RESEARCH ARTICLE

Prognostic Value of Impaired Preoperative Ankle Reflex in Surgical Outcome of Lumbar Disc Herniation

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Abstract

Background: Several prognostic factors exist influencing the outcome of surgical discectomy in the patients with lumbar disc herniation (LDH). The aim of this study is to evaluate the relationship between severity of preoperative impaired ankle reflex and outcomes of lumbar discectomy in the patients with L5-S1 LDH.

Methods: We retrospectively evaluated 181 patients (108 male and 73 female) who underwent simple discectomy in our orthopedic department from April 2009 to April 2013 and followed them up for more than one year. The mean age of the patients was 35.3±8.9 years old. Severity of reflex impairment was graded from 0 to 4+ and radicular pain and disability were assessed by visual analogue scale (VAS) and Oswestry disability index (ODI) questionnaires, respectively. Subjective satisfaction was also evaluated at the last follow-up visit. Chi-square and Kruskal-Wallis tests were used to compare qualitative variables.

Results: Reflex impairment existed in 44.8% preoperatively that improved to 10% at the last follow-up visit. Statistical analyses could not find a significant relationship between the severity of impaired ankle reflex and sex or age (P=0.538 and P=0.709, respectively). There was a remarkable relationship between severity of reflex impairment and preoperative radicular pain or disability (P=0.012 and P=0.002, respectively). Kruskal-Wallis test showed that a more severity in ankle reflex impairment was associated with not only less improvement in postoperative pain and disability but also less satisfaction rate (P<0.001 in all three).

Conclusions: In the patients with L5-S1 LDH, more severe ankle reflex impairment is associated with less improvement in postoperative pain, disability, and subjective satisfaction.

Keywords: Ankle Reflex, Discectomy, Outcome, Prognosis

Introduction

Lumbar disc herniation (LDH) is one of the most common spine disorders. The disease usually improves with conservative treatment, although surgical intervention is occasionally needed. Several important prognostic factors influencing the outcome of surgical discectomy are known and previously discussed. These included herniation type, herniation level, technique and amount of discectomy, smoking, revision surgery, obesity, Lasegue's test, duration of preoperative sciatica, anxiety and depression (1-12). It seems that factors such as age, gender, severity of preoperative muscular weakness,and length of postoperative activity restriction have no significant effect on prognosis (8, 13-16).

The correlation between severity of impaired ankle reflex (Achilles' deep tendon reflex) and outcomes of lumbar discectomy in the patients with L5-S1 lumbar disc herniation has not been previously evaluated. In this study we aim to assess the efficacy of this factor.

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Table 1. Clinical improvement and patients' satisfaction in our treated cases

Index	Before surgery	At the last follow-up visit
Achilles Reflex	100 (55.2%)	163 (90.1%)
2+	57 (31.5%)	12 (6.7%)
1+	24 (13.3%)	6 (3.3%)
0		
VAS[0]	7.8±1.9	1.5±1.4
ODI[†]	47.8±23.5	7.2±10.8
Satisfaction rate		
-Excellent	-	123 (68.0%)
-Good	-	43 (23.8%)
-Fair	-	7 (3.9%)
-Poor	-	8 (4.4%)

[0]VAS: Visual Analogue Scale

[†]ODI: Oswestry Disability Index

Materials and Methods

After local institutional review board approval, we retrospectively evaluated the patients with L5-S1 lumbar disc herniation whom were treated by simple discectomy in our orthopedic department from April 2009 to April 2013. Our inclusion criteria consisted of simple discectomy, L5-S1 LDH, complaints that were refractory to a minimum period of six weeks conservative treatment, and a follow-up period more than 12 months. Those cases with cauda equina syndrome, generalized spinal stenosis, unstable spine requiring spinal fusion or instrumentation, and revision surgery were excluded.

Preoperatively, history taking and physical examination were performed on all patients and documented in their medical records by the senior author (FOK). Plain radiography and magnetic resonance imaging scanning were taken from all cases. Severity of reflex impairment was graded from 0 to 4+ (17). Grade 0 means no response, 1+ a decreased response, 2+ normal response, 3+ an increased response, and 4+ repeating reflex or clonus. The grading was also compared with the normal side. All the patients were assessed by visual analogue scale (VAS) and Oswestry disability index (ODI) questionnaires for scoring radicular leg pain (not lumbar pain) and functional disability (18, 19), VAS scoring was scaled from 0, no pain to 10, worst pain. Translation and cross cultural validation of ODI questionnaire was already performed in Persian speaking patients (20). These questionnaires were repeated at the last follow-up visit. At this time, satisfaction rate was evaluated by asking the patient to choose one of the following responses about their satisfaction with the surgical outcomes, based on criteria adopted from the North American Spine Society Low back Outcome Instrument (21).

