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THE LONG-TERM PROGNOSIS AFTER OPERATION FOR LUMBAR SPINAL STENOSIS

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ABSTRACT. The prognosis for patients treated surgically for lumbar spinal stenosis with a minimum follow-up time of 10 years was evaluated. The study group consisted of 102 patients (39 women and 63 men) with a mean age at operation of 52 years and with a mean follow-up time of 12.4 years. The antero-posterior (AP) diameter was equal to or less than 12 mm at the narrowest point on the preoperative lateral myelograms. The results were based on the Oswestry disability score, the severity of pain, the change in pain and the state of depression. According to this score the results were excellent-to-good in 69 patients (68%), the pain was mild in 64 patients (63%), the change in pain was slight in 78 patients (77%), and there was no depression in 55 patients (54%). The pain and the change in pain had a very high correlation in the Oswestry disability score. The pain led to depression more often in the men than in the women. The depression had a much stronger correlation to outcome in the men than in the women.

Key words: lumbar spinal stenosis, surgery, long-term results.

Success rates of from 26 to 100 per cent have been reported in operative treatment for lumbar spinal stenosis (3, 7, 14). In many studies, the mean follow-up time has been less than 4 years (5, 14). Some information is, however, available on the long-term outcome of laminectomy for lumbar spinal stenosis (5). The degenerative process continues, and the stenosing factors persist after decompressive surgery (16). The purpose of this study was to evaluate the prognosis in these patients with a minimum follow-up time of 10 years.

MATERIAL AND METHODS

Patients

During the period of 1974–82, 182 patients were operated on for lumbar spinal stenosis. Myelography was performed on 154 of these patients. One hundred and eighteen patients with an AP-diameter equal to or less than 12 mm were considered eligible for this study. Ten of the 118 patients had died, one patient was in a bad condition owing to a co-existing disease and 5 patients could not be traced. Thus, the study group comprised 102 patients.

These patients were divided into three subgroups according to the year of operation (Table I). The patients' histories concerning preoperative symptoms, co-existing diseases, previous lumbar surgery, re-operations and surgical procedures were taken on the basis of surgical records and patient interviews.

The study group consisted of 39 women and 63 men with a mean age at operation of 52 years (22–71): women 55 and men 50 years ($p < 0.01$). The mean follow-up time for these

Table I. *Baseline clinical features and outcomes in the entire study group and the subgroups*

	Entire study group ($n = 102$)	Subgroup		
		1 ($n = 36$)	2 ($n = 40$)	3 ($n = 26$)
Women (%)	38	36	40	39
Men (%)	62	64	60	61
Operation age (years)	52	56	51	47
Age at the last follow-up (years)	64	67	64	62
Follow-up time (years)	12	10	12	15
Mean number of laminectomies	1.5	1.6	1.7	1.3
Excellent-to-good outcome (%)	68	64	73	65
Little change in pain (%)	77	75	83	69
No depression (%)	54	50	68	39
Mild use of analgesic (%)	63	61	70	54

Table II. *Number of patients according to myelographic grading of spinal stenosis and Oswestry disability score*

	AP-diameter of dural sac			
	Total block	Subtotal block	< 10 mm	10–12 mm
Number of patients	25	28	34	15
Excellent-to-good (%)	88	61	56	73

Table III. *Oswestry disability score and number of laminectomy levels*

	< 1 LA*	1 LA	2 LA	3 LA	4 LA
Number of patients	11	43	31	15	2
Excellent-to-good (%)	64	77	58	73	0

* LA = laminectomy.

102 patients was 12.4 years (10–17) (Table I). The preoperative symptoms were divided into three categories (4): neurogenic claudication ($n=17$), back and leg pain ($n=66$) and mixed symptoms ($n=19$). The average duration of symptoms was 8.6 years (2 months–40 years). Fifteen patients (15%) had had previous surgery from one month to 23.5 years (mean 7.6 years) prior to the operation for stenosis. Twelve patients had undergone discectomy and one patient fusion, one patient had previously had two operations (discectomy and laminectomy) and one patient had been operated on three times (two discectomies and one laminectomy). Nine patients (9%) had another operation during the follow-up period, all for recurrence of stenosis. This was a second operation for all of them, and the mean time from the first operation was 8.0 years (3.3–12.7).

Radiological diagnosis

The radiographs of each patient were reviewed by the neuroradiologist who did not know the patient's clinical status. The antero-posterior (AP) diameter of the contrast medium column was measured at the narrowest point on the lateral, non-functional myelogram film. The myelographic findings were graded as follows: total block, subtotal block, AP-diameter < 10 mm and AP-diameter 10–12 mm (Table II).

