Extreme lateral lumbar disc herniation

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Authors have described these discs as “extreme lateral”, “far lateral”, “extracanalicular” and “foraminal” or “extraforaminal”.

They may be purely far lateral or extraforaminal in location, located beyond the pedicles, or may include intraforaminal and even intracanalicular components.

Types

Foraminal disc herniation: Lumbar disc herniation at the lumbar intervertebral foramen, considered for some authors a type of extreme lateral lumbar disc herniation

Extraforaminal lumbar disc herniation: Lumbar disc herniation distal to the lumbar intervertebral foramen, considered for some authors a type of extreme lateral lumbar disc herniation

The term ‘far lateral’ applies to prolapse of a lumbar disc which compresses the nerve root at the same level, irrespective of whether it is in the intervertebral canal, at the foramen or further laterally.

Far lateral lumbar disc herniations (FLLDHs) can cause difficulty and differences in diagnosis and treatment compared with intraspinal herniation.

Lindblom demonstrated prolapse of the lumbar disc outside the confines of the vertebral canal in a cadaver study in 1944, but the clinical diagnosis has remained difficult, since these lateral protrusions could not be shown by myelography, or by limited operative exploration.

In 1971 Macnab reported two cases of compression of the L5 root by an extraforaminal protrusion of the L5/S1 disc after a failed exploration at L4/5.

In 1974 Abdullah et al described the clinical syndrome of the “extreme lateral” herniation of the lumbar disc as demonstrated by discography; they found herniations beneath or beyond the facet, compressing the nerve root at the same level, in 11.7% of prolapses of lumbar discs.

Epidemiology

Extreme lateral lumbar disc herniations (ELLDHs) occur more frequently among elderly patients, with a peak incidence in the sixth decade, and are rarely found in children.

Larger series have reported incidences of between 5.8% and 10.3%, and are occasionally occurring predominantly at the L4-L5 and L3-L4 levels in almost equal numbers, they are occasionally...
Noted at L5-S1.

In isthmic spondylolisthesis, extreme lateral disc herniation occasionally occurs; therefore, every isthmic spondylolisthesis patient should be examined carefully for extreme lateral disc herniation with thin-cut axial CT or MRI, especially when the patients complain of lateralizing symptom.\(^{19}\)

**Clinical features**

Because they compress the exiting root with its dorsal root ganglion, the clinical presentation often involves lancinating leg pain, whereas low back pain is often mild to moderate.

The characteristic clinical findings included anterior thigh and leg pain, appropriate sensory loss, absence of back pain, an absent knee jerk and no reduction of straight leg raising.\(^{20}\)

Clinical syndromes reflect compression of the superiorly exiting nerve root and ganglion; ie an L4-L5 far lateral disc produces a L4 root syndrome. Clinical complaints often include severe radicular pain accompanied by very positive mechanical signs; Laségue and reverse Laségue (femoral stretch test) maneuvers. Neurological deficits, including motor, reflex, and sensory findings, are seen over 75% of the time.

**Diagnosis**

Patients will frequently complain of pain in the groin and anterior thigh but little if any back pain. Because the L4 root is often involved, the physical exam often shows quadriceps weakness and a diminished patellar reflex. Other important signs include a negative Lasègue's sign and reproduction of pain with lateral bending of the back toward the involved extremity. Currently, CT or MRI are the diagnostic procedures of choice.\(^{21}\)

**CT**

Although computed tomography (CT) has been shown to be useful in diagnosing posterolateral and central lumbar disk herniations, its effectiveness in demonstrating lateral herniated disks has not been emphasized. The myelographic recognition of those herniations may be difficult because root sheaths or dural sacs may not be deformed. A total of 274 CT scans interpreted as showing lumbar disk herniation was reviewed. Fourteen (5%) showed a lateral disk herniation. The CT features of a lateral herniated disk included: (1) focal protrusion of the disk margin within or lateral to the intervertebral foramen; (2) displacement of epidural fat within the intervertebral foramen; (3) absence of dural sac deformity; and (4) soft-tissue mass within or lateral to the intervertebral foramen. Because it can image the disk margin and free disk fragments irrespective of dural sac or root sheath deformity, CT may be more effective than myelography for demonstrating the presence and extent of lateral disk herniation.\(^{22}\)

