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Computed Tomography of Spinal Epidural Hematoma

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Three cases of spinal epidural hematoma are presented. Computed tomography (CT) was the first diagnostic method used in two patients and demonstrated a surgically confirmed spinal epidural hematoma in both patients. In a third patient who presented with a complete block on myelography, CT was helpful in assessment of the extent of the lesion and suggested a vertebral hemangioma as the cause of the hematoma. CT is a very useful tool in the diagnosis of spinal epidural hematomas.

Spinal epidural hematoma is an uncommon lesion. Early diagnosis is critical if prompt surgical intervention is to be achieved; mortality or complications are high in untreated cases or those with delayed treatment [1–5]. The radiologic diagnosis of spinal epidural hematoma is usually made by myelography. Recently, computed tomography (CT) has been shown to be useful in the evaluation of such lesions [6–8]. Post et al. [6] reported a case of spinal epidural hematoma that was suspected by CT and confirmed by myelography and autopsy. Coin et al. [7, 8] reported two unconfirmed cases of spinal epidural hematoma that were evaluated by CT.

We report two confirmed cases and a third presumed case of spinal epidural hematoma. The first two cases were initially evaluated by CT and the findings were confirmed by myelography and surgery. The third case was evaluated by myelography and metrizamide CT, but surgery was not undertaken and the patient subsequently made a complete recovery.

Case Reports

Case 1

A 62-year-old man was admitted with sudden onset of severe neck pain radiating to both shoulders. There was no history of trauma. Physical examination revealed weakness and paresthesia in the right upper and both lower extremities. The reflexes were decreased in the right upper extremity and increased in both lower extremities. A Babinski reflex was present on the right side. A sensory level was noted at C3. The patient was incontinent. There was slight tenderness to palpation at the midcervical region. The blood pressure was 140/80 mm Hg and the pulse rate was 72 beats/min. Laboratory tests including clotting factors were normal. Cervical spine films were unremarkable. A CT scan of the cervical spine revealed a posterolateral high-density epidural process extending from C3 to C6 (fig. 1). This was confirmed by myelography. Surgery was performed 10 hr after the onset of symptoms and clotted blood was evacuated from the epidural space. There was no evidence of vascular malformation at either surgery or pathologic examination. The postoperative course was uneventful and the patient made a complete recovery.

Case 2

A 67-year-old man was admitted with sudden onset of severe back pain radiating to the

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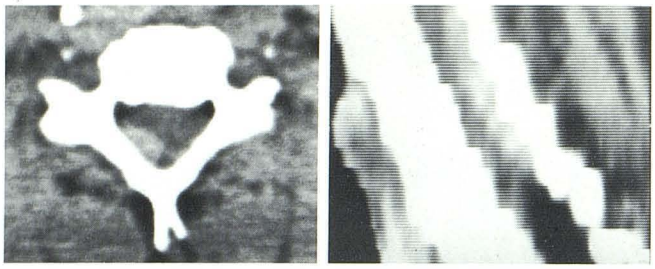

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Fig. 1.—Case 1. **A**, CT scan at C4 level. Biconvex high-density epidural hematoma in posterior and lateral aspects of spinal canal on right. **B**, Sagittal reformatted view to right of midline shows posterolateral location of lesion and its extension from C3 to C6.

buttocks while straining at stool. The patient had a history of diabetes mellitus and hypertension and was on anticoagulant therapy for a femoropopliteal bypass that was performed 3 months earlier.

Physical examination revealed tenderness to palpation at the T11 and T12 levels. The neurologic examination was unremarkable. The blood pressure was 160/90 mm Hg, and the pulse rate was 68 beats/min. The prothrombin time was 26.6 sec (control, 11.5 sec), and the partial thromboplastin time was 50.6 sec (control, 31.5 sec).

Over the next 2 days, a progressive weakness developed in the lower extremities and 1 week after admission, the patient became paraplegic and incontinent with a sensory level at T11. The Babinski reflex was positive bilaterally.

CT 7 days after admission revealed a posterolateral, relatively isodense lesion displacing the dural sac anterolaterally and extending from the lower thoracic to the midlumbar region (fig. 2A). This was confirmed by metrizamide myelography and metrizamide CT (fig. 2B). At surgery, an organizing hematoma in the epidural space was evacuated from T11 to L3. Postoperatively, the patient had moderate recovery in sensory function, but significant residual weakness of the lower extremities and urinary incontinence persisted.

Case 3

A 31-year-old man was admitted after 2 weeks of progressive paraparesis and numbness of the lower extremities. The patient was a mechanic who lifted heavy objects. Physical examination revealed mild weakness in the lower extremities. A sensory level at T3 was noted. There was hyperreflexia of the lower extremities. A Babinski sign was not present. The patient had mild urinary retention. Laboratory studies including clotting factors were normal. Plain films of the thoracic spine revealed subtle bony striations at T4 and possibly T3, suggestive of a hemangioma. These changes were only appreciated retrospectively and after CT findings were available.

