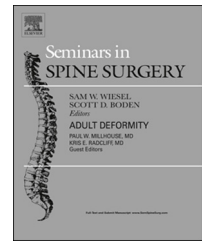


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Cost-effectiveness of treatments for lumbar disc herniation

Shyam A. Patel, MD, Zach Wilt, BS, Sapan D. Gandhi, MD, and Jeffrey A. Rihn, MD*

Department of Orthopaedic Surgery, Thomas Jefferson University Hospital, The Rothman Institute, 925 Chestnut St, 5th Floor, Philadelphia, PA 19107

ABSTRACT

Lumbar disc herniation is a prevalent condition in the general population that can cause disabling symptoms. The treatment of lumbar disc herniation, like many conditions of the spine, has come under increased scrutiny in this era of value-based health care delivery. In response, there has been an increase in cost-effectiveness research in this area. Studies have demonstrated that surgery is cost-effective for the treatment of symptomatic lumbar disc herniation using a traditional open approach. Such research is limited for specific conservative treatment options as well as alternative surgical approaches to treating this condition, such as the minimally invasive approach.

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1. Introduction

Symptomatic lumbar disc herniation is a painful, debilitating, and common condition with a prevalence ranging from 1.6% in the general population to 43% in certain working demographics.¹ Fortunately, there exist a number of different treatment modalities for those afflicted: falling on a spectrum from conservative to surgical therapies. Conservative therapies encompass nonsurgical options including, but not limited to, activity modification, physical therapy, NSAIDs, oral steroid medications, and epidural steroid injections. They are usually first line when disease is symptomatic. As conservative measures are not sufficient to alleviate symptomatic herniation 100% of the time, surgical options often warrant consideration.

However, independent of treatment course pursued, shifting paradigms in health care delivery are shifting the focus toward the cost-effectiveness of the available treatment options for a given condition. In an effort to curb rising costs in health care and aid in making better health care decisions, cost-effectiveness analyses (CEAs) have recently emerged with the aim of better assessing the cost-effectiveness of various

interventions. The purpose of this article is to review the current literature assessing the cost-effectiveness of treatment options in the management of lumbar disc herniation.

2. Cost-effectiveness

In assessing the cost-effectiveness of treatments for symptomatic lumbar disc herniation, authors essentially try to determine the value of different interventions. Value, in the simplest terms, can be thought of as quality over costs. The greater the quality and the lower the costs, the better the value and, ultimately, the more cost-effective the intervention. Quality in spine care is typically measured using patient-reported outcome tools such as the Oswestry Disability Index. Typically, when doing cost-effectiveness analysis the unit of measure of outcome is the quality-adjusted life year (QALY), which measures gain (or loss) of health utility over time. Health utility can be measured indirectly using outcome tools such as the EQ-5D and the SF-6D. The cost-effectiveness of a particular intervention is then expressed as the cost of that intervention per QALY gained

*Corresponding author.

E-mail address: jrihno16@yahoo.com (J.A. Rihn).

as a result of the intervention. The incremental cost-effectiveness ratio (ICER) is a ratio that compares the cost per QALY gained for a type of intervention to the cost per QALY gained for an alternative intervention for the same condition. Although there is no definite threshold in the United States for what is considered a cost-effective treatment, generally speaking, interventions under \$100,000 per QALY are considered cost-effective.

The cost of an intervention can be broken down into indirect and direct costs. Indirect costs mostly comprise the cost to society incurred when an individual is out from work following the intervention for a particular condition, such as lumbar disc herniation. Worker productivity plays a significant role in the cost-effectiveness of treatments for lumbar disc herniation. If a worker is able to perform at his normal capacity and limit missed days, it can directly limit the societal cost of treatment. Lumbar disc herniation is one of the leading causes of lost productive time in the working aged population.² Direct costs are those more “directly” associated with the intervention including, but not limited to, surgical, anesthesia, and hospital fees. Both direct and indirect costs should be evaluated to most accurately estimate the true cost of an intervention from the societal perspective.

