

Aneurysmal Bone Cyst of a Thoracic Vertebra

Seong Rok Han, M.D.,¹ Gi Taek Yee, M.D.,¹
Han Seong Kim, M.D., Ph.D.,² Choong Jin Whang, M.D., Ph.D., F.A.C.S.¹

Departments of Neurosurgery,¹ Pathology,² Ilsan Paik Hospital, College of Medicine, Inje University,
Goyang, Korea

The authors describe a case of aneurysmal bone cyst of a thoracic vertebra. A 34-year-old woman presented with posterior neck and upper back pain. Radiological examination demonstrated an aneurysmal bone cyst involving the posterior elements of the second thoracic vertebra. The spinal cord was compressed severely also. Satisfactory results were obtained after complete resection of the lesion.

KEY WORDS : Aneurysmal bone cyst · Thoracic vertebra.

Introduction

Aneurysmal bone cyst, first described by Jaffe and Lichtenstein in 1942⁷⁾, comprises approximately 1.4% of all bone tumors⁴⁾. Approximately 50% of all aneurysmal bone cysts are found near one end of a long bone and 25% involve the vertebrae, hyoid, jaws, and odontoid⁹⁾. Aneurysmal bone cyst is a benign lesion composed of large vascular spaces separated by trabeculae of connective tissue and bone⁹⁾. Radical surgery can be curative and has been advocated for aneurysmal bone cyst¹³⁾.

We present a case of aneurysmal bone cyst of the thoracic vertebra. Clinical manifestations, methods of investigation, differential diagnosis, treatment and pathogenesis are reviewed also.

Case Report

This 34-year-old-woman was admitted to our hospital complaining of posterior neck and upper back pain.

Examination

Neurologic examination revealed a no motor weakness and myelopathy. Hypesthesia was found in the area of T1-3 dermatomes. The deep tendon reflexes were not exaggerated.

Computerized tomography scanning revealed a ballooned mass lesion involving the posterior elements of the second thoracic vertebra. This mass was observed to extend from both

pedicles to the spinous process (Fig. 1). Magnetic resonance imaging of spine were performed (Fig. 2). The posterior elements of the second thoracic vertebra was destroyed totally. Axial magnetic resonance of T1 weighted image (Fig. 2A) revealed a well-defined expansile mass lesion with hypo-signal intense rim. Sagittal T2 weighted image (Fig. 2B) showed increased signal intensity in the mass with multiple internal septations, and spinal cord was compressed also. Axial gadolinium-enhanced T1-weighted image (Fig. 2C) demonstrated a heterogenous enhancement of the mass.



Fig. 1. Computed tomographic scan with a contrast media of the second thoracic vertebra demonstrates the extension of the osteolytic tumor mass in the soft tissues involving the pedicles, laminae and spinous process.

Operation

A presumptive diagnosis of aneurysmal bone cyst was made, and an operation was carried out. A median longitudinal skin incision and meticulous muscle dissection were done. The pinkish oval shape mass was found. Destroying the T2 lamina completely, as high as lower margin of the lamina T1, and downward to the upper margin of the T3 lamina (Fig. 3A). En-bloc removal could be performed without difficulty. The dura mater was compressed, but its contour and epidural fat were preserved (Fig. 3B).

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• Address for reprints : Gi Taek Yee, M.D., Department of
Neurosurgery, Ilsan Paik Hospital, College of Medicine, Inje University,
2240 Daehwa-dong, Ilsan-gu, Goyang 411-706, Korea
Tel : +82.31-910-7734, Fax : +82.31-915-0885
E-mail : gtyee@ilsanpaik.ac.kr

Pathological examination

The cut surfaces of the surgical specimen showed a honey comb of blood-filled spaces of different sizes separated by ossous septa (Fig. 4A). Microscopic examination of the tissue from the central portion of the lesion disclosed several blood-filled channels of different sizes, bordered only by a thin layer of spindle-shaped endothelial-like cells with no elastica or smooth -muscle wall. The vascular spaces were surrounded by connective tissue (Fig. 4B).

Postoperative course

The post operative course was uneventful.

Discussion

Aneurysmal bone cysts are characterized by varying numbers of small and large cavernous spaces filled clotted-blood fluid⁸. It is a benign and expansile, non-neoplastic lesion that destroys the bony architecture¹³.

Aneurysmal bone cysts represent 1~2% of all primary tumors of the bone⁵. In 94 cases of aneurysmal cyst of the spine reviewed by Hay, et al.⁶ 57% were female and the average age was 16.6years. The cervical spine was affected in 22%, the thoracic vertebrae in 33%, the lumbar spine in 31%, and the sacrum in 13% of cases. In most of the reported cases, the posterior elements of the vertebrae were the site of the lesion.

