

Follow-up Status of Patients Treated with Nerve Blocks for Low-back Pain

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One hundred fifty-one (151) outpatients treated with epidural or subarachnoid blocks for low-back pain not due to malignancy were questioned by mail one to two years after treatment to assess their current functional status as compared with that at the time of treatment. The results emphasize the importance of both gender-associated differences in life functioning and the circumstances of pain onset, while supporting the proposition that nerve-block treatment of low-back pain is useful, particularly so since the majority were cases of chronic pain. The findings also emphasize the complexity of factors in the total treatment situation, the operation of psychologic, social and economic forces in determining the outcome of treatment, and the need for detailed criteria in studies evaluating treatment effects. (Key words: Pain, low-back; Anesthetic techniques, therapeutic; Anesthetic techniques, spinal; Anesthetic techniques, peridural.)

ALTHOUGH LOW-BACK PAIN and its associated disabilities are a major health problem, the literature on both surgical intervention and therapeutic nerve blocks presents a confused and contradictory picture of treatment efficacy. In 1934, Mixter and Barr¹ reported the connection between intervertebral disc rupture and symptoms of pain in the back and extremities with or without evidence of neural dysfunction. Surgical excision of the offending disc was recommended, success depending on limiting delay before operation. Subsequently, the diagnosis of "slipped" or "herniated" disc has been applied to various aches and pains in the lower back; surgery has often been viewed as a cure-all for such problems.²

Published results of surgical removal of lumbar disc ruptures, however, do not justify such optimism, and the reported results vary considerably.³⁻¹¹ A fundamental issue is the imprecision of preoperative diagnosis, which centers on establishing the presence or absence of disc ruptures.⁹ A significant number of surgical explorations negative for disc disease have been reported.^{5,7,9} Such considerations have increased attempts to find more conservative

treatment than surgery for relief of symptoms of low-back pain.

Early attempts utilized injections of various agents, such as saline solution or local anesthetic-saline solution mixtures, into the caudal epidural space^{12,13} until the mid 1950's, when the addition of steroid medication to the caudal injectate was introduced.¹⁴⁻¹⁷ Subsequent reports of therapy using injections of steroids alone or in combination with local anesthetic solutions have varied considerably.¹⁵⁻²⁴

While the literature on nerve-block treatment of low-back pain is generally quite encouraging, there is a dearth of follow-up studies that examine a broad range of treatment-outcome criteria. It is well established that any single medical treatment is part of a set of complex psychological, social, economic and cultural factors that determine the patient's decision to seek treatment, and his response to such treatment.²⁵⁻²⁹ Outpatient nerve blocks need be viewed as one aspect of such a total context,²⁸ with treatment evaluation examining more than pain reduction *per se*.

A retrospective survey of patients already treated, rather than a controlled, prospective study, was considered most desirable at this time. It permitted utilizing an existing patient sample to explore pertinent variables for their utility in designing controlled, evaluative research. The study purpose was twofold: first, to obtain multiple-criteria data on the long-term results in patients treated with nerve blocks, as reported here, and second, to learn which may be sensitive variables essential for the evaluation of treatment in the design of appropriate experimental studies.

Method

For the period January 1, 1973, through December 31, 1973, 268 patients were identified from the anesthesiology daily logs as having been treated with epidural or subarachnoid blocks for low-back pain not due to malignancy. All patients treated were referred by physicians. Patients were contacted by mail in December 1974; therefore, they had been treated between one and two years before the survey.

The questionnaire requested the patient's own assessment of his current functional status compared with the status at time of treatment. Assessment was requested about a variety of physical and psycho-social functions dealing with: pain

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intensity and frequency, time in bed, time lost to gainful activities and employment, ability to walk, bend, work, socialize and engage in recreational activities, past and current drug intake, subsequent treatment for the same condition (including surgery), and satisfaction with the care and treatment received.

Of the 268 questionnaires mailed, six were sent to patients subsequently identified as deceased and 25 were returned as undeliverable, resulting in 237 patients assumed to have received the questionnaire. The final response rate was 65.4 per cent, with 155 questionnaires returned, 151 of which contained data usable for the analysis by total cases. Information as to the sex of one patient was lost in computer analysis, so that analysis by sex is based on 150 cases. The median age of the group was 49.0 years, with a range of 19-74 years. There was no significant difference ($X^2 > P .05$) between age distributions of male and female patients. While the initial sample was 51 per cent female, the final response rate showed a disproportionately high female response (61 per cent); consequently, all analyses are presented by sex as well as for the total group.

It is increasingly accepted in the literature on pain that pain six months or more in duration with failure to respond to therapy is chronic pain, while pain of less than six months' duration is still regarded as acute.²⁶ Table 1 shows the distribution of durations of pain in the current study: the majority of the cases are chronic.

