Clinical history in lumbar disc herniation

A prospective study in 160 patients

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In a prospective study of 160 consecutive patients who underwent primary surgery for lumbar disc herniation, we investigated the value of clinical history for diagnosing the degree of herniation—the main prognostic factor for the postoperative outcome. At surgery, the patients were classified into two groups: intact anulus (negative exploration or protruding disc) and ruptured anulus (subligamentary perforation or complete perforation). The strongest variables predicting the degree of herniation were duration of leg pain, progressive leg pain, educational level and whether or not the patient had previously undergone non-spinal surgery. In patients with ruptured anulus, the median durations of low back pain and sciatica were 16 and 10 weeks, respectively. The corresponding figures for the group with intact anulus were 79 and 50 weeks. 18% of those with ruptured anulus and 39% of those with intact anulus were undergoing medical or psychiatric treatment for other diagnoses; 32% and 55% had previously undergone non-spinal surgery. Thus the two groups differed not only in disc pathology but also in medical, behavioral and social factors that must be taken into account in the preoperative assessment and that may explain discrepancies between impairment and disability.

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Many symptom-free people have lumbar disc herniation discernible on MRI (Boos et al. 1995). Clinical evaluation therefore remains the bedrock for diagnosis and therapy (Morris et al. 1986, Schoedinger 1987, Spengler et al. 1990). Yet only a few prospective studies focus on the clinical history of lumbar disc herniation (Table 1), in contrast to a plethora of studies on diagnostic imaging and surgical techniques. Although the value of clinical history is reverently mentioned in medical textbooks, there are few systematic investigations on its validity and reliability (Kelsey 1975, Nelson et al. 1979, Deyo et al. 1992). In patients with chronic low back pain, the impact of extraspinal factors has been highlighted (Westrin et al. 1972, Svensson et al. 1983, Sandström et al. 1984, Biering-Sørensen and Thomsen 1986, Frymoyer and Cats-Baril 1987). Particularly psychologic factors have a large impact on the outcome of surgical treatment (Kosteljanetz et al. 1984, Herron and Turner 1985, Dvorak et al. 1988, Spengler et al. 1990). Therefore, psychologic tests have been used in the routine assessment before spinal surgery, and recently psychosocial factors have been shown to improve the diagnostic accuracy in identifying symptomatic disc herniations (Boos et al. 1995). Considerably less has been written about somatic comorbidity.

In this study we investigated whether psychosocial, medical and pain-related anamnestic factors differed between lumbar disc herniation patients with or without rupture of the anulus fibrosus, since the grade of herniation is the main prognostic factor after surgery (Reynolds et al. 1959, Spangfort 1972, Weir 1979, Hurme and Aralanta 1987, Spengler et al. 1990).

Table 1. Literature references on the importance of various factors with reported negative effect on the outcome of lumbar disc surgery

	A	B	C	D	E
Number of patients	220	100	84	95	100
Age > 40	+				+
Compensation					+
Long duration	+			+	+
Low education	+				
Female gender		+			
Occupational factors	+			+	
Previous hospitalization					+
Psychological disorders	+	+	+	+	
Somatic symptoms/disease	+				

A Hurme and Alaranta 1987.
B Kosteljanetz et al. 1984.
C Spengler et al. 1980.
D Waddell et al. 1986.
E Weir 1979.

Table 2. Anamnestic factors in patients with lumbar disc hernia (%)

	Ruptured anulus (n 98)	Intact anulus (n 62)	P-value	Missing values [a]
Demographic and social factors				
Age (mean SD)	43 11	43 9	0.4	
Gender, female	46 (47)	29 (47)	1.0	
Education above elementary school	74 (76)	34 (55)	0.007	
Physically heavy work	12 (12)	10 (16)	0.5	
Medical factors				
Concomitant disease	18 (18)	24 (39)	0.005	
Number of concomitant diagnoses (mean SD)	0.22 0.49	0.47 0.56	0.002	
Alcoholism	0 (0)	7 (11)	0.0002	
Psychiatric disease	3 (3)	5 (8)	0.16	
Subjected to previous non-spinal surgery (all operations included)	31 (32)	34 (55)	0.004	
Number of previous operations (mean SD)	0.5 0.9	1.0 1.1	0.0005	
Appendectomy	6 (6)	13 (21)	0.005	
Gynecological operation (n 46 and 29, respectively)	8 (17)	13 (45)	0.01	
Pain-related factors				
Leg pain (duration months) [b]	4 (1–14)	18 (7–29)	0.0001	
Progressive leg pain				
Yes	64 (65)	22 (36)	0.001	
No	32 (33)	38 (61)		
?	2 (2)	2 (3)		
Scheduled for surgery via emergency dept.	60 (65)	5 (8)	<0.0001	2
Pain worst				
a.m.	37 (38)	17 (27)	0.005	
p.m.	10 (10)	19 (31)		
?	51 (52)	26 (42)		
Pain aggravated by walking				
Yes	24 (29)	27 (48)	0.05	20
No	40 (48)	17 (30)		
?	20 (24)	12 (21)		
Pain started during				
Free time	31 (37)	11 (20)	0.08	20
Work	34 (41)	29 (52)		
?	19 (23)	16 (29)		
Leg pain on coughing				
Yes	58 (78)	25 (58)	0.06	43
No	11 (15)	14 (33)		
?	5 (7)	4 (9)		
Urinary complaints				
Yes	16 (19)	20 (36)	0.06	20
No	51 (61)	24 (43)		
?	17 (20)	12 (21)		
Disability rating index (%), median (interquartile range)	68 (60–86)	64 (61–80)	0.5	
Result				
Complete relief of leg pain after 2 years	60/92 (65)	22/53 (41)	0.006	15

