

Predicting the outcome of sciatica at short-term follow-up

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SUMMARY

Background: *The prognostic value of the clinical findings elicited in the patient presenting with sciatica is unknown.*

Aim: *To investigate whether history and physical examination findings can predict outcome.*

Design of study: *Prospective study of prognostic factors.*

Setting: *A sample of primary care patients with sciatica.*

Method: *Short-term favourable outcome was registered as improvement perceived by the patient after two weeks. Long-term failure was defined as eventual surgery or lack of improvement after three months.*

Results: *The signs and symptoms that most consistently predicted an unfavourable outcome were: a disease duration of more than 30 days; increased pain on sitting; and more pain on coughing, sneezing or straining. The straight leg raising test and, to a lesser degree the reversed straight leg raising test, were the most consistent examination findings associated with poor outcome. Chances of short-term improvement were also related to the body weight relative to the length.*

Conclusion: *The predictors in this study can indicate the prognosis of patients with sciatica at an early stage. Knowledge of these prognostic factors may help to fine tune treatment decisions and improve patient selection in trials of conservative therapy strategies.*

Keywords: *sciatica; back pain; outcome assessment.*

Introduction

THE natural course of sciatica^{22,17,23} is favourable in most patients and the primary management challenge is adequate pain control. However, some patients do not improve even in the long term. If a disc herniation is found to be the cause of the sciatic syndrome then patients may become surgical candidates. In any case, patients with poor long-term outcome or eventual lumbo-sacral discectomy may be regarded as patients with an unfavourable outcome of the relatively benign sciatic syndrome. The question arises as to whether an eventual unfavourable outcome may be predicted at an early stage.

Only one study³ has addressed the prognostic value of clinical findings in the patient with sciatica. In this study, the clinical data were gathered retrospectively and patients included were selected because they had undergone magnetic resonance imaging. This introduces a bias because the more severely affected will have had a higher likelihood of being included in the study.

In this paper we present a prospective study to find out whether clinical findings at baseline could predict outcome. In addition, the natural course of the sciatic syndrome (regardless of the cause) was reconstructed.

Method

Study population

Between February 1995 and December 1996, 50 general practitioners (GPs) in Maastricht and surrounding villages invited patients to participate in a study on sciatica. Patients were referred to the neurology department of the Maastricht University Hospital if they presented for the first time with an episode of sciatica with a pain intensity sufficient to justify further therapy. They had to have at least two of the following signs and symptoms: typically dermatomal pain distribution; increased pain in the leg on coughing, sneezing or straining; decreased muscle strength; sensory loss; reflex loss; and/or positive nerve root irritation signs. Patients with the following factors were excluded: previous spinal surgery; concurrent Worker's Compensation claims; pregnancy; unavailability for follow-up visits (e.g. plans to move house); serious comorbidity or an indication for immediate surgical intervention; intractable pain; rapid progression of paresis; a severe paresis of limited duration; or cauda equina syndrome. This study was performed concurrently with a randomised controlled trial of bed rest.²² The study was approved by the institutional review board of the Maastricht University Hospital, and all the patients provided written informed consent.

Baseline examinations

All subjects selected were examined within two days of refer-

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HOW THIS FITS IN*What do we know?*

The natural course of sciatica is favourable in most patients and the primary management challenge is adequate pain control. However, some patients do not improve even in the long term. The question arises as to whether an eventual unfavourable outcome may be predicted at an early stage.

What does this paper add?

About one-third of patients will have recovered two weeks after presentation and about three-quarters after three months. Surgery was a definite alteration not only of the natural course, but the course of sciatica after minimal conservative therapy. A number of signs and symptoms in the history and physical examination predict different types of outcome in patients with sciatica, e.g. an increase of pain on coughing, sneezing or straining is a consistent indicator of a poor prognosis. The predictors of this study indicate the prognosis in patients with sciatica at an early stage, which may help to fine tune treatment decisions.



ral by the GPs. A straight leg raising (SLR) test was performed by raising the patient's straight leg with the patient in a supine position. If this provoked a typical, dermatomal pain in the leg the test was considered positive. This procedure followed the original description of the test in the 1881 thesis by Forst, a pupil of Laségue.

The reversed SLR (known as the femoral nerve stretch test) was performed with the patient in the lateral recumbent position. After a 15° retroflexion of the straight leg in the hip, the knee was bent. If the latter procedure intensified or provoked the patient's leg pain, the test was considered positive.

