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G J Lauten and W D Wehunt

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Computed Tomography in Absent Cervical Pedicle

Gregory J. Lauten[1] and William D. Wehunt[2]

Computed tomography (CT) aids in evaluating many disorders of the spine. Congenital, neoplastic, inflammatory and traumatic problems have been diagnosed and clarified with spinal CT [1–4]. We have used CT to study the congenitally absent cervical pedicle in two patients and to distinguish this condition from other causes of a "widened cervical intervertebral foramen."

Case Reports

Case 1

A 20-year-old man was seen in the emergency room at William Beaumont Army Medical Center for head trauma. History and physical examination were entirely normal. No neck pain or symptoms of radiculopathy were described. Skull and cervical spine films revealed an enlarged C5 neural foramen on the left.

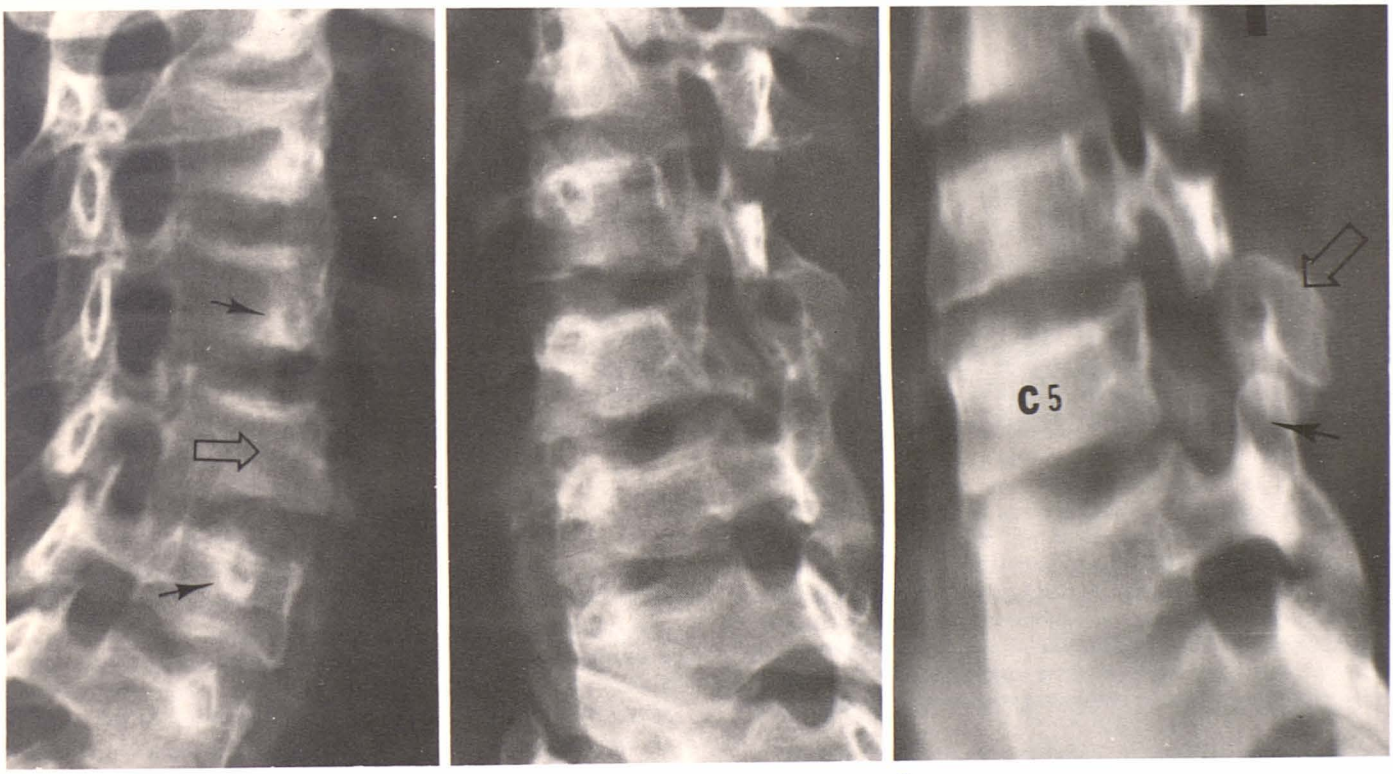

Fig. 1.—Case 1. **A**, Left posterior oblique projection. Absence of C5 pedicle (*open arrow*) from normal end-on pedicles (*arrows*). **B**, Right posterior oblique view. Enlarged left C5 neural foramen. **C**, Tomogram. Dorsally positioned lateral mass and lamina of C5 (*open arrow*) and superior articular facet of C6 (*arrow*).

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[1] Department of Radiology, Letterman Army Medical Center, San Francisco, CA 94129. Address reprint requests to G. J. Lauten.