**MRI**
The diagnosis is best established by using magnetic resonance imaging which visualizes the foramen in an axial and sagittal plane. Although CT and magnetic resonance imaging (MRI) allow successful demonstration of protrusions of the lateral disc, which account for between 6% and 10% of all lumbar disc herniations, prolapse of a lumbar disc in the far lateral zone might be overlooked. The extraforaminal zone is generally not focused on in daily practice with spine MRI, particularly in the condition of large extrusion or protrusion causing descending nerve root compression or severe spinal stenosis at other levels. In particular, it is difficult to observe the disc morphology at the L5-S1 level due to the overlapping bony structures, such as the sacral ala or iliac bone, and severe decrease in disc height by degeneration.

Thirty-three patients presenting with persistent radiculopathy and showing an image suggesting a far lateral disk herniation on CT at 34 disk levels were prospectively imaged with magnetic resonance (MR). In all cases the disk fragment was identified and its separation from the nerve root was possible. This separation was more readily visible on sagittal or angled coronal views. The exact location of the herniation in relation to the facet joints and the pedicles was best assessed with MR: Ten were purely intraforaminal, 8 extraforaminal, and 15 both. Cephalad migration was noted on the sagittal lateral facet plane in 71% of cases. Surgical correlations were available for 25 disks. Three were falsely positive for disk herniation. Enlarged foraminal veins were responsible for this appearance as confirmed by surgery in two of these. When a prediction of disruption of the lateral extension of the posterior longitudinal ligament was made, it was confirmed at surgery in 52% of cases because of extreme lateralization of the herniations.

The possibility of disc herniation should be seriously considered in cases of nerve root compression in which epidural gas is present, especially those associated with gaseous degenerated discs.

**Differential diagnosis**

Extraforaminal periganglionic free, encapsulated disc fragments may mimic tumoral masses, from which they may not be distinguished on MRI.

A report discusses the clinical features of a patient who presented with an L-3 radiculopathy in whom magnetic resonance imaging demonstrated what appeared to be a nerve sheath tumor in an extraforaminal location on the L-3 nerve root. A lateral intermuscular approach to excise the lesion was used to preserve the facet joint. Histological examination of the intraneural lesion revealed degenerative disc fragments. The authors hypothesize that the structure of the annulus fibrosus in the upper lumbar region predisposes these regions to lateral herniation. Furthermore, it is proposed that the lateral disc herniation allowed the disc fragments to erode through the epineurium of the neural sheath. This case expands the differential diagnosis of fusiform enlargement of nerves to include disc herniation.

Symptomatic epidural varix is rarely described in the literature and is difficult to diagnose by CT. A case of symptomatic foraminal epidural varix associated with bilateral spondylolysis simulating an extreme lateral disc herniation on CT is reported.
Treatment

Conservative treatment for ELLDHs includes nonsteroidal anti-inflammatory medications or high-dose steroid combined with bed rest, and even epidural or selective nerve root steroid injections.\(^33\)

Gabapentin provided fast and effective relief of pain caused by FLLDH. It should be kept in mind in the first-step medication of pain for such patients. Direct compression of the dorsal root ganglion or its distal part may be related to the intense pain-relief effect provided by gabapentin.\(^34\)

Although conservative management is occasionally successful (10%), surgery is usually required. The extent of stenosis and attendant degenerative changes dictate whether laminectomy, hemilaminectomy or laminotomy are required along with one of several facet resection options; full facetectomy, the intertransverse approach, medial facetectomy, or an extreme lateral procedure.\(^35\)

There has been discussion as to the most suitable surgical approach to a far lateral disc lesion.\(^36\)

Surgical Approaches

Operative techniques for the treatment of extreme lateral lumbar disc herniations (ELLDH) have ranged from an interlaminar approach with subtotal or total facetectomy to an enlarged midline approach and various paraspinal lateral, as well as endoscopic approaches. In contrast to purely endoscopic techniques, use of a working tube together with an operative microscope (“minimally invasive microscopically assisted percutaneous approach”) combines the advantages of three-dimensional visual control with the minimal surgical trauma of an endoscopic approach.

