Formosan Journal of Surgery (2013) 46, 90–96

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.e-fjs.com

CASE REPORT

Full-endoscopic interlaminar discectomy for herniation at L3–4 and L4–5: Technical note

Hsien-Ta Hsu [a,b,*], Stephen S. Yang [b,c,d]

[a] Division of Neurosurgery, Buddhist Tzu Chi Hospital, Taipei Branch, Taipei, Taiwan
[b] School of Medicine, Buddhist Tzu Chi University, Hualien, Taiwan
[c] Department of Surgery, Buddhist Tzu Chi Hospital, Taipei Branch, Taipei, Taiwan

Received 10 April 2012; received in revised form 4 June 2012; accepted 2 November 2012
Available online 11 May 2013

KEYWORDS
disc herniation;
endoscope;
interlaminar;
lumbar discectomy

Summary Full-endoscopic interlaminar discectomy (FEILD) for herniations above the level of L5–S1 has been the subject of few studies. FEILD was performed between July 2009 and September 2009 on three patients with symptomatic lumbar disc herniations above the level of L5–S1. The patients were 29 years, 67 years, and 71 years of age, and had experienced symptoms for 2 months, 12 months, and 6 months, respectively. After the operation, the mean visual analog scale score decreased from 6.6 to 1.3 and the mean Oswestry Disability Index score decreased from 20.3 to 3. In conclusion, FEILD is feasible for the treatment of disc herniations at L3–4 and L4–5 and offers good functional outcomes in terms of visual analog scale and Oswestry Disability Index. To achieve a good outcome, a beginner should first master open microscopic lumbar discectomy and then start with observing procedures, assisting at procedures, and practicing FEILD on cadavers.

1. Introduction

Lumbar intervertebral discs are important supporting structures of the spinal column. When herniation occurs, discs are a major source of low back pain and sciatica.[1] Most symptomatic lumbar disc herniations can be successfully treated with conservative therapy. When conservative management fails, open discectomy, microscopic discectomy, and endoscope-assisted microdiscectomy have been shown to result in good outcomes.[2,3] Open midline discectomy, when needed, requires muscle retraction, bone resection, and dural sac and nerve retraction, which can lead to instability of the spine and scarring of the epidural space, which can become clinically symptomatic in up to 10% of cases.[4]

* Corresponding author. Division of Neurosurgery, Buddhist Tzu Chi Hospital, Taipei Branch, Number 289, Jianguo Road, Xindian City, Taipei, Taiwan.
E-mail address: j1208192@ms45.hinet.net (H.-T. Hsu).
[d] No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

1682-606X/$ - see front matter
http://dx.doi.org/10.1016/j.fjs.2013.03.004

Endoscopic lumbar discectomy evolving into both full-endoscopic transforaminal discectomy (FETFD), and full-endoscopic interlaminar discectomy (FEILD) have been performed since 1990.[5] FETFD is useful for foraminal and extraforaminal disc herniations, unless migrated or sequestrated fragments are inaccessible through the foramen.[6] FEILD is suitable for disc herniations at L5—S1; however, it is difficult to perform FEILD at L4—5 or higher levels because of narrow interlaminar windows.[7—9]

FEILD is performed via the posterior midline approach, which is similar to the approach used in open microscopic discectomy. The recent development of new devices, such as shavers and corresponding instruments, has made the use of FEILD above the L5—S1 level technically possible.[8] Here, we give details of the technique of FEILD for lumbar discectomy at L3—4 and L4—5 to remove migrated and bulging discs, and to decompress lateral recess stenosis.