[2] Department of Radiologic Pathology, Armed Forces Institute of Pathology, Washington, D.C. 20306.

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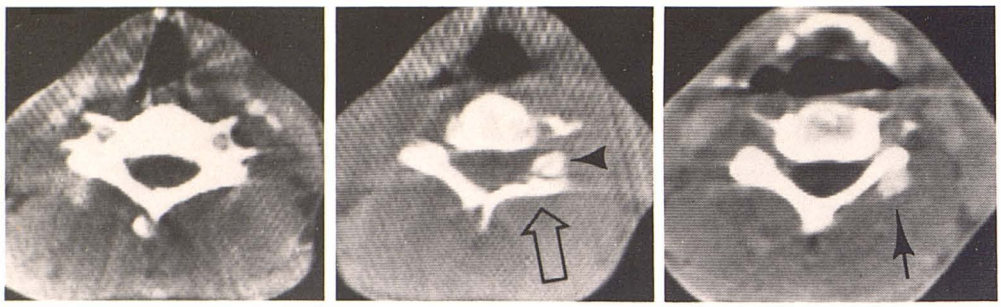


Fig. 2.—Case 1. **A**, CT scan at C6. Normal vertebra. **B**, At C5. Absence of left pedicle is obvious. Hypertrophied left lateral mass and lamina (*open arrow*) and tip of superior articular facet of C6 (*arrowhead*) are also seen. **C**, At C4. Top of lateral mass of C5 is posterior to lateral mass; inferior facet of C4 (*arrow*).

Fig. 3.—Case 1. Myelogram. Left C4 and C5 nerve roots exiting together through enlarged neural foramen.

After review of the cervical spine radiographs, tomography of the cervical spine was performed in the right posterior oblique projection (fig. 1). This showed absence of the pedicle of C5 on the left and dorsal position of the lateral mass and lamina of the C5 with respect to the lateral masses of the other cervical vertebra. CT scanning from C4 to C6 demonstrated these anatomic findings in the axial projection (fig. 2). The CT scans were obtained during contrast infusion to search for an intraspinal tumor suspected as the cause of the "widened foramen." Pantopaque cervical myelography revealed two cervical roots exiting together through the enlarged foramen with no extradural or intradural abnormality (fig. 3).

Case 2

A 36-year-old man was evaluated for neck stiffness and minor neck pain. A cervical spine series showed a large neural foramen on the left (fig. 4). Tomography in the right posterior oblique projection (fig. 4) suggested both the absence of a C7 pedicle and a dorsally positioned lateral mass on the left. CT from C6 to T1 showed this altered anatomy in the axial projection (fig. 5). Myelography was not performed because CT was considered to have demonstrated absence of a space-occupying lesion.

Findings

Radiographic

The differential diagnosis of a widened cervical intervertebral foramen includes: (1) dumbbell intraspinal tumor; (2) tortuous or aneurysmal vertebral artery eroding the foramen; and (3) congenitally absent cervical pedicle [5].

The plain film–tomographic findings of absent cervical pedicle have been described [6–10]. The fundamental abnormality is complete absence of a pedicle of the involved vertebra. This may best be seen on the oblique view where there is a missing circular image in the vertical row of end-on pedicles (figs. 1 and 4). Other findings include an enlarged neural foramen, dorsal position of the lamina, malformation of the lateral mass, and complete or partial absence of the superior articular facet (figs. 1 and 4). A straight posterolateral margin of the affected vertebral body may also be seen on the oblique view which demonstrates the widened foramen (figs. 1A and 4A). Although these plain film–tomographic findings are well known and characteristic for absent pedicle, these patients often undergo myelography to definitively rule out a dumbbell intraspinal tumor such as a neurofibroma.

CT

CT readily demonstrates cross-sectional anatomy of the spine. The vertebral body, posterior elements, and spinal canal can be evaluated in the axial projection for symmetry and bony abnormality.

In our cases of absent cervical pedicle, the typical bony deviations are visualized to unique advantage. At the level of abnormality, a CT section shows absence of the pedicle as well as posterior location of the ipsilateral lamina and lateral mass. There is no erosion or soft-tissue mass within the abnormal neural foramen (figs. 2B and 5B). At the level immediately above the absent pedicle, a CT scan demonstrates the characteristic "superior drift" of the involved lamina and malformed lateral mass. In addition, the inferior facet of the next higher vertebra will be seen somewhat more anterior than usual due to the absence of the superior facet at the involved level (figs. 2C and 5C).

