Sciatica caused by nerve root entrapment in the lateral recess: the superior facet syndrome


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Fifteen patients with intense sciatic pain in whom surgical exploration disclosed no evidence of a herniated disc were found to have an entrapped L-5 or S-1 nerve root in a stenotic lateral recess beneath the superior articular facet of the inferior vertebra. Neurological abnormalities were infrequent. A conspicuously positive Lasègue sign was the most definite and consistent finding. Roentgenograms of the spine were not helpful, and myelography was negative or showed minimal changes because of the normal ventrodorsal diameter of the spinal canal and the lack of filling of the narrow lateral recesses. Electromyography was positive in the five patients studied. Surgical unroofing of the lateral recess with removal of the overhanging horizontal portion of the superior facet decompressed the incarcerated nerve root and relieved symptoms.

Key Words: sciatica · root entrapment · lateral recess · superior facet

The intense radicular pain of sciatica caused by a herniated disc is familiar. That similar symptoms may result from nerve root entrapment in a stenotic lateral vertebral recess without discal herniation is less well known and requires consideration. In 15 such patients with negative explorations for herniated disc, relief of pain was achieved by unroofing the lateral recess and excising the overhanging portion of the superior articular facet, thereby freeing the incarcerated nerve root.

Of the various explanations for nerve root compression in the absence of a herniated disc, the most important refer to encroachment on available space within the canal. Narrowing may result from congenital, developmental, or degenerative bone changes affecting the spinal canal and its foramina. This may be augmented by hypertrophy and ventral intrusion of the posterior longitudinal ligament simulating typical clinical and even radiological evidence of discogenic nerve root compression. Raaf in reviewing 819 operative procedures for herniated discs, found that 5.5% had other lesions capable of producing symptoms. These included arachnoiditis, radiculitis, scar tissue, adhesions, and spurs. There were 150 patients (18.3%) with no gross nerve root lesion who were thought to have some structural defect causing symptoms resembling discogenic sciatic pain.

Schlessinger first described two patients...
Nerve root entrapment in the lateral recess

with sciatic pain caused by compression of the first sacral nerve root in an abnormally deep bony recess at the level of the fifth lumbar and first sacral vertebrae. Myelography was not helpful in diagnosis. Operation revealed that the root was tightly wedged laterally and could be extricated only with the greatest difficulty. In neither case was there evidence of herniation of the disc. In one patient, the recess was further compromised by degeneration and thinning of the fifth lumbar disc with backward displacement of the body of the fifth lumbar vertebrae. In the second, hypertrophic changes with thickening of the margins of the vertebral bodies were contributory causes. Decompressive facetectomy provided relief.

The usual shape of the spinal canal in the lower lumbar region is either oval or triangular (Fig. 1 A). In our group of patients, the configuration of the canal is trifoliate, with a normal ventrodorsal and transverse diameter. The narrowing is confined to the lateral recesses, which are cup-shaped and tightly embrace the nerve roots (Fig. 1 B, C). This pattern differs from spinal stenosis in patients with congenital or developmental narrowing in whom the entire ventrodorsal diameter is reduced, resulting in compression of the cauda equina. Many patients will demonstrate varying degrees of both patterns.

Summary of Cases

These 15 patients appeared in a group of 400 operated on during the past 5 years with the presumed diagnosis of a herniated disc. The age span was from 17 to 51 years with the majority (11) being between 20 and 40 years. There were eight men and seven women.

Intense sciatica, at first intermittent, but later intractable, was the most conspicuous symptom and was the presenting complaint. There was nothing in the onset or quality of this pain to differentiate it from that seen with a disc herniation. Symptoms were primarily unilateral, though bilateral pain was present in three patients. Back pain of varying degree was present in nine patients. Trauma was a precipitating factor in six.

The most conspicuous physical finding in every patient was a strikingly positive Laségue maneuver. Restriction of back mobility...
and flattening of the lumbar curve was observed in 10, and tilt and scoliosis in four.

Abnormalities in the neurological examination were minimal, if present at all, and were not adequate to provide accurate interspace localization. Mild weakness was observed in eight patients, involving the extensor hallucis longus in six and the hamstring muscles in two. Hypalgesia was present in the L-5 dermatome in five patients and over the S-1 area in one. Reflex changes included a depressed knee jerk in three patients and a depressed ankle jerk in one.

Laboratory studies, except for the electromyogram, were not unusual. Roentgenograms of the spine were normal except for alterations in the lumbar lordotic curve, scoliosis, and evidence of spondylosis in four patients. The spinal fluid dynamics, cell count, and protein were normal. Myelography in six patients was negative. Eight showed minimal or questionable findings with shallow indentations or asymmetry of the lateral margins being the only significant changes (Fig. 2). Only one myelogram was considered to be positive.

Electromyography on five patients was abnormal and was instrumental in arriving at the decision to operate. The abnormalities included hyperirritability, insertional activity, polyphasic potentials, and fibrillations. All patients were subjected to prolonged periods of conservative care because of meager objective findings.

No evidence of a herniated disc was found despite extensive exploration of two interspaces and foramenotomy. The presence of lateral recess and superior facet entrapment was suggested by shingling of the lamina with little or no space between these structures even with the patient in the extreme flexed or crouch position. The horizontal inferomedial half of the facet covered the lateral recess, and the overhanging portion had to be removed before the nerve root could be exposed and decompressed. Demonstration of an acutely injected, irritated nerve root confirmed the nature and level of the pathology. The surrounding tissues were normal or showed varying evidence of scarring with prominent bone margins. After the incarceratated root had been decompressed, the sheath filled with spinal fluid resuming a normal turgid appearance. This proved to be a good prognostic sign. In eight patients the L4-L5 interspace was involved. In five, the S-1 root

Fig. 2. Myelogram showing a minimal asymmetry at the L4-L5 interspace (A and B) with slight indentation on the right side and a ventral bulge of minor degree (C).
Nerve root entrapment in the lateral recess

was trapped beneath the facet of the sacrum, while in two patients, both the L-5 and S-1 roots were affected, the latter being more seriously compressed Fig. 3.

