The Essence of Clinical Practice Guidelines for Lumbar Disc Herniation, 2021: 5. Prognosis

Hiromitsu Toyoda

Department of Orthopaedic Surgery, Osaka City University, Graduate School of Medicine, Osaka, Japan

Keywords:
recurrent lumbar disc herniation, reoperation, return to work, return to sports

This article is the last part of the five-article series, The Essence of Clinical Practice Guidelines for Lumbar Disc Herniation, published in the Spine Surgery and Related Research: Volume 6, Issue 4.

Prognosis

Summary

- Surgical treatment of lumbar disc herniation generally has a favorable prognosis, but patients requiring reoperation are not rare. The most common reason for reoperation is recurrence of herniation, and the rate of reoperation for recurrent lumbar disc herniation increases as the follow-up duration becomes longer.
- Severity of leg paralysis before surgery and rate of spinal canal stenosis before surgery are risk factors for prolonged leg paralysis.
- Regarding return to work or sports, there are no major differences in the return rate between surgical and conservative treatment, including patients who undergo surgical treatment after undergoing other treatment procedures.
- To summarize a recent systematic review on factors that affect the results of surgical treatment of lumbar disc herniation, younger age, better mental health, higher preoperative visual analog scale (VAS) for leg pain, and absence of workers’ compensation are factors that improve clinical results including pain; activities of daily living, and smoking, concomitant diabetes, protruding type, increased disc height, and segmental range of motion are risk factors for recurrence.

Commentary

1. What are the rates of recurrent lumbar disc herniation and reoperation?

By surgical procedure, the rate of symptomatic recurrent lumbar disc herniation was 0%-23.1% after standard discectomy, 0%-23% after microdiscectomy, 1.6%-6.1% after endoscopic discectomy, and 0%-12.5% after full-endoscopic discectomy1-24. The reoperation rate for recurrent lumbar disc herniation tended to increase as the follow-up duration became longer; the cumulative incidence was 0.5%-4.0% at 1 year after surgery, 1.6%-9.6% at 2 years after surgery, and 1.5%-8.5% at 5 years after surgery. There are two systematic reviews on differences in the reoperation rate for recurrence among various surgical procedures. The first review concluded that there are no differences in the recurrence rate among full-endoscopic, endoscopic, and standard discectomy4. The other review concluded that the recurrence rate after a minimally invasive procedure was higher3.

The cumulative reoperation rates including various reasons at 1, 2, and 5 years after surgery were 0.6%-7.4%, 8.0%-10.5%, and 2.4%-13.4%, respectively11,12,16,17,25-30.

2. Is surgical treatment effective to improve severe neurological deficits accompanied by drop foot or bladder and bowel dysfunction?

Severe neurological deficits accompanied by drop foot are improved following surgical treatment in ~40% (25%~64%) of cases; however, the neurological recovery after surgery is not sufficient when time to surgery takes a long time from the onset of paralysis31. Clinical results are not affected
by time to surgical treatment as long as surgery is performed within 1 month after the onset, but surgical treatment after a certain length of time after the onset brings about a smaller improvement. Some reports have shown a better improvement of paralysis in patients who underwent surgery within 35 days after the onset of paralysis than in those who underwent surgery 69 days after the onset, and other reports have shown no symptomatic improvements with surgery performed more than 70 days after the onset of paralysis.

Although the level of evidence supporting the surgical treatment of severe neuropathy is low, the efficacy of surgical treatment is inarguable as the recovery rate in the surgical treatment group was higher than that in the conservative treatment group. In patients with severe neurological deficits accompanied by bladder and bowel dysfunction, urination and defecation disorders remain after surgical treatment in ~40% (13.3%~90%) and ~50% (10.5%~90%) of patients, respectively. Bladder and bowel dysfunction was improved after surgery in only about 50% of lumbar disc herniation patients with severe paralysis (cauda equina syndrome).