Myelography revealed a complete block at the upper T5 level (fig. 3A). CT about 4 hr later revealed displacement of the dural sac toward the right side by a left-sided mass lesion that extended from upper T5 to upper T3 (fig. 3B). Wide window settings revealed changes in the trabecular pattern of the third and fourth thoracic vertebal bodies compatible with a hemangioma (fig. 3C). The radiologic impression was that of an epidural mass, probably a hematoma secondary to bleeding from a vertebal hemangioma. The patient refused surgery and was treated with steroids. Over the following

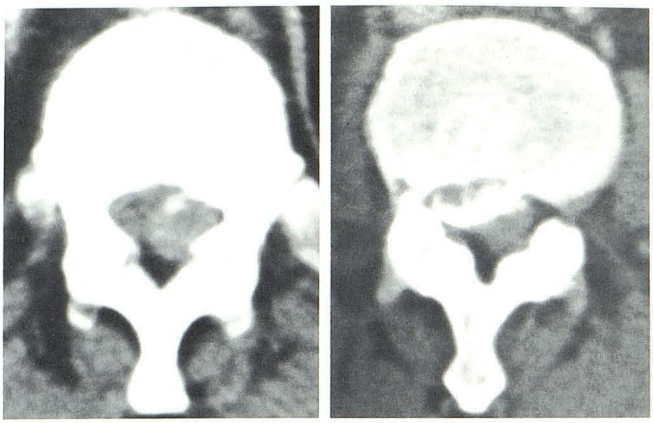

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Fig. 2.—Case 2. **A**, CT scan at L1 level. Compression and displacement of dural sac by mass lesion located posterolaterally on left. Small high-density clot at anterior aspect of this relatively isodense epidural hematoma. **B**, Metrizamide CT scan after myelogram at slightly lower level than **A** shows anterolateral displacement of enhanced dural sac by posterolateral epidural hematoma.

days, there was a slow but dramatic improvement in the neurologic status. At follow-up 1 month later, the patient had recovered fully. Repeat CT showed complete resolution of the left-sided mass lesion (fig. 3D). When last seen 1 year later, the patient was still asymptomatic.

Discussion

Proper management of patients with spinal epidural hematoma requires early and accurate diagnosis. In the appropriate clinical setting, CT can play a major role in the initial evaluation of patients with spinal epidural hematoma. If necessary, myelography may then be performed to confirm the CT findings.

The CT appearance of spinal epidural hematoma depends on the age of the hematoma. In case 1, a patient with acute spinal epidural hematoma, the lesion presented as a high density relative to the spinal cord. In case 2, a patient with subacute spinal epidural hematoma, the lesion was relatively isodense. In case 3, a patient presumed to have a subacute spinal epidural hematoma, CT was performed after myelography. Had a CT scan been available before the myelogram, the lesion would have probably appeared isodense.

In this series, CT was found very helpful and played an important role in each case. In case 1, a patient with spontaneous spinal epidural hematoma, CT played a primary role in the diagnosis and subsequent management of the patient. In case 2, a patient on anticoagulant therapy and progressive signs of spinal cord compression, an epidural hematoma was diagnosed by CT and subsequently confirmed by myelography and surgery. In case 3, CT clearly demonstrated thoracic vertebral changes that were not well defined on plain films and suggested the size and extent of the epidural lesion over two vertebral segments. The spontaneous clinical recovery and complete resolution of the epidural lesion on a subsequent CT scan were in favor of an epidural hematoma that probably originated from a vertebral

