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CT Identification of Postlaminectomy Pseudomeningocele

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A postlaminectomy pseudomeningocele is a spherical, fluid-filled space with fibrous capsule lying dorsal to the thecal canal in the laminectomy opening that occasionally develops after surgery. Eight cases were found in 400 symptomatic postlaminectomy patients undergoing computed tomographic examination. The contents are of cerebrospinal fluid density and may or may not have demonstrable communication with the subarachnoid space. Whether they are the cause of symptoms is conjectural; none of these eight patients had surgical removal.

A postlaminectomy pseudomeningocele apparently results from an inadvertent meningeal tear [1] during spinal surgery. Although uncommon, it has numerous names in the literature, including extradural cyst, extradural pseudocyst, spurious meningocele, pseudomeningocele, iatrogenic meningocele, arachnoid cyst, and postoperative diverticulum. Postlaminectomy pseudomeningocele is a distinct entity and should be distinguished from posterior herniation of the intact thecal sac through a bilateral laminectomy defect, although the latter is also occasionally referred to as a postoperative pseudomeningocele. Eight cases discovered on computed tomography (CT) in our series of 400 postlaminectomy patients are presented and the literature reviewed. We were unable to find any description of postlaminectomy pseudomeningocele in the CT literature.

Materials and Methods

In the course of spinal CT studies on about 400 symptomatic postoperative patients, eight cases of postlaminectomy pseudomeningocele were discovered. In seven patients, bilateral laminectomies had been performed, two in the cervical spine and five in the lower lumbar spine. A unilateral lumbar laminectomy was done in the eighth patient. The patients were 27–69 years old and there was no gender preponderance. The postoperative scans were obtained from 1 month to 5 years after laminectomy. None of the patients had surgical confirmation of the lesion.

All CT studies were performed on a General Electric CT/T 8800 using a 9.6 sec scanning speed. In the lumbar area, six 5-mm-thick sections were obtained at 4 mm intervals through each disk space level. In the cervical area, 1.5-mm-thick contiguous slices were employed.

Postoperative myelography was performed in four of the eight cases, one cervical and three lumbar. Metrizamide (Amipaque, Winthrop Labs, New York, NY) was used in three cases, Pantopaque in one.

Results

CT Characteristics

On CT, the postlaminectomy pseudomeningocele was a rounded area of low density immediately posterior to the thecal sac at the site of a previous laminectomy.

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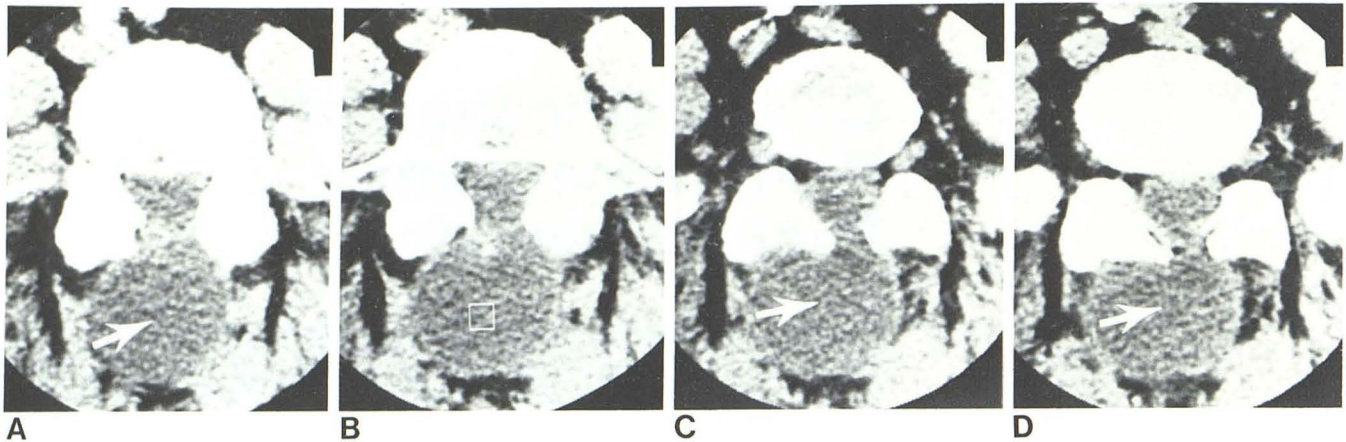


Fig. 1.—Postlaminectomy pseudomeningocele 5 years after laminectomy. Uniform low-density rounded area (arrows) directly behind laminectomy site in sequential slices from L4–L5 has thin wall of higher density and almost

appears to connect with dural sac in C. Density of contents is similar to that of thecal sac. Lesion was almost spherical, measuring $4 \times 4\frac{1}{2}$ cm.