In many instances of a widened cervical intervertebral foramen, confident diagnosis of absent cervical pedicle

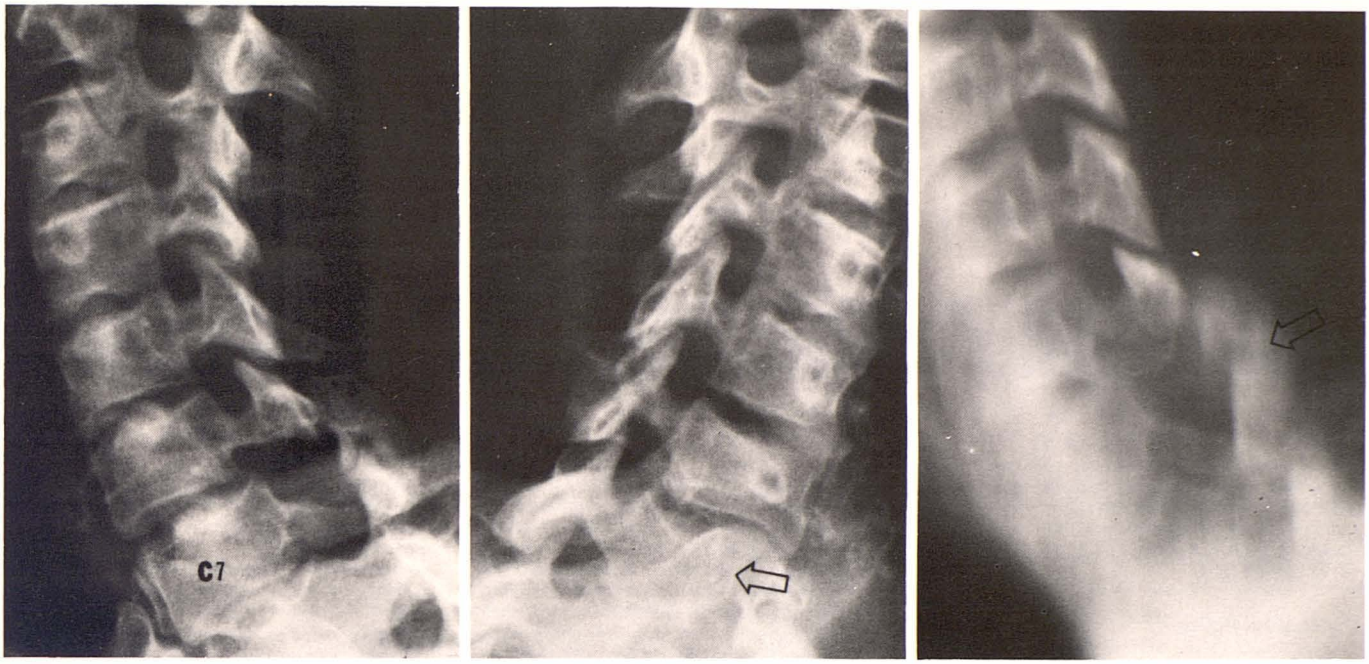
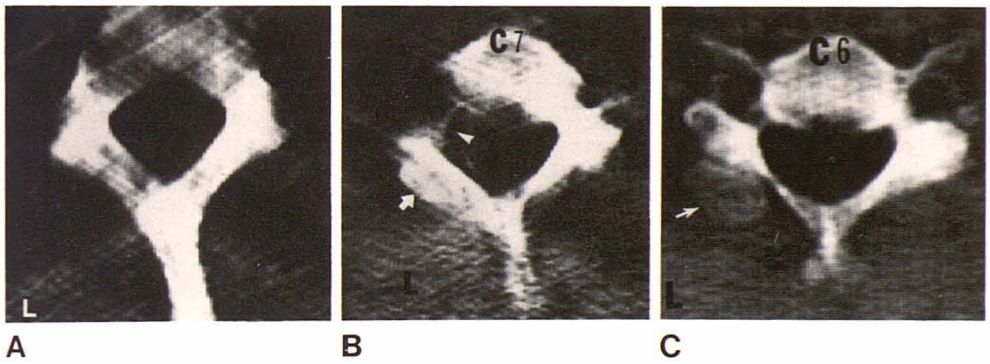


Fig. 4.—Case 2. At C7. **A**, Right posterior oblique view. Enlarged neural foramen. **B**, Left posterior oblique view. Absence of pedicle (*open arrow*). **C**, Tomogram. Dorsal position of hypertrophic lamina (*open arrow*).

Fig. 5.—Case 2. **A**, At T1. Normal vertebra. **B**, At C7. No pedicle is seen (*arrowhead*), but posterior position of hypertrophied left lamina is visible (*arrow*). **C**, At C6. Enlarged lateral mass (*arrow*) abnormally positioned behind lateral mass; inferior facet of C6.



requires an invasive procedure, cervical myelography, to rule out dumbbell intraspinal tumor. CT can demonstrate the typical bony derangements seen in absent pedicle, and at the same time show lack of bony erosion or mass within the neural foramen.

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