The best approach is microsurgical decompression of the spinal nerve via the intertransverse muscle, ligament and fascia. With this approach, there is no facet destruction and satisfactory nerve root decompression is safe and effective in relieving radicular pain.\(^37\)

O’Brien et al have identified constant anatomical landmarks in cadaveric dissections that facilitate access to the intervertebral foramen when combined with a posterolateral approach, as described by Watkins, for lumbar spinal fusion. The authors describe a technique that allows rapid localization and safe excision of these extreme-lateral lumbar disc herniations without the need for bone resection.\(^38\)

The paraspinal approach for extreme lateral lumbar disc herniations using the minimally invasive microscopically assisted percutaneous technique is reasonable and safe and thus a good alternative to open surgical procedures.\(^39\)

Most surgeons use an interlaminar approach, but full exposure of the nerve root requires total resection of the facet joint which may prejudice the subsequent stability of the spine.

They often cannot be adequately exposed through the typical midline hemilaminectomy approach. Many authors have advocated a partial or complete unilateral facetectomy to expose these herniations, which can lead to vertebral instability or contribute to continued postoperative back pain.

The extent of stenosis and attendant degenerative changes dictate whether laminectomy, hemilaminectomy or laminotomy are required along with one of several facet resection options; full facetectomy, the intertransverse approach, medial facetectomy, or an extreme lateral procedure.
Postoperatively, patients' neurological outcomes based on both surgeon and patient based outcome measures (SF-36), were comparable for the different surgical procedures which had been based on the individual patient's pathology. This has led to the development of approaches to expose the nerve root within the intertransverse space by a paramuscular route with retraction of the erector spinae from the midline, or by muscle splitting, usually with a paramedian incision.

see paramuscular approach

**Microsurgical anatomy**

Level dependent changes in the posterior arch cause a shift of the disc space distally relative to the facet joint, an increasing amount of bone to overlie the intervertebral foramen, and a decreasing amount of working space within the exposure in the caudal direction. Therefore, more bone removal from the lateral aspect of the pars interarticularis and supero-lateral aspect of the facet joint is required in the lower lumbar spine. When the exposed ligamentum flavum is resected, the dorsal root ganglion is seen and access to the herniation and disc space is achieved. Level dependent changes in the pedicles and transverse processes lead to an alteration in the course and relationships of the nerves, thereby influencing the pathophysiology of and surgical technique for the ELLDH. The operative target is the lateral aspect of the pars interarticularis and not the intertransverse space as has been previously described. Our techniques allows for the early identification of the nerve with minimal risks of injury to it, to the adjacent vessels and to the structural integrity of the facet joint and pars interarticularis.

**Outcome**

Failure to recognise its presence has often been responsible for a poor outcome and persistent sciatica after operation.

**Case series**

**2016**

Thirteen patients with isolated FLLDH were evaluated for the study prospectively. All of the cases were diagnosed by lumbar magnetic resonance imaging. The previously prescribed medical therapy of the patients was not changed and gabapentin (3 × 600 mg/d) was added. For each patient, visual analog scale and Odom criteria were administered and recorded at 4 time points as follows: pretreatment and days 1, 7, and 30 posttreatment. Paired t test was used to examine scores of the cases before and after gabapentin treatment. Results were considered significant at P < 0.05, and 95% confidence interval was calculated.