3. What percentage of patients can return to work after treatment?

The return-to-work rates 3 months, 1 year, and 8 years after surgical treatment are 44.4%-100%, 72%-89.9%, and 82.5%, respectively. There are no major differences in the return-to-work rate between surgical and conservative treatment. Factors that have negative effects on the return-to-work rate include long preoperative sick leave, smoking, female sex, advanced age, psychiatric comorbidity, lower education level, lower subjective prognosis of gainful employment, history of lumbar disc herniation, concomitant chronic illness, and residual pain and dysfunction after surgery. Minimally invasive surgery is associated with a higher return-to-work rate and a shorter length of time to return to work than standard surgery.

4. What percentage of patients can return to sports after treatment?

The return-to-sports rates after surgical and conservative treatment are about ≥80%, with no significant differences between the treatment methods. The length of time to return to competition ranged widely from 1 month to 1 year (season). Other postoperative return-to-sports indices were a return-to-competition rate of 78%-89%, an interval of return to competition of 1 month-2.4 years (seasons), and a length of time to retirement from competition after return of 1.2-5.2 years, ranging widely depending on specific areas of competition and surgical procedures, except for the return rates, which were higher than 80% in general.

5. Does the prognosis depend on specific postoperative treatment procedures?

Rehabilitation programs undergone after surgery have been reported to bring about good short-term functional improvements in the intensive training group; however, the effects do not last for a long term. All of these studies reported that rehabilitation did not increase the hernia recurrence rate. Return-to-work guidance is effective to improve the employment rate. This commentary is essentially a reproduction of the review in the previous edition, because no new papers relevant to this BQ after publication of the previous edition were found.

6. What factors affect the prognosis of surgical results?

Factors that affect the surgical results have been studied from various angles, such as patient background, radiological findings, and psychosocial factors, and a large amount of evidence has been accumulated. In this BQ, we reviewed factors reported in these articles after classifying into the following four categories: 

1. Confident: There are at least two high-quality studies providing supportive evidence and no high-quality articles providing counter evidence; 

2. Almost confident: There are at least two high-quality studies providing supportive evidence and one high-quality article providing counter evidence; 

3. Probable: There is one high-quality study providing supportive evidence; and 

4. Insufficient evidence: There are at least two high-quality studies providing supportive evidence and at least two high-quality articles providing counter evidence.

Among physical factors, insufficient evidence was available for relationships of advanced age, body mass index (BMI), and smoking with clinical results, but younger age, short duration of illness (<6 months), better mental health, and higher VAS leg pain score were factors that improved clinical results such as pain and activities of daily living. Among social factors, long sick leave and being related to workers’ compensation were confident factors associated with poor prognosis. Among radiological factors, sequestration type and extrusion type were almost confident factors associated with good prognosis, and contained type was a confident factor associated with poor prognosis. As factors associated with recurrent lumbar disc herniation, age, work contents, and BMI had insufficient evidence, and smoking, protrusion type, concomitant diabetes, increased disc height, and increased segmental range of motion were confident factors.

7. Are there any procedures that have effects on the postoperative progress?

Improved methods and various devices for intraoperative procedures and anesthesia procedures have been developed to improve postoperative results; however, many of these treatment methods are not approved in Japan.

Conflicts of Interest: The author declares that there are no relevant conflicts of interest.

The original version of this clinical practice guidelines appeared in Japanese as Yotsui Tsuikanban Hernia Shinryo...
Guidelines 2021, and its translated version in English was published in the Journal of Orthopaedic Science: Japanese Orthopaedic Association (JOA) clinical practice guidelines on the management of lumbar disc herniation, third edition. 2022;27(1): 31-78.

References

1. Parker SL, Mendenhall SK, Godil SS, et al. Incidence of low back pain after lumbar discectomy for herniated disc and its effect on patient-reported outcomes. Clin Orthop Relat Res. 2015;473(6): 1988-99.

2. Yin S, Du H, Yang W, et al. Prevalence of recurrent herniation following percutaneous endoscopic lumbar discectomy: a meta-analysis. Pain Physician. 2018;21(4):337-50.

3. Chang X, Chen B, Li HY, et al. The safety and efficacy of minimally invasive discectomy: a meta-analysis of prospective randomised controlled trials. Int Orthop. 2014;38(6):1225-34.

