The Long-Term Results of Surgical Treatment for Spinal Stenosis in the Elderly

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ABSTRACT

Purpose: To evaluate the surgical results of spinal stenosis in the elderly and to investigate which factors may contribute to a poor outcome.

Methods: This is a retrospective study of 68 patients aged 60 and above who had decompression laminectomy for lumbar spinal stenosis between 1989 and 1991. They were evaluated at an average of eight years after surgery. The mean age at surgery was 68 years. Twenty-eight had co-existing illnesses. Twenty-one had concomitant degenerative spondylolisthesis. Thirty-two (47%) had decompression laminectomy performed at one level. Eleven (16%) had arthrodesis. Seven had spinal instrumentation, of which six were Hartshill rectangles. Functional result was graded using modified Paine classification. Multivariate analysis with logistic and linear regression was used to determine predictors of poorer outcomes.

Findings: There were 68% excellent and good, 22% fair and 10% poor results. Back pain was relieved in 91% of the patients. Leg pain was relieved in 76% of the patients. Numbness was relieved in 87% of the patients. Five patients had re-operations. Multivariate analysis revealed that age, sex, co-morbidity score, number of levels decompressed, and degenerative spondylolisthesis did not predict worse outcomes. However, Hartshill rectangle instrumentation and pre-operative leg numbness predicted less favourable results.

Conclusions: The surgical results of spinal stenosis in the elderly are favourable and comparable to those reported for the general population at an eight-year follow-up.

Keywords: Decompression laminectomy, elderly, Fusion, Hartshill rectangles, Spinal stenosis.

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INTRODUCTION

The symptoms of degenerative lumbar spinal stenosis are related to nerve root compression due to degenerative disc disease, facet joint arthritis and segmental spinal instability. Patients with severe spinal stenosis either do not improve with conservative measures or have frequent recurrent symptoms[1]. In the elderly, the age of the patient and co-existing illness may increase the risk of surgery. Thus in spite of the failure of conservative treatment, they may prefer not to have surgery.

Success rates for decompression laminectomy ranged from 55% to 85%[2-9]. Most of these reports included patients of a wide age range. There are few reports focusing on surgical results of spinal stenosis in the elderly and even for these, the results are conflicting.

In this paper, we present the long-term results and complications in 68 patients aged 60 years and above with degenerative lumbar stenosis who had surgical decompression. The aims of our study were to evaluate the long-term outcome in terms of patient satisfaction with the operation, post-operative back and leg pain, numbness, functional status, and the occurrence of repeat surgery. We also attempted to identify whether socio-demographic and clinical features, and co-morbidity were associated with a poor clinical outcome.

METHODS

During the period between 1989 and 1991, 84 patients aged 60 years and above underwent surgery for degenerative lumbar spinal stenosis. The patients' history of pre-operative symptoms and signs, previous back surgery, surgical diagnosis, surgical procedure, and concomitant medical problems were obtained from case records. In 1998, at an average of eight years after surgery, questionnaires were mailed to the patients to be completed and returned for evaluation. By then, seven patients had died of unrelated causes. Nine were excluded from our study because of no response, or incomplete clinical case records, or both. Sixty-eight patients were available for analysis. There

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were 45 women and 23 men. The average age was 68 years old at the time of surgery with a range of 60 to 82 years. The average follow-up was 97 months (range; 84 to 108 months).

At the time of surgery, twenty-eight patients (40%) had co-existing illness. Four had ischemic heart disease, 14 had hypertension, two had chronic renal failure, six had diabetes mellitus, and two had chronic obstructive pulmonary disease as their main co-morbidity. None of these 68 patients had previous lumbar surgery. We assessed co-morbidity with the cumulative illness rating scale, also known as the co-morbidity score[10].

At the time of surgery, forty-seven patients (69%) had back pain. Fifteen patients complained of bilateral radicular symptoms and 40 patients had unilateral radicular symptoms. Forty-six patients (68%) had intermittent neurogenic claudication. Thirty patients (44%) complained of numbness in the leg. No patient had significant peripheral vascular disease.

