PSYCHOLOGICAL DISTRESS DETERIORATES THE SUBJECTIVE OUTCOME OF LUMBOSACRAL FUSION A PROSPECTIVE STUDY

J. VAN SUSANTE [1], D. VAN DE SCHAAF, P. PAVLOV

A prospective study was set up to evaluate the influence of psychological distress on the outcome of lumbosacral fusion in a group of chronic low back pain (CLBP) patients. Response to low back surgical procedures depends upon physical and psychological factors. Various reports exist concerning the influence of a patient's psychological condition on the outcome of low back surgery. Few investigators, however, have checked this influence in a prospective manner. A psychogenic back pain score (NPL) was administered to 53 CLBP patients (24 men and 29 women) prior to surgery, to evaluate the presence of psychological distress. According to the test score patients were divided in an "organic", an "uncertain" and a "psychogenic" group. Disability in activities of daily living resulting from the back pain was also scored preoperatively with the Oswestry Disability Index (ODI). Twelve months after surgery the ODI was readministered to the 50 patients available to follow-up. Each group separately showed significant improvement of disability 12 months after fusion, however, the "organic" group scored significantly better than the "psychogenic" group. Questionnaires about back pain, sciatic pain and use of analgesics and Visual Analog Scales regarding pain and disability also indicated better results in the "organic" group. Psychological distress deteriorates the subjective outcome of lumbosacral spine fusion and psychological screening should indeed be an integral part of the global assessment of CLBP patients, especially when surgery is considered.

Keywords : spinal fusion ; psychological factors ; prognosis ; prospective.
Mots-clés : arthrodèse lombo-sacrée ; facteurs psychologiques ; pronostic ; étude prospective.

INTRODUCTION

Chronic low back pain (CLBP) represents a major health problem. Various studies indicate that two out of three people will have an episode of low back pain at some point during their lives (20, 22). From all low back pain patients, only 5% come to experience chronic symptoms ; however, this small minority accounts for 70-90% of the total expenditure on back treatment (9). Less than half of the patients disabled by back pain for more than 6 months ever return to work, and chances of re-employment practically vanish after 2 years (14). This indicates that the economic consequences of low back pain, especially chronic low back pain, are of great magnitude. Surgery on CLBP patients cures only a small minority, and patient selection has proved to be determinant in achieving successful results (13, 14).

It is now well established that recovery from low back pain, not only depends on physical but also on psychological factors (24, 2, 18). Patients with CLBP are commonly found to exhibit increased levels of emotional distress (27, 21). Psychological distress can be seen as the cause of this low back pain, or vice versa. Irrespective of its origin the response of low back pain to surgical

[1] Dept. of Orthopaedic Surgery, St. Maartenskliniek, P.O. Box 9011, 6500 GM, Nijmegen, The Netherlands.
[2] University Hospital Nijmegen, Department of Orthopaedics, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands.
Correspondence and reprints : J. van Susante.

procedures appears to be strongly influenced by psychological factors (19, 27). To select patients for lumbosacral fusion the objective radiographic criteria alone are not specific enough (3) and surgeons should therefore also consider the patients' emotional stability. As Hoover (15) stated, "Evaluation of the contribution of emotional stability to the patients's pain is by far the most difficult problem and the source of greatest error in making a decision as to fusion".

There has been much interest in identifying variables that can predict the outcome of low back surgery in CLBP patients. Several studies have attempted to determine what variables are important in predicting and achieving a successful outcome of spinal fusion (8, 3, 14, 21). The predictive value of most of these factors varies from series to series (24, 2). Few investigators, however, have studied this problem in a prospective manner.

The presence of psychopathology in CLBP patients is most commonly measured with the Minnesota Multiphasic Personality Inventory (MMPI) (4, 24, 17). Surgery may be more effective in patients with normal MMPI scores (6, 27, 14), whereas the typical "Conversion-V profile" of the hypochondriasis, depression and hysteria scores implies a poor prognosis (19, 24). The MMPI, however, encounters a semantic problem (5). Its validity disappears when the questions are translated into a non-English language. This has led to the creation of equivalent psychological tests in other languages, such as Finnish (16). Comparatively, Zant *et al.* (1987) developed a Dutch psychogenic back pain score to detect psychological distress in CLBP patients (29, 30) ; this test was used in our study.

