Volume: 25, Issue:3, July 2014 pp: 205-209 ORIGINAL ARTICLE / ORJİNAL MAKALE

EARLY RESULTS OF LUMBAR PERCUTANEOUS ENDOSCOPIC DISCECTOMY

LOMBER PERKUTAN ENDOSKOPİK DİSKEKTOMİ ERKEN DÖNEM SONUÇLARI

Sevda UĞRAŞ[1],
İsmail OLTULU[2],
Mehmet İŞYAR[3],
Melih MALKOÇ[3],
Akın UĞRAŞ[4]

[1]Neurosurgery Specialist, Private Duygu Hospital, İstanbul.
[2]Orthopedics and Traumatology Specialist, İstanbul Medipol University, Medical School, Orthopedics and Traumatology Department, İstanbul.
[3]Assist. Dr, Orthopedics and Traumatology Specialist, İstanbul Medipol University, Medical School, Orthopedics and Traumatology Department, İstanbul.
[4]Assoc. Dr, Orthopedics and Traumatology Specialist, İstanbul Medipol University, Medical School, Orthopedics and Traumatology Department İstanbul.

SUMMARY

Aim: To discuss the early results of lumbar percutaneous endoscopic discectomy.

History: Endoscopic disc surgery, which allows minimally invasive discectomy, is a method that has recently begun to be used in Turkey.

Materials and Methods: 23 cases, who were followed up for at least 12 months, were included in this study. The average age was 44.3 ± 13.5 years. 73.9% had disc hernia at the L4–5 level, 21.7% at the L5–S1 level, and one case at the L3–4 level. Regarding the anatomical localization, 47.8% were foraminal, 21.7% were paracentral, 17.4% were extraforaminal, and 13% were central.

Results: The visual analogue scale (VAS) score for leg pain was 1.8 ± 1.4 postoperatively. Recurrence was seen in five cases. At the last follow-up, the VAS score for lower back pain was 3.2 ± 3 and the VAS score for leg pain was 1.4 ± 1.5. According to the MacNab criteria, 66.7% of the patients showed perfect results, 13.3% of the patients showed good results, and 20% of the patients showed average results. 80% of patients described themselves as fully healed. 93.3% of patients reported that they would choose the same procedure again.

Result: Percutaneous endoscopic discectomy, which is as successful as microscopic discectomy, is a minimally invasive procedure resulting in high patient satisfaction.

Key Words: Lumbar, percutaneous, endoscopic, discectomy

Level of Evidence: Retrospective clinical study, Level III

ÖZET

Amaç: Lomber perkütan endoskopik diskektomi erken dönem sonuçlarını tartışmak.

Tarihçe: Lomber disk cerrahisinde minimal invazif diskektomiye izin veren endoskopik disk cerrahisi ülkemizde yeni kullanılan bir yöntemdir.

Materyal metod: Son takipleri yapılan ve en az 12 ay izlenen ortalama yaşları 44.3 ± 13.5 olan 23 olgu incelendi. Olguların % 73.9'u L4-5 seviyesinde, % 21.7'si L5-S1 seviyesindeyken bir olguda L3-4 lomber herni mevcuttu. Anatomik olarak % 47.8 foraminal, % 21.7 parasantral, % 17.4 ekstraforaminal ve % 13 santral yerleşimli lomber herni opere edildi.

Bulgular: Olguların operasyon sonrası bacak ağrısı VAS skoru ortalama 1.8 ± 1.4 idi. 5 olgu nüksetti. Son kontrol VAS skoru bel için ortalama 3.2 ± 3, bacak için 1.4 ± 1.5 bulundu. Mac Nab skoruna göre olguların % 66.7'si mükemmel sonuç, % 13.3'ü iyi sonuç ve % 20'si orta sonuç aldı. Olguların % 80'i tam iyileştiğini ve % 93.3'ü tekrar aynı cerrahiyi olabileceğini bildirdi.

Sonuç: Perkütan endoskopik diskektomi lomber disk hastalığı için yüksek hasta memnuniyeti olan ve mikroskopik diskektomi kadar başarılı bir yöntemdir.

Anahtar Kelimeler: Lomber, perkütanöz, endoskopik, diskektomi

Kanıt Düzeyi: Retrospektif klinik çalışma, Düzey III

Address: Op. Dr. İsmail Oltulu, İstanbul Medipol Üniversitesi, Tıp Fakültesi, Ortopedi ve Travmatoloji ABD, TEM Avrupa Otoyolu Göztepe çıkışı No:1, Bağcılar 34214 İstanbul.
Gsm: 0506 4186293,
Tel: 0212 4607777,
Fax: 0212 4607070.
E-mail: ioltulu@hotmail.com
Received: 11th March, 2014.
Accepted: 17th June, 2014.