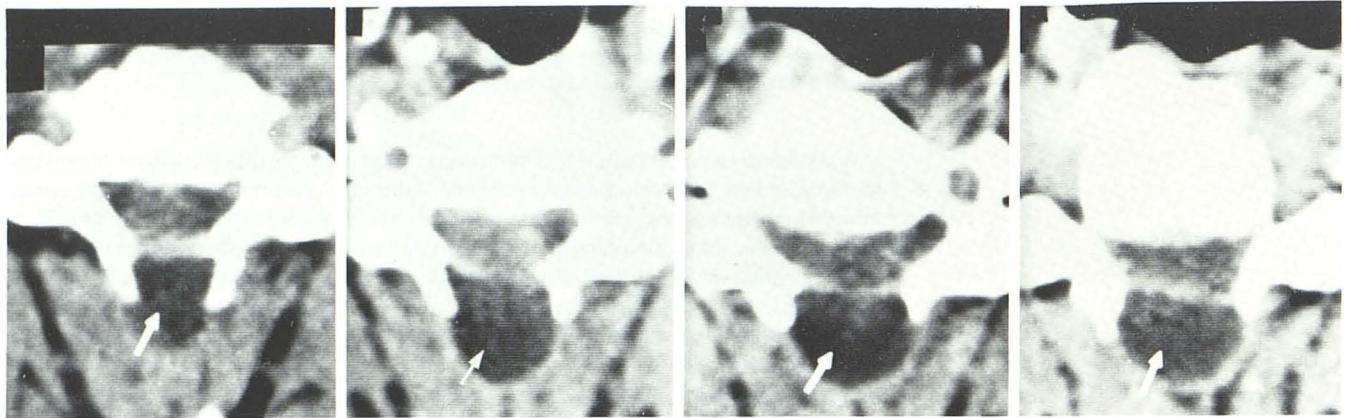


Fig. 2.—Pseudomeningocele at C5 in 47-year-old patient who had bilateral laminectomies 3 years before for herniated disk at C5 and now has bilateral leg symptoms. Pseudomeningocele is clearly demonstrated on suc-

cessive scans of C4 as rounded lucency (arrows) directly behind thecal sac. It has dense wall and is spherical (about 2×2 cm); it did not fill during myelography, and its presence was unsuspected.

tomy (figs. 1 and 2). In the lumbar region, the contents were similar or slightly lower in density than that of the thecal sac. In the cervical area, the contents appeared significantly lower in density than that of the thecal sac, probably because the sac contains the spinal cord at this level. The lesions appeared to be partly or completely contained within a capsule, which was denser than its contents and usually denser than the surrounding tissue (figs. 1 and 2), which often separated the postlaminectomy pseudomeningocele from the thecal sac. The capsule was better visualized when it was surrounded by fat (fig. 3). The postlaminectomy pseudomeningoceles ranged in size from 1.5×2 cm to 4.5×5.5 cm.

Myelographic Features

Of the four cases in which postoperative myelography was performed, three were studied at our institution and available for review. In one case, no communication between the subarachnoid space and the pseudomeningocele

was demonstrated by metrizamide myelography or by CT after intrathecal metrizamide instillation (fig. 4). In the second case (fig. 5), rapid communication was noted fluoroscopically, filling the pseudomeningocele with metrizamide. The premyelogram scout films revealed residual Pantopaque globules, which moved dependently with gravity within the pseudomeningocele. In the third case, the pseudomeningocele filled slowly with metrizamide, which was seen only on delayed films. In the fourth patient, the postoperative cervical Pantopaque myelogram obtained elsewhere failed to show communication.

Clinical Features

In our CT series, the incidence of postlaminectomy pseudomeningocele was eight (2%) of the 400 postoperative patients. The earliest pseudomeningocele was noted 1 month postoperatively. The oldest was discovered 5 years after surgery.