4. Shriver MF, Xie JJ, Tye EY, et al. Lumbar microdiscectomy complication rates: a systematic review and meta-analysis. Neurosurg Focus. 2015;39(4):E6.

5. McGirt MJ, Garcia Ambrosi GL, Datoo G, et al. Recurrent disc herniation and long-term back pain after primary lumbar discectomy: review of outcomes reported for limited versus aggressive disc removal. Neurosurgery. 2009;64(2):338-44.

6. Azarhomayoun A, Chou R, Shirid S, et al. Sequestrectomy versus conventional microdiscectomy for the treatment of a lumbar disc herniation: a systematic review. Spine (Phila Pa 1976). 2015;40(24):E1330-9.

7. Ran J, Hu Y, Zheng Z, et al. Comparison of discectomy versus sequestrectomy in lumbar disc herniation: a meta-analysis of comparative studies. PLoS One. 2015;10(3):e0121816.

8. Wera GD, Marcus RE, Ghanayem AJ, et al. Failure within one year following subtotal lumbar discectomy. J Bone Joint Surg Am. 2008;90(1):10-5.

9. Kim MS, Park KW, Hwang C, et al. Recurrence rate of lumbar disc herniation after open discectomy in active young men. Spine (Phila Pa 1976). 2009;34(1):24-9.

10. Li Z, Yang H, Liu M, et al. Clinical characteristics and risk factors of recurrent lumbar disc herniation: a retrospective analysis of three hundred twenty-one cases. Spine (Phila Pa 1976). 2018;43(21):E1463-9.

11. Leven D, Passias PG, Errico TJ, et al. Risk factors for reoperation in patients treated surgically for intervertebral disc herniation: a subanalysis of eight-year sport data. J Bone Joint Surg Am. 2015;97(16):1316-25.

12. Kim KT, Park SW, Kim YB. Disc height and segmental motion as risk factors for recurrent lumbar disc herniation. Spine (Phila Pa 1976). 2009;34(24):2674-8.

13. Schick U, Elhabony R. Prospective comparative study of lumbar sequestrectomy and microdiscectomy. Minim Invasive Neurosurg. 2009;52(4):180-5.

14. Molimento JA, Knopman J, Parikh K, et al. Results and risk factors for recurrence following single-level tubular lumbar microdiscectomy: clinical article. J Neurosurg Spine. 2010;12(6):680-6.

15. Fakouri B, Patel V, Bayley E, et al. Lumbar microdiscectomy versus sequestrectomy/free fragmentectomy: a long-term (>2 y) retrospective study of the clinical outcome. J Spinal Disord Tech. 2011;24(1):6-10.

16. Aizawa T, Ozawa H, Kusakabe T, et al. Reoperation for recurrent lumbar disc herniation: a study over a 20-year period in a Japanese population. J Orthop Sci. 2012;17(2):107-13.

17. Shamji MF, Bains I, Yong E, et al. Treatment of herniated lumbar disk by sequestrectomy or conventional discectomy. World Neurosurg. 2014;82(5):879-83.

18. Kotil K, Köksal NS, Kayaci S. Long term results of lumbar sequestrectomy versus aggressive microdiscectomy. J Clin Neurosci. 2014;21(10):1714-8.

19. Al-Arif S, Schwabe K, Jabarin M, et al. Emergency lumbar disk operation: how safe is it? J Neurol Surg A Cent Eur Neurosurg. 2017;78(3):250-4.

20. Rihn JA, Kurd M, Hilibrand AS, 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.

21. Kulikarni AG, Bassi A, Dhruv A. Microendoscopic lumbar discectomy: technique and results of 188 cases. Indian J Orthop. 2014;48(1):81-7.

22. Hong X, Liu L, Bao J, et al. Characterization and risk factor analysis for reoperation after microendoscopic discectomy. Orthop. 2015;38(6):e490-6.

23. Yao Y, Liu H, Zhang H, et al. Risk Factors for the recurrent herniation after microendoscopic discectomy. World Neurosurg. 2016;95:451-5.

24. Yao Y, Liu H, Zhang H, et al. Risk factors for recurrent herniation after percutaneous endoscopic lumbar discectomy. World Neurosurg. 2017;100:1-6.

