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Computed tomography in spinal hemangioma with cord compression

Report of two cases

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Abstract. Two teenagers with spinal cord compression due to a thoracic vertebral hemangioma are presented. Myelography showed a complete block in both patients. Selective intercostal arteriography was normal or non-conclusive. Only computed tomography (CT) gave precise information about the extent and nature of the compressive lesion. In the first case it showed angiomatous involvement of the body and all parts of the neural arch of T4, and a posterior epidural ossified angiomatous mass. In the second case it showed angiomatous involvement of the vertebral body and an anterior extradural soft tissue mass; this latter was considered to represent a resolving extradural hematoma. CT, preferably performed after intrathecal contrast injection, is the diagnostic procedure of choice for spinal hemangioma with cord involvement.

Key words: Vertebral hemangioma – Spinal cord compression – Computerized tomography – Myelography

Vertebral hemangioma is a common [5, 19] and benign condition of cavernous or capillary dysembryoplastic type [14], usually discovered incidentally on lateral radiographs of the lumbar spine or chest. Spinal cord compression is a rare complication [11, 20]. We report two cases which emphasize the role of high-resolution computed tomography (CT) in the assessment of the mechanism of cord compression.

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Case reports

Case 1

This 19-year-old male was admitted with a 3 month history of thoracic back pain, and progressive weakness and hypoesthesia of the lower limbs. Neurologic examination showed marked spasticity of the legs, patellar hyperreflexia, and bilateral ankle clonus. Plain films of the thoracic spine disclosed a typical vertebral hemangioma of T4. Myelography performed by lumbar injection of 20 ml of iopamidol showed a complete block with a posterior extradural compression of the cord at the same level; the examination was completed by a lateral C1–C2 contrast injection (Fig. 1A). The block extended over the whole height of T4. CT examination (Fig. 1B) 3 hours after myelography showed extensive involvement of T4, including body, pedicles, laminae, articular facets, spinous and transverse processes. The posterior epidural space was occupied by a $20 \times 15 \times 7$ mm angiomatous bony mass, containing hypertrophied, vertically oriented trabeculations, and compressing the spinal cord. Its upper and lower margins reached the level of the pedicles of T3 and the T4–5 intervertebral disc, respectively. Selective intercostal arteriography was normal (Fig. 1C). A few hours later, the neurologic condition worsened rapidly with complete paraplegia and urinary retention. Spinal cord decompression was achieved by emergency laminectomy and removal of the posterior epidural ossified angiomatous mass arising from the laminar junction of T4 (Fig. 1D). The histologic diagnosis was vertebral hemangioma with multiple areas of recent hemorrhage. The patient recovered completely within one month of the operation.

Case 2

This 17-year-old male suffered sudden transient attacks of upper thoracic back pain of unknown origin for three years. He was taken to hospital after a more severe attack of back pain, accompanied by paresthesias of the lower limbs and difficulty in walking. Plain films of the thoracic spine showed a vertebral hemangioma of T8. Within 10 days the symptoms had disappeared. Eight months later, however, the patient was admitted to our hospital with sudden onset of severe back pain, loss of sensation in the lower limbs, and an ataxic gait. A myelogram (Fig. 2A) performed by lumbar injection of metrizamide, showed a complete extradural block at the level of T8. Again, symptoms regressed spontaneously. A control myelogram (Fig. 2B) was obtained one week later by the suboccipital route.