The results of surgery were excellent in 11 of the 15 patients over an interval of 6 months to 5 years; all regained and maintained normal activity without restriction. This included the youngest patients from 17 to 37 years of age. Three other patients in the series who had good results and were able to resume occupational activities experienced minimal residual discomfort and disability. Finally, one patient, although improved, still had significant functional impairment. His back pain and bilateral leg pain had started with an industrial accident 20 years before we saw him, and spondylosis and perineural scarring were already advanced. No patient required reoperation or spine fusion.

Discussion

In these patients, the dominant finding is intense radicular pain. Evidence of entrapment is manifested by a conspicuously positive Lasègue sign. Neurological alterations are absent or minimal. It is not possible to establish the diagnosis radiologically including myelography because of the normal vertical and transverse diameters of the spinal canal (Fig. 1). Since the lateral recesses do not fill with the radiopaque contrast medium, compressive changes are not evident in this region.

The plane of the superior articular facet in the patients with a trifoliate canal has two curves (Figs. 1 and 4). The upper portion presenting in the vertical or sagittal plane is clearly visualized in the anteroposterior x-ray view. However, the thin inferior segment that forms the roof of the lateral recess lies in the horizontal or coronal plane, and so cannot be visualized as a distinct anatomical entity in any projection.

We believe extensive operative exposure is mandatory in cases with so-called “negative exploration” for a herniated disc, particularly if suspicion of lateral recess entrapment has been aroused by the presence of shingling

Fig. 3. Drawing to illustrate the typical operative findings (A) and operative result (B). In (A) there is little space between the lamina at L4-L5, portions of the facets are oriented vertically and horizontally. The lateral recess and most of the spinal canal are covered by the horizontal portion, and the most medial margin of the facet approaches the midline (arrows). A normal configuration is shown at the L5-S1 level. In (B) at the termination of the procedure, the canal including the lateral recess at L4-5 has been unroofed by removal of the yellow ligament and the medial overhanging portion of the superior articular facet (S.A.F.). The red, flattened nerve root has rapidly filled with spinal fluid and assumed a turgid appearance. The normal exposure is drawn at L5-S1. I.A.F. = inferior articular facet.
The appearance of symptoms in these patients may relate to inflammatory thickening of investing tissues secondary to acute or chronic trauma, hypertrophy of the vertebral margins, thinning of the intervertebral disc, and subluxation of the vertebral bodies and facets. Encroachment on the available space ultimately results in root compression. Chronic irritation produces perineural fibrotic changes and adhesions with reactive swelling further compromising function.

In patients with congenital or developmental stenosis of the spinal canal, compression of the cauda equina causes a more severe neurological deficit with sphincter disturbances, sexual dysfunction, and bilateral signs of root compression often arousing suspicions of a tumor. The spinal canal is flattened. The laminae are thick, overlapping, and vertically oriented with large bulbous facets and corresponding multiple myelographic defects including complete block.

In spondylosis, nerve root compression occurs with or without discal herniation. Osteophyisis is grossly evident. Varying degrees of antero- or retrolisthesis may be present, reducing all diameters of the foramen. Roentgenograms of the spine and the myelo-

Fig. 4. Drawings to show the anatomy of the superior facet syndrome. A. The anatomical details of the trifoliate spinal canal (S.C.) are illustrated with narrowing at the lateral recesses at a and b. The vertical double-ended arrows show the differences that may exist in the depth on each side. The shaded portion of the superior articular facets (c and d) in the horizontal plane (g-h) covers the cup-like lateral recess in which the nerve root (N) may be incarcerated (right). Tropism is noted at the vertical portions of the articular facets (e-f)

B. The dorsal surfaces of the fifth lumbar and first sacral vertebrae present characteristic features that aid in identification of this variant (right) as compared to normal (left). The superior facet normally (left) projects upward over the intervertebral disc. On the right, the medial overhanging portion (shaded) covers a portion of the spinal canal and forms the roof of the lateral recess at both interspace levels. Minimal space exists between the lamina.

C. The essential features of operative decompression are compared on the normal left side and the variant on the right at both levels. The overhanging portion of the facet has been removed more extensively at A than at a, with liberal foramenotomy. The position of the pedicle P is represented by the dotted area. Little of the inferior facet needs to be removed.
Nerve root entrapment in the lateral recess

gram are positive in these patients, as are the operative findings.\(^5,7\) In patients with reverse spondylolisthesis, Hadley\(^7\) described a decrease in the ventrodorsal diameter of both the foramen and the canal, with the tip of the superior articular facet projecting into the foramen, compressing the nerve root against the unyielding uppermost pedicle.

Discal herniation beneath the articular facets is not uncommon and results in marked neural compression. Neurological alterations are conspicuous in such patients and the myelogram is frequently positive. Hirsch\(^8\) found herniated discs beneath the superior facet in patients with characteristic neurological symptoms and findings but in whom both myelography and prior operation had been negative. He concluded that when no other intraspinal pathology exists, surgical exploration is inadequate unless foramotomy and facetectomy are performed.

Relief of pain in patients following negative exploration for a herniated disc may possibly be related to the extensive lateral decompression required while searching for the presumed lesion.

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References


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