INTRODUCTION:

Herniated intervertebral disc disease is the most common reason for lumbar spinal surgery[17]. After description of the technique using microscopy and instrumentation of disc hernias by Caspar in the early 1980s, the use of microscopy increased. This technique is still used today as a gold standard for disc surgery[3].

Spinal canal decompression with an indirect percutaneous posterolateral approach was first used by Kambin in January 1973 [11]. In 1998, Kambin reported that he used a bipolar transforaminal approach in 50 patients with a non-migrated sequestered disc and central hernia[12].

In 1994, Hoogland developed a new instrument that would expand the foramen using special drillers and therefore would allow endoscopic imaging and instrumentation of the anterior of the spinal canal[9]. Percutaneous endoscopic lumbar discectomy is mainly performed in two ways: transforaminal or interlaminar[19]. Generally, both approaches are used at all levels, except for the L5–S1 level in patients with a high iliac wing[19,22]. The interlaminar approach is typically performed at the L5–S1 level[19,22].

The aim of this study is to examine the early results of patients with lumbar disc hernia treated with a percutaneous endoscopic approach.

MATERIALS AND METHODS:

Patients that were operated on by two surgeons (S.U. and A.U.) between 2008 and 2013 were included into the study by retrospective screening. The inclusion criteria included a follow-up of at least 12 months and the presence of disc disease. 12 of the 23 total cases were male and 11 were female, and the average follow-up was 25.5 ± 6.8 months.

When the lumbar disc hernias were evaluated by level, one case had disc hernia at the L3–4 level, five cases had hernia at L5–S1, and 17 cases had hernia at L4-5. Anatomically, the lumbar hernias were at a central location in three cases, at a paracentral location in five cases, at a foraminal location in 11 cases and at an extraforaminal location in four cases. 69.6% of the cases had a protruded lumbar disc hernia and 30.4% of the cases had an extruded lumbar disc hernia. The right leg was affected in 52.2% of the cases and the left leg was affected in 47.8%. Surgery was performed in a supine position for 87% of the cases, and in a lateral position for 13%. Sedation was applied to all cases with local anesthesia.

Surgical Technique:

The patient was prepared in a supine or lateral position. A line was drawn over the midline spinous projections, passing either 10 or 12 cm lateral to the midline, according to the patient's weight. While the pedicle to be entered was marked with disc space anteroposterior fluroscopic images, the targeted disc was crossed by a line passing from the lateral. After application of local anesthesia to the crossed point, an 18-gauge spinal needle was moved towards the disc space by making a 45° angle with the body coronal axis (Figure-1).

After finding the target disc, discography was performed with a solution containing 4.5 cc of contrast material and 0.5 cc of methylene blue. A guide Kirschner wire was moved through the spinal needle and tissue dilatators were sent through the same wire. A study cannula was placed and the dilatators and wire were then removed. The position was controlled using fluoroscopy and endovision was performed.

The disc was discharged from the foraminal region using endovision (Figure-2).

After intradiscal partial discectomy, the protruded or extruded disc was pulled to this region and discectomy was carried out. At the end of the process, the inside of the cannula was aspirated with an injector, and 2 cc of intermediate-acting corticosteroids were injected.

The visual analog scale (VAS) was used to assess the early postoperative leg pain in all cases. At the last follow-up, the VAS score for lower back and leg pain and radicular complaints, and the MacNab score examining the movement abilities and activity situations were assessed. The patient satisfaction after surgery was questioned.