All six patients with a lumbar pseudomeningocele com-

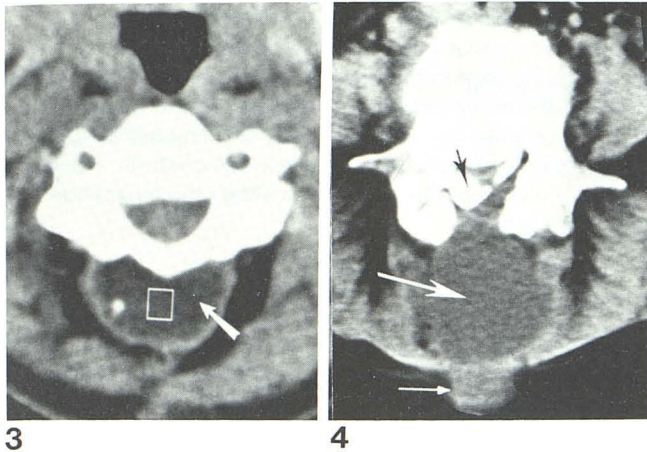


Fig. 3.—Cervical postlaminectomy pseudomeningocele. A neurofibroma was removed from C1–C2 months before. CT was performed because of recurrence of symptoms. A round, low-density area (*arrow*) is just behind bilateral laminectomy at C2. A droplet of Pantopaque from preoperative myelogram is within lesion. Distinct dense capsule is best seen where surrounded by fat. Lesion was spherical, about 3.0 × 2.5 cm.

Fig. 4.—Noncommunicating pseudomeningocele 5 months after laminectomy. Continued back discomfort after diskectomy led to discovery of bulge overlying lumbar spine. CT shows characteristic low-density rounded collection (*large white arrow*) behind laminectomy, extending to posterior skin bulge (*small white arrow*). Metrizamide instilled in dural sac (*black arrow*) did not enter pseudomeningocele. Lesion was about 3 cm in diameter and about 4 cm long. Absence of dense wall may reflect recent origin of lesion.

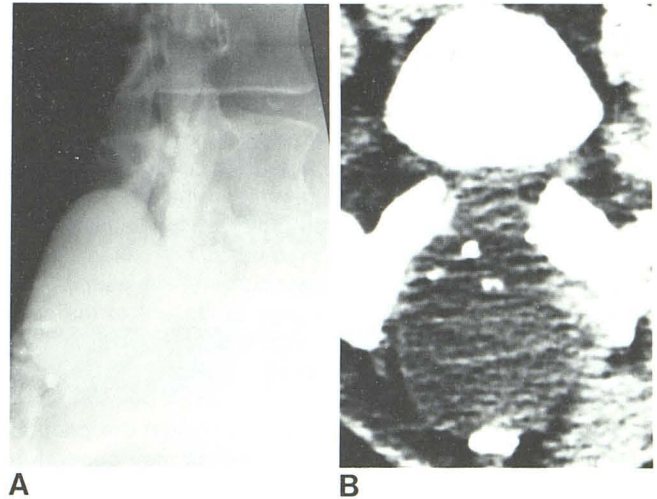


Fig. 5.—Communicating lumbar postlaminectomy pseudomeningocele. Multiple previous operations were performed on lumbar spine, including attempted repair of CSF leak from dural tear 2 years before these examinations. The patient had low back pain radiating to the right leg and headaches induced by bending or straining, which were relieved by recumbency. **A**, Lateral view from lumbar metrizamide myelogram. Large pseudomeningocele is filled with metrizamide and residual Pantopaque. **B**, CT 4 days after myelography. No definite separation of lesion from thecal sac is delineated. Interval since myelography accounts for lack of metrizamide in lesion. Lesion was 4½ × 5½ cm.

plained of low back pain. Three also had radiating pain to one or both legs and one noted focal swelling in the back at the site of the pseudomeningocele. The two patients with cervical pseudomeningoceles had radicular symptoms in the arms (unilaterally in one case and bilaterally in the other).