Paresis was tested as described by the Medical Research Council. Light touch was tested by softly stroking the skin in dermatomal patterns, and pain sensation by applying the blunt and sharp edges of a plastic stick. The finger-to-floor distance was tested by having the standing patient reach for the floor with full knee extension, and the distance between middle fingers and the floor was then measured. A detailed description of investigative technique and the variabilities between observers are reported elsewhere.

Three classes of independent variables were investigated for their prognostic value (Table 1). An additional variable was included, indicating inclusion in the bed rest or 'watchful waiting' group in the trial. Differences in the qualitative description of pain were assessed at baseline, two weeks, and 12 weeks, with the McGill Pain Questionnaire,¹¹ in which patients choose words that best fit their pain, resulting in a total pain rating index. This was directly monitored by an anonymous researcher. Two functional status questionnaires: the modified Roland Disability Scale, and the revised Oswestry Low Back Pain Questionnaire, were completed by the patients at baseline.^{2,4,7,14}

Outcome parameters

Patients were seen by one outcome assessor and they completed questionnaires at baseline and after two weeks and

12 weeks. The patients indicated whether their condition had worsened, had remained unchanged, had improved or had improved greatly. Major improvement after two weeks was defined as major improvement as reported by the patient. Poor outcome after three months was defined as the absence of any improvement, or eventual surgery. To assess the influence of defining surgery as a poor outcome, we repeated the analysis to predict poor outcome in the patients treated conservatively throughout.

Statistical analysis

First, a bivariate analysis was performed for all variables in Table 1. Dichotomous baseline parameters were compared to dichotomous outcomes (major improvement after two weeks and favourable outcome after three months) by the χ^2 test for independent proportions. Continuous outcome measures were compared for the two classes by Student's *t*-test. A Pearson correlation coefficient was calculated for the associations between continuous variables. Multiple logistic regression analysis⁹ was used to predict favourable outcome after two weeks and 12 weeks. Set I (Table 1) was modelled first, then Set II, incorporating the predictive variables from the model of Set I. The predictors from Set I and II were then used with the variables of Set III. Presented in Tables 3 and 4 are all variables that were significantly associated with outcome in the bivariate analysis, or that were significantly predictive of outcome in the final reduced logistic regression models.

Results

Of 338 patients referred by GPs for low back pain, 227 had sciatica. Forty-four patients, who had slightly less severe disease (as scored on the visual analogue scale by the observer) and a somewhat lower score on the affective dimension of the McGill Pain Questionnaire,¹⁰ declined to participate. Of the 183 finally selected, two patients who reported improvement did not return after two weeks. After three months a total of 14 patients had been lost to follow-up; nine were unwilling to return, two had moved, two had incurred serious unrelated illnesses, and one had been imprisoned. Their baseline characteristics and success rate after two weeks were similar to the 169 remaining patients. The baseline characteristics of the 183 patients selected are shown in Table 1. The median duration of disease at baseline was 16 days, but more than 30 days for 26% of patients.

After two weeks, 36% of the patients showed major improvement. After 12 weeks, 73% of patients showed reasonable to major improvement without surgery. Of the 49 patients with poor outcome, 71% will have undergone surgery one year after initial presentation.

In Table 2, the second column shows the percentage of patients with a particular finding that shows a favourable outcome at follow-up. The next column shows the percentage recovering when the finding was absent. In Figure 4, for example, 85% of patients with a positive SLR test recover, while 69% of patients with a negative SLR recover. Decreased pain at night, the tendency to improve already at baseline, decreased pain on increase of pressure, and a higher Quetelet index (reflecting the weight divided by the squared length) are the factors related to favourable out-

Table 1. Patient characteristics (n = 183).