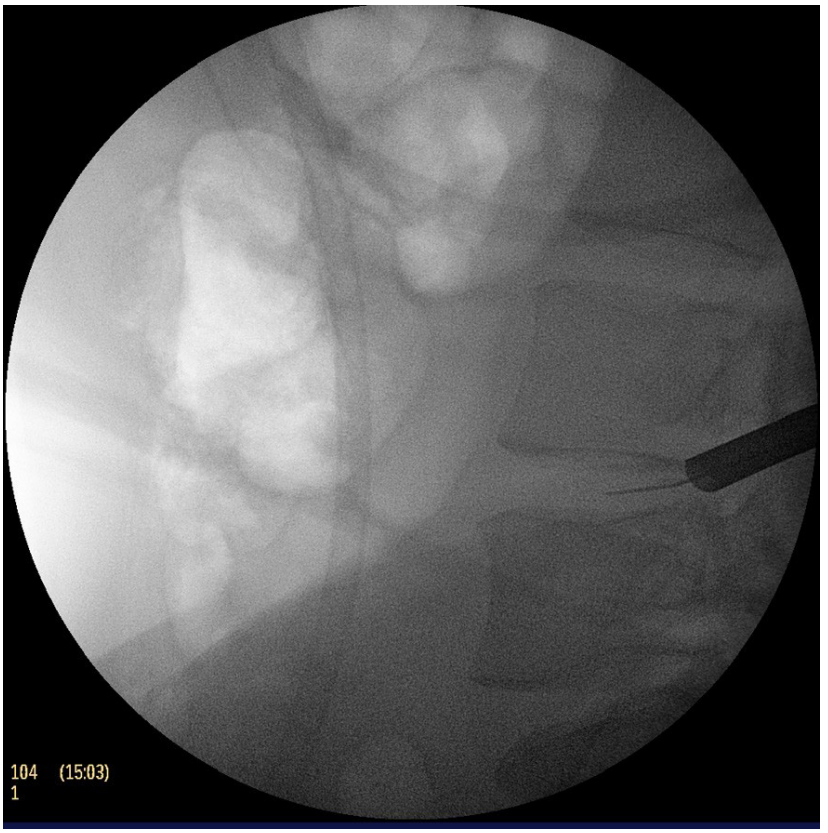

Figure-1. Image of the guide wire in the disc space

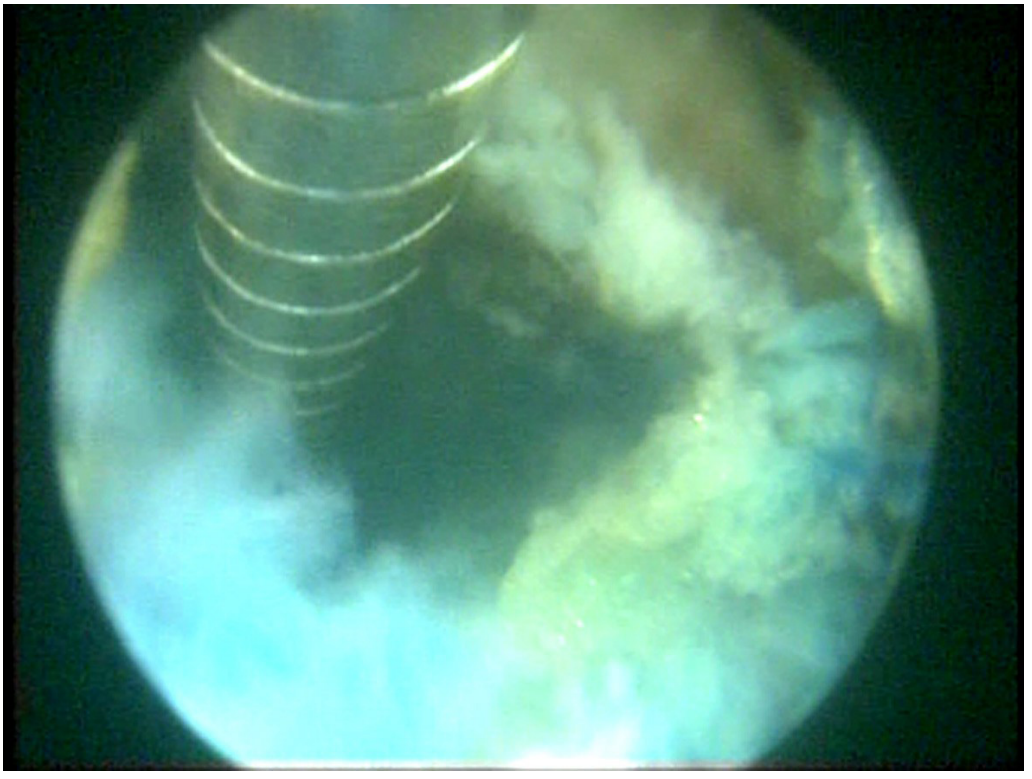

Figure-2. Discharging the disc material by an endoscopic approach.

RESULTS:

There was recurrence in 21.7% of cases. When the recurrence and the demographic factors were compared, no significant relationships were found. The recurrent cases were re-operated on with a microsurgery method. Postoperative temporary paresis developed in one case.

