



SURGERY OR CONSERVATIVE MANAGEMENT FOR LUMBAR SPINAL PAIN: WHAT DOES THE EVIDENCE SAY?

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ABSTRACT

The prevalence and impact of chronic low back pain have spawned a rapidly expanding range of tests and treatments. The increasing costs, complications and overutilization of treatments for back pain have been strongly condemned. Thus there is a need to review definitive treatments for back pain. The paper discusses the literature on success of surgical versus conservative management of back pain. Data from both randomized and observation studies suggest a symptomatic benefit at least in first 5 years with surgery in patients with persistent sciatica. But at the same time the outcomes without surgery are generally quite favorable and patients with mild symptoms have good prognosis without surgery. The decision to use surgical care should always be preceded by patient's participation in an active exercise program and probably after multidisciplinary investigation and consultation. If surgery is warranted, it should not be delayed so long that the function deteriorates but should be undertaken for the correct indications as soon as possible.

Patients with LBP can be subcategorized in to three groups: a. those with non specific LBP, b. those with LBP associated with radiculopathy or spinal stenosis and c. those with LBP associated with other spinal causes such as tumor, infection, cauda equina syndrome that require prompt evaluation as well as conditions such as ankylosing spondylitis and vertebral compression fractures. More than 85% of the patients who initially consult a primary care physician have non specific LBP or pain that cannot be easily attributed to a specific disease or spinal abnormality³.

The 3 main categories of treatment of LBP are surgical, nonsurgical and pharmacologic. Conservative treatments vary widely and are individualized to the patient. Acute LBP is usually treated through self care, exercise, analgesics, superficial heat therapy and patient education. Non invasive techniques for chronic LBP include exercise regimens such as pilates and yoga, spinal decompression, back schools and cognitive behavioral therapy³. Pain of discogenic origin may be the most intractable type of chronic LBP and the patients who do not respond to conservative medical management have the options of surgical management⁴.

INTRODUCTION

Low back pain (LBP) is ranked first as a cause of disability and inability to work, and expected to affect up to 90% of the world's population at some point in their lives¹. Contrary to the conventional wisdom that held that most of the episodes of acute LBP are benign and self limited with 80-90% of the attacks resolving within 6 weeks, it is currently recognized that acute LBP tends to relapse and many patients experience recurring episodes, leading to a chronic condition².

The prevalence and impact of chronic LBP have spawned a rapidly expanding range of tests and treatments. Recent studies from US document a 629% increase in Medicare expenditures for epidural steroid injections; a 423% increase in expenditures for opioids; a 307% increase in the number of lumbar MRI's; and a 220% increase in spinal fusion surgery rates. The studies available suggest that these increases have not been accompanied by population-level improvements in patient outcomes or disability rates⁵. Gibson et al⁶ in the 1999 Cochrane review stated that there is no scientific evidence on the effectiveness of any form of surgical

decompression or fusion for degenerative lumbar spondylosis compared with natural history, placebo or conservative management. In addition higher spine surgery rates are sometimes associated with worse outcomes. In US out of 100, 000 operations for lumbar disc disease are performed every year, 20-40% are unsuccessful, resulting in failed back surgery syndrome⁷.

The non invasive treatment strategies have emerged partly because of limited success and expense of surgery. Studies have shown the success of exercise, stabilization training and multidisciplinary approach in LBP^{8,9}. Thus there is a need to review the evidence in order to justify the need of conservative or surgical management of LBP so that costs and complications arising out of the treatment can be minimized. The paper discusses the available evidence on success of conservative management versus surgical management in mechanical disorders of spine.

Natural history of spinal pain

The natural history studies have revealed that most patients with spondylolisthesis and lumbar spinal stenosis (LSS) do not worsen with time and very rarely there is rapid deterioration, therefore the non surgical treatment remains the mainstay for its management. In their study on natural history of patients with LSS followed over a 4 year period, Johnsson et al¹⁰, 1992 reported that 85% of the subjects demonstrated either improvement or no change in symptoms and 70% reported either increases or no change in walking tolerance with no treatment administered.

