Metrizamide CT Scanning in Spinal Nerve Root Cysts


ABSTRACT: Two cases of lumbosacral root cysts of different etiology are reported. Their specific radiographic features are described using the combined technique of metrizamide myelography followed by computerized tomography of the spine. The terminology of intraspinal cysts is reviewed and their distinguishing features discussed.

RÉSUMÉ: Tomodensitométrie à la métrizamide en recherchant les kystes dans les racines spinales. Nous rapportons deux cas de kystes dans les racines spinales provenant de différentes étiologies. Les caractéristiques radiographiques particulières ont été étudiées employant la technique de myélographie à la métrizamide, suivie par la tomodensitométrie de l'épine. Nous discutons la terminologie des kystes intraspinaux ainsi que leurs traits reconnaissables.


Early studies of nerve root cysts relied upon plain radiographs for diagnosis, by demonstrating the associated bony erosions. 

Direct visualization of these cysts became possible with the introduction of contrast myelography, although the original oil based agents had certain limitations. They are viscous, a property which prevents their free flow into the cysts. Unless there is a widely patent communication with the spinal subarachnoid space, this type of myelography will display the cysts only as negative filling defects. Eventually the contrast may seep through even a narrow communication, so that delayed screenings will demonstrate the cysts directly.

With computerized tomography (CT) there is a better appreciation of nerve root anatomy, although the intra-arachnoidal structures are poorly imaged. However, when myelography using the water soluble contrast agent metrizamide is combined with CT scanning of the spine, a precise display of the whole nerve root and its intra-arachnoidal components is achieved. Further improvements in diagnosis may occur as the technique of magnetic resonance imaging (MRI) evolves.

These advances have led to the recognition of a variety of abnormalities of spinal nerve roots. Since the different characteristics of various nerve root cysts are not always appreciated, the terminology has become confused. Because of Tarlov’s original work, many are incorrectly called perineural cysts and different terms are often used to describe the same lesion. We report two cases which illustrate this point and discuss the efficacy of metrizamide myelography combined with CT in the investigation of spinal nerve root cysts.

Case Reports

Patient 1

A 51-year-old man was admitted to hospital in 1982 for investigation of low back and right leg pain. The back pain was located in his lumbosacral region and had been present for approximately 10 years. It was aggravated by exertion and partially relieved by rest. Three years prior to admission he developed right leg pain, radiating from his buttock to his foot in the distribution of the L5 dermatome. He had had accidents in 1951 and in 1968, resulting in fractures of his pelvis, right hip and right femoral shaft.

Examination revealed no abnormality of his spine. Right sided straight leg raising elicited mild low back pain at 80 degrees. There was no neurological abnormality. Plain radiographs of the lumbosacral spine showed erosion of the right pedicle of L5 (Figure 1). Computerized tomographic scanning demonstrated an isodense cystic lesion in the right L5 neural foramen, associated with the pedicle erosion (Figure 2). Metrizamide myelogram confirmed the presence of a solitary cyst located on the right L5 nerve root (Figure 3). A right L4/5 laminectomy was performed. The disc at this level appeared normal. The fifth lumbar root was traced laterally to the pedicle. There was a cystic dilatation of the root sleeve beginning at a point opposite the root axilla and extending distally approximately 1 cm. It was relatively diffuse with no obvious neck. Its wall seemed to consist of thinned dura. Treatment consisted of simple bony decompression. In the immediate postoperative period he was relieved of pain and at follow-up six months later was still pain free. We believe that the lesion was a post-traumatic nerve root cyst.

Patient 2

A 58-year-old woman presented with a four year history of low back pain, which had increased in severity during the preceding six months. It radiated into her left buttock and down the posterior aspect of her left leg to the mid-calf. It was aggravated by straining, prolonged standing and walking. There were no other symptoms. Her past medical history
was unremarkable. Physical examination revealed a normal stance and
gait. Spinal motion was normal. Left sided straight leg raising produced
low back pain at 45 degrees. There was no neurological abnormality.
Nerve conduction studies showed light prolongation of the H-reflex
in each leg, suggesting bilateral S1 radiculopathies. Plain radiographs
of the lumbar spine showed scalloping of the posterior surfaces of the
bodies of L5 and S1 (Figure 4a). Metrizamide myelography demon­
strated multiple nerve root cysts that were associated with the bony
changes (Figure 4b). CT scanning after intrathecal metrizamide clearly
displayed the configuration of the cysts and their association with the
widened neural foramina (Figure 5a). Within the cysts were fluid levels
composed of CSF and contrast material. The contrast was dependent
because of its greater density (Figure 5b). The cysts were bilateral and
located on the spinal roots from L3 through S1 (Figure 6). They were
proximal to the dorsal root ganglion and were easily filled by contrast
material. We believe them to represent the saccular variety of nerve
root sleeve dilatation.15 Surgical treatment was discussed but the patient
decided not to consider it.