(1) Excellent: if the operation met the patient's expectations,(2) Good: if the patient did not improve as much as he/she had hoped, but the patient would undergo the same operation for the same results,(3) Fair: if the operation helped but the patient would not undergo the same surgery for the same result,(4) Poor: if the patient is the same as or worse than he or she was preoperatively.

Statistical analysis

Data collected including demographic characteristics, ODI, VAS, ankle reflex grading, satisfaction rate, follow-up periods were entered into SPSS ver. 16 (SPSS Inc., Chicago, IL, USA). Data description was performed by statistical indicators like mean, median, and standard deviation. Chi-square and Kruskal-Wallis tests were used to compare qualitative variables. In all statistical tests, p value less than 0.05 was considered as significant.

Results

Ultimately, 181 patients (108 male; 59.7% and 73 female; 40.3%) were eligible to be enrolled into our study. The mean age of the patients was 35.3±8.9 years old (ranged; 20-73). We could follow-up these patients for 35.6±13.9 (ranged; 12 to 59 months). Mean improvement in reflex impairment, VAS, ODI and final patients' satisfaction rates were depicted in Table 1. Iatrogenic aggravation or creation of reflex impairment occurred in no patients.

Statistical analyses could not find a significant relationship between the severity of impaired preoperative ankle reflex and sex or age (P=0.538 and P=0.709, respectively). There was a remarkable relationship between severity of reflex impairment and preoperative radicular pain or disability (P=0.012 and P=0.002, respectively). Kruskal-Wallis test showed that a more severity in ankle reflex impairment was associated with not only less improvement in postoperative pain and disability but also less satisfaction rate (P<0.001 in all three).

Discussion

Awareness of prognostic factors affecting the surgical outcomes of lumbar disc herniation can make the physicians' and patients' expectations of surgery closer to reality. We could not find any papers directly evaluated the impact of reflex impairment on surgical outcomes of lumbar discectomy to be able to compare the results but numerous studies exist in the literature assessing other prognostic factors. In a relevant study conducted by Blaauw et al., improvement in radicular function one year after lumbar surgery for both LDH and lumbar stenosis in 443 cases was evaluated (22). Before surgery, Achilles reflex impairment was detected in 42%; while

one year after operation, this percent improved in 57% of patients. Iatrogenic deterioration or creation of reflex impairment occurred in 10% of the patients. Although the samples studied in this and our papers are not the same, prevalence of reflex impairment in the latter was 44.8% preoperatively that improved to 10% at the last follow-up visit (percent improvement of 77.8%). Iatrogenic deterioration was not observed in any of our patients.

Mariconda et al. in another similar study evaluated functional relevance of neurologic recovery at about 20 years after lumbar discectomy in 180 cases (23). In this study, the prevalence of abnormal reflexes before surgery was 38.9% and at the last follow-up visit, ODI<20% was reported by 75.6% while 90% of the patients were satisfied with the operation. The authors did not assess the effect of reflex impairment on clinical results but they found that male gender and higher educational level had good prognostic rules in surgical outcomes of lumbar discectomy. In comparison, our study only assessed the patients with L5-S1 LDH and follow-up period was much shorter. The prevalence of reflex impairment of less than +2 in our cases was 44.8% and surgery could reduce ODI to less than 20% in 86.7% of the patients. Excellent or good subjective satisfaction was achieved in 91.8% of our treated that was comparable with the previous study.

Lee and co-authors in a retrospective study on 40 patients with LDH who underwent open discectomy, analyzed prognostic factors affecting the surgical results (8). They assessed both radiological and clinical factors such as type and degree of herniation, presence of instability, age, sex, level of LDH, length of preoperative pain, smoking, body mass index, and revision versus primary operation. These authors finally concluded that revision surgery and non-extruded herniation were two poor prognostic factors that inversely could affect the ultimate clinical results. In the study we carried out, severe ankle reflex impairment was found to be a poor prognostic factor in predicting the final functional outcomes.

Our study has several faults worth mentioning. First, design of the study was retrospective and inevitably, the study contains its inherent limitations. Second, the patients were followed-up and examined by the same physicians who were involved in their treatment and this could somewhat distort the results. To achieve stronger and more reliable results, it is proposed that a prospective control trial study to be conducted and surgical outcomes evaluated by a blind assessor. In conclusion, we found that Achilles reflex impairment not only correlates with preoperative severity of pain or disability, but also has a poor prognostic effect. More severe preoperative ankle reflex impairment is associated with less improvement in postoperative pain, disability, and also less subjective satisfaction.