In VAS examinations for leg pain in the early period, the average value was found to be 1.8 ± 1.4. In the last follow-up, the average VAS score for the lower back pain was 3.2 ± 3, and this was 1.4 ± 1.5 for the leg pain. No significant change between the postoperative and last follow-up VAS scores was found. According to the MacNab score, 66.7% of the patients had perfect results, 13.3% had good results, and 20% had moderate results. 80% of the cases reported a full recovery and 93.3% stated that they would have the same surgery again.

DISCUSSION:

Lew et al. reported an 85% success rate for the results of transforaminal percutaneous endoscopic discectomy for foraminal and extraforaminal disc hernias[16]. Similarly, Yang reported an 85.7% success rate for transforaminal endoscopic discectomy[10]. He stated that these results could be compared to the results of foraminal and extraforaminal disc hernias treated by traditional surgical methods[10].

In a study including 307 patients that had primary lumbar disc hernia, that were treated with posterolateral endoscopic discectomy, and were followed up for at least one year, Yeung reported 83.6% perfect and good results, 9.3% bad results and 5% re-operation[21]. In this study, an 80% success rate was obtained for lumbar disc disease treated using an endoscopic method, despite the inexperience of the surgeons. The success rate obtained in this study was found to be comparable with previously published results. Importantly, 93.3% of patients reported that they would choose the same operation again, despite the recurrence.

Recurrence is an inevitable complication of disc surgery. Even in clinical series of microsurgery, recurrence has been reported at rates between 5% and 18% [9]. In endoscopic discectomy surgery, the recurrence rate is between 0% and 12% [18]. Many authors have reported that the case number should be increased and the learning curve should be completed to avoid recurrence[2,3,6,20]. The absence of interlaminar damage with endoscopic surgery results in a lack of scar tissue after surgery, and allows interlaminar disc surgery to be performed again easily on recurrence[13].

The published complication rates of endoscopic excision are low[18]. Damage of a removed root has been reported at variable rates, between 1.0% and 6.7% [5]. There are two stages in endoscopic discectomy. The first step is to place a needle for the placement of the scope. The second step is the placement of the scope for fragmented disc excision. Generally, the first stage is performed blindly using fluoroscopy. Due to a lack of visual control, damage of a removed root is possible. The study cannula should be placed in the foramen as near to the facet joint as possible[1]. In this study, only one patient had temporary paresis due to a removed root in the postoperative early period. To avoid the risk ofdamage of a removed root, it is important for the surgeon to communicate with the patient, who is under intraoperative local anesthesia. Sedation should not be applied early. Here, the patients received surgery under local anesthesia and sedation. The patients were informed about the communication and what they would have to do during surgery beforehand. There were no problems with communication during surgery.

An important change in the evaluation of the posterolateral endoscopic discectomy technique was the transition from central disc decompression to fragmentectomy. For patients whose disc materials were massively drained, an increase in the incidence of postoperative lower back pain and intervertebral instability often developed[4]. These changes caused the lateralization of the entry site from 8 cm to 10 cm or 12 cm[4]. In this series, surgeons applied fragment excision after intradiscal decompression. However, massive disc decompression was avoided. It was reported that transforaminal decompression provided a significant amount of decompression without causing instability in the intervertebral foraminal region, when compared to posterior decompression[4].

Foraminoplasty was not applied to the patients in this study. Particularly for migrated lumbar disc hernias, foraminoplasty provides a better field of view[4]. Many authors have used the percutaneous endoscopic

foraminoplasty technique for various lumbar disc diseases[4,7,8,14,15]. In this study, the surgeons were careful about the initial cases, and they chose disc hernias such as broad-based protrusion or far-lateral foraminal herniation, which can be easily reached with a posterolateral technique. An increase in the surgeon's dexterity allows the transition to the foraminoplasty technique, which allows intervention to central disc herniation or sequestered fragments.

As a result, few complications and a satisfactory success rate were obtained in this limited case series, despite the surgeons not being familiar with the endoscopic technique. It is recommended that patients are given information about the recurrence rates before surgery. It is important that the technique has a success rate similar to microsurgery, and that microdiscectomy can be easily performed, due to the lack of posterior damage, when recurrence occurs.