TREATMENT

Nerve blocks consisted of either subarachnoid or epidural injection of a combination of lidocaine and triamcinolone acetate at the level of suspected nerve-root irritation or entrapment. For epidural injections 6 ml of 1 per cent lidocaine with epinephrine (1:200,000) and 2 ml of triamcinolone (50 mg) were used. For subarachnoid blocks, the drugs used were 2 mg tetracaine in 2 ml triamcinolone. In patients who had undergone spinal fusion, 15 ml of 1 per cent lidocaine with epinephrine (1:200,000) and 2 ml of triamcinolone were injected into the caudal epidural space. Of the 151 patients, 140 received epidural blocks and 11 received subarachnoid blocks. Analgesic medications were also continued, with occasional treatment by anti-depressants and/or tranquilizers given in minimal doses. No attempt was made to confirm the use of prescribed medications.

It is to be noted that there were often other treatment procedures in addition to the blocks (drugs, home exercises, physical therapy, bed rest, etc.), resulting in a confounding of treatment variables. While this is quite usual for the total treatment situation (although not usually reported),

TABLE 1. Time from Onset of Pain to Clinic Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
3 months	5	5.4	6	10.3	11	7.3
3-6 months	11	12.0	10	17.2	21	13.9
6-12 months	12	13.0	7	12.1	19	12.6
1-2 years	13	14.1	5	8.6	19*	12.6
2-5 years	17	18.5	15	25.9	32	21.2
More than 5 years	26	28.3	12	20.7	38	25.2
No response	8	8.7	3	5.2	11	7.3
	92	100.0	58	100.0	151	100.0
Pain for a year or more	56	60.9	32	55.2	89	59.0

* Sex of one patient lost in computer analysis. Data are used where appropriate in all total group analyses in all tables.

an inherent caveat exists in the evaluation of any single therapeutic component. For these reasons, as well as the overall lack of control procedures in the survey, statistical tests of significance were not undertaken except in the very few appropriate circumstances in which they are specifically mentioned.

Results

ONSET OF PAIN

In table 2 the distribution of patient-ascribed circumstances under which the pain began is presented. As might be expected, accidents at work were more a factor for men than for women, as more men are employed outside the home, while women experienced more accidents within the home setting. Accidents, however, accounted for only 25 per cent of the pain-initiating circumstances for women, in sharp contrast to almost 52 per cent for men. On the other hand, the onset of pain unrelated by the patient to any specific event or circumstance accounted for 42.4 per cent of the female and only 27.6 per cent of the male patients.

FREQUENCY AND INTENSITY OF PAIN

Patients were asked to rate pain frequencies before and after nerve-block treatment. Retrospective evaluations, of course, are fraught with problems of reliability and validity; yet the patient does compare himself with his remembrance of the past, and this plays a role in his assessment of present status and the effectiveness of treatment. In the original questionnaire a definition of each rating category appearing in table 3 and all subsequent tables was provided, though it is obvious that the categories defy precise boundaries. Of importance, however,

TABLE 2. Circumstances under Which Pain Began

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Accident at work	5	5.4	23	39.7	28	18.5
Accident at home	10	10.9	2	3.4	12	7.9
Other accident	8	8.7	5	8.6	13	8.6
At work: not accident	12	13.0	7	12.1	19	12.6
Following surgery	12	13.0	2	3.4	14	9.3
Following illness	3	3.3	1	1.7	4	2.6
Cause of pain not identified	39	42.4	16	27.6	56	37.1
No response	3	3.3	2	3.4	5	3.3
	92	100.0	58	100.0	151	100.0
All accidents	23	25.0	30	51.7	53	35.1
Cause of pain not identified	39	42.4	16	27.6	56	37.1
		67.4		79.3		72.2

are the perceived shifts as a function of treatment and the differences between the sexes. Table 3 presents pain as remembered before and after for the total group as well as by sex. Fourteen patients reported themselves pain-free (9.3 per cent), but differences appear as a function of gender, with more than twice as many women (12 per cent) as men (5.2 per cent) reporting complete success. Of considerable import is the marked decrease in the

“pain always present” category that appears for both sexes, with correspondingly more use of the lesser pain frequency categories. It is apparent that the patients do make a meaningful distinction between “always present” and “usually present.”

