The Distress and Risk Assessment Method (DRAM)

FAILURE TO PREDICT THE OUTCOME OF LUMBAR DISCECTOMY

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Our aim was to judge the influence of preoperative psychological disturbance on the outcome of lumbar discectomy. We evaluated 66 patients, before and after operation, using a self-administered questionnaire. Disability was assessed using the Oswestry disability index and psychological disturbance the Distress and Risk Assessment Method (DRAM) score. Patients were classified as normal, at risk or distressed, and the outcome of surgery in the three groups was compared at a follow-up of six months.

The mean self-reported preoperative disability was significantly higher in those with psychological disturbance. A total of 54 patients (82%) returned completed postoperative questionnaires. Postoperative disability scores at six months were not significantly different in the three risk groups. Psychological disturbance improved after surgery. Our study suggests that the early outcome of lumbar discectomy is not affected by preoperative psychological disturbance. We conclude that a patient with a symptomatic prolapsed intervertebral disc should not be denied surgery on the basis of preoperative psychological assessment.

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It has long been recognised that psychological disturbance is an important contributor to long-term disability from low back pain.¹⁻³ A number of studies have suggested that psychologically disturbed patients have worse outcomes

after intervention^{4,5} such as chemonucleolysis,⁶ lumbar discectomy,⁷ spinal fusion,⁸⁻¹⁰ and laminectomy.¹¹ The view is widely held that surgery should be avoided in these patients, although this has been disputed by two studies which suggest that outcome depends upon the appropriate selection of patients rather than psychological factors.^{12,13}

The Distress and Risk Assessment Method¹⁴ (DRAM) score was developed as a practical means of assessing the degree of psychological disturbance in patients with low back pain. We have used a combination of a modification of the Zung depression scale¹⁵ and the Modified Somatic Perception Questionnaire (MSPQ)¹⁶ to assess depression and somatisation of anxiety. This combination has been shown to be accurate in the assessment of psychological disturbance in patients with low back pain.^{14,17} The DRAM score has been shown to predict poor outcome in the conservative treatment of low back pain.¹⁴ It has not been formally evaluated as a predictor of the outcome after spinal surgery. Our aim was to assess the influence of preoperative psychological disturbance on the outcome of lumbar discectomy for a prolapsed intervertebral disc.

Patients and Methods

Since December 1996 all new patients presenting to our spinal clinic have been assessed using a self-administered questionnaire which includes the Oswestry disability index¹⁹ and the DRAM score.¹⁴ Patients were reassessed by the same questionnaire after treatment. We have classified them according to the method of Main et al.¹⁴ They were considered normal if the modified Zung score was less than 17 and the MSPQ less than 12. Those with a modified Zung score between 17 and 33 and an MSPQ of less than 12 were considered to be at risk, and those with modified Zung scores greater than 33 or a MSPQ of 12 or more were classified as distressed. We did not distinguish between depressive and somatic distress.

The study group consisted of patients who were admitted for lumbar discectomy for a symptomatic prolapsed intervertebral disc between March 1997 and May 1999. Patients were offered surgery if they had failed to improve during three months of conservative treatment or had a progressive neurological deficit. There were 66 patients, 32 men and 34 women, with a mean age at operation of 38 years (20 to

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58). All were assessed before operation using MRI. Only those with a demonstrable prolapse of the disc which was consistent with their clinical signs were offered surgery. Emergency admissions from accident and emergency, and patients transferred from other clinicians were excluded, since they were not assessed by a preoperative questionnaire. Patients were sent follow-up questionnaires at three and six months. Those who did not complete the initial follow-up questionnaires were sent a reminder and a further questionnaire.

Statistical analysis. For statistical analysis we used STATA 6.0 (STATA Corporation, Texas). Analysis of variance was used to investigate the association between the preoperative psychological disturbance (DRAM score) and the preoperative and postoperative self-reported disability (Oswestry index). The DRAM score was treated as a categorical variable with three groups. The preoperative Oswestry and Zung scores were distributed normally. The Wilcoxon signed rank-test was used to investigate the significance of the observed differences between preoperative and postoperative disability and psychological distress. Linear regression analysis was used to explore the relationships between variables.

Results

The preoperative DRAM scores for the 66 patients indicated that 11 had no evidence of psychological disturbance, 24 were judged to be at risk and 31 were distressed. Completed postoperative questionnaires were received from 82% (54 patients). The mean self-reported preoperative disability (Table I) was significantly higher in those with psychological disturbance (ANOVA, $p = 0.0025$). The mean disability scores improved postoperatively in each of the three risk groups (Wilcoxon signed-rank test, $p < 0.02$). There was no significant difference in the mean postoperative disability

scores between the three risk groups ($p = 0.18$, ANOVA). Linear regression analysis showed no significant relationship between disability scores and gender or age.