The etiology of Aneurysmal bone cyst is obscure, although the following theory is generally accepted. The aneurysmal bone cysts may be due to development of a hemodynamic vicious cycle in a bone that is the site of a congenital vascular anomaly. This cycle is triggered by trauma or the development of other pathology, which interferes with venous drainage of the area. As a result, subsequent increase in venous pressure and development of a dilated and engorged vascular bed in the affected bone¹⁻³.

The main symptom in aneurysmal bone cyst of the spine is pain, which is usually slight and intermittent at first, but becomes severe and constant when the lesion expands rapidly¹. Neurological symptoms varied from slight paresthetia to complete paraplegia. Rapid neurological deterioration may occur, and in such instances surgery is indicated even more urgently to

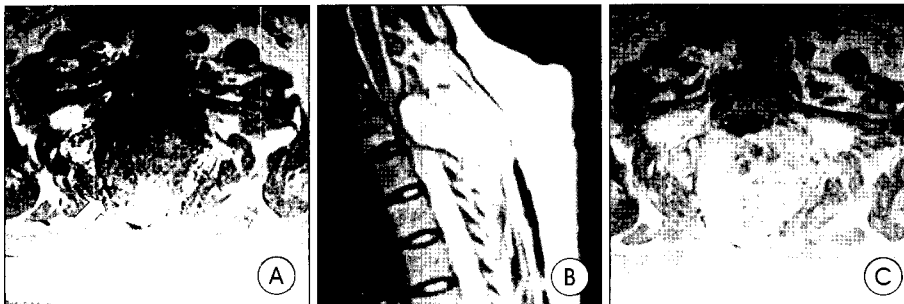


Fig. 2. Axial magnetic resonance of T1 weighted image (A) of the second thoracic vertebra reveals a well-defined expansile mass lesion of posterior elements, and a hypo-signal intense rim is seen at the interface between the mass and surrounding normal tissue (arrow). Sagittal T2 weighted image (B) shows increased signal intensity in the mass with multiple internal septations, and the spinal cord is compressed from behind. Axial gadolinium-enhanced T1-weighted axial image demonstrates a heterogenous enhancement of the mass (C).

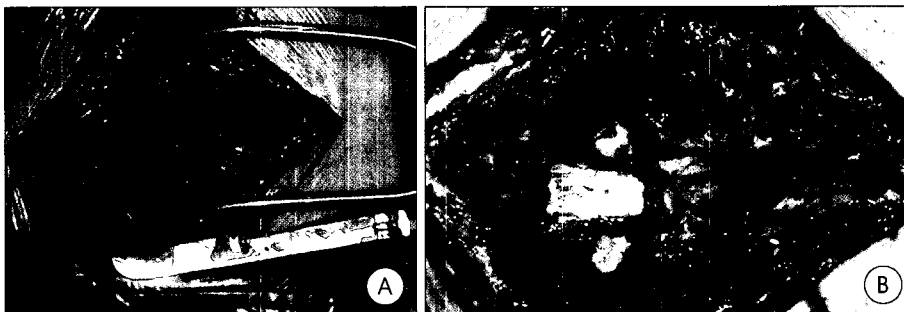


Fig. 3. The photograph (A) shows a pinkish oval shape mass(arrow), which destroys the posterior elements of upper thoracic vertebra. After the mass is removed totally (B), the dura mater and pedicles are seen.

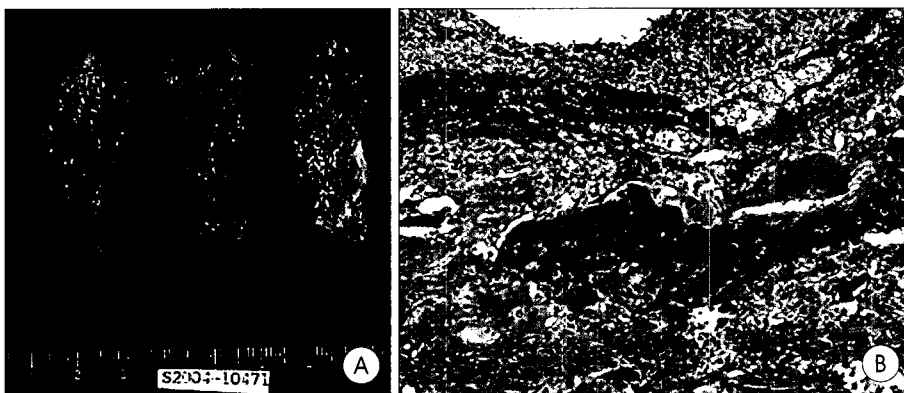


Fig. 4. Serial sections of the mass (A) reveal hemorrhagic cut surface with multicystic spaces and solid portions. Photograph of microscopic finding (B) shows a septa composed of fibroblasts, giant cells, and reactive woven bones (H & E, x100).

prevent irreversible damage to the spinal cord¹⁾.