The purpose of this study was to determine prospectively whether the presence of psychological distress influenced the subjective outcome of spinal fusion in a group of CLBP patients.

MATERIALS AND METHODS

Patient selection. Patients had surgery recommended after non-operative treatment failed to provide adequate relief of their back pain. Moreover, spondylodesis was not considered unless there was at least a 6-month history of disabling low back pain. Specific indications were disc pathology, post-laminectomy syndrome, lysis or olisthesis. In addition, temporary immobilization with a pantaloon plaster cast had to show adequate relief of pain in all patients to be included and also discography had to provoke specific pain, while signs of disc degeneration were mandatory. Fusion at one or more levels between L1 and S1 was a prerequisite.

Selected study group. Fifty-three consecutive patients (24 men and 29 women), admitted to the St. Maartens-Kliniek in Nijmegen for lumbosacral fusion, were included. Their mean age was 42 years (range 27-63). Forty-four percent of the participants were on total compensation and another 15 percent were receiving partial compensation payments at the time of admission. Indications for treatment, fusion levels and operative technique (interbody fusion or posterolateral fusion) are summarized in Table I. The response rate one year after surgery was 98% (one drop-out) ; two more patients were excluded from the study because of an associated musculoskeletal disorder. Therefore, a total of 50 patients was available to follow-up.

Table I. — Clinical features

Indication for Surgery	disc pathology post-laminectomy lysis/olisthesis miscellaneous	21 17 10 2
Fusion Levels	L3-L4 1 L4-L5 6 L5-S1 15	L4-S1 21 L3-S1 2 Other 5
Technique	Interbody fusion Posterolateral fusion	24 26

Procedure. A psychogenic back pain test (Zant *et al.* 1987) was administered by an independent observer to all subjects on admission. The test consists of 168 adjectives, and the patients have to indicate whether they find them related to their back pain or not. Among these 168 adjectives there are 23 which have a specific positive or negative value concerning the presence of psychogenic factors in relation to the back pain. The remaining 145 adjectives are non-informative and are used to obscure the relevant adjectives. In table II these adjectives are listed together with their individual values. For each individual these values were added and the total score was then a measure for the psychological background. Special tables were used to

Table II. — Scoring adjectives from the Dutch Pain List (NPL) together with their respective score

Allesoverheersend (Predominating)	-38	Psychisch (Psychic)	128
Beroerd (Miserable)	32	Schadelijk (Harmful)	-51
Doordringend (Piercing)	45	Schrijnend (Smarting)	-35
Droefmakend (Saddening)	123	Startpijn (Start pain)	36
Eentonig (Monotonous)	76	Triestmakend (Grieving)	-52
Frustrerend (Frustrating)	-42	Zich uitbreidend (Expanding)	33
Knellend (Pinching)	-78	Vermoeiend (Fatiguing)	65
Knijpend (Squeezing)	45	Vlammend (Flaming)	44
Martelend (Tormenting)	-64	In de zenuwen (In the nerves)	44
Onbehandelbaar (Untreatable)	62	Zenuwslopend (Nerve-racking)	211
Prikkelend (Irritating)	-36	Zwaardrukkend (Ponderous)	97
Problematisch (Problematic)	-70	(Constante) (Constant)	-247

convert this algebraic sum to a percentage, which reflected the portion of the pain due to psychological factors. According to their percentage patients were preoperatively divided into three groups. Scores above 90% were classified as pleading for a predominantly psychogenic origin, whereas scores below 5% were classified as pleading for an organic origin. Because quantification of psychological factors is difficult and can be assumed to be unreliable, we chose to attribute a relatively large scoring-domain (5-90%) to the uncertain group.

The disability in activities of daily living was measured preoperatively with the Oswestry Disability Index (7). The Oswestry Disability Index is a questionnaire which allows patients to estimate their disability as to pain intensity, personal hygiene, lifting, walking, sitting, standing, sleeping, sexual activity, social life and travelling. The patients also marked their pain and disability on a visual analog scale. Spondylodesis was then performed by a senior surgeon, whereas the test results were stored by the independent observer. Twelve months after surgery the result of the fusion was evaluated for all patients. The ODI was readministered and all patients completed self-report indices of pain and disability (16, 1), containing verbal rating scales and Visual Analog Scales. These instruments provided information regarding each patient's subjective experience of pain intensity and the degree to which this pain interfered with daily activities. Statistical analysis was performed using the Paired t-test and the Two-sided t-test.