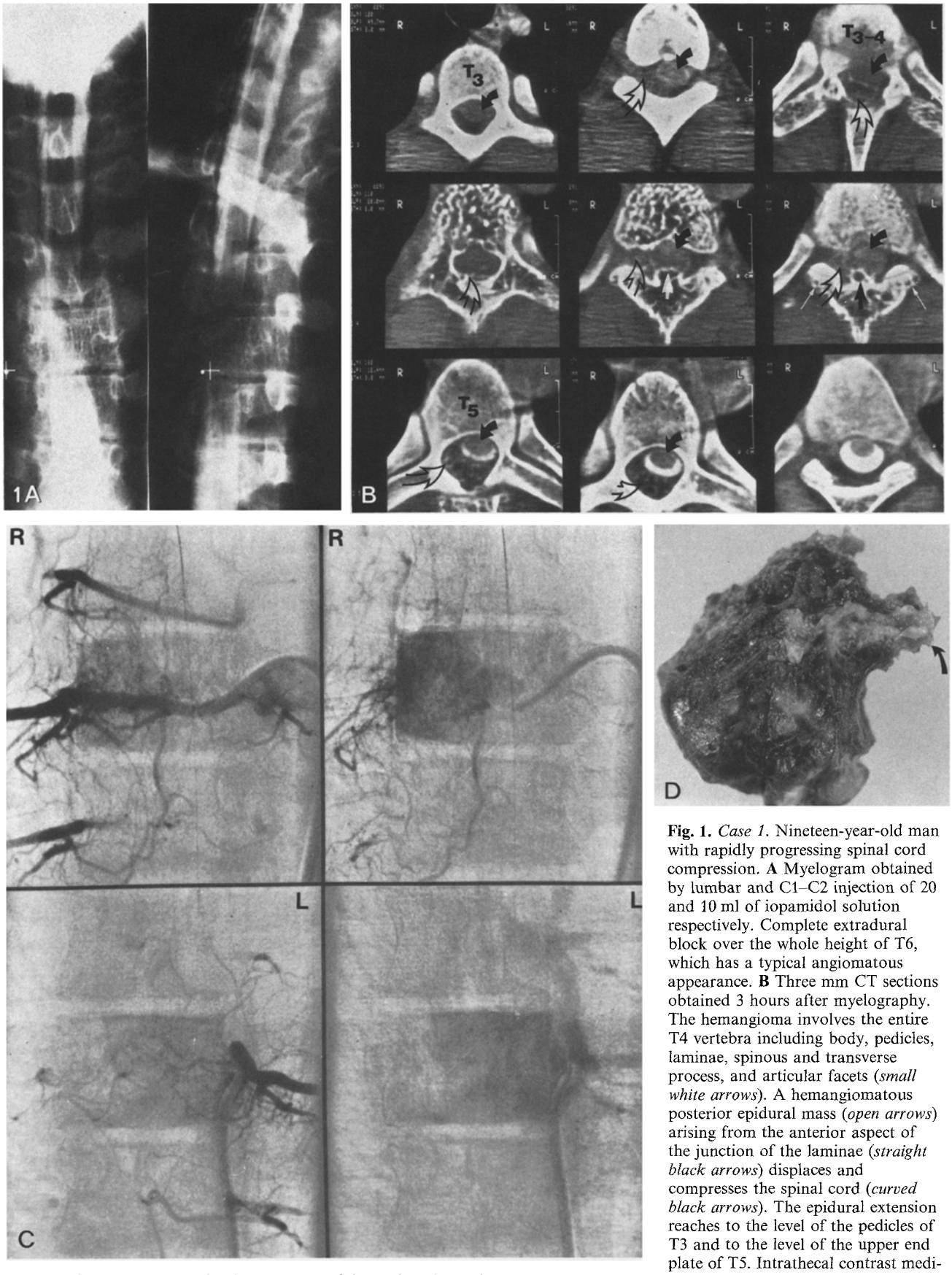

Fig. 1. *Case 1.* Nineteen-year-old man with rapidly progressing spinal cord compression. **A** Myelogram obtained by lumbar and C1–C2 injection of 20 and 10 ml of iopamidol solution respectively. Complete extradural block over the whole height of T6, which has a typical angiomatous appearance. **B** Three mm CT sections obtained 3 hours after myelography. The hemangioma involves the entire T4 vertebra including body, pedicles, laminae, spinous and transverse process, and articular facets (*small white arrows*). A hemangiomatous posterior epidural mass (*open arrows*) arising from the anterior aspect of the junction of the laminae (*straight black arrows*) displaces and compresses the spinal cord (*curved black arrows*). The epidural extension reaches to the level of the pedicles of T3 and to the level of the upper end plate of T5. Intrathecal contrast medium is again present at this level. **C** Selective right (*top*) and left (*bottom*) intercostal arteriogram in early and late phases. Normal angiographic pattern of T4. There are arterio-venous shunts and opacification is limited to the ipsilateral hemi-vertebra. **D** Operative specimen, posterior epidural bony hemangiomatous mass. The *arrow* points to the side which was attached to the anterior aspect of the laminar junction

