Far-Lateral Disk Herniation: Treatment by Automated Percutaneous Discectomy

Automated percutaneous discectomy has certain advantages over other surgical approaches to the treatment of far-lateral disk herniation; primarily, the procedure can be performed under local anesthesia without soft-tissue disruption. We describe four patients with far-lateral herniations who were successfully treated with the procedure.

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Treatment of extremely far-lateral disk herniations poses somewhat of a dilemma [1]. The standard interlaminar approach may necessitate a large, if not complete, facetectomy to expose the herniation, thereby increasing soft-tissue trauma and potentially creating instability [2, 3]. A paraspinous approach that obviates facet removal has been described [4, 5]; however, the scarcity of this type lesion, with the infrequent use of this approach to the spine, means that the anatomy is unfamiliar to most neurosurgeons.

Automated percutaneous discectomy, which has recently gained attention as a noninvasive alternative treatment for uncomplicated disk herniations [6–9], may also be a good alternative treatment for the extremely far-lateral herniated nucleus pulposus, provided the herniation is still contained. Performing the procedure from a posterolateral approach under local anesthesia affords excellent proximity to the herniation as well as safety, since the chance of nerve root injury is greatly minimized when the patient is awake.

We describe four patients with extremely far-lateral herniations who were successfully treated by automated percutaneous discectomy.

Subjects and Methods

Automated percutaneous discectomy is performed in the operating room or radiologic suite under C-arm fluoroscopic control. A preoperative one-slice planing CT scan is taken in the prone position to identify any bowel in the intended path of the procedure. Strict sterile technique is followed, and continuous vital sign monitoring with pulse oximetry is carried out. The patient is placed in the lateral decubitus position, and an entry point is chosen approximately 10 cm from the midline at the level of the herniated disk as determined by the CT scan. Local anesthetic is used to anesthetize the skin at the entry point and the underlying fascia and musculature. An 18-gauge pencil-tip trocar with removable hub is placed down to the disk space. Before penetrating the anulus, an anteroposterior view is obtained to confirm that the tip of the trocar is lateral to a line that joins the medial border of the pedicles, confirming that the trocar is not traversing the thecal sac.

During trocar placement, the patient is monitored for signs of radicular pain. When radicular pain is experienced, the trocar is withdrawn its full length and then redirected. Once confirmed to be outside the thecal sac, the trocar is advanced into the center of the disk. Anteroposterior and lateral fluoroscopic views are obtained to confirm this location. After confirmation, the hub of the trocar is removed, and a 2.8-mm cannula with an inner-tapered dilator is passed over the hubless trocar. When the 2.8-mm cannula reaches the anulus, its position against
the anulus is confirmed by a 90° oblique view to the cannula. With
the outer cannula in place and the 18-gauge trocar still in the center
of the disk, a trephine is placed over the 18-gauge trocar through the
cannula, and the anulus is incised. The trephine and trocar are
removed, and the Nucleotome (Surgical Dynamics, Inc., Alameda,
CA) is placed through the outer cannula into the disk. It is confirmed
to be within the disk on two views, and then the disk is aspirated for
approximately 20 min.

Case Reports

Case 1

A 48-year-old man had not worked for 6 weeks owing to severe
pain and paresthesia in the left anterior thigh. The patient did not
respond to bed rest, analgesics, and physical therapy. His physical
examination was remarkable for decreased pin-prick sensation over
the L4 distribution on the left with decreased knee jerk and normal
strength in his quadriceps. A CT scan showed a far-lateral herniated
disk at the L4-L5 level to the left consistent with the patient’s
symptoms (Fig. 1). A percutaneous diskectomy at the L4–L5 level on
the left side was performed by means of the technique described
above. The patient was discharged from the hospital the next day
without complications. He reported relief of his symptoms 1 week
after the procedure and was asymptomatic at follow-up approxi­
mately 2 years later.

Case 2

A 45-year-old female railroad employee injured herself while cou­
ping and uncoupling trains. She presented with a 17-month history
of right anterior thigh pain with associated paresthesia. She had been
unable to work since her injury. The patient did not respond to
conservative therapy, which consisted of rest, physical therapy, and
nonsteroidal antiinflammatory medication. Her physical examination
revealed decreased strength on the right of the quadriceps with
decreased right knee jerk. A CT scan revealed a far-lateral herniated
nucleus pulposus on the axial image consistent with her symptoms
(Fig. 2). An automated percutaneous lumbar diskitomy provided imme­
diate relief of her symptoms. Physical examination at 6 weeks
revealed increased strength in the quadriceps with persistent de­
creased knee jerk. She remains asymptomatic 1½ years after the
procedure.

Case 3

A 50-year-old waitress presented with right anterior thigh pain of
4 months’ duration. She did not respond to conservative therapy,
which consisted of epidural steroids and physical therapy. Physical
examination showed a decreased right knee jerk and was otherwise
unremarkable. Her CT examination showed a far-lateral herniation
with deviation of the right L4 nerve root posteriorly, consistent with
her symptoms (Fig. 3). A percutaneous diskitomy provided imme­
diate relief of her symptoms. She remains asymptomatic more than
3 years after the procedure.

Case 4

A 39-year-old male construction worker presented with a 2-month
history of low back and right anterior thigh pain when he stressed
himself. While on physical therapy his pain progressed in severity and
became constant. His CT scan revealed a far-lateral herniated nucleus
pulposus impinging on the L4 nerve root as it was exiting the neural
foramen (Figs. 4 and 5). The patient underwent an L4–L5 percuta­
nous diskitomy, which gave him immediate relief from his pain. He
remains asymptomatic more than 1 year after the procedure.

Discussion

Far-lateral disk herniations occur most frequently at the
L4–L5 level and, next most often, at the L3–L4 level, imping-
Automated percutaneous discectomy appears to be an alternative to both these methods. The path to the disk is direct in relation to the herniation. The instruments pass close to the herniation and may actually go through it in many instances. Because the procedure is done under local anesthesia, the possibility of nerve root injury is minimized. If a patient experiences radicular pain during the procedure, the position of the trocar is changed. In addition, the instruments do not violate the spinal canal, thus eliminating the problem of epidural fibrosis. Finally, there is no bone removal or danger of instability.

While these four cases were successfully treated, it is known that a large number of far-lateral herniations are actually extruded fragments. To obtain a high percentage of successful results, patients must be carefully selected, and we continue to use the criterion of fragment migration above or below the disk space to exclude patients from this procedure. In addition, all patients should have the classic clinical findings of anterior thigh pain with absent knee jerk or quadriceps weakness to confirm the diagnosis.

Automated percutaneous discectomy in the extremely far-lateral herniation may technically be somewhat more difficult than automated percutaneous discectomy in more usually placed herniations. Commonly, the nerve root is pushed posteriorly by the herniation in this entity, decreasing the space behind the nerve root and just anterior to the superior articular facet, which is usually the path the instruments take. In one case, the nerve root was not directly impinging upon, but pressure on the herniation by the instruments indirectly increased the pressure on the nerve root, producing radicular symptoms. Finally, there is theoretically an increased chance for reherniation extremely far laterally owing to the hole in the annulus made with the introduction of the instruments.

In conclusion, the extremely far-lateral herniation represents a unique problem in both diagnosis and treatment. The two traditional surgical approaches to this entity have definite disadvantages. Automated percutaneous discectomy, which can be performed under local anesthesia without violating the epidural space or necessitating facet removal, appears to be
a reasonable alternative approach to the extremely far-lateral herniation in selected cases.

REFERENCES