Though lifetime prevalence of major episode of LBP varies from 60-80%, only 10% of these episodes are accompanied by sciatica. Sciatica lasting longer than 2 weeks is even less common with a lifetime prevalence of 1.6%¹¹. It is commonly agreed that lumbar disc herniation has a favorable natural history. Hakelius, 1970¹² examined a natural history cohort in which patients were treated with only bed rest and corset for two months and he observed a marked reduction in pain and improvement in function overtime. 80% of the patients had major improvement after six weeks; 90% after twelve weeks; and 93% after twenty four weeks.

Studies on conservative versus surgical management of LBP

The studies are grouped as under:

Lumbar spinal stenosis (LSS)

Atlas et al¹³, 2000 from the Maine lumbar spine study provided outcome information on 148 patients with LSS. Subjects in this study were not randomized into treatment groups and the patients selecting surgery were worse both clinically and radiographically at baseline than those selecting conservative management. A total of 67 patients underwent combinations of assorted nonsurgical treatments, including medications (narcotic analgesics); epidural steroid injections; bed rest; bracing; and various forms of exercise, manual medicine intervention, or physical modalities. At the 1-year follow-up, over 80% of the non surgically treated patients' pain did not worsen, and half of these patients reported improvement. This status remained almost the same at 4 years, with over 70% of the nonsurgical group reporting that they were not worse and one half of these patients reporting improvement. Additionally, 49% of the nonsurgical patients were satisfied to live the rest of their lives at their current status. At the 4-year follow-up, 85.7% of the subjects with moderate symptoms at baseline who were treated non surgically were the same or better. Although this study indicated that many patients may respond positively or at least remain stable over time, it is difficult to conclude which particular types of nonsurgical interventions were most efficacious.

Atlas et al¹⁴, 2005 in Maine lumbar spine study conducted a comparison of long term (8 to 10 year) outcomes of surgical versus non surgical management of LSS. For surgically treated patients almost all had decompression laminectomy. For non surgically treated patients back exercises, bed rest, physical therapy, spinal manipulation, narcotic analgesics and epidural steroids were most frequently used. It was found that patients undergoing surgery had worse baseline symptoms and functional status than those initially treated non surgically. Outcomes at 1 and 4 years favored initial surgical treatment. After 8 to 10 years, a similar percentage of surgical and nonsurgical patients reported that their low back pain was improved (53% vs. 50%, $P = 0.8$), their predominant symptom (either back or leg pain) was improved (54% vs. 42%, $P = 0.3$), and they were satisfied with their current status (55% vs. 49%, $P = 0.5$). However, patients initially treated surgically reported less severe leg pain symptoms and greater improvement in back-specific functional status. By 10 years, 23% of surgical patients had undergone at least one

additional lumbar spine operation, and 39% of nonsurgical patients had at least one lumbar spine operation. Patients undergoing subsequent surgical procedures had worse outcomes than those continuing with their initial treatment. Outcomes according to actual treatment received at 10 years did not differ because individuals undergoing additional surgical procedures had worse outcomes than those continuing with their initial treatment. These results support a shared decision-making approach among physicians and patients when considering treatment options for LSS.

Weinstein et al¹⁵ in 2009 in their study to determine long term effects of surgical versus non surgical treatment, enrolled surgical candidates having degenerative spondylolisthesis with spinal stenosis in to a randomized cohort or observational cohort. Treatment consisted of standard decompressive laminectomy (with or without fusion) or usual nonoperative care. Primary outcome measures were the SF-36 scores and the modified Oswestry Disability Index (ODI) at 6 weeks, 3 months, 6 months, and yearly up to 4 years. In the randomized cohort (304 patients enrolled), 66% of those randomized to receive surgery received it by four years whereas 54% of those randomized to receive nonoperative care received surgery by four years. In the observational cohort (303 patients enrolled), 97% of those who chose surgery received it whereas 33% of those who chose nonoperative care eventually received surgery. The intent-to-treat analysis of the randomized cohort, which was limited by nonadherence to the assigned treatment, showed no significant differences in treatment outcomes between the operative and nonoperative groups at 3 or 4 years. Compared with patients who were treated nonoperatively, patients in whom degenerative spondylolisthesis and associated spinal stenosis were treated surgically maintained substantially greater pain relief and improvement in function for 4 years.