RESULTS

Patients turned out to be almost equally divided among the three groups (Fig. 1). No intergroup differences in mean age, operative technique, fusion levels or episodes of back pain could be found. The psychogenic group turned out to contain relatively more females (the male/female ratio for the organic and the psychogenic group was 1.0/0.7 and 1.0/2.1, respectively), and more "complete compensation" cases (Table III).

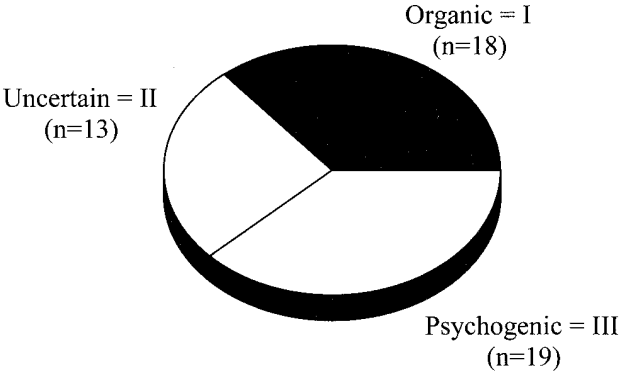

Fig. 1. — Distribution of the 50 patients among the three study-groups.

Table III. — Type of compensation available at time of surgery for each group

	Complete	Partial	None
Organic	36%	16%	48%
Uncertain	43%	14%	43%
Psychogenic	53%	16%	31%

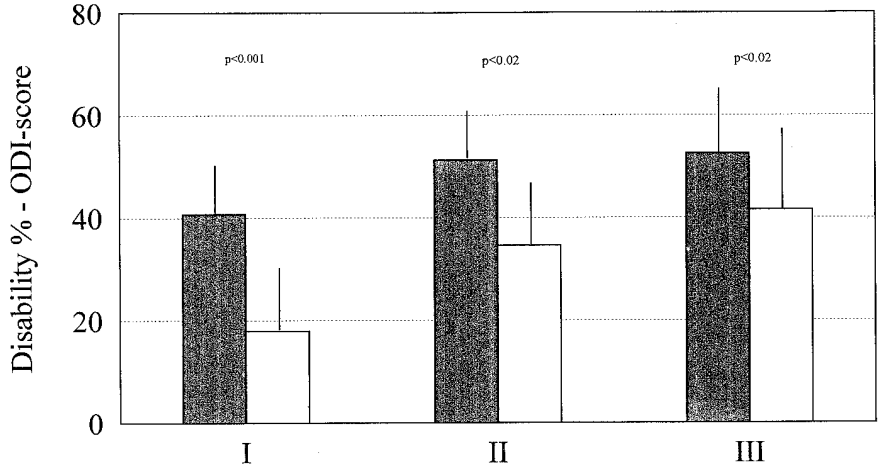

Fig. 2. — Disability in activities of daily living, expressed as percentage of a perfect Oswestry Disability Index (ODI) score, for each group before (*black*) and 12 months after (*shaded*) spinal fusion. Bars indicate the mean, supplied with standard deviation, for each group (I = organic ; II = uncertain ; III = psychogenic).

The overall improvement after surgery for all 50 patients together was highly significant, as deduced from the ODI scores ($p < 0.005$). Fig. 2 presents for each group the initial percentage of disability in daily activities, as measured with the Oswestry Disability Index (ODI), compared to 12 months after surgery. Each group separately showed significant improvement after fusion. However, the organic group scored best ($p < 0.001$, compared to $p < 0.02$ in the uncertain and in the psychogenic group). Patients from the psychogenic group not only appeared to experience their pain as relatively more disabling prior to surgery, but this was also followed by less improvement afterwards.

These findings were consistent with the results from the self-administered questionnaires 12 months after surgery. Verbal rating scales (Table IV) indicated that both relief of back pain and sciatica scored best in the organic group, gradually decreasing from the uncertain to the psychogenic group. Sixty percent of the patients from the organic group considered their pain as definitively decreased after surgery, versus 26 percent in the psychogenic group. As to the sciatic component these percentages were 79 and 31 respectively (Table IV). The postoperative need for analgesics was three times higher in the psychogenic group (Table IV). The Visual Analog Scales also showed higher initial pain perception and less improvement after surgery in the psychogenic group (Fig. 3). Seven out of 50 patients were disappointed about the result of the fusion ; 5 of these belonged to the psychogenic group.