Set I: demographic	%	Set II: signs and symptoms	%	Set III: physical examination	%
Age	46 ^f	Leg pain greater than back pain	69	Decreased lordosis	26
Male sex	56	Sudden onset of pain	43	Finger-to-floor distance >24 cm	41
Tertiary education	24	Cause of pain known	33	Paresis	18
Living alone	11	Pain worse at night	33	Hypaesthesia	33
Employed	61	Paroxysmal pain	39	Hypalgesia	14
Previous sciatica	37	Pain already improving	28	Ankle tendon reflex difference	15
Previous low back pain	73	Observer's opinion ^a	59 (m)	Knee tendon reflex difference	9
Family history	32	Typically dermatomal pain	92	SLR test	71
Comorbidity	34	Increased pain on pressure ^b	49	Reversed SLR test	24
Smokers	48	Pain on sitting	54	Valleix points ^c	11
Active in sporting activities	44	Decreased pain on lying down	99	Kemp sign present ^d	41
Has exercised abdominals	37	Decreased pain when upright	97	Naffziger sign present ^e	15
Quetelet index	25.2 ^f	Subjective weakness	26		
Questionnaire results		Subjective sensory loss	45		
Revised Oswestry	28 ^f	Cold sensations	30		
Roland Disability	5.3 ^f	Paraesthesias in the leg	54		
McGill Pain	19.4 ^f	Disturbed urinary passage			
		Urinary incontinence	4		
		Health worries	28		

^aComplaint severity scored on a visual analogue scale. ^bDuring coughing, sneezing or straining. ^cTenderness along the sciatic nerve.^{5,20} ^dPain on lateroflexion and axial pressure of lumbar spine.^{9,20} ^ePain on compression of jugular veins.^{5,20} ^fMean values.

Table 2. Predictors of major improvement over following two weeks (n = 183).

Clinical findings	Percentage showing improvement		Crude odds ratio ^a (95% CI)	Adjusted odds ratio (95% CI) ^b
	Present	Absent		
Most pain at night	25	42	0.5 (0.2–0.9)	0.4 (0.2–0.9)
Already improving from baseline	53	30	2.7 (1.4–5.2)	2.9 (1.3–6.4)
More pain on increase of pressure	24	47	0.4 (0.2–0.7)	0.3 (0.1–0.6)
Finger-to-floor distance >25cm	38	20	1.3 ^c	2.1 (1.0–4.3)
Disturbed light touch sensation	45	32	1.8 ^c	2.5 (1.2–5.1)
Quetelet index ^d	–	–	0.8 (0.79–0.96)	0.88 (0.78–0.98)

^aDemonstrates crude odds ratios, i.e. associations between findings and outcome in a univariate logistic model. ^bThese findings significantly contribute to prediction of the logistic regression model. The complete reduced model is presented. The intercept for this model is 2.59 (95% CI = 0.73–242). The presented adjusted odds ratios are derived from the final reduced multiple logistic regression model. ^cNon-significant association in the bivariate analysis. ^dThe Quetelet index is a continuous measure. The mean Quetelet index in the group with major improvement was 24.1, and in the group without major improvement 25.8. The *P*-value for difference in means was 0.009.

come at two weeks. For example, on average, patients with a favourable short-term outcome had an index of 24.1, while those with an unfavourable outcome had a higher relative body weight of 25.8 kg/m². When the independent predictive properties of the clinical findings were investigated in a multivariate analysis, the final optimally predictive model incorporated the finger-to-floor distance and disturbed light touch sensation, besides the four predictors from the analysis.

Table 3 shows that a model that best predicts outcome at three months contains only three variables: a duration of disease of more than 30 days, a positive SLR test, and a reversed SLR test. While a trend towards recovery at baseline and more pain on increase of pressure were associated with favourable outcomes, these findings did not contribute to a logistic regression model. Even when patients with eventual surgery were excluded from the analysis, the duration of disease and the SLR test remained predictors of poor outcome.

Discussion

Success rates of conservative therapies for sciatica vary from recovery for nearly all patients in the reports by Saal and Saal^{17,16} to a 30% rate of major complaints after eight years reported by Pearce and Moll.¹³ In general, sciatica is considered to have a favourable natural course¹⁸ and in an approximation of the literature, it can be stated that three-quarters of patients with sciatica will have recovered after between three and five months.¹⁹ This is confirmed by our study, which shows that about one-third of patients will have recovered two weeks after presentation and about three-quarters after three months.