Lumbar disc herniation (LDH)

Weber, 1983¹⁶ conducted the first randomized trial in spinal surgery on LDH in which 60 patients had surgery and 66 continued to be treated with conservative measures. Weber found that those treated with surgery had a significantly better result at one year postoperatively ($p < 0.05$). At four years postoperatively, the surgically treated patients had a trend toward better results, but that difference was not present at 10 years. The surgically treated

patients had far fewer relapses than the non operatively treated group in the first 4 years. Motor weakness improved equally in both groups, as did sensory dysfunction. 35% of the patients, equally distributed in the two groups, had demonstrable sensory dysfunction 10 years after the hospitalization for the LDH. The study had flaws in that not all patients were randomized, a large number of non operatively treated patients crossed over into the surgical group, the study lacked adequate statistical power, the outcome assessment was not blinded, and the outcome measurement was relatively insensitive.

Atlas et al¹⁷, 2001 in Maine lumbar spine study assessed 5 year outcomes for patients with sciatica caused by a LDH treated surgically and non surgically. For patients choosing surgery 95.9% underwent open discectomy. Operative findings were consistent with a extruded disc fragment or herniation in 91.2%. For patients electing non surgical treatment back exercises, physical therapy, bed rest, spinal manipulation, narcotic analgesics and epidural steroids were most frequently used. It was found that surgically treated patients had worse baseline symptoms and functional status than those initially treated nonsurgically. By 5 years 19% of surgical patients had undergone at least one additional lumbar spine operation, and 16% of nonsurgical patients had opted for at least one lumbar spine operation. Overall, patients treated initially with surgery reported better outcomes. At the 5 year follow up, 70% of patients initially treated surgically reported improvement in their predominant symptom (back or leg pain) versus 56% of those initially treated nonsurgically ($P, 0.001$). Similarly, a larger proportion of surgical patients reported satisfaction with their current status (63% vs. 46%, $P, 0.001$). The relative advantage of surgery was greatest early in follow up and narrowed over 5 years. The least symptomatic patients at baseline did well regardless of initial treatment, although function improved more in the surgical group. For patients with moderate or severe sciatica, surgical treatment was associated with greater improvement than nonsurgical treatment at 5 years. However, patients treated surgically were as likely to be receiving disability compensation, and the relative benefit of surgery decreased over time.

Weinstein et al¹⁸, 2006 in a spine patient outcomes research trial (SPORT) on surgical versus non surgical treatment for LDH compared standard open discectomy versus non operative treatment

individualized to the patient and found that adherence of subjects to the assigned treatment group was limited. Most patients in non operative group had received education and counseling (93%), anti inflammatory medications (61%), epidural steroids (50%), activity restriction (29%), physical therapy (44%). 50% of patients assigned to surgery received surgery within 3 months of enrollment, while 30% of those assigned to non operative treatment received surgery in the same period. Intent to treat analyses demonstrated substantial improvements for all primary and secondary outcomes in both treatment groups. Between group differences in improvements were consistently in favor of surgery for all periods but were small and not statistically significant for the primary outcomes (SF 36, Modified ODI). The secondary measures of sciatica severity and self reported progress did show statistically significant advantages for surgery. The results revealed that patients in both the surgery and the non operative treatment groups improved substantially over a 2 year period. The findings of the study were consistent with clinical experience in that relief of leg pain was most striking and consistently improved with surgery. 95% of surgically treated patients had no intraoperative complications and only 4% had dural tear as a post operative complication. Because of the large numbers of patients who crossed over in both directions, conclusions about the superiority or equivalence of the treatments could not be given.