Surgical treatment

The level of the operative procedure depended on the preoperative myelographic findings. The surgical technique consisted of a central laminectomy extended laterally to decompress the nerve roots. The aim of the surgery was to decompress the neural tissue both centrally and laterally. In most cases lateral decompression was achieved by partial facetectomy, but the whole facet was removed when deemed necessary. The mean length of laminectomy was 1.5 ± 0.9 levels (women 1.6 and men 1.5 levels) (Table III).

Method

Questionnaires regarding Oswestry low back pain disability (2) and the short depression index (SDI) (12) were completed by the patients. Information was requested on severity of pain measured by the use of analgesics for leg and back pain, as well as change in pain in back and leg during the past 5 years. The former, regarding Oswestry disability, consisted of 10 sections (pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and travelling), and the score was graded as excellent-to-good (0–40%) and as poor-to-very poor (41–100%). The results of the SDI were graded as no depression (0–6 points), mild (7–12 points) and severe depression (13–18 points). The severity of pain was classified as mild (the patient did not use or only occasionally used analgesics) or as severe (the patient used analgesics regularly). The change in pain during the last 5 years of the follow-up time was classified as little change (same, better or slightly worse) and severe change (much worse or re-operation).

Table IV. *Depression and Oswestry disability scores*
EX-to-GD = excellent-to-good; *PR-to-VP* = poor-to-very poor

	EX-to-GD	PR-to-VP	
Number of patients			
—no depression	46	9	$p=0.0012$
—mild depression	20	18	
—severe depression	3	6	$p=0.0010$
Women			
—no depression	16	6	$p=0.047$
—depression (mild and severe)	7	10	
Men			
—no depression	30	3	$p=0.0008$
—depression (mild and severe)	16	14	

Table V. *Severity of pain and Oswestry disability score*
EX-to-GD = excellent-to-good; *PR-to-VP* = poor-to-very poor

	EX-to-GD	PR-to-VP	
Number of patients			
—mild pain	56	8	$p < 0.000001$
—severe pain	13	25	
Women			
—mild pain	15	2	$p = 0.0011$
—severe pain	8	14	
Men			
—mild pain	41	6	$p = 0.00001$
—severe pain	5	11	

Table VI. *Severity of pain and depression of the patients*

	No depression	Depression (mild and severe)	
Number of patients			
—mild pain	42	22	$p = 0.0021$
—severe pain	13	25	
Women			
—mild pain	12	5	$p = 0.117$
—severe pain	10	12	
Men			
—mild pain	30	17	$p = 0.0018$
—severe pain	3	13	

Statistics

For the statistical analyses the χ^2 test was used for comparison of the subgroups. p-values less than 0.05 were considered significant.

RESULTS

When assessed by the Oswestry disability scores the condition was excellent-to-good in 69 patients (68%) (women 59% and men 73%) and poor-to-very poor in 33 patients. The excellent-to-good results in the three subgroups were 64%, 73% and 65%. Fifty-five patients had no depression; 22 of the women (56%) and 33 of the men (52%) (Table I). There was a correlation between depression and disability (Table IV).

The severity of pain was mild in 64 patients; 17 of the women (44%) and 47 of the men (75%) ($p < 0.01$). Pain was significantly correlated to both disability and depression (Tables V and VI). The change in pain during the last 5 years of the follow-up was little in 78 patients (76%). The correlation of this change with the disability and with the use of analgesics was very strong ($p < 0.000001$), but with the depression it was weak ($p = 0.021$).

The association of the preoperative myelographic finding and the length of laminectomy on the prognosis are shown in Tables II and III. The condition of the patients was less favourable after re-operations performed during the follow-up time ($p = 0.021$).

Preoperative factors such as age at the time of operation, prior surgery, other diseases at the time of surgery, duration of the symptoms and the follow-up time had no statistical significance on the final outcome.

DISCUSSION

A single, standardized measure for assessing patient outcome was not found in the literature, and there was

a wide range of outcome variables and considerable variation in the definition of excellent, good, fair and poor overall outcome (6, 14). Our choice of measurement aimed to illustrate the very long-term prognosis of surgical treatment from a variety of aspects.

The Oswestry score was excellent-to-good in 68% of the patients. Turner et al. (14) reported widely differing results concerning good-to-excellent outcomes, ranging from 26% to 100% (mean 64%) and a mean follow-up time of 3.9 years. Katz et al. (5) described good outcome in 57%, but the mean age at the time of operation was 69.3 years. Verbiest (15) followed postoperatively 33 patients with follow-up times of 9–20 years. Twenty patients (61%) maintained complete relief from symptoms during the study period. In a recent long-term study (mean 8.6 years; range 5–19) by Postacchini & Cinotti (11) the outcome was excellent-to-good in 70%. Our results suggest that the long-term outcome of surgically treated lumbar spinal stenosis is fully comparable with the outcome of a shorter-time follow-up, and that the outcome does not necessarily deteriorate during a prolonged follow-up time. The feeling of pain remained unchanged in 78 patients during the last 5 years of the follow-up time in our study.

