Thoracic Disc Herniation with Concomitant Lumbar Spinal Stenosis Resulting in Epidural Compression Syndrome in a Renal Transplant Patient

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Abstract

The authors report the case of a 64-year-old female renal transplant patient who presented with acute onset of right lower extremity weakness and urinary retention. Her imaging studies confirmed a T11-12 paracentral disc herniation with spinal cord deformation and myelomalacia with concomitant degenerative spondylolisthesis at L4-5 resulting in epidural compression syndrome. Following appropriate surgical intervention, she regained the ability to urinate at 4 months following surgery, independent ambulation at 6 months, and return to pre-injury activities one year following surgery.

Keywords

Epidural compression syndrome; Thoracic disc herniation; Lumbar spinal stenosis; Spondylolisthesis and urinary incontinence

Introduction

Epidural compression syndrome is a rare clinical entity that can be difficult to identify given its similarities and differences with cauda equina syndrome. However, similar to cauda equina syndrome, it requires prompt identification and treatment to optimize functional outcome. Concomitant pathologies of the lumbar and thoracic are far less common and require thorough preoperative planning. This case highlights a patient presenting with a thoracic disc herniation resulting in epidural compression syndrome in the setting of degenerative lumbar spinal stenosis.

Case Report

A 64-year-old female presented with complaints of right lower extremity weakness and urinary retention. The patient reported waking that morning with a new onset of right lower extremity weakness and inability to urinate following a day of increased activity. She denied bowel incontinence but reported 4 instances of urinary retention, with the last episode following right hip surgery 2 years previously. Her past medical history was significant for a renal transplant 12 years prior for chronic kidney disease, requiring chronic steroids and immunosuppressive. Her past medical history also included atrial fibrillation, hypertension, obesity, and hyperlipidemia.

The patient was afebrile with normal vital signs. Physical exam revealed that she could stand, but could not ambulate without assistance. The lumbar spine was non-tender to palpation, with decreased range of motion in all planes. Weakness was present in the bilateral lower extremities, right greater than left, with knee flexion and extension strength 3/5 bilaterally, and bilateral ankle dorsiflexion, plantar flexion, and extensor hallucis longus strength 4/5. Sensation was decreased over the left foot, most prominently in the L4 dermatome. Reflexes are 2+ for the patellar tendons and 2+ for Achilles tendons without distraction with zero beats of clonus to bilateral ankles.

Radiographs revealed degenerative changes to the lumbar spine with a grade 2 L4-L5 spondylolisthesis (Figure 1). Magnetic resonance imaging, revealed a left paracentral T11-12 disc herniation with cranial migration behind the T11 vertebral body resulting in cord compression and myelomalacia. There was also a multi-level degenerative disc disease, worse at L4-5 with confirmation of the grade 2 spondylolisthesis and associated central canal stenosis (Figures 2 and 3).

Operation

After preoperative planning, she underwent an L4-L5 posterior lumbar interbody fusion, T11 bilateral laminectomy, left T11 facetectomy and partial corpectomy, and T11-12 discectomy (Figure 4). The left T11 nerve root was sacrificed to aid in exposure. The post-operative course was complicated by lumbar incisional dehiscence and surgical site infection which was treated with serial irrigations and debridements and ultimately a rotational flap performed in conjunction with plastic surgery.

Postoperative course

She required scheduled catherizations immediately following

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Figure 1: Lateral radiograph at presentation demonstrating degenerative L4-5 spondylolisthesis and disc space narrowing at T11-12.
surgery due to overflow incontinence. She progressed to require only intermittent catheterization at 2 months following surgery and regained the ability to volitionally void at 4 months. At her 6 month followup, she was able to ambulate without an assistive device and had returned to her preoperative activity level at one year. Radiographs obtained at 1 year follow-up demonstrated well-fixed implants with fusion at L4-5 and her exam demonstrated full motor strength with residual numbness in the left T11 and right L4 nerve distributions (Figure 5).

Discussion

Spinal stenosis is a common disease in elderly patients, and is typically the result of progressive narrowing of the spinal canal through a degenerative process. Stenosis of the vertebral canal can result in compression of the neural elements causing a range of symptoms according to the level and severity of the stenosis. Although spinal stenosis can occur at any level, it most commonly occurs at the most mobile segments of the spine, i.e., at the cervical and lumbar levels [1].

On the contrary, thoracic disc herniation is an uncommon disease. In 1838, Key documented the first case of a thoracic herniated disc causing spinal cord compression [2]. It was not until 1922, however, that Adson performed the first laminectomy and disc removal [3]. The true incidence of thoracic herniated discs is unknown, as many cases are unrecognized or patients are asymptomatic. Most patients present in their 4th through 6th decades of life [3,4], although cases have been reported in patients ranging in age from 11 to 75 [5-7]. Historically, only 0.15% to 4% of all symptomatic protrusions of an intervertebral disc are in the thoracic spine [3,4,8,9]. Herniations are uncommon in the upper thoracic spine, with most cases occurring between the T8 and L1 levels; predominantly T11-12, representing 26% to 50% of all thoracic herniation’s [10,11]. Additionally, neurologic sequelae is unusual, with the prevalence of herniated thoracic discs with associated neurological deficit estimated at 1 per 1 million in the population [5,9,12,13]. Most authors favor degenerative processes as the major cause of thoracic disc herniation, as there is a higher incidence of herniation in the thoracolumbar spine, where greater degenerative changes occur [3,10,11,14]. Subsequently, our patient likely represents an extreme presentation of global degenerative changes in the thoracolumbar spine.

