Aneurysmal Bone Cysts of the Spine

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SUMMARY

Two cases of aneurysmal bone cyst of the spine are reported. These rather rare tumours may pose initial diagnostic problems. If, however, the clinical and radiological features are studied, diagnosis should be easy and the appropriate treatment will follow. Computed tomography provides an additional diagnostic aid. Management appears to be primarily surgical, but the role of radiotherapy has not yet been clearly defined.


Bloodgood in 1919 gave the name 'giant cell tumour' to the spinal bony lesions first described by Cooper and Travers in 1818. Jaffe et al. in 1940 subdivided the group of tumours into the benign chondroblastoma, the non-osteogenic fibroma of bone and the aneurysmal bone cyst. The term 'aneurysmal bone cyst' was used to describe a lesion with the typical radiographic appearance of a cystic lesion with a 'blow-out' of the surrounding bone.

CASE REPORTS

Case 1

A 15-year-old Black girl was referred to her regional hospital because of a mass in the back of the neck, which had been enlarging progressively during the preceding 12 months. Her initial complaint had been of pain in the neck. Radiographs of the region showed erosion of the laminae and spinous process of the second cervical vertebra. A bony capsule was said to be clearly visible on the lateral view. No exact diagnosis was made and no treatment was instituted. She was later readmitted because of the progressive enlargement of the mass. While in hospital she suddenly developed severe pain in the arms, followed by rapid onset of 'severe' quadriparesis. Repeat X-ray studies revealed almost total destruction of the second cervical vertebra, associated with subluxation between the atlas and the third cervical vertebra. She was immediately placed in cervical traction, with subsequent marked pain relief and almost full return of motor function. She was then referred for neurosurgical management.

New films of the neck demonstrated quite clearly the extent of the lesion (Fig. 1). Computed tomographic studies confirmed the site and extent of the lesion (Fig. 2). The patient had recovered fully, and general and neurological examination revealed no abnormalities. Routine laboratory investigations were negative.

Because of the gross bony destruction and because extensive surgery and stabilization would have been required had the lesion proved to be an aneurysmal bone cyst, a biopsy was carried out to establish the nature of the lesion. The patient was immobilized in a plaster of Paris Minerva jacket, leaving a posterior cervical opening for surgery. A midline incision was used, and the muscles were split to reveal a yellowish-red, soft tumour, which was grossly cystic in parts. Biopsy specimens were taken, and two of the cysts were opened, yielding yellowish fluid and altered blood. The wound was closed in layers.

Fig. 1. Lateral radiograph of the cervical spine showing marked destruction of C2, subluxation of C1 upon C3 and a large posterior soft-tissue mass.

Histological examination confirmed the clinical diagnosis of a benign aneurysmal bone cyst. The patient was then transferred to the orthopaedic department for a fur-
ther operation. She was stabilized in a lightweight halo-thoracic jacket and received before surgical treatment a course of 3000 rad in daily doses of 300 rad. At the operation a soft tumour of approximately 10 x 7 x 4 cm was dissected from the soft tissues adjacent to the spine and the spinous processes and laminae of C1-C5. The arch of the atlas was sacrificed and an autogenous iliac H-graft was secured in position with silver wire. The patient made a full and uneventful recovery.

Case 2

A 16-year-old Coloured boy presented with back pain, which had been present for approximately 2 months, and an associated progressive paraparesis of recent onset. The pain appeared to be radicular in nature and predominantly on the right, although there had been an isolated episode of left-sided pain. The onset of the pain and the paraparesis were sudden but not simultaneous. There was loss of sensation up to an ill-defined symmetrical upper limit between T4 and T10. On the day of admission he complained of difficulty with micturition. General examination and routine laboratory investigations were non-contributory. On neurological examination he was found to have hypertonia in both lower limbs and loss of all sensory modalities, except proprioception, to the level of T2/3. This level became more clearly defined during the next few hours. It was associated with urinary retention and almost complete paraplegia. Plain radiographs of the thoracic spine revealed a lytic lesion of the left side of the body of T2, with involvement of the head of the corresponding rib (Fig. 3). There was no obvious radiological evidence of involvement of the posterior elements of T2. The patient was referred to the neurosurgical unit for urgent myelography, which showed a total block at the level of T2/3. Immediate laminectomy was performed, at which a soft, fleshy and very vascular tumour was found, predominantly posteriorly sited at the T1/2 level, but extending rostrally to C7 and caudally to T2. The mass was found to extend laterally to the left into the transverse process of T2, and the head of the adjacent rib. The tumour was also noted to have involved the body of T2. Subtotal removal of the tumour left a small portion of the extra-axial mass behind and the wound was closed in layers. Histological examination showed the mass to be a benign aneurysmal bone cyst. The patient made a good recovery, with full return of bladder function and good return of lower limb power, and was able to walk with the aid of walking sticks. Postoperatively the patient underwent tomographic and computed tomographic investigations, which demonstrated the extent both of the operation and the remaining small tumour mass (Fig. 4). It was decided not to refer the patient for radiotherapy, but to follow him up carefully with a view to further surgery if indicated.