The use of analgesics was aimed to measure the severity of the patients' pain. The result was excellent-to-good in 64% of the patients (women in 44%, men in 75%), i.e. they did not use analgesics or used them only occasionally. In Nixon's series, 30% of the women and 45% of the men did not use analgesic medication (10). The need for analgesics could be an accustomed habit. It is not possible to determine what is cause and what is effect, but the use of analgesics had a very strong statistical association with the patients' disability in our study (Table V).

It is generally known that psychological factors may also affect surgical results, but it is difficult to show the cause and the effect (8). Depression is quite common especially in elderly patients, and it should not be overlooked (13). In the present study even the mild depression correlated with the disability (Table IV). Furthermore, the patients with depression used more analgesics than those without depression, but this was statistically significant only in the men.

In our study 9 patients had a second operation during the follow-up period. Patients with spinal stenosis after a previous back operation are difficult to evaluate and treat (9). Brodsky (1) found good-to-excellent results in 72% of 221 patients treated for postlaminectomy stenosis. Nasca (9) obtained good results in 60%, fair in 25% and poor in 15% of 32 patients. Our results were excellent-to-good in 33% of 9 re-operated patients and in 71% of the rest of the patients. Statistically the difference was clear, but the re-operated patients were so few in number that it was not possible to draw any firm conclusions.

In conclusion, it can be considered acceptable to make a long-term prognosis of surgically treated spinal stenosis, especially in men. The re-operation rate was low after the operation for lumbar spinal stenosis, but the results of these re-operations were not satisfactory. It is also important to recognize depression as a factor related to the outcome. Pain and depression had a stronger correlation to disability in men than in women in our study.

REFERENCES

1. Brodsky, A. E.: Post-laminectomy and post-fusion stenosis of lumbar spine. Clin Orthop *115:* 130–139, 1976.
2. Fairbank, C. T. J., Couper, J., Davies, J. B. & O'Brien, J. P.: The Oswestry low back pain disability questionnaire. Physiotherapy *66:* 271–273, 1980.
3. Herron, D. L. & Mangelsdorf, C.: Lumbar spinal stenosis, Results of surgical treatment. J Spin Dis *4:* 26–33, 1991.
4. Johnsson, K-E., Willner, S. & Pettersson, H.: Analysis of operated cases with lumbar spinal stenosis. Acta Orthop Scand *52:* 427–433, 1981.
5. Katz, N. J., Lipson, J. S., Larson, G. M., McInnes, M. J., Fossel, H. A. & Liang, H. M.: The outcome of decompressive laminectomy for degenerative lumbar stenosis. J Bone Joint Surg (Am) *73:* 809–816, 1991.
6. Korres, S., Loupassis, G. & Stamos, K.: Results of lumbar discectomy: a study using 15 different evaluation methods. Eur Spine J *1:* 20–24, 1992.
7. Kruger, J., Tönnies, H. & Senff, H.: Zum Krankenheitsbild der Claudicatio Intermittens nervosa bei lumbaler Spinalstenose. Neurochirurgia *28:* 121–130, 1985.
8. La Rocca, H.: Failed lumbar surgery syndromes: causes and correctives. *In* The Textbook of Spinal Surgery. vol. 1 (eds. K. H. Bridwell & R. L. DeWald), pp. 719–737. Lippincott, New York, London, Hagerstown, 1991.
9. Nasca, J. N.: Surgical management of lumbar spinal stenosis. Spine *12:* 809–816, 1987.
10. Nixon, E. N.: Results of surgical treatment. *In* Spinal Stenosis (ed. E. N. Nixon), pp. 342–368. Edward Arnold, London, 1991.
11. Postacchini, F. & Cinotti, G.: Bone regrowth after surgical decompression for lumbar spinal stenosis. J Bone Joint Surg (Br) *74:* 862–869, 1992.
12. Rimon, R., Keltinkanagas-Järvinen, L., Söderlund, S. & Itäpuro, A.: A short depression index (in Finnish). Psychiatr Fenn *59:* 1–16, 1984.
13. Spengler, D. M.: Degenerative stenosis of the lumbar spine. J Bone Joint Surg (Br) *69:* 305–308, 1987.
14. Turner, A. J., Ersek, M., Herron, H. & Deyo, R.: Surgery for lumbar spinal stenosis. Attempted meta-analysis of the literature. Spine *17:* 1–8, 1992.

15. Verbiest, H.: Results of surgical treatment of idiopathic developmental stenosis of the lumbar vertebral canal. A review of twenty-seven years experience. J Bone Joint Surg (Br) *59:* 181–188, 1977.
16. Zucherman, J. & Schofferman, J.: Pathology of failed back syndrome. State of the Art Reviews *1:* 1–12, 1986.

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