[a] No, multiple or unclear answers or missing data or lost protocols.
[b] Median (95% confidence intervals).

Patients and methods

160 consecutive patients, 85 men with a mean age of 43 (SD 10, range 19–68) years underwent primary surgery for suspected lumbar disc herniation because of severe sciatica, with clinical and radiographic signs of lumbar disc hernia. Preoperatively, the patients graded their subjective disability, using the disability rating index (Salén et al. 1994), a 12-item visual analogue scale test. They also filled in a form regarding, e.g., past and present medical and psychiatric history, natural functions, history of pain, previous treatment, and all previous medical records were reviewed. Only patients who were currently under medical or psychiatric treatment with a definite diagnosis were considered to have comorbidity. The patients' educational level was classified as "high" (academics and skilled workers) or "low" (no further education after elementary school). Physical work load was separately classified as high or low.

At surgery, disc pathology was graded as intact anulus: negative exploration (13) and protruding disc (49) or ruptured anulus: subligamentary perforation

Table 3. Number of previous non-spinal operations in patients with lumbar disc hernia

Number of operations	Number of patients	Percentage of patients with ruptured anulus
0	94	71
1	32	56
2	20	50
3–4	14	21

Table 4. Odds ratios for various clinical history factors for the diagnosis of ruptured anulus

	Odds ratio	95% confidence interval
Intercept	3.384	(0.38, 30)
Duration of sciatica (weeks)	$1/(D)^{0.76}$	(0.41, 1.11) [a]
Education	3.223	(1.3, 7.8)
Progressive sciatic pain	2.7696	(1.2, 6.3)
Previous non-spinal surgery	3.523	(1.6, 8.0)

[a] Confidence interval of the exponent.
D interval onset of sciatica and surgery in weeks.

(39) and complete perforation (59). Thus there were 98 patients with ruptured anulus and 62 with intact anulus. Those with spinal stenosis and other kinds of pathologic change were excluded from the investigation. Kruskal-Wallis test, chi-square analysis or Fisher's exact test at a rejection level of 5%, as well as a model for logistic regression analysis (Christensen 1990) were used.

Results

Most patients had been through several previous episodes of back and leg pain. Patients with ruptured anulus had a shorter duration of back pain and sciatica than those with intact anulus (Table 2). Degree of herniation was not related to age, gender, body weight or stature. However, patients with an intact anulus had a higher incidence of comorbidity and previous non-spinal surgery (Tables 2 and 3). Patients with a ruptured anulus reported a lower incidence of acute onset, but a higher incidence of progressive pain. The two groups also had different circadian pain patterns. However, we found no association between degree of herniation and injury or whether the symptoms had started during work. Nor was there any significant difference in the occurrence of precipitating or aggravating factors—e.g., sitting or coughing. In both groups, about half the patients stated a definite opinion about a causative or triggering factor for sciatica, but there were no differences between the groups. Most patients had difficulties in sleeping and about one fifth suffered from continuous insomnia. Disability rating index revealed no significant difference between the groups.

Logistic regression analysis showed that the strongest predictors for grade of herniation were duration of sciatica, deterioration of sciatica, educational level, and previous non-spinal surgery (Table 4). From this model, one can calculate odds for every conceivable combination of values for the explanatory variables. For example, a patient who has a high level of education with a deteriorating sciatica of 1 month's duration and no previous surgery obtains an odds of having a ruptured anulus of 36. Correspondingly, a patient with non-progressive sciatica for 1 year, with a low education and previous surgical procedures gets an odds of 0.168. The latter patient's odds for having an intact anulus is thus 1/0.168, i.e., 6. After 2 years, complete relief from leg pain was commoner in patients with ruptured anulus (Table 2).