The mean Zung score and MSPQ (Table II) both improved significantly after surgery (Zung score $z = 5.7$, $p < 0.0001$; MSPQ $z = 4.8$, $p < 0.0001$). There was a significant relationship between changes in the Oswestry Index and the Zung score (linear regression analysis, $p < 0.001$) after operation. Psychological disturbance as assessed by the DRAM method improved after surgery. Before operation, nine patients (17%) were normal, 19 were at risk (35%) and 26 were distressed (48%). After operation, 29 patients were normal (54%), 15 were at risk (28%) and ten were distressed (19%).

Discussion

Our study suggests that the outcome of lumbar discectomy, assessed at six months using the Oswestry disability index, is not adversely affected by preoperative psychological disturbance. Earlier studies have reported poor outcomes for lumbar discectomy,⁷ spinal fusion,^{6,8,9} laminectomy¹¹ and spinal surgery in general^{4,5} in psychologically disturbed patients. We have studied only patients undergoing lumbar discectomy. All of our patients had radicular symptoms and signs, with clear evidence of a disc prolapse on MRI, constituting strong evidence of an organic basis for their symptoms. Previous studies have included patients undergoing spinal fusion for low back pain,^{4,5,8-10} but who did not have access to MRI. Selection of patients for surgery in these circumstances is more difficult. The poor results of surgery previously reported in psychologically disturbed patients may reflect intervention in patients who did not have surgically remediable pathology.¹²

The Oswestry disability index has been extensively validated as a measurement of outcome for patients with spinal

Table I. Mean preoperative, postoperative, and change in Oswestry disability scores for 54 patients who underwent lumbar discectomy (95% confidence intervals in parentheses)

Risk group	Number of patients	Oswestry Disability Index		
		Preoperative	Postoperative	Change
Normal	9	36.4 (28.7 to 44.2)	13.6 (4.8 to 22.3)	-22.8 (-9.8 to 36.0)
At risk	19	43.4 (38.0 to 48.8)	10.7 (4.4 to 17.1)	-32.7 (-25.2 to 40.2)
Distressed	26	54.3 (47.1 to 61.6)	19.6 (12.1 to 27.2)	-34.7 (-24.8 to 44.6)
Total	54	47.5 (43.1 to 51.9)	15.5 (11.1 to 19.1)	-32.0 (-26.4 to 37.7)

Table II. The mean preoperative and postoperative psychological distress scores, and the change in the score for 54 patients who underwent lumbar discectomy (95% confidence intervals shown in parentheses)

Risk group	Number of patients	Zung score			MSPQ score		
		Preoperative	Postoperative	Change	Preoperative	Postoperative	Change
Normal	9	10.6	4.4	-6.2 (-1.2 to -11.1)	1.9	1.6	-0.3 (+1.3 to -2.0)
At risk	19	24.9	14.7	-10.2 (-4.9 to -15.5)	6.1	3.3	-2.7 (-0.8 to -4.7)
Distressed	26	41.6	22.0	-19.6 (-14.1 to -25.1)	15.1	6.3	-8.8 (-5.7 to -12.0)
Total	54	30.6	16.5	-14.1 (-10.5 to -17.6)	9.7	4.5	-5.3 (-3.4 to -7.1)

pathology. It has satisfactory internal consistency¹⁸ and high retest reliability.^{18,19} It has been shown to be sensitive to change, with the mean score falling from 47 to 20 in a group of patients with successful conservative treatment for acute low back pain over a period of three weeks.¹⁸ A low Oswestry score at the time of discharge from a rehabilitation programme has been shown to correlate with the ability to return to work,¹ and also with objective measurement of physical strength, mobility and absence of spinal muscle spasm.^{20,21}

Weber²² has shown that the long-term outcome of lumbar intervertebral disc prolapse is not improved by surgical intervention. The principal indication for surgery in our practice is disabling sciatica which has not responded to conservative treatment. We have assessed the outcome of discectomy at six months because our aim is to provide early symptomatic relief. Our study did not investigate the long-term results of lumbar discectomy in psychologically disturbed patients.