Mean visual analog scale score was 9.3 in the pretreatment period, and reduced to 5, 2.6, and 1.3 on posttreatment days 1, 7, and 30, respectively (P < 0.05). Mean Odom criteria score was 4 before gabapentin treatment. It decreased to 2.3 at posttreatment day 1 and 1.5 at day 7. At the end of 1 month, symptoms had resolved completely in all cases (P < 0.05).
Gabapentin provided fast and effective relief of pain caused by FLLDH. We advise that the gabapentin should be kept in mind in the first-step medication of pain for such patients. Direct compression of the dorsal root ganglion or its distal part may be related to the intense pain-relief effect provided by gabapentin.

2010

2 cases of far-lateral lumbar disc herniations treated surgically via an extreme-lateral transpsoas approach. The procedure was performed using the MaXcess minimally invasive retractor system to access and successfully remove the disc fragments without complication. To the authors' knowledge, these are the first reported cases of using a minimally invasive retroperitoneal approach for the treatment of far-lateral disc herniations.

2002

In 1988-1997, patients with extreme lateral disc prolaps (KBWJM) were operated on the Department of Neurosurgery Medical Academy of Białystok. Females accounted for 4.9% (2 cases) and 95.1% were males (39 cases) with age range 41-60 years. During a study of clinical state 12 months after the operation, we found in 75.6% of patients good and very good results of the surgical treatment of KBWJM. During that period of time, two patients (4.9%) were reoperated out of 41 all patients.

2000

41 patients with extreme lateral disc herniation in the lumbar spine. This group of patients represented 3.1% of all patients operated to discopathy of the lumbar spine at the Department of Neurosurgery of the Medical Academy of Białystok in the years 1988-1997. Males constituted 95.1% of the study series, with an age range 41-60 years. In 92.7% of the patients extreme lateral herniation was diagnosed either at L4-L5 level or L5-S1 level. In 78.1% of the cases different types of motoric disturbances were observed, while in 65.8% radicular type disorders in superficial sensibility were noted.

1999

A study was undertaken to evaluate the long-term benefit in 202 patients who were surgically treated via a microsurgical far-lateral approach for foraminal or extraforaminal lumbar disc herniations.

All patients underwent surgery at the authors' institute since 1987 and represented 6.5% of all lumbar spinal disc surgeries. There were 67 women and 135 men who ranged in age from 19 to 78 years (mean age 58 years). All patients had unilateral leg pain due to lumbar disc herniations into or lateral to the lateral interpedicular compartment. One patient underwent surgery at the L1-2 level, nine at L2-3, 48 at L3-4, 86 at L4-5, and 58 at the L5-S1 level. The mean follow-up period was 50 months (range 12-120 months). Outcome was defined as excellent (no pain), good (some back pain), fair (moderate radiculopathy), and poor (unchanged or worse) based on Macnab classification. Overall, excellent and good results were achieved in 62 (31%) and 85 (42%) patients, respectively, and fair
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and poor results in 40 (20%) and 15 (7%) patients, respectively. Of 11 recurrent disc herniations, four presented in an extreme-lateral position, five in a paramedian location, and two on the contralateral side. There were three minor complications related to surgery, seven general complications, and no case of spinal instability.

The far-lateral approach is a safe, effective procedure that avoids the risk of secondary spinal instability.  

Twenty-five patients with far lateral disc herniation underwent surgery using an extreme lateral approach. There was no medial facetectomy or disruption of the pars interarticularis. The intertransverse ligament was released from the superior portion of the inferior transverse process, and the nerve was located before removal of the disc. Preoperative and postoperative visual analog pain scale and Oswestry functional status evaluation were reviewed along with complications to evaluate the efficacy of the surgery.

No serious complications were noted, although transient neuropathic pain was common and was theorized to be caused by manipulation of the dorsal root ganglion during surgery. This pain was usually resolved within 4 to 6 weeks. The mean preoperative and postoperative visual analog scale scores were 7.7 and 4.2, respectively. The mean preoperative and postoperative Oswestry scores were 50.7% and 34.7%, respectively. Both of these improvements were statistically significant (P < 0.01).

This far lateral approach allowed the nerve and far lateral disc herniations to be easily identified. Also, there was less blood loss and no medial facetectomy or disruption of the pars interarticularis. This is a safe, effective technique with no disruption of spinal stability.