Twenty-seven patients (40%) had single-level compression, of which 20 were at L4/5 level and seven at L3/4 level. Forty-one patients (60%) showed compression at multiple levels ranging from L2/3 to L5/S1.

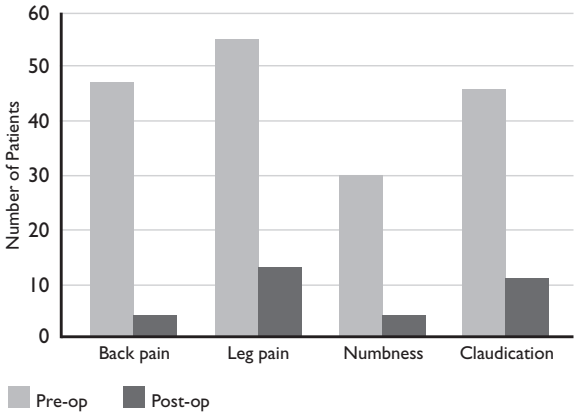
Associated degenerative spondylolisthesis[11] was present in 21 patients or 31%. Pre-operative back pain was present in 18 of the 21 patients with spondylolisthesis (86%), which was significantly more than those without spondylolisthesis (62%). There were similar proportions of sciatic leg pain, neurogenic claudication and numbness between those with and without spondylolisthesis.

SURGICAL PROCEDURE

The indications for surgery were disabling leg pain and progressively limited walking ability. Five patients had surgery because of the presence of progressive neurological deficits. The level(s) of decompression were determined by clinical and radiographic evaluation. Thirty-two patients (47%) had decompression laminectomy at one level. Of the 32 patients, 24 (75%) were at the L4/5 level. The remaining 36 patients had two or three level decompression laminectomy. Nerve root exploration was performed in all instances and where necessary, the lateral recesses were decompressed by medial facetectomy.

Eleven patients (16%) had posterolateral arthrodesis at the time of decompression laminectomy. Of these 11 patients, nine had degenerative spondylolisthesis. Autogenous bone grafts from the iliac crest were used for fusion. Seven patients had concomitant spinal instrumentation, six with Hartshill rectangles and the remaining patient with pedicle screw fixation. Five out of seven instrumented cases had degenerative spondylolisthesis. The patient with pedicle screw fixation had no degenerative spondylolisthesis.

Fig. 1 Patient Symptomatology – before, and eight years after surgery for lumbar spinal stenosis.



ANALYSIS

At the eight-year follow-up, various information was obtained from the patients via questionnaire. The functional results were expressed as excellent, good, fair and poor based on the classification by Paine[12], which was modified to allow for scoring (Table I). For statistical purposes, we combined the excellent and good categories in the modified Paine score into one category: excellent and good.

We also studied whether any variable would affect the functional results, patient satisfaction, and the need for repeat surgery. The variables analysed were sex, age at time of surgery, co-existing medical illness, spondylolisthesis, pre-operative back pain, leg pain, numbness, number of levels of decompression (single or multiple), arthrodesis, and instrumentation.

Associations between various variables and clinical outcomes (functional results, patient satisfaction) were assessed with multivariate techniques. Patient satisfaction on evaluation was categorised as a) very satisfied or satisfied; and b) dissatisfied. The functional result was derived from the scoring system (modified from Paine classification), which ranged from 4 to 16. Bivariate relationship using chi-square test was performed to detect any relationship between the variables and the need for repeat surgery.

RESULTS

Fig. 1 shows the changes in the number of patients having symptoms before surgery and at eight years after surgery.

Table I. Surgical results based on Paine classification.

Category	Points	No. of Patients (%)
Analgesic intake		
Not necessary	1	39 (57%)
Occasional	2	13 (19%)
Most of the time	3	8 (12%)
All the time	4	8 (12%)
Lifestyle after Surgery		
Return to normal work (including housework) and recreational activities with no restrictions	1	27 (40%)
Return to normal work (including housework) and recreational activities with minimal restrictions	2	8 (12%)
Return to light work or light household activities with some restrictions in outside activities	3	21 (31%)
Not returned to work and engaged in only limited activities	4	12 (18%)
Shopping		
Comfortably without pain	1	27 (40%)
Sometimes with pain	2	24 (35%)
Always with pain	3	6 (9%)
Pain stops me from going shopping	4	11 (16%)
Walking Distance		
Unlimited	1	50 (74%)
400 meters or more	2	7 (10%)
Less than 400 meters	3	8 (12%)
Cannot walk even a short distance	4	3 (4%)

Excellent (4), good (5-8), fair (9-12), poor (13-16)

Back pain

Forty-three patients (91%) reported improvement of back pain. One patient did not improve. Three reported improvement initially but later had recurrence of back pain.