There is no actual study of the natural course of sciatica. In all studies to date, intercurrent therapies have been given that may have changed the natural course of sciatica in some way or another, even in the case of placebo therapies. In this study, surgery was a definite alteration of the natural course. We demonstrate not the natural course, but the course of sciatica after minimal conservative therapy, i.e. two weeks of bed rest in approximately half the patients, anal-

Table 3. Predictors of favourable outcome after 12 weeks.^a

Clinical findings	Percentage showing improvement		Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
	Present	Absent		
Regarding eventual operation as unfavourable outcome (<i>n</i> = 183)				
Duration of pain 30 days or less	40	23	0.3 (0.1–0.6)	0.1 (0.05–0.2)
Already improving at baseline	53	30	2.9 (1.2–6.9)	— ^b
More pain on increase of pressure	24	47	0.5 (0.2–0.97)	— ^b
Positive SLR	69	85	0.4 (0.2–0.9)	0.4 (0.1–0.9)
Positive reversed SLR	61	77	0.5 (0.2–0.97)	0.4 (0.2–0.9)
Excluding patients with eventual surgery from the analysis (<i>n</i> = 156)				
Duration of pain more than 30 days	69	93	0.2 (0.10–0.6)	0.1 (0.03–0.4)
More pain on sitting	92	81	2.8 (0.99–7.8)	4.0 (1.20–13.2)
Positive SLR	83	94	0.3 (0.10–1.3)	0.2 (0.05–0.8)

^aThe complete reduced models are shown. The intercept for the model with eventual surgery is 14 (95% CI = 5.2–38). ^bThese factors were related to outcome in the bivariate analysis but did not contribute to the predictive properties of the logistic regression model.

gesics, and hypnotics. The course was considered unfavourable if the patient perceived a lack of improvement (in any respect) at three months. Also, if at any point the duration and intensity of pain and decline in functional status was such that a change from minimal conservative therapy to surgery was considered necessary, both by the patient and the doctor treating them, the course was considered unfavourable. The drawback is that both these aspects of outcome are subjective and may be influenced by psychosocial factors and by treatment preferences of the patient and treating physician. The advantage is that outcome is presented in the manner most relevant to the patient.

Carragee and Kim have previously studied the association between clinical findings and outcome of sciatica.³ In their study with retrospective gathering of clinical data, a duration of disease of more than six months, a Worker's Compensation claim, and being in an older age group, predicted poor outcome. The duration of disease features as a predictor of outcome in our study as well. Concurrent Worker's Compensation claims were among the exclusion criteria in our study, not only because the prognosis of this group may be different, but also because the diagnosis of sciatica may be more troublesome. Older age was not a poor prognostic sign in our study. Other studies have focused on the outcome of surgery and of rehabilitation after surgery.¹² Favourable outcome of surgery was predicted by sedentary work, absence of motor or sensory deficits, and preoperative autotractor,¹ and unfavourable outcome by abnormal hysteria and hypochondriasis subscales of the Minnesota Multiphasic Personality Inventory.^{6,24} None of these factors were relevant in our study of minimal conservative therapy for sciatica. The scores of the Roland Disability Scale, the Oswestry Low Back Questionnaire and the McGill Pain Questionnaire, were not related to outcome.

Our study shows that a number of signs and symptoms in the history and physical examination predict different types of outcome in patients with sciatica. Our definition of sciatica was derived from the Dutch consensus statement on sciatica. It seems logical that a trend towards recovery at presentation should predict favourable short-term outcome.

Similarly, when sciatica has been present for more than 30 days at presentation, the chances of improvement are diminished compared with shorter disease duration. Of the signs and symptoms, an increase of pain on coughing, sneezing or straining is a consistent indicator of a poor prognosis. It could be hypothesised that this symptom predicts poor outcome because it predicts eventual surgery.²¹ On the contrary, an increase in pain on sitting predicts poor outcome in patients who do not have surgery. Previously, the SLR test had been shown to predict poor outcome for low back pain patients;¹⁵ however, this may have been because a positive SLR test is associated with sciatica and because sciatica has a worse prognosis than low back pain. Even among patients with sciatica, the SLR test is a consistent indicator of a poor prognosis. In addition, among patients who do not have surgery but who have a poor outcome, the SLR test is more frequently positive. Interestingly, weight relative to length of the patient is associated with short-term recovery. This may be a direct causal relation in which case strategies to reduce weight may prove worthwhile also for sciatica patients. Alternatively, relative weight may be correlated with factors such as degree of physical activity, lifestyle, and hypertension, which may explain the association with outcome.

Most conservative interventions are ineffective for the majority of patients with sciatica.¹⁹ They may, however, have an effect on a particular subgroup, e.g. groups with a particular prognosis. The predictors of this study indicate the prognosis in patients with sciatica at an early stage, which may help to fine tune treatment decisions. For example, the decision to prescribe a more extensive physical therapy programme might take into account the likelihood of a future unfavourable outcome. It may also improve patient selection for trials of conservative therapy strategies.

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