We found that the mean self-reported preoperative disability scores were significantly higher in those with psychological disturbance. 'Distressed' patients reported 48% higher preoperative disability scores than 'normal' patients. This confirms the findings of other studies.²³ Hazard et al¹ have shown that both psychologically disturbed and depressed patients, assessed with the Minnesota Multiphasic Personality Inventory and the Beck depression index, respectively, have higher Oswestry scores than normal patients, when self-reported disability is compared with objective physical measurements. Psychological disturbance improved postoperatively. Before operation, 83% of patients were 'at risk' or 'distressed'. Many of these patients returned to normal after surgery, as after operation only 46% of patients were 'at risk' or 'distressed'. We found a significant relationship between changes in disability and psychological distress. These findings support the previous studies,¹²⁻¹⁴ which have reported that psychological disturbance improves after successful spinal surgery. Our study has demonstrated no significant difference in the outcome of lumbar discectomy between normal and psychologically disturbed patients. We conclude that patients with a symptomatic prolapsed intervertebral disc should not be denied surgery on the basis of preoperative psychological assessment.

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References

1. Hazard RG, Bendix A, Fenwick JW. Disability exaggeration as a predictor of functional restoration outcomes for patients with chronic low back pain. *Spine* 1991;16:1062-7.
2. Turner JA, Robinson J, McCreary CP. Chronic low back pain: predicting response to non surgical treatment. *Arch Phys Med Rehabil* 1983;64:560-3.
3. Waddell G, Main CJ, Morris EW, Di Paola M, Gray ICM. Chronic low-back pain, psychologic distress, and illness behaviour. *Spine* 1984;9:209-13.
4. Dzioba RB, Doxey NC. A prospective investigation into the orthopaedic and psychologic predictors of outcome of first lumbar surgery following industrial injury. *Spine* 1984;9:614-23.
5. Pheasant HC, Gilbert D, Goldfarb J, Herron L. The MMPI as a predictor of outcome in low-back surgery. *Spine* 1979;4:78-84.
6. Wiltse LL, Rocchio PD. Preoperative psychological tests as predictors of success of chemonucleolysis in the treatment of low-back syndrome. *J Bone Joint Surg [Am]* 1975;57-A:478-83.
7. Spengler DM, Ouellette EA, Battié M, Zeh J. Elective discectomy for herniation of a lumbar disc: additional experience with an objective method. *J Bone Joint Surg [Am]* 1990;72-A:230-7.
8. Turner RS, Leiding WC. Correlation of the MMPI with lumbosacral spine fusion results: a prospective study. *Spine* 1985;10:932-6.
9. Wilfling FJ, Klonoff H, Kokan P. Psychological, demographic and orthopaedic factors associated with prediction of outcome of spinal fusion. *Clin Orthop* 1973;90:153-60.
10. Wiltse LL. Psychological testing in predicting the success of low back surgery. *Orthop Clin North Am* 1975;6:317-8.
11. Uomoto JM, Turner JA, Herron LD. Use of the MMPI and MCMI in predicting the outcome of lumbar laminectomy. *J Clin Psychol* 1988;44:191-7.
12. Waddell G, Morris EW, Di Paola MP, Bircher M, Finlayson D. A concept of illness tested as an improved basis for surgical decisions in low-back disorders. *Spine* 1986;11:712-9.
13. Watkins RG, O'Brien JP, Draugelis R, Jones D. Comparisons of preoperative and postoperative MMPI data in chronic back patients. *Spine* 1986;11:385-90.
14. Main CJ, Wood PL, Hollis S, Spanswick CC, Waddell G. The distress and risk assessment method. *Spine* 1992;17:42-52.
15. Zung WWK. A self-rating depression scale. *Arch Gen Psychiatry* 1965;12:63-70.
16. Main CJ. The modified somatic perception questionnaire (MSPQ). *P Psychosom Res* 1983;27:503-4.
17. Greenough CG, Fraser RD. Comparison of eight psychometric instruments in unselected patients with back pain. *Spine* 1991;16:1068-74.
18. Fairbank JC, Couper J, Davis JB, O'Brien JP. The Oswestry low back pain disability questionnaire. *Physiotherapy* 1980;66:271-3.
19. Triano JJ, McGregor M, Cramer GD, Emde DL. A comparison of outcome measures for use with back pain patients: results of a feasibility study. *J Manipulative Physiol Ther* 1993;16:67-73.
20. Gronblad M, Hurri H, Kouri JP. Relationships between spinal mobility, physical performance tests, pain intensity and disability assessments in chronic low back pain patients. *Scand J Rehabil Med* 1997;29:17-24.
21. Triano JJ, Schultz AB. Correlation of objective measure of trunk motion and muscle function with low back disability ratings. *Spine* 1987;12:561-5.
22. Weber H. Lumbar disc herniation: a controlled, prospective study with ten years of observation. *Spine* 1983;8:131-40.
23. Greenough CG, Fraser RD. Assessment of outcome in patients with low-back pain. *Spine* 1992;17:36-41.