Leg pain

Forty-two patients (76%) reported improvement in leg pain after surgery. Seven patients did not improve. Six patients improved initially but subsequently had recurrence of leg pain.

Leg numbness

Twenty-six patients (87%) reported improvement in leg numbness after surgery. Three patients did not have any improvement. One patient improved after surgery but experienced numbness again later.

Intermittent claudication

Forty-six patients had intermittent neurogenic claudication, of which 35 (76%) reported significant improvement after surgery. Seven patients did not improve at all. Four patients had initial improvement but experienced recurrent claudication later.

Functional results and patient satisfaction

Table I shows our results from the modified Paine classification. There were 46 (68%) excellent to good, 15 (22%) fair, and 7 (10%) poor results. Mean scores were 6 for excellent to good, 10 for fair, and 14 for poor results. Fifty-one patients (75%) were very satisfied with the lumbar surgery. Twelve patients (18%) were satisfied with the operation. Five patients were dissatisfied (7%) with the surgery.

Post-operative complications

Five patients had dural tears during surgery. These tears were recognised intra-operatively and were all repaired. None had persistent leakage of cerebrospinal fluid after surgery. Three patients had excellent to good results. Two had fair results, and none had poor result. One patient developed deep wound infection that was treated successfully with

Table II. Surgical results of decompression laminectomy of various authors.

Author	No. of Patients	Age Range (years)	Follow-up (months)	Success Rate (%)
Getty (1980)	31	18-75	42	55
Surin (1982)	22	47-76	30	86
Hall (1985)	68	32-83	48	84
Wong (1992)	59	32-78	30	63
Herno (1993)	108	23-67	154	69
Katz (1991)*	88	55-88	97	75
Sanderson (1993)*	31	65-81	42	81
Jonsson (1994)*	50	71-84	24	61 (leg symptoms) 41 (back symptoms)
Current Study*	68	60-82	97	68

* Reports focusing on patients 55 years and above.

intravenous antibiotics. No patient had nerve root injury or cauda equina syndrome.

Repeat surgery

The poor results included those who had repeat surgery. Five patients had repeat operations for persistent and disabling leg or back pain, or both. Of the five cases that underwent repeat surgery, one had degenerative spondylolisthesis. Two out of the five patients that required repeat surgery had Hartshill instrumentation at the index surgery.

Correlates of clinical outcomes

Multivariate analysis of all 68 cases revealed that instrumentation (p=0.001) and pre-operative numbness (p=0.004) were independently associated with worse functional results. Instrumentation (p=0.001) was also associated with reduced patient satisfaction. The other variables were not associated with worse functional results nor with reduced patient satisfaction.

Bivariate relationship between repeat surgery and various baseline variables was examined. Instrumentation could predict the chances of repeat surgery to some extent (p=0.08). The odds of repeat surgery for a patient with instrumentation were about eight times that of one without instrumentation.

Age, sex, coexisting illness, back pain and leg pain before surgery, spondylolisthesis, number of levels of decompression and arthrodesis had no influence on the outcome of the surgery.

DISCUSSION

Success rates (Table II) for decompression laminectomy for lumbar spinal stenosis ranged from 55% to 85%[2-9,13-15]. Differences in patient and surgery characteristics, as well as the methods of outcome assessments[8] account for the wide range of reported good and excellent results. Most reports also group patients together from a wide age range, from 18 years[3] to 88 years[16], with only three papers[7,17,18] focusing on results of surgery for lumbar spinal stenosis in the elderly.