Discussion

Persistent pain after lumbar disc surgery was felt by patients with disc protrusion (Spangfort 1972, Fager and Freidberg 1980, Spengler et al. 1980). This paradox—that the outcome after surgery is less favorable in patients with the least tissue injury (intact anulus) than in patients with a more extensive disc injury (ruptured anulus)—indicates that extraspinal factors are also important for the outcome. The overrepresentation of previous non-spinal surgery and somatic comorbidity in the group with intact anulus indicates that these patients largely represent a different population from the group with ruptured anulus. The influence of somatic disorders on the outcome of disc surgery has previously been noted: Weir (1980) reported an incidence of somatic comorbidity around 24% and gross obesity in 16% of patients operated on for lumbar disc hernia. Finneson (1978) noted a high incidence of somatic pain from other causes in patients with failed spinal surgery; Rich (1984) found poor surgical results in diabetics. Nonspecific somatic symptoms are associated with poor surgical results (Hurme and Alranta 1987), and patients having undergone multiple surgical procedures for lumbar disc herniation are reported to show a high incidence of drug abuse and somatic complaints (Raskind and Glover 1975, Spengler et al. 1980).

From a strictly biologic point of view, it is hard to pinpoint a common pathogenetic denominator explaining the uneven clustering found in the present

study. Although diabetes mellitus and thyroid disorders, e.g., have direct effects on the composition of connective tissue, it seems unlikely that differences between the groups are mainly caused by mechanisms acting on connective tissue. It seems more likely that behavioral/psychologic factors are operative. It is well known that psychologic disorders affect the outcome after spinal surgery (Dvorak et al. 1988, Spengler et al. 1990) and psychologic tests are used in the preoperative assessment in spinal surgery. The finding of a higher incidence of previous surgical procedures in patients with intact anulus indicates that many of them already had an established illness behavior. It is interesting to note the difference in gynecologic operations which, like orthopedic procedures, are often performed because of pain and discomfort, rather than on absolute indications. A similar pattern was found for appendectomy, where pain is also a main indication for operation. The other types of operations were too few to attain individual statistical significance.

Moreover, the diagnosis of disc protrusion is uncertain. In a symptom-free normal population, MRI reveals that 25–40% have herniations (Boden et al. 1990, Jensen et al. 1994). Moreover, not less than 76% of a symptom-free group that was age-, sex- and risk-factor matched to a discectomy group had herniation on MRI; the corresponding figure for the operated group was 96% (Boos et al. 1995). Even at surgery there is no sharp demarcation between negative exploration and a protruding disc. Dislocation of the disc over anatomical limits and root involvement can be difficult to identify during surgery, when the anulus is intact. In addition, disc protrusion probably varies with load and position; the maximal degree of protrusion may not be apparent at surgery, with the patient under anesthesia lying prone on a frame.

Like Kosteljanetz et al. (1984) we found that about one third of the patients reported an acute onset of sciatica. Patient recall, however, is often inaccurate, influenced by factors like compensation and insurance coverage (Kelsey 1975). The clinical history is, by definition, subjective and the patients' opinion about the severity of symptoms and related disability is therefore affected by their overall situation. Most patients recalled that back pain generally preceded sciatica, a gradual onset of back pain/sciatica, and several previous attacks of back pain/sciatica. This might favor the view that a continuous degenerative process precedes the hernia.

As to duration of sciatica, several authors consider it a negative prognostic factor (Hurme and Alaranta 1987, Spengler et al. 1990), whereas others find that duration per se does not influence the outcome after surgery (Rish 1984). The most characteristic pain feature of patients with ruptured anulus was progressive pain—the main indication for disc surgery (Spengler et al. 1990)—which, of course, is presumably just why this group had a shorter duration of symptoms. In addition to severity of pain, the interval between onset and surgery is clearly affected by social and economic factors, like insurance coverage and availability of medical facilities. Education was a strong predictor: a blue collar worker has a restricted liberty to adapt his work situation. For a white collar worker, the pain may have less serious social and economic consequences and therefore not prompt him to undergo surgery.

The fact that only about half of patients with disc protrusion improve after surgery (Spangfort 1972) indicates that many of the protruding discs removed at surgery were not the major cause of pain and disability, but that these patients suffer from referred pain and clinical/radiographic signs mimicking disc herniation rather than from compressive radicular pain. In lumbar disc hernia, pain is almost the only indication for surgery. However, there is often an incongruence between pain, physical impairment and self-reported disability (Blaauw et al. 1988, Hazard et al. 1994). Our two groups showed no significant difference in disability rating index. Although disability is not a linear function of impairment, it is interesting to compare the present material with other medical conditions. Salén et al. (1994) found that a group of healthy persons scored an index of 0.8%, arthrosis patients on the waiting list for total hip replacement 65%, and wheelchair-bound multiple sclerosis patients 85%. Clinically, however, the patients with ruptured discs appeared to have suffered a considerably higher degree of physical impairment, as shown by their more restricted spinal range of motion and higher incidence of crossed Lasègue sign (Vucetic and Svensson 1996). Obviously, this was also the surgeons' opinion since these patients had a shorter symptom duration before surgery and a larger fraction of them were scheduled for surgery via the emergency department. Total disability is thus the result of multiple factors, e.g., social, economic, somatic and psychologic factors which must be taken into account in identifing patients likely to benefit from surgery—and even more importantly those who are apt to do poorly. Therefore, disability per se should not serve as an indication for surgery.

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