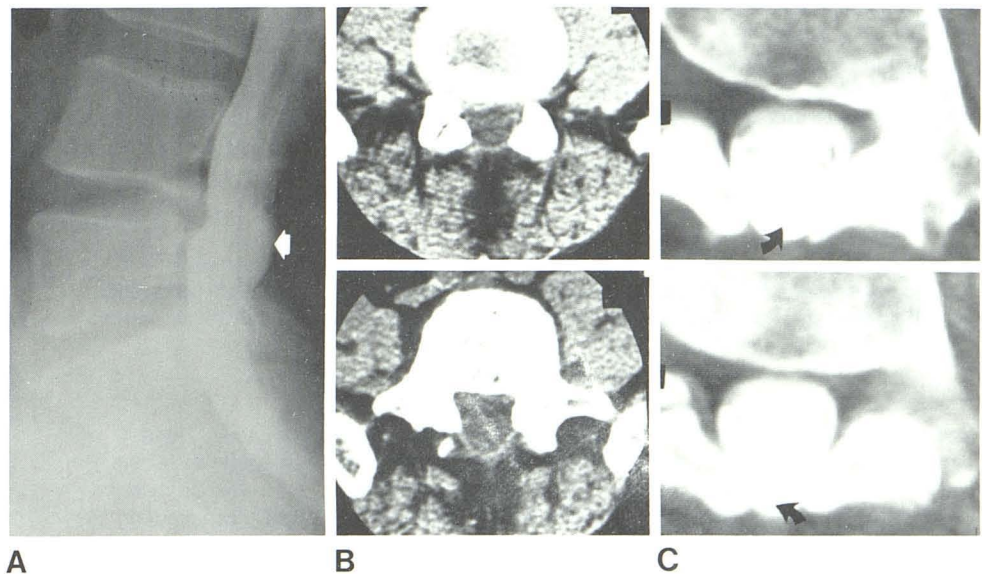
Discussion

A postlaminectomy pseudomeningocele results from an inadvertent surgical dural tear. Some authors [2–5] believe

that arachnoid herniates through the tear and proliferates to form an arachnoid-lined sac filled with cerebrospinal fluid (CSF). Others [6–8] conjecture that CSF extravasates into the posterior soft tissues through a tear that extends through the arachnoid and eventually develops a fibrous capsule. Perhaps both types exist, depending on the length of the initial tear.

A distinction should be made between postlaminectomy pseudomeningocele and simple posterior bulging of the intact thecal sac through a bilateral laminectomy defect. The latter has also been called a postoperative pseudomen-

Fig. 6.—Postlaminectomy posterior herniation of thecal sac. **A**, Metrizamide myelogram, lateral view, shows posterior extension of thecal sac at L5 level (*arrow*). **B**, CT at same level shows bulging of dural sac through laminectomy defect. Note ellipsoid sac on lower right section, point of maximal bulging, and absence of capsule separating herniated part from rest of sac. **C**, Metrizamide CT at L5 in another patient shows simple bulging of sac through laminectomy defect (*arrows*).



ingocele (fig. 6), an unfortunate source of confusion.

Before the advent of CT, myelography was the only method that could identify a pseudomeningocele and then only if the communication with the subarachnoid space remained open to permit the myelographic media to enter. In our four cases with myelography, no communication existed in two. Kim et al. [6] identified nine pseudomeningoceles in 21 patients 1 month after cervical laminectomy using air myelography. In the three cases he reexamined by the same technique 3 months after surgery, the lesions were no longer identified, either because of closure of the communication or due to disappearance of the pseudomeningocele. Swanson and Fincher [9] found an incidence of 0.07% in 1,700 laminectomies.

Persistence of the communication between the pseudomeningocele and the subarachnoid space may depend on the nature of the lesion. Pseudomeningoceles that are due to arachnoid herniation might be more likely to maintain this communication [4], while in those with fibrous capsules, eventual sealing off of the CSF leak seems more likely.

The clinical significance of postlaminectomy pseudomeningocele is unclear. Many investigators [2, 4, 7, 8] consider it a symptomatic lesion causing recurrent back pain and radicular irritation. Others [6, 10] believe that pseudomeningocele should be suspected if the surgeon is aware of any injury to the dura during the operation in a patient who develops low back pain with radiation after initially successful surgery. In our patients, low back pain and/or radicular symptoms led to their CT studies. The role of pseudomeningocele in producing these symptoms, however, is questionable since similar symptoms were present in all of our 400 postoperative patients examined. Rinaldi and Hodges [4] reported relief of symptoms in three patients after surgical removal of pseudomeningoceles. None of our patients

have had excision of their pseudomeningocele.

Although uncommon, postlaminectomy pseudomeningocele occurs more frequently than was suggested by previous studies based on postoperative Pantopaque myelography. CT is certainly the ideal method for demonstrating these lesions. CT is noninvasive and will demonstrate a pseudomeningocele regardless of an existing communication with the thecal sac.

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