Pathologically, aneurysmal bone cysts contain multiple fluid-filled cavities separated by multiple septa lined here and there by multinucleated giant cells. These large spaces filled with blood don't have an endothelial lining⁹⁾. When isolated from cystic structure, these areas may resemble other benign or malignant lesions such as osteoblastoma, osteosarcoma, giant cell granuloma, or even fibrous dysplasia. The entire lesion must be examined in order to assure the correct diagnosis²⁾.

Radiography of aneurysmal bone cysts usually shows an expansile cystic lesion with a honey comb or a soap bubble appearance¹³⁾. Plain radiographs are of great value in the diagnosis of aneurysmal bone cyst of the spine. Usually an expanded destructive is seen. And some sclerosis of the surrounding bone is often present¹⁾. Computed tomography scan usually reveals an expanded bony lesion with contents of heterogenous densities, and may also enhance peripherally with contrast^{5,10)}. Magnetic resonance imaging reveals a well-defined expansile mass lesion with multiple internal septations. T1-weighted images reveal multiple internal lobulations with varying intensities. A hypointense rim may be seen at the interface of the aneurysmal bone cyst with bordering tissue. In T2 weighted images, increased signal intensity in the cysts suggests old blood clot. About 30% of aneurysmal bone cyst have a fluid-fluid level^{5,10,13)}.

Total excision has been recommended as an ideal treatment^{8,9)}, but is not always feasible¹⁾. Either piecemeal or en bloc removal can be performed, but the latter is preferred whenever possible, to reduce intraoperative bleeding¹¹⁾. Subtotal excision or simple curettage is associated with high recurrence rates varying from 21% to 50%^{9,13)}.

Radiation therapy has recently been advocated only in situations where complete surgical excision is not possible⁴⁾. There are two drawbacks to radiotherapy in case of aneurysmal bone cyst involving the spine : Sarcomatous changes and post-irradiation myelopathy^{1,4)}.

The potential for recurrence is low, and may be related to the age of the patient, the size of the lesion, the presence of mitoses, or the incompleteness of the resection²⁾.

Conclusion

Aneurysmal bone cyst is essentially a benign lesion, and usually occurs in young age group. Occasionally it becomes acutely exacerbated, causing irreversible damage to the spinal cord. For these reasons, prompt diagnosis and timely treatment are important.

References

1. Ameli NO, Abbassioun K, Saleh H, Eslamdoost A : Aneurysmal bone cysts of the spine. **J Neurosurg** **63** : 685-690, 1985
2. Branch CL, Challa VR, Kelly DL : Aneurysmal bone cyst with fibrous dysplasia of the parietal bone. **J Neurosurg** **64** : 331-335, 1986
3. Choi JJ, Youm JY, Kim SH, Koh HS, Song SH, Kim Y : A case of aneurysmal bone cyst on the whole 5th cervical vertebra. **J Korean Neurosurg Soc** **31** : 74-77, 2002
4. Dysart SH, Swengel RM, van Dam BE : Aneurysmal bone cyst of a thoracic vertebra. **Spine** **17** : 846-848, 1992
5. Gan YC, Mathew B, Salvage D, Crooks D : Aneurysmal bone cyst of the sphenoid sinus. **J Neurosurg** **15** : 51-54, 2001
6. Hay MC, Paterson D, Taylor TKF : Aneurysmal bone cyst of spine. **J Bone Joint Surg** **60B** : 406-411, 1978
7. Jaffe HL, Lichtenstein L : Solitary unicameral bone cyst with emphasis on the roentgen picture, the pathologic appearance and the pathogenesis. **Arch Surg** **44** : 1004-1025, 1942
8. Kanamiya T, Asakawa Y, Naito M, Yoshimura T, Isayama T : Pathological fracture through a C-6 aneurysmal bone cyst. **J Neurosurg (Spine)** **94** : 302-304, 2001
9. Kumar R, Mukherjee KK : Aneurysmal bone cysts of the skull. **Br J Neurosurg** **13** : 82-84, 1999
10. Lippman CR, Jallo GI, Feghali JG, Jimenez E, Epstein F : Aneurysmal bone cyst of the temporal bone. **Pediatr Neurosurg** **31** : 219-223, 1999
11. Luccarelli G, Fornari M, Savoirdo M : Angiography and computerized tomography in the diagnosis of aneurysmal bone cyst of the skull. **J Neurosurg** **53** : 113-116, 1980
12. McArthur RA, Fisher RG : Aneurysmal bone cyst involving the vertebral column. **J Neurosurg** **24** : 772-776, 1966
13. Muzumdar DP, Goel A, Mistry R, Gujral S, Fatehpurkar S : Postoperative cerebellar herniation in a large intrapetrous aneurysmal bone cyst. **J Clin Neurosci** **11** : 534-537, 2004