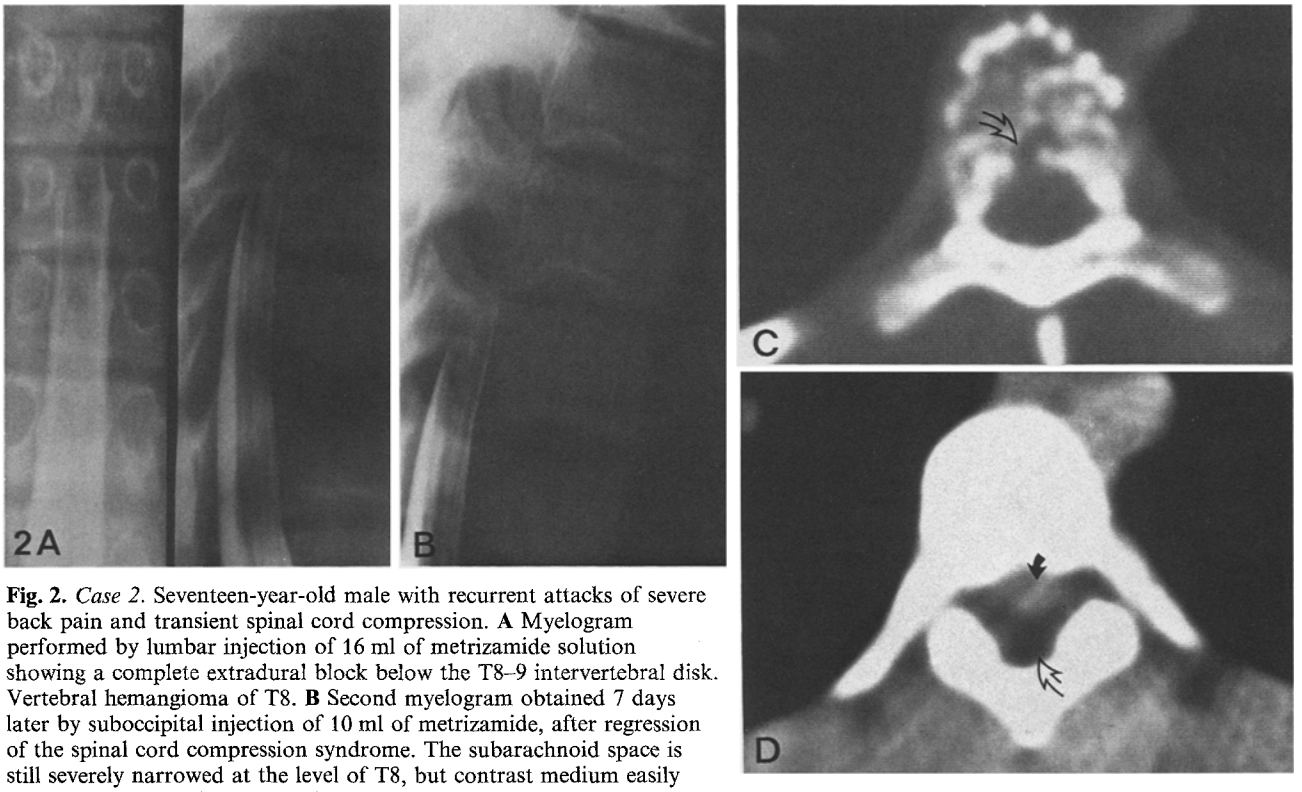

Fig. 2. *Case 2.* Seventeen-year-old male with recurrent attacks of severe back pain and transient spinal cord compression. **A** Myelogram performed by lumbar injection of 16 ml of metrizamide solution showing a complete extradural block below the T8–9 intervertebral disk. Vertebral hemangioma of T8. **B** Second myelogram obtained 7 days later by suboccipital injection of 10 ml of metrizamide, after regression of the spinal cord compression syndrome. The subarachnoid space is still severely narrowed at the level of T8, but contrast medium easily passed into the lumbar subarachnoid space.
C CT section passing through T8 showing the classical hemangiomatous involvement of the body. The *arrow* points to the large canal of the basivertebral vein. No space-occupying lesion in the vertebral canal could be identified before intravenous contrast injection at any window setting.
D CT section through the inferior end-plate of T8, obtained after intravenous bolus injection of contrast. An anterior epidural 10×8 mm space-occupying lesion (*arrow*) (90 HU) displaces the spinal cord posteriorly (*open arrow*). The subarachnoid space is no longer opacified on this examination performed 4 hours after myelography