1997

Of a total of 330 patients requiring operation on a lumbar disc, 20 (6.1%) with lateral disc prolapse had a new muscle-splitting, intertransverse approach which requires minimal resection of bone. There were 16 men and 4 women with a mean age of 52 years. All had intense radicular pain, 15 had femoral radiculopathy and 19 a neurological deficit. Far lateral herniation of the disc had been confirmed by MRI. At operation, excellent access was obtained to the spinal nerve, dorsal root ganglion and the disc prolapse. The posterior primary ramus was useful in locating the spinal nerve and dorsal root ganglion during dissection of the intertransverse space. At review from six months to four years, 12 patients had excellent results with no residual pain and six had good results with mild discomfort and no functional impairment. Two had poor results. There had been neurological improvement in 17 of the 20 patients. We report a cadaver study of the anatomy of the posterior primary ramus. It is readily identifiable through this approach and can be traced down to the spinal nerve in the intertransverse space. We recommend the use of a muscle-splitting intertransverse approach to far lateral herniation of the disc, using the posterior primary ramus as the key to safe dissection.

1994

A retrospective analysis of clinical characteristics of 178 consecutive patients with extreme lateral lumbar disk herniation, amongst 3047 patients operated on for herniated lumbar disc, is presented.
The level specific incidence of extreme lateral disc herniation (ELLDH) ranged from a low of 4.5% at L4-5 to peak of 17.4% at L3-4 although the largest number of ELLDH occurred at L4-5 and L5-S1 for a total number of 139 cases (78.1%). 43.6% of all L3 radiculopathies were caused by an L3-4 ELLDH, whereas only 4.4% of all L5 radiculopathies were caused by an L5-S1 ELLDH. Leg pain, either of the sciatic or the femoral type, was the first and dominant clinical symptom of radiculopathy, but pain radiation occurred not always in the appropriate dermatomal segment. ELLDH at upper levels (L2-3 and L3-4) caused usually none or only minor low back signs (76.2%), whereas ELLDH at lower levels more often caused moderate or major lumbar symptoms and signs (59.6%). Positive femoral nerve traction test with upper ELLDH showed a high frequency (84.4%) and reliability and is therefore an important clinical parameter in this situation. Motor deficits occurred more often (78.8%) than sensory deficits (46.6%), were usually of the monoradicular type and were therefore a more reliable clinical sign than sensory disturbances.

Between January 1990 and February 1992, a total of 301 patients underwent discectomy for lumbar disc herniation; 29 had an extreme lateral herniation, i.e., foraminal or extraforaminal. The intervertebral foramen is a three-dimensional area demarcated primarily by the pedicles; we call it the lateral interpedicular compartment. The extraforaminal zone is the space outside the lateral border of the pedicles. All patients were evaluated by computed tomography (CT), water soluble myelography, postmyelographic CT scanning, or magnetic resonance imaging. Fifteen patients consecutively underwent disco-enhanced CT to adjust a correct diagnosis and to distinguish extraforaminal from foraminal herniation. In 10 cases of extraforaminal herniation, a selective radicular decompression with good-to-excellent clinical results was achieved by an extra-axial lateral decompression of the interpedicular compartment, with preservation of the facet joint. The operative target was the lateral aspect of the pars interarticularis and not the intertransverse space, as previously described. In two cases of both foraminal and extraforaminal herniation, the same technique was used. Fourteen patients with foraminal disc herniation and three patients with both foraminal and extraforaminal herniation underwent a standard intervertebral foraminotomy. An accurate preoperative diagnosis established by disco-CT is crucial in order to select the most suitable surgical approach.

1992

A total number of 15 patients has been operated. In 10 patients the lateral microsurgical approach proposed by REULEN, in five cases a combined procedure with lateral sequestrotomy and medial nucleotomy. In the first group, re-sequestration occurred in three cases and further surgery including medial nucleotomy was performed then. A good result with remission could be achieved in 13 cases, whereas in two cases with additional spondylolisthesis, lumbar back pain continued, but the radicular symptoms were reduced.