REFERENCES

1. Ahn Y, Lee SH, Park WM, Lee HY: Posterolateral percutaneous endoscopic lumbar foraminotomy for L5-S1 foraminal or lateral exit zone stenosis: Technical note. *J Neurosurg* 2003; 99(3 suppl): 320–323.
2. Benzel EC, Orr RD. A steep learning curve is a good thing! *Spine J* 2011; 11(2): 131-132.
3. Caspar W. A new surgical procedure for lumbar disc herniation causing less tissue damage through a microsurgical approach. *Adv Neurosurg* 1977; 4: 74.
4. Choi G, Lee SH, Lokhande P, Kong BJ, Shim CS, Jung B, Kim JS. Percutaneous endoscopic approach for highly migrated intracanal disc herniations by foramino- plastic technique using rigid working channel endoscope. *Spine* 2008; 33(15): 508-515.
5. Choi I, Ahn JO, So WS, Lee SJ, Choi IJ, Kim H. Exiting root injury in transforaminal endoscopic discectomy: preoperative image considerations for safety. *Eur Spine J* 2013; 22(11): 2481-2487.
6. Gibson JNA, Cowie JG, Iprenburg M. Transforaminal endoscopic spinal surgery: The future 'gold standard' for discectomy? A review. *Surgeon* 2012; 10: 290- 296.
7. Hafez MI, Zhou S, Coombs RR. The effect of irrigation on peak temperatures innerve root, dura and intervertebral disc during laser-assisted foraminoplasty. *Lasers Surg Med* 2001; 29: 33–37.
8. Hafez MI, Coombs RR, Zhou S, et al. Ablation of bone, cartilage, and facet joint capsule using Ho:YAG laser. *J Clin Laser Med Surg* 2002; 20: 251–255.
9. Hoogland T, van den Brekel-Dijkstra K, Schubert M, Miklitz B. Endoscopic transforaminal discectomy for recurrent lumbar disc herniation: a prospective, cohort evaluation of 262 consecutive cases. *Spine* 2008; 33(9): 973-978.
10. Jang JS, An SH, Lee SH. Transforaminal percuta- neous endoscopic discectomy in the treatment of foraminal and extraforaminal lumbar disc herniations. *J Spinal Disord Tech* 2006; 19(5): 338-343.
11. Kambin P, Gellman H. Percutaneous lateral discectomy of the lumbar spine: A preliminary report. *Clin Orthop* 1983; 174: 127–132.
12. Kambin P, O'Brien E, Zhou L. Arthroscopic microdiscectomy and selective fragmentectomy. *Clin Orthop* 1998; 347: 150–167.
13. Kim CH, Chung CK, Jahng TA, Yang HJ, Son YJ. Surgical outcome of percutaneous endoscopic inter-laminar lumbar diskectomy for recurrent disk herniation after open diskectomy. *J Spinal Disord Tech* 2012; 25(5): E125-E133
14. Knight MT, Vajda A, Jakab GV. Endoscopic laser foraminoplasty on the lumbar spine-early experience. *Minim Invasive Neurosurg* 1998; 41: 5–9.
15. Knight MT, Ellison DR, Goswami A. Review of safety in endoscopic laser foraminoplasty for the management of back pain. *J Clin Laser Med Surg* 2001; 19: 147–157.
16. Lew SM, Mehalic TF, Fagone KL. Transforaminal percutaneous endoscopic discectomy in the treatment of farlateral and foraminal lumbar disc herniations. *J Neurosurg* 2001; 94: 216–220.
17. Martin BI, Mirza SK, Comstock BA. Reoperation rates following lumbar spine surgery and the influence of spinal fusion procedures. *Spine* 2007; 32: 382–387.
18. Nellensteijn J, Ostelo R, Bartels R, Peul W, Van Royen B, Van Tulder M. Transforaminal endoscopic surgery for symptomatic lumbar disc herniations: a systematic review of the literature. *Eur Spine J* 2010; 19(2): 181-204.
19. Ruetten S, Komp M, Merk H. Full-endoscopic interlaminar and transforaminal lumbar discectomy versus conventional microsurgical technique: a prospective, randomized, controlled study. *Spine* 2008; 33: 931–939.
20. Wang B, Lu G, Patel AA, Ren P, Cheng I. An evaluation of the learning curve for a complex surgical technique: the full endoscopic interlaminar approach for lumbar discherniations. *Spine J* 2011; 11(2): 122-130.
21. Yeung AT, Tsou PM. Posterolateral endoscopic excision for lumbar disc herniation: surgical technique, outcome and complications in 307 consecutive cases. *Spine* 2002; (27): 722–731.
22. Yeung AT, Yeung CA. Minimally invasive techniques for the management of lumbar disc herniation. *Orthop Clin North Am* 2007; 38: 363–372.