It showed the disappearance of the total block, but marked narrowing of the subdural space persisted at the level of T8. CT examination was obtained four hours after the myelogram when unfortunately the subarachnoid space was no longer opacified. It showed a typical hemangioma involving the body of T8. Bolus injection of intravenous contrast medium strongly enhanced a 10×8 mm anterior epidural mass which displaced and compressed the spinal cord. This mass was adjacent to the basi-vertebral veins, the bony path of which appeared unusually large. Aortography and selective intercostal angiography were inconclusive. The patient recovered totally within two weeks. A diagnosis of repeated, spontaneously resolving, extradural bleeding from the hemangiomatous vertebra was reached. The patient was therefore treated with radiation therapy only.

Discussion

Most cases of spinal hemangioma involve the vertebral body only. Concomitant involvement of a pedicle, transverse process, spinous process or lamina has occasionally been reported [4, 16, 18]. Our review of the literature reveals only one case with involvement of the entire vertebra [18], similar to our first patient. From the reported cases and from our case 2, it is obvious that spinal cord compression is not restricted to hemangiomatous involvement of the neural arch as was believed formerly [18].

Compression of the spinal cord due to vertebral hemangioma is uncommon. The exact incidence has not been reported, although 250 cases were collected in 1971 in a review of the world literature [20]. Spinal cord compression occurs in one of four ways [7–9, 14–18, 20, 21]:

1. Subperiostal growth resulting in an epidural extension of the vertebral hemangioma
2. Hypertrophy and ballooning of the angiomatous vertebra with thickening of the pedicles and laminae, leading to narrowing of the vertebral canal
3. Compression fracture of the involved vertebra
4. Epidural hemorrhage.

Of these conditions, the first two are the most frequent. Subperiostal growth resulting in an epidural extension arises in most cases from the posterior aspect of the vertebral body [9, 14, 18, 20]. In our first case, the epidural extension arose from the anterior aspect of the junction of the laminae.

Compression fractures are rare since hemangiomatous vertebra are reinforced by thick hypertrophied vertical trabeculae [4, 8, 9, 14].

Vertebral hemangioma manifesting itself by epidural bleeding is the least frequent cause of spinal cord compression and has been reported rarely [8, 9]. From the clinical course and the neuroradiologic findings, little doubt exists that repeated epidural bleeding was the cause of spinal cord compression in our second case, although surgery has not been performed.

Both our cases were investigated by myelography, angiography, and CT. Myelography demonstrated an extradural block, but gave little information about the nature of the obstruction. Selective angiography is considered the most useful recent advance in diagnosis [3, 7, 14]. It has been used for the demonstration and embolisation of the arterial feeders of the lesion [2–4, 6, 7, 10, 12–14]. However, surprisingly in our patients it did not give additional information about the nature of the cord compression; it even failed to show early opacification through shunts or opacification of the whole vertebral body during unilateral intercostal artery injection, which are considered to be the typical angiographic features of spinal hemangioma [2, 4, 7, 13].

To our knowledge, few reports [4, 11] deal with CT as a diagnostic tool for direct imaging of hemangiomas and determination of the precise site and nature of concomitant spinal cord compression. The case published by Leehey et al. [11], case number 3 reported by Gastoni et al. [4], and our own cases show that CT, preferably performed with intrathecal contrast medium, gives most precise diagnostic informations and guidelines for a surgical approach, or indeed for surgical abstention as in our second patient.

In a few cases, conventional radiology might miss the characteristic, vertically orientated hypertrophied bony trabeculations, whereas in our experience, the CT aspect of vertebral hemangioma is almost pathognomonic; no primary or secondary tumor has the same CT features. We agree with Gaston et al. [4] and Cerullo [1] that CT-myelography is far superior to any other imaging modality in this respect and represents the rational approach to management of vertebral hemangioma with spinal cord compression.

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