Table IV. — Verbal rating scales about back pain, sciatic pain and use of analgesic 12 months after surgery for each group

	Organic %	Uncertain %	Psychogenic %
Back pain			
>>	0	8	5
>	0	8	16
=	13	15	21
<	27	15	32
<<	60	54	26
Sciatic pain			
>>	0	0	6
>	7	8	13
=	0	38	31
<	14	23	19
<<	79	31	31
Analgesics	20	23	63

>> : strongly increased ; > : increased ; = : same ; < : decreased ; << : strongly decreased.

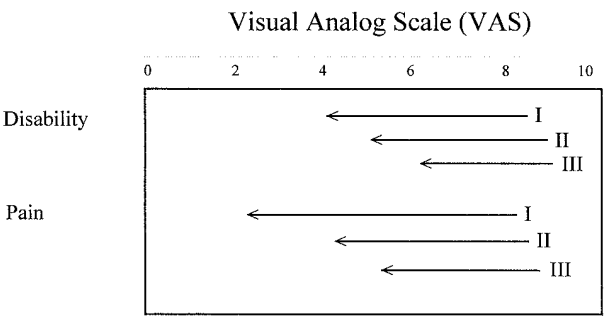

Fig. 3. — Gradual decrease in disability and pain, expressed on a Visual Analog Scale (VAS) from before to after surgery (<), for each group (I = organic ; II = uncertain ; III = psychogenic). The VAS represents a gradual increase from 'no pain'(= 0) to 'much pain' (= 10).

DISCUSSION

In the present study there was a highly significant overall improvement of disability after spinal fusion in a selected group of CLBP patients. Only 14% (7 out of 50 patients) were disappointed about the result one year after the fusion, which is satisfying in comparison with reported success rates as low as 10% 5 years after surgery (23). In this group of CLBP patients, subjects from the organic group experienced their low back pain initially as less disabling than those from the uncertain and psychogenic group, but obtained relatively more improvement after surgery. Obviously, psychological factors play an important role. These findings are in agreement with the fact that, as with many other illnesses, the pain perception and reaction on pain are highly dependent on a person's psychological condition (23, 27, 10).

In comparing the three study-groups we also found that, the more patients were psychologically distressed, the more they were on full compensation. Adequate financial support for impairment in working ability seems to influence successful recovery from spinal fusion in a negative way. Previous investigators also stated that the presence of compensation factors can reduce the success rate of any form of treatment for back pain and sciatica by approximately one third (26).

Besides, a significant difference in sex ratio was found for the study-groups, as women were 3 times more numerous in the psychogenic group than men, compared to an almost equal distribution in the organic group. From these results one would suspect emotional distress to occur more frequently in women than in men, which is in fact the case for all psychological and psychiatric disturbances (23, 29). The fact that the susceptibility for emotional distress is higher in females should be taken into consideration when planning low back surgery.

In the English speaking world, the MMPI is widely accepted in examining pain in low back patients, in portraying manifestations of the pain and in following treatment. However, given the semantic problem, the time consuming aspect of administration and the current controversy over the validity and reliability of the MMPI (9), interest still exists in other psychological tests as predictors of the outcome of back surgery. The NPL psychogenic back pain score we used proved to be a reliable alternative to the MMPI in screening psychological distress in CLBP patients. Moreover, the NPL test had an accuracy of 90% in classifying back pain as mainly organic or psychogenic, when compared to extensive interviews led by professional psychologists (29). The test takes only a few minutes, and interpretation is very simple, which makes practical use in a clinic feasible. In contrast with the MMPI, which offers specific rates for 13 different scales concerning a patient's psychological condition (17), the NPL test just denotes how far psychological factors are responsible for the pain. Although it offers only restricted understanding of the exact nature of a patient's psychological condition, it proves to have significant validity in predicting treatment outcome. These characteristics of high prediction validity, combined with simple administration, are, in our opinion, mandatory for a psychological test to be used clinically in the evaluation of a CLBP patient. Information from whatever psychological test, however, should always be used with considerable caution in treatment planning and only as an adjunct to other objective clinical data.