Table 4, where pain intensity is rated, shows that “no pain” was reported by almost 14 per cent of the group, which, compared with table 3, represents an additional seven patients, all female, who

TABLE 3. Pain Frequency: before *vs.* after Treatment

	Pain before Treatment				Pain After Treatment			
	Female Patients		Male Patients		Female Patients		Male Patients	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
No pain	—	—	—	—	11	12.0	3	5.2
Rarely present	1	1.1	3	5.2	8	8.7	9	15.5
Only under certain circumstances	3	3.3	4	6.9	18	19.6	9	15.5
Frequently present	8	8.7	5	8.6	14	15.2	6	10.3
Usually present	15	16.3	10	17.2	14	15.2	14	24.1
Always present	62	67.4	34	58.6	24	26.1	16	27.6
No response	3	3.3	2	3.4	3	3.3	1	1.7
	92	100.0	58	100.0	92	100.0	58	100.0
Totals (Male and Female Patients)								
	Pain Frequency before Treatment				Pain Frequency after Treatment			
	Number		Per Cent		Number		Per Cent	
No pain	—		—		14		9.3	
Rarely present	4		2.6		18		11.9	
Only under certain circumstances	7		4.6		27		17.9	
Frequently present	13		8.6		20		13.2	
Usually present	25		16.6		28		18.5	
Always present	97		64.2		40		26.5	
No response	5		3.3		4		2.6	
	151		100.0		151		100.0	

TABLE 4. Pain Intensity: before vs. after Treatment

	Pain Usually Felt before Treatment				Pain Usually Felt after Treatment			
	Female Patients		Male Patients		Female Patients		Male Patients	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
No pain	—	—	—	—	18	19.6	3	5.2
Mild	3	3.2	—	—	6	6.5	8	13.8
Uncomfortable	9	9.8	7	12.1	23	25.0	13	22.4
Fairly severe	29	31.5	23	39.7	20	21.7	12	20.7
Very severe	23	25.0	10	17.2	3	3.3	4	6.9
Unbearable	8	8.7	1	1.7	—	—	—	—
No response	20	21.8	17	29.3	22	23.9	18	31.0
	92	100.0	58	100.0	92	100.0	58	100.0

	Totals (Male and Female Patients)			
	Pain Usually Felt before Treatment		Pain Usually Felt after Treatment	
	Number	Per Cent	Number	Per Cent
No pain	—	—	21	13.9
Mild	3	2.0	14	9.3
Uncomfortable	16	10.6	36	23.8
Fairly severe	52	34.4	32	21.2
Very severe	34	22.5	7	4.6
Unbearable	9	6.0	—	—
No response	37	24.5	41	27.2
	151	100.0	151	100.0

reported being pain-free. While there is obviously some confusion or unreliability of the distinction between intensity and frequency in the ratings, again, it is the shifts in the data that are of primary importance, and the trend in table 4 is consistent with that in table 3. The most severe category—unbearable pain—was not used at all following treatment, and the frequencies in the other categories of severe pain decreased markedly for both sexes. The reported decreases in pain intensity were considerably greater than decreases in pain frequency, indicating that for many patients the pain is now less intense and more bearable, even if as frequent as before.

DAYS IN BED

Time in bed or lying down (down-time) is a frequent and concomitant aspect of chronic back pain and has been used as an index of the value of treatment or rehabilitative success.^{30,31}

Table 5 shows the reported frequencies of time in bed before and after treatment. The majority of patients of both sexes reported spending some days in bed as a consequence of pain prior to treatment; somewhat more so for the women than the men. Of those who reported spending days in bed due to pain, more than 71 per cent reported improvement following treatment, either spending no days

TABLE 5. Days in Bed: before vs. after Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Before treatment						
No	14	15.2	12	20.7	26	17.2
Yes	75	81.5	45	77.6	121	80.1
No response	3	3.3	1	1.7	4	2.6
	92	100.0	58	100.0	151	100.0
After treatment						
No longer spend days in bed	31	40.2	11	25.0	42	34.7
Some days in bed, but fewer	25	32.5	20	45.5	45	37.2
TOTAL IMPROVED	56	72.7	31	70.5	87	71.9
No change	19	24.7	11	25.0	30	24.8
Worse than before	2	2.6	2	4.5	4	3.3

TABLE 6. Ability to Walk, Bend Over, and Work after Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Ability to walk						
Complete improvement	19	20.7	5	8.6	25	16.6
Very good improvement	15	16.3	8	13.8	23	15.2
Good improvement	20	21.7	17	29.3	37	24.5
No improvement	28	30.4	19	32.8	47	31.1
Worse	6	6.5	6	10.3	12	7.9
No response	4	4.3	3	5.2	7	4.6
	92	100.0	58	100.0	151	100.0
Ability to bend over						
Complete improvement	16	17.4	2	3.4	18	11.9
Very good improvement	13	14.1	8	13.8	22	14.6
Good improvement	18	19.6	15	25.9	33	21.9
No improvement	35	38.0	22	37.9	57	37.7
Worse	7	7.6	8	13.8	15	9.9
No response	3	3.3	3	5.2	6	4.0
	92	100.0	58	100.0	151	100.0
Ability to work						
Complete improvement	14	15.2	3	5.2	17	11.3
Very good improvement	18	19.6	11	19.0	30	19.9
Good improvement	22	23.9	12	20.7	34	22.5
No improvement	29	31.5	24	41.4	53	35.1
Worse	6	6.5	5	8.6	11	7.3
No response	3	3.3	3	5.2	6	4.0
	92	100.0	58	100.0	151	100.0

or fewer days in bed. Differences between the sexes in the overall improvement rates were minimal, but differences did appear as to whether they now spent fewer days or no days in bed. Almost 25 per cent of the patients reported no improvement at all, and more than 3 per cent reported that they were now worse. Those patients who reported being worse in any way following treatment are discussed below.