25. Choi KC, Lee JH, Kim JS, et al. Unsuccessful percutaneous endoscopic lumbar discectomy: a single-center experience of 10,228 cases. Neurosurgery. 2015;76(4):372-80.

26. Vink SS, Diwan A, Phillips FM, et al. What is the rate of revision discectomies after primary discectomy on a national scale? Clin Orthop Relat Res. 2017;475(11):2752-62.

27. Vinas-Rios JM, Sanchez-Aguilar M, Medina Gomez FA, et al. Incidence of early postoperative complications requiring surgical revision for recurrent lumbar disc herniation after spinal surgery: a retrospective observational study of 9,310 patients from the German Spine Register. Patient Saf Surg. 2018;12(1):9.

28. Heindel P, Tuchman A, Hsieh PC, et al. Reoperation rates after single-level lumbar discectomy. Spine (Phila Pa 1976). 2017;42(8):E496-501.

29. Kim CH, Chung CK, Park CS, et al. Reoperation rate after surgery for lumbar herniated intervertebral disc disease: nationwide cohort study. Spine (Phila Pa 1976). 2013;38(7):581-90.

30. Martin BI, Mirza SK, Flum DR, et al. Repeat surgery after lumbar decompression for herniated disc: the quality implications of hospital and surgeon variation. Spine J. 2012;12(2):89-97.

31. Balaji VR, Chin KF, Tucker S, et al. Recovery of severe motor deficit secondary to herniated lumbar disc prolapse: is surgical intervention important? A systematic review. Eur Spine J. 2014;23(9):1968-77.

32. Overdevest GM, Vleggeert-Lankamp CLAM, Jacobs WCH, et al. Recovery of motor deficit accompanying sciatica—subgroup analysis of a randomized controlled trial. Spine J. 2014;14(9):1817-24.

33. Korse NS, Jacobs WCH, Elzevier HW, et al. Complaints of micromotion, defecation and sexual function in cauda equina syndrome of a randomized controlled trial. Spine J. 2014;21(10):2505-9.

34. Zieger M, Luppa M, Meisel HJ, et al. The impact of psychiatric comorbidity on the return to work in patients undergoing herniated disc surgery. J Occup Rehabil. 2011;21(1):54-65.

35. Oosterhuis T, Costa LOP, Maher CG, et al. Rehabilitation after lumbar disc surgery. Cochrane Database Syst Rev. 2014;2014(3):CD003007.