This case highlights a unique presentation, where a thoracic disc extrusion is associated with concomitant degenerative spinal stenosis of the lumbar spine. Studies based on concurrent thoracic and lumbar stenosis, as well as triple stenosis (cervical, thoracic, and lumbar), are rare [15]. Furthermore, we are unaware of any studies which characterize concomitant thoracic disc disease and lumbar spinal stenosis. However, there have been case reports documenting thoracic paraplegia developing after lumbar decompression surgery for lumbar spinal canal stenosis, where computerized tomography myelography and magnetic resonance imaging revealed another compressive lesion in the thoracic spine. The authors highlighted the importance of preoperative physical and radiographic examination of the thoracic spine when lumbar imaging is inconclusive [16].

There is extreme variation in the clinical presentation of thoracic

Figure 2: Sagittal T2 MRI sequence showing T11-T12 disc herniation with cord deformation and associated myelomalacia and L4-5 degenerative disc disease and spondylolysis with resultant spinal stenosis.

Figure 3: (A) Axial T2 MRI image at T11-T12 disc level showing disc herniation with cord compression, (B) polycystic kidney disease.

Figure 4: (A) Postoperative radiographs demonstrating L4-5 PLIF, (B) T11-12 posterior instrumentation.

Figure 5A-5C: Radiographs demonstrating AP and lateral of full spine with focused lateral of the thoracolumbar junction 1 year following surgery showing well fixed implants with fusion at L4-5.
disc herniation, which may explain why there is no clear-cut syndrome identified for this phenomenon. Tovi and Strang outlined the usual chronological progression, which begins with thoracic pain followed by sensory disturbances, weakness, and finally bowel and bladder dysfunction [17]. Arce and Dohrmann later confirmed this pattern in a review of the literature of 179 patients who described their initial symptoms [18]. Of these patients, 57% described pain, 24% described sensory disturbance, 17% described motor weakness, and 2% described bladder dysfunction. However, by the time of presentation, 90% of the patients had signs and symptoms of cord compression, 61% had motor and sensory complaints, and 30% had bowel or bladder dysfunction.

Cauda equina syndrome is also an uncommon condition, characterized by back pain, lower extremity motor weakness, loss of sensation in the sacral nerve root distribution, decreased rectal tone, urinary retention resulting in overflow incontinence, and/or fecal incontinence [18]. It has been reported that cauda equina syndrome occurs in approximately 2% of cases of herniated lumbar disc [19]. Conversely, epidural compression syndrome is a term which encompasses disease compressing not only the cauda equina, but compression anywhere along the thecal sac [18]. Thus, a potential pitfall exists in conflating cauda equina syndrome with epidural compression syndrome. Sole reliance upon lumbar MRI may be inadequate in diagnosing an epidural compression syndrome which occurs more proximally, and could potentially delay definitive treatment. This case highlights that thoracic lesions specifically may be difficult to diagnose because their clinical symptoms may resemble those for lumbar spine lesions. We found several series which highlight cases of nonmetastatic thoracic spine compression initially missed by lumbar imaging [16,20-22].

Indications for surgery include progressive myelopathy, lower extremity weakness or paralysis, bowel or bladder dysfunction, and radicular pain refractory to conservative measures. Of these, cauda equina and epidural compression syndromes are typically considered absolute surgical indications, and while most investigators recommend emergent surgical decompression, the timing of surgical decompression is controversial [23,24]. The past decade has seen the emergence of the much-referrred-to 48-hour limit as a possible window of safety. A recent systematic review by Chau et al. suggested the level of neurological dysfunction at surgery is probably the most significant determinant of prognosis, and with earlier surgical intervention, the more beneficial the effects for compressed nerves, especially with acute neurologic compromise [24]. Our patient had surgical decompression within 72 hours of hospitalization and had a good outcome, with return of urinary control approximately 4 months postoperatively. Studies have shown that most patients will in fact have a return of urinary control. A retrospective study by Buchner and Schillenwolf analyzed the results of 22 patients who underwent discectomy following a diagnosis of cauda equina syndrome due to lumbar intervertebral disc herniation [25]. Postoperatively, 77% of patients had complete urinary function recovery within the follow-up period (mean: 3 years and 9 months), 18% had persistent stress incontinence, and 5% was incontinent 4 years postoperatively [25].

This case was also unique in that the patient’s medical history was significant for renal transplantation on chronic immunosuppressants. A cross-sectional study by Helenius et al. [26] analyzed the impact of solid organ transplantation on the spine in 40 young adults. Back pain, scoliosis, wedged vertebrae, and narrowed, degenerated disc spaces were common after solid organ transplantation in childhood. However, to our knowledge, this is one of the first instances of a thoracic disc causing cord compression in a patient with a history of renal transplant reported in the literature.

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