CASE REPORT

Percutaneous Endoscopic Lumbar Discectomy for a Huge Herniated Disc Causing Acute Cauda Equina Syndrome: A Case Report

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Abstract: Microsurgery for lumbar disc herniation that requires surgical intervention has been well described. The methods vary from traditional open discectomy to minimally invasive techniques. All need adequate pre-anesthetic preparation of patients as general anesthesia is required for the procedure, and nerve monitoring is necessary to prevent iatrogenic nerve injury. Conventional surgical techniques sometimes require the removal of the corresponding lamina to assess the nerve root and herniated disc, and this may increase the risk for posterior instability of the vertebral body. Should this occur, fusion surgery may be needed, further increasing morbidity and cost. We present here a case of lumbar herniated disc fragments causing acute cauda equina syndrome that were endoscopically resected through a transforaminal approach in an awake patient under local anesthesia. Percutaneous endoscopic discectomy under local anesthesia proved to be a better alternative to open back surgery as it made immediate intervention possible, was associated with fewer perioperative complications and morbidity, minimized soft tissue damage, and allowed early rehabilitation with a better outcome and greater patient satisfaction. In addition to these advantages, percutaneous endoscopic discectomy protects other approaches that may be needed in subsequent surgeries, whether open or minimally invasive. J. Med. Invest. 62: 100-102, February, 2015

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INTRODUCTION

Cauda equina syndrome is one of the very few real emergency conditions in spine pathology. Earliest possible diagnosis and prompt intervention will achieve the best possible outcome (1). Management of the syndrome frequently involves surgical decompression. If undertaken within 48 h of symptom onset, the risk of long-term neurological damage will be reduced (2). If the etiology is a herniated disc, the surgical technique may vary, ranging from open minimally invasive to percutaneous endoscopic discectomy.

We present here a case of percutaneous endoscopic lumbar discectomy (PELD) using a transforaminal approach under local anesthesia for a newly diagnosed case of acute cauda equina syndrome due to a herniated disc at the L4-L5 level. This case highlights an effective treatment option for cauda equina syndrome due to a herniated disc in which symptoms were promptly relieved intraoperatively and the patient was actively involved; thus, fully utilizing the benefits of advances in endoscopic techniques (3).

CASE REPORT

A 36-year-old woman presented with a 1-month history of low back pain and radiating pain to the left lower limb with numbness. On physical examination, there was no right side weakness, but on the left side the straight leg raising test (SLRT) was positive at 40 degrees and muscle strength of both the tibialis anterior (TA) and extensor hallucis longus (EHL) was reduced to 2/5 on manual muscle testing (MMT). Hypoesthesia (3/10) in the left L5 dermatome was also noted. The working diagnosis was lumbar disc herniation at L4-L5 with left L5 radiculopathy. She was referred for magnetic resonance imaging (MRI) and percutaneous endoscopic discectomy, but she chose to seek a second opinion. One week later, she presented to the emergency department with more severe low back pain radiating to the bilateral lower limbs, numbness, saddle anesthesia, bilateral lower limb weakness, and bladder dysfunction. On examination, her SLRT on the right side was positive at 60 degrees and on the left side was 40 degrees. Bilateral lower extremity TA, EHL, and flexor hallucis longus (FHL) strength on the MMT was reduced to 2/5. Hypoesthesia (3/10) was noted in the L5-S5 dermatomes bilaterally, along with saddle anesthesia. MRI showed a massive herniated disc at L4-L5 that had migrated caudally causing severe compromise of the spinal canal (Figure 1). The preoperative diagnosis was a herniated L4-L5 disc leading to acute cauda equina syndrome. She emergently consented to transforaminal percutaneous endoscopic discectomy under local anesthesia at L4-L5, from the left side, keeping in mind that if any difficulty were encountered, an inter-laminar approach might be required.

The patient was positioned prone on a standard spine frame. The optimum location for cannula insertion was determined before surgery to be 8 cm left of midline on computed tomography and MRI (4, 5). After adequate painting and draping, 1% lidocaine was used for local anesthesia under C-arm guidance (4). Intravenous

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pentazocin was given for mild sedation, and the level of anesthetic was titrated so that patient was able to communicate with the surgeon throughout the procedure.