Lumbar spondylosis (LS)

Fritzell et al¹⁹, 2001 in a study on 294 patients (after power analysis of 80%) with disabling LBP who were felt to be surgical candidates randomized the subjects to conservative care (i.e., physical therapy supplemented with education and other pain relieving technologies at the discretion of the treating physician) or surgery (fusion). The groups were comparable in all demographic variables measured with the exception of a higher incidence of medical co morbidity in the surgical group. Patients were observed for 2 years with intermediate evaluations at 6 months and 1 year following onset of treatment. Outcomes were assessed using multiple well-validated outcome measures. Follow up was achieved in 98% of patients. The surgical group did significantly better in terms of pain relief, degree of disability as measured by the ODI, Million, and General Function Scale, return to work status, and degree of satisfaction reported by the patients and the independent

observer. The study provided high quality evidence demonstrating that lumbar fusion is associated with better outcomes than standard conservative care for appropriately selected patients.

Brox et al²⁰, 2003 conducted a randomized study evaluating the relative efficacy of instrumented posterolateral fusion *versus* a specific protocol of cognitive intervention and physical therapy in a group of 64 patients (27 fusion, 37 nonfusion). The patients enrolled in the physiotherapy arm underwent a specifically designed program for patients with LBP which included cognitive therapy designed to address patient fear behavior as well as supervised physiotherapy averaging 25 hours per week for 8 weeks. 97% of patients were observed for 1 year. Both groups improved significantly from baseline on all outcome measures. The surgical group did do significantly better in terms of relief of lower limb pain, and tended to do better than the physiotherapy group in terms of improvement in back pain, emotional distress, and overall success ratings by both the patient and independent observer. The physiotherapy group scored better fear avoidance activity and work, as well as in fingertip-floor distance. The authors interpreted their findings as demonstrating equivalence between their program of physiotherapy and lumbar fusion. The fact that both groups improved significantly also supports the efficacy of both strategies as superior to the natural history of chronic LBP treated in a conservative fashion.

DISCUSSION

The review of the studies on conservative versus surgical management of mechanical disorders of spine has revealed that recent evidence favors surgical management. Data from both randomized and observation studies suggest a symptomatic benefit at least in first 5 years with surgery in patients with persistent sciatica. But at the same time the outcomes without surgery are generally quite favorable and patients with mild symptoms have good prognosis without surgery.

Most of the studies available in literature are observational, non randomized, have substantial baseline differences, do not have well defined treatment protocols, thus definitive conclusions cannot be drawn. Many studies lack in defining impairment specific conservative treatment i.e. categorizing the type of non surgical treatment.

Therefore one can derive only limited conclusions i.e. to go for conservative or surgical management.

Nelson et al²¹, 1999 in their prospective study on prevention of spinal surgery with aggressive strengthening exercise concluded that many patients had spared surgery besides recommendation, can tolerate intensive specific exercise and a percentage of spinal patients can avoid surgery by completing an aggressive strengthening program. On the other hand, Jarett et al²², 2012 in their systematic review article on effectiveness of land based exercise compared to decompressive surgery in the management of lumbar spinal canal stenosis concluded that decompressive surgery is more effective than land based exercise in the management of LSS. However, given the conditions slowly progressive nature and the potential for known surgical complications, it is recommended that a trial of conservative management with land based exercise be considered prior to consideration of surgical intervention.

The decision to use surgical care should always be preceded by patient's participation in an active exercise program and probably after multidisciplinary investigation and consultation. Only 10% to 15% of patients with degenerative spondylolisthesis and spinal stenosis ultimately have surgery²³. Unnecessary surgery leads to failed back surgery syndrome. If surgery is warranted, it should not be delayed so long that the function deteriorates but should be undertaken for the correct indications as soon as possible²⁴.

In the absence of a cauda equina syndrome or progressive weakness, the best indication for surgical management is refractory radicular pain. Surgical decision making should not be based on the size of the disc herniation, as large extruded herniations tend to resolve more predictably, or on either stable motor weakness or numbness, as the ultimate resolution of weakness and sensory deficits is similar following either nonoperative or surgical management, although surgery hastens the process. The treatment should be chosen by the patient after proper education through a process of shared decision making, taking psychosocial co morbidities in to consideration rather than reflect the "surgical signature" of the surgeon²⁵.

CONCLUSION

The choice of treatment should be guided by the clinical course and presentation, keeping the co

morbidities and natural history in view. The challenge is to determine the right procedure for a given patient population, define a clinically relevant difference in outcome using reliable and valid outcome measures and design randomized controlled trials with adequate power.

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