DISCUSSION

Lumbosacral nerve root cysts are relatively common,16 an
incidence of 17 percent being reported in patients undergoing

myelography for the investigation of low back pain and sciatica.19
There are four broad categories which include perineural cysts,1
root sleeve dilatations,7,19 arachnoid cysts20,21,22 and traumatic
root cysts.28

The meninges and subarachnoid space enclose the nerve root
laterally, as far as the dorsal root ganglion and end by merging
with the perineurium.23 This forms the root sleeve or sheath.
Tarlov1 believed that perineural cysts arose following traumatic
hemorrhage leading to splitting of the nerve root sheath.
Subsequent distension of the potential space between the
endoneurium and perineurium resulted in cyst formation. It is
usually located at, or just distal to, the dorsal root ganglion on
the sacral and coccygeal roots. It does not communicate freely
with the spinal subarachnoid space. Unlike other cystic lesions,
part of its lining contains neural tissue. When these criteria
were strictly applied, Nishiura17 could find only 16 cases of true
perineural cysts in the literature.

Root sleeve dilatation19 may originate in degenerative change
or congenital weakness of the meningeal covering of the root.
This results in dilatation of the subarachnoid space up to the
site where the dura and arachnoid fuse with the perineurium. A
diffuse dilatation is called "tubular" whereas one localized to
the distal part of the sheath is called "saccular".15 Strully7
described an entity called meningeal diverticulum. This seems
identical to the "saccular" variety of root sleeve dilatation.
Neave and Wycoff15 have summarized the myelographic fea­
tures of this lesion. These include free passage of the contrast
material between the subarachnoid space and the dilated root

Figure 1 — Plain x-ray of lumbosacral spine in anteroposterior view. Note
the pedicle erosion of right L5 (arrow).

Figure 2 — CT scan prior to metrizamide myelography. Note the isodense
rounded cyst situated in the neural foramen on the right, associated with
smooth erosion of the medial aspect of the pedicle and the dorsolateral
aspect of the vertebral body (arrow).

Figure 3 — Metrizamide myelogram showing a solitary cyst at the L5
root on the right side.
sleeve, multiple bilaterally symmetrical lesions in more than 50 percent of patients, involvement mainly of the sacral roots, a cephalo-caudad accentuation, and occasionally an enlargement of the whole dural sac.

The extradural arachnoid cyst arises from an evagination of arachnoid through a congenital dural defect and thus lacks a dural covering. It is termed an arachnoid diverticulum if its communication with the subarachnoid space remains patent. If this becomes obliterated then the term arachnoid cyst is more appropriate. It may also be intradural, where it is believed to arise from a congenital splitting or duplication of the arachnoid, in which cerebrospinal fluid loculates.

Trauma to the dura during surgery may lead to an arachnoid diverticulum. If the injury involves the arachnoid also, cerebrospinal fluid may leak into the surrounding tissues to form a pseudocyst. These iatrogenic cysts should be differentiated from those that arise after root avulsion or root sleeve tear due to closed spinal injury. In the latter, the arachnoid is

Figure 4a — Plain x-rays of lumbosacral spine. Note the scalloped erosions of the posterior aspects of the bodies of L5 and S1 (arrows).

Figure 4b — Metrizamide myelogram. Contrast material fills the cyst demonstrating their association with the vertebral erosions (arrows).

Figure 5a — CT scan examination with intrathecal metrizamide shows widening of neural foramina by the cysts (arrows).

Figure 5b — Bilateral cysts showing fluid level composed of CSF and contrast material.
torn but the dural component of the root sleeve remains intact. When exposed directly to the pulsatile pressure of cerebrospinal fluid the dura undergoes cystic dilatation. This is traditionally called traumatic root cyst and usually involves the fifth lumbar root.

To our knowledge, the use of metrizamide myelography combined with CT scanning in the investigation of spinal nerve root cysts has been described only once previously. Three other papers report using the two procedures separately. In these cases CT without metrizamide enhancement, clearly displayed the localized bony erosions associated with the cysts. Attenuation values isodense with water suggested the cystic nature of the eroding masses. This feature is not specific for a nerve root cyst since a degenerating neurofibroma could show similar values. Metrizamide myelography subsequently confirmed the diagnosis of spinal nerve root cysts.

Many authors have associated a syndrome of low back pain, sciatica, and occasional focal neurological abnormalities with spinal nerve root cysts. Although there is no consensus, surgery is usually recommended if the cyst exhibits mass effect and particularly if the symptoms can be localized to a particular root. The precise diagnosis afforded by combining metrizamide myelography with CT improves the likelihood of choosing appropriate treatment. This technique will confirm the cystic nature of a nerve root lesion, display its spatial relationship and any communication with the spinal subarachnoid space. It will also demonstrate the size and reveal any evidence of nerve root displacement.

ACKNOWLEDGEMENT

The authors wish to acknowledge the painstaking efforts of Donna Headrick for typing the repeated revisions of the manuscript.

REFERENCES