1991

The clinical, radiologic, and operative findings, and clinical results in 26 cases of foraminal nerve root involvement, each treated by variable operative procedures for an existing pathologic condition, were studied. These 26 cases consisted of 8 intraforaminal or extraforaminal lumbar disc herniations and
18 foraminal nerve root entrapments. The cases with an extreme lateral lumbar disc herniation underwent lateral fenestration or osteoplastic hemilaminectomy without concomitant spinal fusion, and showed excellent operative results. A sufficient selective decompression was achieved with a good clinical result in the cases of lumbar spondylosis without preoperative spinal instability, by lateral fenestration or osteoplastic hemilaminectomy. This result suggests that the selective decompression procedure is recommended for cases with reliable preoperative diagnoses. When an intraspinal lesion makes it difficult to diagnose coexisting foraminal nerve root involvement, decompression of the nerve root canal, approaching from medial to lateral, is recommended. The fusion operation should be performed in cases undergoing even a unilateral total facetectomy, regardless of the patient's old age. A correct preoperative diagnosis is crucial in order to obtain satisfactory operative results.  

**1990**

25 patients who were diagnosed as having far lateral lumbar disc herniations and underwent paramedian microsurgical lumbar-disc excision. Twelve of these were at the L4-5 level, six at the L5-S1 level, and seven at the L3-4 level. In these cases, myelography was uniformly normal and high-quality magnetic resonance images may not be helpful. High-resolution computerized tomography (CT) appears to be the best study, but even this may be negative unless enhanced by performing CT-discography. Discography with enhanced CT is ideally suited to precisely diagnose and localize these far-lateral herniations. The paramedian muscle splitting microsurgical approach was found to be the most direct and favorable anatomical route to herniations lateral to the neural foramen. With this approach, there is no facet destruction and postoperative pain is minimal. Patients were typically discharged on the 3rd or 4th postoperative day. The clinical and radiographic characteristics of far-lateral lumbar-disc herniations are reviewed and the paramedian microsurgical approach is discussed.

**1988**

Extreme lateral disc herniations in the Abdullah et al series account for 10% of all lumbar herniations; 80% occurred at the L3, L4 and L4, L5 interspaces. The authors review the clinical findings in 138 patients and point to the characteristic features of the clinical syndrome. They compare the accuracy of various diagnostic studies and conclude that computed tomography is highly accurate and should be used before other diagnostic studies. Discography is still helpful as a confirmatory study in some cases, whereas myelography is particularly useful in disclosing other associated lesions. Analysis of the operative series revealed a high percentage of extruded fragments (60%) and a significant number of double herniations on the same side and at the same level (15%). These two findings may respectively preclude chemonucleolysis and microsurgery from the surgical management of extreme lateral herniations. Double herniations explain some discrepancies in the clinical picture and are emphasized as a potential source of error in diagnosis. The surgical technique allows exploration for herniations within the intervertebral canal as well as for extraforaminal herniations without sacrifice of the facet. Operative results are presented.

Forty-eight patients had 50 extraforaminal disk herniations (EFDHs) demonstrated on CT and/or MR by (1) presence of disk density or disk signal material lateral to the neural foramen, (2) displacement or obliteration of paravertebral fat, and (3) nerve root or ganglion compression or displacement. Forty-
one of 50 EFDHs had a coexisting intraforaminal component; nine of 50 had an isolated far lateral herniated nucleus pulposus. EFDHs typically occurred in the absence of a coexisting intraspinal disk herniation. Migratory fragments were seen in 50% of all cases and were at or cephalad to the interspace of origin in all cases. Forty-six percent of EFDHs were at L2-L3 or L3-L4, although the most commonly affected level was L4-L5 (38%). EFDHs, which were often overlooked (15/50 scans reviewed), are an important preventable cause of failed intraspinal disectomy. EFDHs can be readily identified on both CT and MR if appropriate scans are obtained from L2 through S1 and if the neural foramina and paravertebral spaces are carefully examined.