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References

1. Carragee EJ, Han MY, Suen PW, Kim D. Clinical outcomes after lumbar discectomy for sciatica: the effects of fragment type and anular competence. J Bone Joint Surg Am. 2003; 85-A(1):102-8.
2. Dewing CB, Provencher MT, Riffenburgh RH, Kerr S, Manos RE. The outcomes of lumbar microdiscectomy in a young, active population: correlation by herniation type and level. Spine. 2008; 33(1):33-8.3.
3. Miwa S, Yokogawa A, Kobayashi T, Nishimura T, Igarashi K, Inatani H, et al. Risk factors of recurrent lumbar disc herniation: a single center study and review of the literature. J Spinal Disord Tech. 2015; 28(5):E265-9.4.
4. Sinigaglia R, Bundy A, Costantini S, Nena U, Finocchiaro F, Monterumici DA. Comparison of single-level L4-L5 versus L5-S1 lumbar disc replacement: results and prognostic factors. Eur Spine J. 2009; 18(Suppl 1):52-63.
5. Carragee EJ, Spinnickie AO, Alamin TF, Paragioudakis S. A prospective controlled study of limited versus subtotal posterior discectomy: short-term outcomes in patients with herniated lumbar intervertebral discs and large posterior anular defect. Spine. 2006; 31(6):653-7.
6. Faulhauer K, Manicke C. Fragment excision versus conventional disc removal in the microsurgical treatment of herniated lumbar disc. Acta Neurochir (Wien). 1995; 133(3-4):107-11.
7. Moller AM, Pedersen T, Villebro N, Munksgaard A. Effect of smoking on early complications after elective orthopaedic surgery. J Bone Joint Surg Br. 2003; 85(2):178-81.

8. Lee JC, Kim MS, Shin BJ. An analysis of the prognostic factors affecting the clinical outcomes of conventional lumbar open discectomy: clinical and radiological prognostic factors. Asian Spine J. 2010; 4(1):23-31.
9. Rihn JA, Kurd M, Hilibrand AS, Lurie J, Zhao W, Albert T, et al. The influence of obesity on the outcome of treatment of lumbar disc herniation: analysis of the Spine Patient Outcomes Research Trial (SPORT). J Bone Joint Surg Am. 2013; 95(1):1-8.
10. Iglesias-Casarrubios P, Alday-Anzola R, Ruíz-López P, Gómez-López P, Cruz-Bértolo J, Lobato RD. Lasegue's test as prognostic factor for patients undergoing lumbar disc surgery. Neurocirugia (Astur). 2004; 15(2):138-43.
11. Rihn JA, Hilibrand AS, Radcliff K, Kurd M, Lurie J, Blood E, et al. Duration of symptoms resulting from lumbar disc herniation: effect on treatment outcomes: analysis of the Spine Patient Outcomes Research Trial (SPORT). J Bone Joint Surg Am. 2011; 93(20):1906-14.
12. D'Angelo C, Mirijello A, Ferrulli A, Leggio L, Berardi A, Icolaro N, et al. Role of trait anxiety in persistent radicular pain after surgery for lumbar disc herniation: a 1-year longitudinal study. Neurosurgery. 2010; 67(2):265-71.
13. Karabekir HS, Emel E, Atar EK, Yildizhan A. Is age a prognostic factor of postoperative outcome of lumbar disc herniation operations? Neurosciences (Riyadh). 2007; 12(4):282-4.
14. Girardi FP, Cammisa FP Jr, Huang RC, Parvataneni HK, Tsairis P. Improvement of preoperative foot drop after lumbar surgery. J Spinal Disord Tech. 2002; 15(6):490-4.
15. Postacchini F, Giannicola G, Cinotti G. Recovery of motor deficits after microdiscectomy for lumbar disc herniation. J Bone Joint Surg Br. 2002; 84(7):1040-5.
16. Carragee EJ, Han MY, Yang B, Kim DH, Kraemer H, Billys J. Activity restrictions after posterior lumbar discectomy. A prospective study of outcomes in 152 cases with no postoperative restrictions. Spine. 1999; 24(22):2346-51.
17. Boes CJ. The history of examination of reflexes. J Neurol. 2014; 261(12):2264-74.
18. Wewers ME, Lowe NK. A critical review of visual analogue scales in the measurement of clinical phenomena. Res Nurs Health. 1990; 13(4):227-36.
19. Fairbank JC, Pynsent PB. The oswestry disability index. Spine. 2000, 25(22):2940-52.
20. Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Mobini B. The oswestry disability index, the roland-morris disability questionnaire, and the quebec back pain disability scale: translation and validation studies of the Iranian versions. Spine. 2006, 31(14):E454-9.
21. Wood EG, Hanley EN. Lumbar disc herniation and open limited discectomy: indications, techniques, and results. Oper Tech Orthop. 1991; 1(1):23-8.
22. Blaauw G, Braakman R, Gelpke GJ, Singh R. Changes in radicular function following low-back surgery. J Neurosurg. 1988; 69(5):649-52.
23. Mariconda M, Galasso O, Secondulfo V, Cozzolino A, Milano C. The functional relevance of neurological recovery after lumbar discectomy: a follow-up of more than 20 years. J Bone Joint Surg Br. 2008; 90(5):622-8.