The Wolf endoscope system was used for the procedure. Using anterior-posterior and lateral fluoroscopy, a needle was advanced to the L4-L5 disc space. Safe access to the herniated nucleus pulposus was made through Kambin's safety triangle following a walking technique between the exiting L4 nerve root and the traversing L5 nerve root (4-6). Discography was conducted with indigo carmine to dye the nucleus pulposus and herniated mass blue. In this procedure, the annulus fibrosus remains white and the epidural space remains red due to the presence of vessels. A guide pin was inserted into the disc through a puncture wound, and the obturator and cannula were inserted sequentially through the 8 mm skin incision. After cannula insertion, an endoscope with an optical angle of 25 degrees was inserted to visualize the fragment at the base of the herniated mass, which was then removed piece by piece. Then, following an inside-out and hand down technique, the cannula was moved toward the epidural space, where the herniated mass was removed (4). The beveled end of the working cannula was also used as a nerve root retractor. The pulsation of the dural tube indicated adequate decompression (4). During the operation, on the table, after removal of the herniated disc, the patient reported prompt relief of her symptoms, with no further pain in the bilateral lower extremities. Motor power improved in the right lower extremity, as did sensation around the perineum (i.e. saddle anesthesia; S3-5 dermatomes).

She had significant improvement in her symptoms immediately following surgery. Complete motor and sensory improvement in the right lower extremity was noted with full recovery from saddle anesthesia. Only left foot drop with TA of 3/5 and EHL of 2/5 on the MMT and left L5 dermatome hyposthesia of 3/10 persisted for many days, and we did not therefore expect immediate recovery. Immediate postoperative MRI showed significant decompression with some remnant disc material (Figure 2). Thus no additional surgery was advised, but to rather wait and watch. At the 6-week and 3-month follow ups, she had experienced no recurrence of symptoms and had a Japanese Orthopedic Association score (7) of 28; motor and sensory symptoms were normalized in bilateral lower limbs. At 3 months, MRI showed complete resolution of the residual herniated disc (Figure 3).

DISCUSSION

With advancements in surgical equipment and procedures, different techniques have been developed to meet patients’ wishes and surgical techniques are becoming more sophisticated and result-oriented. Recent orthopedic surgical approaches take the soft tissues more into account, and surgical approaches have been transformed from open to minimally invasive in order to minimize damage to soft tissue structures. This concept has made the evolution of PELD more promising (8-11).

To date, percutaneous endoscopic discectomy is the most minimally invasive approach to lumbar disc pathology. Broadly, three different surgical approaches have been described for this procedure: the transforaminal, far lateral, and interlaminar approaches (3, 5, 12, 13). The most beneficial aspect of this technique is that...
we can perform most surgeries under local anesthesia with the patient awake so that we can continuously communicate with the patient to monitor operative improvement or deterioration of symptoms on the table. This decreases the chance of iatrogenic nerve root injury while accessing the disc and performing decompression (4, 5). As highlighted in the present case, intervention can be performed emergently as routine pre-anesthesia preparation is not required, unlike in more conventional methods (5, 14).

Before introduction of the PELD technique, conventional methods for spinal canal decompression ultimately caused more soft tissue violation and even bone resection (4). This heightened the risks for postoperative instability, which in turn increased the risks for posterior spinal fusion rate as well as morbidity and rehabilitation needs. During open surgery, the nerve root has to be retracted medially, which increases the possibility of nerve paralysis; in transforaminal percutaneous endoscopic discectomy only the splitting of muscle is done, entry is through the safety triangle as it does not require bone resection, and this affords a quick start to rehabilitation, improving the postoperative course (9-11). All these features, plus the fact that the postoperative scar is only 8 mm, which further enhances its acceptability (4), contribute to better functional and emotional outcomes for patients.

Complications such as nerve root injury, dural tear, intracranial hypertension, major vessel injury, and surgical site infection can occur during and after percutaneous endoscopic discectomy with a transforaminal approach (4). Patients should be properly counselled about recurrent disc herniation and operative failure, for which they may require the same or another procedure in the future (4, 5, 12, 15).

CONCLUSION

Central disc herniation and extruded huge disc fragments can now be effectively managed under local anesthesia even in emergency condition such as acute cauda equina syndrome (4-6, 14).

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