of the vertebral body.

During the follow-up period of 1 year, no evidence of recurrence was seen and the patient remained asymptomatic.

Some particular features of localization and imaging findings of intraosseous schwannomas help distinguishing them from primary bone tumors such as osteoblastoma, giant cell tumor, aneurysmal bone cyst, solitary plasmacytoma [6–8]. Intraosseous schwannomas, by visualizing radiographic tools, present virtually always lytic and despite absence of central calcification or ossification, a narrow sclerotic zone may be present between the tumor and bone [3, 5, 10].

Intraosseous schwannomas, in general, are successfully treated using surgical excision or thorough curettage and recurrence is uncommon [2].

Conclusion

The presented case is the first case of intraosseous schwannoma of Th12 vertebra without spinal canal involvement and distinguished from the previously reported cases available in the English literature search by its pure intraosseous localization and absence of spinal canal extension. Considering its heterogeneous clinical presentation, intraosseous schwannoma should be included in the differential diagnosis of an extradural mass which could be free from the abutting neural tissue that causes expansion and consequently the destruction of the vertebra.

Conflict of interest statement None.

References

1. Barnowsky L, Dala R (1992) Extradural schwannoma manifested as an expansile vertebral lesion. *AJR Am J Roentgenol* 159: 1352–1353
2. Chang CJ, Huang JS, Wang YC, Huang SH (1998) Intraosseous schwannoma of the fourth lumbar vertebrae: case report. *Neurosurgery* 43:1219–1222. doi:[10.1097/00006123-199811000-00120](https://doi.org/10.1097/00006123-199811000-00120)
3. Choudry Q, Younis F, Smith RB (2007) Intraosseous schwannoma of D12 thoracic vertebra: diagnosis and surgical management with 5-year follow-up. *Eur Spine J* 16(3):283–286. doi:[10.1007/s00586-006-0247-0](https://doi.org/10.1007/s00586-006-0247-0)
4. Dickson JH, Waltz TA, Fechner RE (1971) Intraosseous neurilemmoma of the third lumbar vertebra. *J Bone Joint Surg Am* 53:349–355
5. Inaoka T, Takahashi K, Hanaoka H, Aburano R, Takusashi Y, Matsuno T, Sugimoto H, Furuse M (2001) Paravertebral neurinoma associated with aggressive intravertebral extension. *Skeletal Radiol* 30:286–289. doi:[10.1007/s002560100327](https://doi.org/10.1007/s002560100327)
6. Koci TM, Mehringer CM, Yamagata N, Chiang F (1995) Aneurysmal bone cyst of the thoracic spine: evolution after particulate embolization. *AJNR Am J Neuroradiol* 16:857–860
7. Kron HM, Schurmans J (1990) Osteoblastoma: clinical and radiologic findings in 98 new cases. *Radiology* 175:783–790
8. Meyers SP, Yaw K, Devaney K (1994) Giant-cell tumor of the thoracic spine: MR appearances. *AJNR Am J Neuroradiol* 15: 962–964
9. Osborn A (1994) Intradural extramedullary tumors, cysts, and tumor like masses. *Diagnostic Neuroradiology*. St. Louis, MO, pp 895–906
10. Singrakhia MD, Parmar H, Maheshwari M, Fehlings M (2006) Cervical schwannoma presenting as an expansile vertebral body lesion, report of two cases with a technical note on the surgical management. *Surg Neurol* 66:192–196. doi:[10.1016/j.surneu.2005.11.057](https://doi.org/10.1016/j.surneu.2005.11.057)
11. Turk PS, Peters N, Libbey NP, Wanebo HJ (1992) Diagnosis and management of giant intrasacral schwannoma. *Cancer* 70: 2650–2657. doi:[10.1002/1097-0142\(19921201\)70:11<2650::AID-CNCR2820701114>3.0.CO;2-1](https://doi.org/10.1002/1097-0142(19921201)70:11<2650::AID-CNCR2820701114>3.0.CO;2-1)