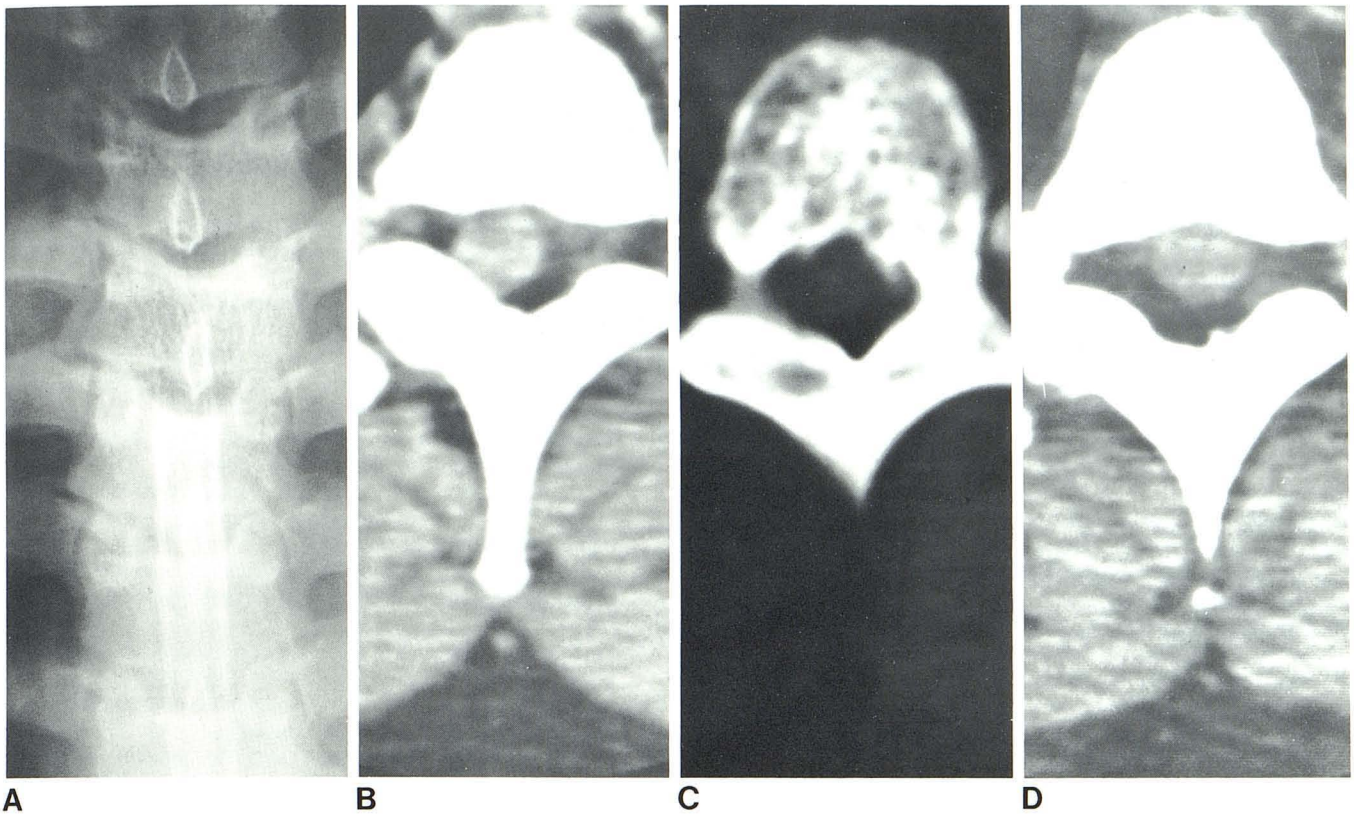

Fig. 3.—Case 3. **A**, Metrizamide myelogram. Complete extradural block at upper T5 level. Discrete vertical striations at T4 and possibly T3 vertebral bodies suggest hemangiomas. **B**, Metrizamide CT at T4–T5 level. Right-sided displacement of enhanced dural sac by poorly defined lesion on the left. **C**, CT scan at T4 level using wide window settings. Irregularly thickened trabeculae consistent with hemangioma. **D**, CT scan at T4–T5 level 1 month later. Midline dural sac and complete resolution of left-sided mass lesion.

hemangioma. Lang and Peserico [9] reported a case of spinal epidural hematoma associated with vertebral hemangioma; the latter was not visible on plain films of the spine. Absence of bone changes on plain films of the spine does not, therefore, exclude the possibility of a spinal vertebral hemangioma.

Clinically, a spinal epidural hematoma is suspected when there is an acute onset of severe neck or back pain, often associated with radicular pain. Spinal neurologic deficits accompany or follow the pain within minutes, hours, or days. Urinary retention is frequently present [1, 2, 5, 10–12]. Familiarity with the various causes of spinal epidural hematoma is important if early diagnosis and rapid management are to be accomplished. Spinal epidural hematoma can be spontaneous or develop secondary to minor or major trauma, coagulopathies, rupture of vascular malformations, hypertension, neoplasm, infection, lumbar puncture, spinal anesthesia, and pregnancy [2, 5, 10–17]. Rupture of vascular malformations may account for some of the spontaneous spinal epidural hematoma particularly in young patients [18, 19]. Anticoagulant therapy is one of the more common causes of spinal epidural hematoma and accounts for more than one-third of all cases [2].

In case 3, a thoracic vertebral hemangioma combined with minor traumas from lifting heavy objects probably predisposed to bleeding into the epidural space. With vertebral hemangioma, spinal cord or root compression may be caused by invasion from or expansion of the hemangiomatous vertebra, and rarely by bleeding from or a compression fracture of the involved vertebra [9, 20–22]. Case 3 is also of interest because the epidural lesion resolved spontaneously and without surgical intervention. Spontaneous resolution of spinal epidural hematoma has been reported occasionally [2, 11].

As CT of the spine is not ideal for localizing pathology in the absence of specific clinical or radiologic localizing data; the usual recommended sequence of studies is plain film radiography and myelography. CT should, however, follow plain films of the spine if the patient has a history suggestive of spinal epidural hematoma and signs and symptoms that localize the lesion to a specific segment of the spine, namely sudden onset of neck or back pain, often radicular, with long tract signs and sensory level. If the CT scan is negative, then a myelogram should immediately follow.

It is noteworthy that although CT is widely used in the evaluation of the spine, only one confirmed case of spinal epidural hematoma in the literature was diagnosed by CT [6]. This is probably because CT has not been widely accepted in the evaluation of patients with suspected spinal epidural hematoma. It is also possible that late-generation

CT scanners with high resolution may not have completely replaced some of the earlier CT scanners with poor resolution. Further acceptance of a much wider application of CT in the investigation of the spine and its contents may prove beneficial and rewarding in the early diagnosis of lesions such as spinal epidural hematoma.

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