1987

During a 1-year period from December 1, 1984, through November 30, 1985, a total of 174 patients underwent lumbar discectomy for herniated nucleus pulposus. Eighteen (10.3%) were diagnosed as having foraminal or extraforaminal disc herniations. Sixteen patients are included in this study. All patients were evaluated with computed tomography, metrizamide myelography, discography, and discography-enhanced computed tomography (disco-CT). Accurate diagnosis of foraminal or extraforaminal herniation was made with disco-CT in 15 of 16 cases (93.8%), compared with discography alone (37.5%), computed tomography alone, and/or myelography-enhanced computed tomography (50%) and myelography alone (12.5%). Surgical treatment with bilateral hemilaminectomy, partial medial facetectomy, and partial internal foraminotomy, if needed, followed by discectomy is very effective and the favored surgical management for nerve root decompression in most all cases.

1986

Eleven cases were diagnosed since 1975, and all were confirmed by operative treatment. This number is a very small percentage of the total, but if these cases had not been diagnosed correctly, the results of surgery would have been poor. Selective lumbosacral radiculography and nerve root block techniques are very useful in determining the nerve root involved. Discography is an excellent diagnostic technique for finding the relationship between the nerve root and hernia mass. Extraforaminal disc herniation must be kept in mind as a cause of lumbar radiculopathy.

1984

12 cases of root compression from disc herniation at the level of the pedicle or farther laterally in the foramen (extreme lateral disc herniation). Diagnosis and localization of the root compression were determined preoperatively in 11 of 12 cases based on the computed tomographic (CT) scan appearance of the lesion. Myelography was performed in 9 cases and was interpreted as normal in 6 and abnormal in 3 instances. In each of the 3 abnormal studies, the actual abnormality was at a different level than that predicted by the myelogram. The clinical presentations in these patients were not distinct except that a positive straight leg raising test was present in only 7 of 12. Preoperative knowledge of the site of nerve root compression as delineated by CT scanning was essential in planning the operative procedure. It prevented unnecessary exploration of uninvolved levels and directed the surgeon to the far lateral site of the herniation. Illustrative examples are presented.
Thirty-five patients with an unremarkable or a negative water-soluble contrast myelogram and a diagnosis of foraminal neural entrapment made or more firmly established by computed tomography (CT) were detected in evaluating 950 patients presenting for myelography. The CT criterion of foraminal neural entrapment was the presence of a mass displacing epidural fat and encroaching on the neural intervertebral foramen or lateral recess so as to compromise an emerging nerve root. The entrapment (confirmed operatively) was due to a laterally prolapsed disc (16 cases), superior articular hypertrophy (4 cases), lateral recess stenosis (3 cases), posterolateral vertebral bone lipping (2 cases), tumors (6 cases), postoperative scarring (2 cases), spondylolisthesis (1 case), and synovial cysts that encroached on the neural foramina (1 case). CT is an important additional investigation in patients with a painful radiculopathy and a negative or equivocal water-soluble contrast myelogram.

Case reports

A 46-year-old woman presented with a history of mild low back and intense right leg pain. The leg pain was like electrical discharges. Right knee extension was weak together with hyperalgesia and loss of heat sensation in the right LA dermatome. The right patellar reflex was absent. Electromyography showed acute and chronic denervation of muscles innervated by the right L4 nerve root. MR scan showed a right L4-5 extraforaminal mass distorting the L4 dorsal root ganglion. The mass enhanced homogeneously after gadolinium injection and was thought to be a tumor. It was surgically removed using a midline incision and intraspinal, followed by extraspinal dissection. Under the operating microscope, the mass extended between an intact lateral longitudinal ligament and a swollen dorsal root ganglion. Histopathologic examination ruled out a tumor and showed that the mass consisted of degenerated disc material surrounded by a large peripheral zone of neovascularization.

Extraforaminal periganglionic free, encapsulated disc fragments may mimic tumoral masses, from which they may not be distinguished on MRI.

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