3. Conservative treatment for lumbar disc herniation

Whether conservative or surgical therapy is to be pursued in the treatment of lumbar disc herniation is contingent on several factors, including the severity/nature of neurological symptoms and prior success or failure with conservative measures. Most often, patients attempt conservative treatment prior to considering surgical alternatives. The majority of symptomatic lumbar disc herniations will resolve without surgical management within 6 weeks. For this reason, it is likely more cost-effective to delay major interventions for at least 6 weeks in favor of less invasive and less costly conservative measures. Evidence-based clinical guidelines on the diagnosis and treatment of lumbar disc herniation from the North American Spine Society identified a number of treatments that currently have insufficient evidence to justify their use, including intravenous glucocorticosteroids, 5-hydroxytryptamine receptor inhibitors, gabapentin, agmatine sulfate, amitriptyline, low-power laser or ultrasound treatment, spinal traction, and physical therapy/structural home exercise programs.² Such treatments with limited to no benefit are unlikely to be cost-effective. Further studies are needed to clearly establish which conservative treatment options, if any, have proven benefit for treating lumbar disc herniation and radiculopathy.

Currently, most studies in the literature that assess the cost-effectiveness of conservative therapies do so toward the treatment of low back pain in general, not necessarily lumbar disc herniation. In fact, for many studies, any specific causes for back pain (e.g., disc herniation) are listed as exclusion criteria.

Manchikanti et al.³ performed a CEA using four randomized controlled trials and found that epidural injections not only

improved symptoms but were also cost-effective at \$2206 per QALY at 2-year follow-up. Daffner et al.⁴ retrospectively examined a database to determine the cost of conservative management in the treatment of lumbar disc herniation prior to surgery. The largest sum spent was on injections (\$1368) followed by diagnostic imaging (\$823), outpatient visits (\$136), physical therapy (\$325), chiropractic care (\$380), preoperative studies (\$85), medications (\$59), and miscellaneous charges (\$338). The study underscores the significant costs associated with failed conservative treatment when patients subsequently go on to surgical care. In total, costs associated with failed conservative care comprise one-third of total charges incurred after surgical intervention had taken place. Yet, it deserves note that many patients did get better on conservative care alone, obviating the need for surgery⁴; hence, both clinically and financially, it is appropriate to attempt conservative treatment prior to discussing surgical alternatives.

4. Surgical versus nonoperative treatment

The literature comparing conservative care to surgery for the treatment of lumbar disc herniation is fairly extensive and includes randomized controlled trials, reviews of these trials, long-term studies, and cost analyses.

In 1996, Malter et al.⁵ performed a CEA of lumbar discectomy using previously published data on outcomes by Weber⁶ and newly collected data on costs. The study by Weber involved 126 subjects who were randomized to surgical or nonsurgical care of radicular pain having failed, at the minimum, 2 weeks of conservative therapy. Additionally all patients were shown to have disc herniation on myelogram and were assessed at 1, 4, and 10 years. Because Weber never collected any outcome data prior to the 12-month mark, Malter et al. obtained outcome data from a prospective randomized trial in which patients were either randomized to receive chemolysis or placebo in order to supplement Weber's study. Costs were totaled using a commercially available insurance database from which reimbursements were used as proxies for costs. The authors found surgical care superior to nonsurgical care by a difference of 0.37 QALYs. Over an 18-month period of time, surgical care was shown to be more expensive than conservative care by \$12,550. Hence, the authors calculated the cost per QALY gained by pursuing surgical treatment for disc herniation as \$29,200 without discounting health and \$33,900 with discounting. Unfortunately, this study did not include any indirect costs; hence, it is possible that the total costs of surgical and nonsurgical care individually had been greatly underestimated in this study.

Hansson and Hansson⁷ performed a 2-year CEA comparing surgical and nonsurgical treatment of lumbar disc herniation. In all, 92 patients who had undergone surgery due to lumbar disc herniation were matched to controls with similar symptoms who had not undergone surgical treatment. The direct cost in the surgical group was 5 times higher than that of the conservative group (\$10,311 versus \$2068, respectively), mostly attributable to cost associated with the surgical procedure itself. However, overall, indirect costs in the surgical group were lower at \$32,807 than in the nonsurgical

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