2. Patients and methods

2.1. Patients

From July 2009 to September 2009, three patients (one woman and two men) with buttock and leg pain due to disc herniations with or without lateral recess stenosis at L4—5 or L3—4 underwent FEILD. The patients were 29 years, 67 years, and 71 years of age, and had experienced symptoms for 2 months, 12 months, and 6 months, respectively, prior to undergoing surgery. Follow-up at an outpatient clinic took place 1 week postoperatively, and a well-trained nurse under the supervision of a surgeon (not involved in the procedures) followed up with the patients by phone at 3 months and 6 months after surgery and yearly thereafter. Operative time, intraoperative blood loss, and postoperative complications were recorded. Preoperative and 1-month postoperative magnetic resonance imaging (MRI) scans were compared.

2.2. Surgical technique

The operation was performed under general anesthesia with the patient in the prone position. A skin incision, about 8 mm in length, was made in the middle of the lateral edge of the interlaminar window (Fig. 1A and B). A 6.9-mm outer diameter obturator was inserted bluntly to the lateral edge of the interlaminar window and then a working sheath with a beveled opening was inserted towards the ligamentum flavum. An endoscope (Panoview Plus discoscope, 25°, 6.9 mm × 5.6 mm, working length 165 mm, working channel 4.1 mm; Richard Wolf GmbH) was inserted and the procedure was continued under direct visualization with normal saline irrigation maintained at a constant rate. A mini-laminotomy was performed using specially designed burrs with caps to protect nerve roots while drilling bone. A lateral incision 3—5 mm was made in the ligamentum flavum and enlarged sufficiently to allow entry into the spinal canal. A curved dissector was passed through the ligamentum flavum, moved forward along the bony edge of the pedicle, and then used to mobilize the nerve root medially. The beveled opening of the working sheath was placed on the herniated disc with the nerve root pushed medially (Fig. 1C and D). A long round-headed pin was used to penetrate the annulus fibrosus and was then pushed into the nucleus pulposus (Fig. 1E and F), thus creating a hole for annulotomy and subsequent discectomy, and allowing radiographic confirmation of the disc. Direct endoscopic visualization allowed for complete resection of the herniated disc. It was known that decompression has been achieved when the nerve root was seen floating in the irrigation fluid (Fig. 1G).

3. Results

Patient characteristics and clinical outcomes are summarized in Table 1. The operative times were 232 minutes, 220 minutes, and 139 minutes. No measurable blood loss, postoperative bleeding, nerve injury, or dural tear was encountered. Postoperative MRI showed that there was sufficient decompression of the stenosis and adequate removal of the herniated disc in each case. After operation, the mean visual analog scale (VAS) score decreased from 6.6 to 1.3 and the mean Oswestry Disability Index (ODI) score decreased from 20.3 to 3.

3.1. Case 1

The patient was a 29-year-old man who had left buttock and leg pain for 2 months. Neurological examination disclosed left L5 root dermatome hypoesthesia and left big toe weakness. MRI showed a left L4—5 herniated disc with downward migration (Fig. 2A and B). The operative time was 220 minutes and blood loss was negligible. He was discharged the day after surgery. After the operation, his VAS score and ODI score improved from 7 and 24 to 1 and 0, respectively. Postoperative MRI showed nearly total removal of the migrated disc and reactive granulation changes (Fig. 2C and D).

3.2. Case 2

The patient was a 71-year-old woman with a 6-month history of right buttock and leg pain. Neurological examination demonstrated right L4 dermatome hypoesthesia. MRI revealed an L3—4 herniated disc with right canal compression and an L4—5 general disc bulging (Fig. 3A and B). The herniated disc at L3—4 was the cause of her complaints, therefore, FEILD at L3—4 was performed. The operative time was 232 minutes and blood loss was minimal. After the operation, her VAS score and ODI score improved from 7 and 20 to 0 and 6, respectively. Her recovery was uneventful and postoperative MRI showed sufficient decompression of the L3—4 herniated disc (Fig. 3C and D).

3.3. Case 3

The patient was a 67-year-old man with a 1-year history of left buttock and leg pain. Neurological examination revealed left L5 dermatome hypoesthesia. MRI revealed a bulging disc at L4—5 with left lateral recess stenosis (Fig. 4A and B). An anteroposterior radiograph showed that the