Patients who undergo decompression lumbar laminectomy for spinal stenosis are often elderly[2,5,16,17]. Several papers[19,20,21] reported that elderly patients more than 65 had increased risk of peri-operative morbidity and mortality. Factors predisposing patients to worse outcomes included those with increasing age[6] and coexistent medical illness[19]. One study reported a 10% post-operative complication rate and a 1% intra-operative complication rate in the surgical treatment of lumbar spinal stenosis in patients older than 75 years of age[22]. Katz[18] studied 88 patients aged 55 years and above who had decompression laminectomy. Though the results at one year after surgery were gratifying, long-term follow-up revealed that 15 (17%) had repeat operation because of instability or stenosis. Twenty-one (30%) had severe pain on evaluation. On the other hand, Sanderson[7] in a study of 31 patients aged 65 years and above found that overall, 64% had an excellent result, 17% a good result and 19% a poor result. He concluded that the long-term outcome of decompression surgery in the elderly is good and does not differ from that reported for younger patients. Jönsson[17] reported excellent results in 28 out of 46 cases in relief of leg pain and 19 out of 46 cases in relief of back pain in patients aged 71 to 84 years old. He concluded that his two-year results are comparable to those of decompression surgery in younger patients. To date there are no studies from Asia on the results of surgery on elderly patients with spinal stenosis.

Ninety-one percent of our patients reported improvement of back pain. This is quite surprising, considering the fact that many had back pain. Perhaps a longer follow-up is required to detect any significant deterioration of back pain in this group. Three patients in our study experienced initial improvement but had recurrent back pain later. The back pain could be due to spinal instability since none of them had concomitant spinal fusion performed. Five patients (7.4%) in our series had repeat lumbar surgery. This was within the range of 5% to 18% re-operation rate as reported by other authors[5,8,16,19,23]. We found no significant difference in the rates of re-operation between those who did and did not have arthrodesis, which is similar to other results[8].

With regard to the predictors of outcome, a less favourable result has been reported in women[5], and in patients with greater severity and duration of symptoms before surgery[24], co-existing medical illness[18,19], compensation and litigation issues[25], prior back surgery[25], and multi-level decompression[26]. Jönsson[27] found significant correlation between good result and pronounced constriction of the spinal canal, pre-operative duration of symptoms of less than four years and no preoperative back pain. Herron[25] reported no correlation between patient outcome and age, duration of symptoms, number of level(s) decompressed, weakness, numbness, spondylolisthesis, associated diskectomy and fusion. Turner's meta-analysis[8] revealed no significant relationship between outcome and patient age or gender, prior back surgery, spondylolisthesis, number of level(s) decompressed and fusion.

Multivariate analysis performed on our patients revealed that age, sex, co-morbidity score, back and leg pain before surgery, spondylolisthesis, number of levels of decompression and arthrodesis did not affect clinical outcomes. However, pre-operative numbness and instrumentation were significantly associated with poorer results. In our study, those patients who presented with numbness before surgery might have underlying nerve root compression and ischemia of a longer duration or greater severity or both, resulting in worse functional results after surgery. We found that instrumentation was significantly associated with a worse functional result and reduced patient satisfaction. It seems that spinal instrumentation with Hartshill rectangles was associated with worse outcomes. The possibility of repeat surgery was about eight times higher for a patient with instrumentation than for those without instrumentation. The Hartshill rectangle was used in our institution before 1991 for spinal stabilisation in degenerative disease of the lumbar spine, and is now obsolete. In our series, two of the six patients who had Hartshill rectangles required repeat lumbar surgery, due to persistent post-operative back and leg pain. The patient who had pedicle screw implant had good functional outcome and had no repeat surgery.

A limitation of our study is the retrospective nature of this analysis, with some of the patients lost to follow-up (deaths, non-responders, incomplete case records). This is not unexpected in long-term studies dealing with elderly subjects.

In conclusion, the surgical results of decompression laminectomy in patients 60 and above at eight years were favourable, and were comparable to other reported studies on the general population. Co-existing illness did not adversely affect clinical outcomes in this group of elderly patients. Patients who had spinal instrumentation with Hartshill rectangles had worse outcomes and were more likely to undergo repeat surgery. Leg numbness before surgery also predicted poorer results.

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