DISCUSSION

Aneurysmal bone cysts are benign lesions and are characterized by a variable number of channels and spaces with surrounding bony walls of varying thickness seen on gross
examination and microscopically. The spaces may be filled with serous fluid, fresh and altered blood and may be lined by giant cells or endothelial-like cells. There may be associated solid tissue, densely fibrous in nature, probably derived from organizing haematoma and on occasion forming the bulk of the tumour. Macroscopically the lesions expand the cortex of the bone in which they occur, producing rarefaction and ultimately leaving a thin, encompassing shell of cortical bone. The spinal lesions involve the posterior segments (the laminae, spinous processes or transverse processes), or the anterior segment (the vertebral body). It is usual for the posterior elements to be more extensively involved. The tumours are usually well demarcated and do not tend to invade the surrounding soft tissues. Various theories have been proposed as to their origin, none of which has been substantiated.

Fig. 4. Computed tomographic scan, at the level of T2, showing the postsurgical bony defect (large arrows) and the remaining tumour mass involving the body of T2 (small arrows). The decompressed spinal cord is clearly outlined by intrathecal metrizamide.

Aneurysmal bone cysts of the spine are uncommon. In 1967 Dahlin, on analysing 2,000 primary bone tumours at the Mayo Clinic, found an incidence of only 1.4%. The incidence in the spine appears to equal that in the appendicular skeleton. To date only 92 cases of spinal aneurysmal bone cysts have been reported. They have been reported at every level in the spine except the coccyx. They have a predilection for the lumbar spine and are often not confined to a single vertebra. There is a slight female preponderance, with a male : female ratio of 1 : 1.3. Children and adolescents are mainly affected, with a peak in the second decade.

Back pain is the commonest presenting symptom and may be related to an injury by the patient. The pain is usually nonspecific, but may be radicular in nature. Various neurological symptoms may be associated with the pain, but severe paraparesis is the commonest. A palpable mass may be present in approximately 6% of cases. The radiological features have been well described. The classic lesion is characterized by an expansile osteolytic cavity, often containing fine strands of bone, surrounded by an egg-shell rim of blown-out cortex. Myelography and tomography may be of great value in delineating the extent of the lesion. Selective spinal angiography may also be of value. Computed tomography has been helpful in outlining the extent of the lesion and in detecting the thin surrounding rim of bone. However, it does not appear to assist appreciably in the pre-operative diagnosis. It may be of great value in revealing the proximity of the lesion to adjacent important structures, e.g. the ureter.

The management of these cases is surgical and, where possible, aims at radical total removal of the tumour. Surgery is indicated as an emergency procedure when there is progressive neurological deficit. Subsequent stabilization procedures may then be required to prevent further neurological and structural sequelae. Recurrence may follow subtotal removal, and this is likely when the tumour has poorly demarcated limits.

Radiotherapy has been proposed by some authors as the prime or preliminary mode of treatment. Its role has not yet been clearly defined in the management since the development of malignant changes and post-irradiation myelopathy have been reported in some patients who had received radiotherapy.

**CONCLUSION**

This rare bony tumour should be remembered in the differential diagnosis of lytic lesions of the spine in young individuals. Although the radiological appearance is typical, it may not easily be recognizable when collapse of the surrounding structures into the cavity has occurred. The computed tomographic findings appear to correlate closely with the plain radiographic features, and may be of help in confirming the diagnosis. Radical surgery, with stabilization when indicated, appears to be the treatment of choice. Radiotherapy, because of its attendant risks, does not appear to be the best treatment, but may be of value in the postoperative management when there has been subtotal removal of the tumour or a recurrence.

**REFERENCES**