36. Andersen M, Ernst C, Rasmussen J, et al. Return to work after
lumbar disc surgery is related to the length of preoperative sick leave. Dan Med J. 2017;64(7):4-7.
37. Kerr D, Zhao W, Lurie ID. What are long-term predictors of outcomes for lumbar disc herniation? a randomized and observational study. Clin Orthop Relat Res. 2015;473(6):1920-30.
38. Huysmans E, Goudman L, Van Bellegem G, et al. Return to work following surgery for lumbar radiculopathy: a systematic review. Spine J. 2018;18(9):1694-714.
39. Puolakkka K, Ylinnen J, Neva MH, et al. Risk factors for back pain-related loss of working time after surgery for lumbar disc herniation: a 5-year follow-up study. Eur Spine J. 2008;17(3):386-92.
40. Jensen LD, Frost P, Schiøttz-Christensen B, et al. Predictors of vocational prognosis after herniated lumbar disc: a two-year follow-up study of 2039 patients diagnosed at hospital. Spine (Phila Pa 1976). 2011;36(12):E791-7.
41. Hussein M, Abdeldayem A, Mattar MMM. Surgical technique and effectiveness of microendoscopic discectomy for large uncontained lumbar disc herniations: a prospective, randomized, controlled study with 8 years of follow-up. Eur Spine J. 2014;23(9):1992-9.
42. Hussein M. Minimal incision, multifidus-sparing microendoscopic discectomy versus conventional microdiscectomy for highly migrated intracanal lumbar disk herniations. J Am Acad Orthop Surg. 2016;24(11):805-13.
43. Schroeder GD, McCarthy KJ, Micev AJ, et al. Performance-based outcomes after nonoperative treatment, discectomy, and/or fusion for a lumbar disc herniation in National Hockey League athletes. Am J Sports Med. 2013;41(11):2604-8.
44. Reiman MP, Sylvain J, Loudon JK, et al. Return to sport after open and microdiscectomy surgery versus conservative treatment for lumbar disc herniation: a systematic review with meta-analysis. Br J Sports Med. 2016;50(4):221-30.
45. Gray BL, Buchowski JM, Bumpass DB, et al. Disc herniations in the national football league. Spine (Phila Pa 1976). 2013;38(22):1934-8.
46. Hsu WK, McCarthy KJ, Savage JW, et al. The Professional Athlete Spine Initiative: outcomes after lumbar disc herniation in 342 elite professional athletes. Spine J. 2011;11(3):180-6.
47. Huysmans E, Goudman L, Van Bellegem G, et al. Return to work following surgery for lumbar radiculopathy: a systematic review. Spine J. 2018;18(9):1694-714.
48. Watkins IV RG, Hanna R, Chang D, et al. Return-to-play outcomes after microscopic lumbar discectomy in professional athletes. Am J Sports Med. 2012;40(11):2530-5.
49. Overley SC, McAnany SJ, Andelman S, et al. Return to play in elite athletes after lumbar microdiscectomy: a meta-analysis. Spine (Phila Pa 1976). 2016;41(8):713-8.
50. Kjellby-Wendt G, Carlsson SG, Styf J. Results of early active rehabilitation 5-7 years after surgical treatment for lumbar disc herniation. J Spinal Disord Tech. 2002;15(5):404-9.
51. Millisdotter M, Strömqvist B. Early neuromuscular customized training after surgery for lumbar disc herniation: a prospective controlled study. Eur Spine J. 2007;16(1):19-26.
52. Dolan P, Greenfield K, Nelson RJ, et al. Can exercise therapy improve the outcome of microdiscectomy? Spine (Phila Pa 1976). 2000;25(12):1523-32.
53. Yilmaz F, Yilmaz A, Merdol F, et al. Efficacy of dynamic lumbar stabilization exercise in lumbar microdiscectomy. J Rehabil Med. 2003;35(4):163-7.
54. Carragee EJ, Helms E, O’Sullivan GS. Are postoperative activity restrictions necessary after posterior lumbar discectomy? A prospective study of outcomes in 50 consecutive cases. Spine (Phila Pa 1976). 1996;21(16):1893-7.
55. Donceel P, Du Bois M, Lahaye D. Return to work after surgery for lumbar disc herniation. A rehabilitation-oriented approach in insurance medicine. Spine (Phila Pa 1976). 1999;24(9):872-6.
56. Wilson CA, Roffey DM, Chow D, et al. A systematic review of preoperative predictors for postoperative clinical outcomes following lumbar discectomy. Spine J. 2016;16(11):1413-22.
57. Strömqvist F, Strömqvist B, Jönsson B. The outcome of lumbar disc herniation surgery is worse in old adults than in young adults: a study of 14,090 individuals in the Swedish Spine Surgery Register (SweSpine). Acta Orthop. 2016;87(5):516-21.
58. Kihl JA, Hillbrand AS, Radcliff K, 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.
59. Huang W, Han Z, Liu J, et al. Risk factors for recurrent lumbar disc herniation: a systematic review and meta-analysis. Medicine (Baltimore). 2016;95(2):e2378.
60. Miwa S, Yokogawa A, Kobayashi T, et al. Risk factors of recurrent lumbar disk herniation: a single center study and review of the literature. J Spinal Disord Tech. 2015;28(5):E265-9.
61. Belykh E, Krutko AV, Baykov ES, et al. Preoperative estimation of disc herniation recurrence after microdiscectomy: predictive value of a multivariate model based on radiographic parameters. Spine J. 2017;17(3):390-400.
62. Yaman ME, Kazanci A, Yaman ND, et al. Factors that influence recurrent lumbar disc herniation. Hong Kong Med J. 2017;23(3):258-63.