In conclusion we would like to state that screening of psychological distress should indeed be an integral part of the total assessment of CLBP patients, especially when surgery is consi-

dered. The NPL test we used proved to be a reliable instrument for this purpose. In spite of the observed statistically significant mean differences evident between patient outcome groups, in general no single factor is sufficiently accurate in predicting outcome to determine treatment prescription.That is, no patient should be assigned to or excluded from surgery or any type of treatment on the basis of a single test result.

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SAMENVATTING

J. VAN SUSANTE, D. VAN DE SCHAAF, P. PAVLOV. Psychologische stoornissen verminderen het uiteindelijk resultaat van lumbosacrale fusies.

In deze prospectieve studie is de invloed onderzocht van psychogene factoren op het subjectieve resultaat van een lumbosacrale spondylodese bij een groep patiënten met chronische rugklachten. Reeds eerder verschenen studies hebben een verband aangetoond tussen de geestelijke conditie van een patient en het resultaat van spondylodese. Weinig onderzoekers hebben dit echter prospectief gedaan. Een psychogene rugpijn test (NPL) werd, derhalve, afgenomen bij 53 chronische rugpatienten (24 mannen en 29 vrouwen) voor operatie, teneinde de invloed van psychogene factoren te objectiveren. Op geleide van de test uitslag zijn de patienten verdeeld in een „organische", een „onzekere" en een „psychogene" groep. Beperkingen in ADL-functies door de rugpijn werden preoperatief gescoord met de Oswestry Disability Index (ODI). Twaalf maanden na operatie werd de ODI opnieuw afgenomen in combinatie met een aanvullende vragenlijst. Elke groep apart liet een significante verbetering zien 12 maanden na spondylodese, waarbij de organische groep significant beter scoorde dan de psychogene groep. Vragenlijsten en „Visual Analog Scales" scoorden ook beter in de organische groep. De aanwezigheid van psychogene factoren bij een patient met chronische rugklachten verslechterd het resultaat van spondylodese. Psychologische screening zou derhalve deel uit moeten maken van de totale evaluatie van een patient met chronische rugklachten, zeker wanneer chirurgische interventie overwogen wordt.

RÉSUMÉ

J. VAN SUSANTE, D. VAN DE SCHAAF, P. PAVLOV. La détresse psychologique a une influence péjorative sur le résultat subjectif de l'arthrodèse lombo-sacrée. Étude prospective.

Les auteurs ont réalisé une étude prospective pour évaluer l'influence de la détresse psychologique sur le résultat de l'arthrodèse lombo-sacrée dans un groupe de lombalgiques chroniques. La réponse à la chirurgie du rachis lombaire dépend de facteurs physiques mais aussi psychologiques. De nombreux travaux ont montré l'influence de l'état psychologique des patients sur les résultats de la chirurgie du rachis lombaire. Cependant, peu de chercheurs ont étudié cette influence de façon prospective. Un score de lombalgies psychogènes (NPL) a été établi chez 53 lombalgiques chroniques (24 hommes et 29 femmes) avant traitement chirurgical, pour évaluer la présence d'une détresse psychologique. En fonction du score obtenu, les patients ont été divisés en trois groupes : «organique», «incertain» et «psychogène». La gêne fonctionnelle occasionnée par la douleur rachidienne dans les activités de la vie de tous les jours a également fait l'objet d'une évaluation préopératoire avec l'Oswestry Disability Index (ODI). Douze mois après l'opération, ce dernier index a été établi à nouveau sur les 50 patients revus. Douze mois après l'opération, une amélioration fonctionnelle significative a été observée dans chaque groupe considéré séparément ; le groupe «organique» montrait cependant une amélioration significativement plus importante que le groupe «psychogène». Des questionnaires concernant la lombalgie, les radiculalgies, et l'utilisation d'analgésiques ainsi que des échelles visuelles analogiques concernant la douleur et la gêne fonctionnelle ont aussi montré de meilleurs résultats dans le groupe «organique». La détresse psychologique influence de façon péjorative le résultat subjectif de l'arthrodèse lombo-sacrée ; une évaluation psychologique devrait faire partie intégrante de l'évaluation des lombalgiques, en particulier lorsqu'on envisage un traitement chirurgical.