ABILITY TO WALK, BEND, AND WORK

These three important and traditional criteria of treatment of low-back pain are presented together in table 6 so that the trends can be compared readily. For the three indices, at least half of the women reported some improvement, and in each instance the overall rate of improvement was greater than that reported by the men. Lowest overall

TABLE 7. Ability to Participate in Recreational and Social Activities after Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Recreational activities						
Complete improvement	10	10.9	2	3.4	12	7.9
Very good improvement	15	16.3	5	8.6	21	13.9
Good improvement	22	23.9	12	20.7	34	22.5
No improvement	33	35.9	30	51.7	63	41.7
Worse	7	7.6	6	10.3	13	8.6
No response	5	5.4	3	5.2	8	5.3
	92	100.0	58	100.0	151	100.0
Social activities						
Complete improvement	14	15.2	5	8.6	19	12.6
Very good improvement	14	15.2	9	15.5	24	15.9
Good improvement	23	25.0	8	13.8	31	20.5
No improvement	31	33.7	27	46.6	58	38.4
Worse	4	4.3	7	12.1	11	7.3
No response	6	6.5	2	3.4	8	5.3
	92	100.0	58	100.0	151	100.0

TABLE 8. Medications for Pain

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Still taking medicine for pain relief						
No	20	21.7	20	34.5	40	26.5
Yes	62	67.4	37	63.8	100	66.2
No response	10	10.9	1	1.7	11	7.3
	<u>92</u>	<u>100.0</u>	<u>58</u>	<u>100.0</u>	<u>151</u>	<u>100.0</u>
Quantity taken						
Same	23	37.7	13	39.4	36	38.3
Less	22	36.1	9	27.3	31	33.0
More	16	26.2	11	33.3	27	28.7
	<u>61</u>	<u>100.0</u>	<u>33</u>	<u>100.0</u>	<u>94</u>	<u>100.0</u>

TABLE 9. Overall Evaluation: before vs. after Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Complete improvement	12	13.0	4	6.9	16	10.6
Very good improvement	20	21.7	10	17.2	31	20.5
Good improvement	23	25.0	18	31.0	41	27.2
No improvement	29	31.5	20	34.5	49	32.5
Worse	5	5.4	5	8.6	10	6.6
No response	3	3.3	1	1.7	4	2.6
	<u>92</u>	<u>100.0</u>	<u>58</u>	<u>100.0</u>	<u>151</u>	<u>100.0</u>

rates for both sexes were those for ability to bend. This activity, usually of major difficulty for the patient who has low-back pain, showed the lowest rates of improvement for both sexes and also the highest reported ratings of being worse than before treatment. The highest rate of no change was reported by the men with regard to ability to work (41.4 per cent).

RECREATIONAL AND SOCIAL ACTIVITIES

These activities (table 7) are indirectly, rather than directly, affected by treatment for pain, yet changes represent important consequences of treatment. Striking differences between the sexes appeared here, particularly when compared with the preceding data. Men reported the lowest rates of improvement here of all the functions examined,

along with high rates of reporting worsened ability. The reasons for this would certainly appear to involve complex psycho-social factors not apparent from these data.

MEDICATIONS FOR PAIN

One meaningful goal of treatment and rehabilitation should be to decrease the number and quantity of analgesics, particularly narcotics. No inquiry was made as to specific types of medications taken, since it was assumed on the basis of patients' frequent inability to name their medications in the clinical situation that such inquiry would probably not be fruitful. From table 8 it can be seen that for both sexes the majority still took medication of some sort for pain relief. Of those reporting that they still were taking pain-relief medication,

TABLE 10. Operated on for Pain since Treatment

	Female Patients		Male Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
0	73	79.3	49	84.5	123	81.5
1x	13	14.1	8	13.8	21	13.9
2x	1	1.1	1	1.7	2	1.3
No response	5	5.4	0	0.0	5	3.3
	<u>92</u>	<u>100.0</u>	<u>58</u>	<u>100.0</u>	<u>151</u>	<u>100.0</u>

33 per cent reported taking less than before, while almost 29 per cent reported taking even more than before. Although more men reported taking more medications than before, the small number of patients reporting in this analysis makes comparisons by sex of questionable value.

OVERALL EVALUATION

In the last question patients were asked for their overall evaluation, comparing before and after treatment according to the specified descriptions for each category as used for the preceding ratings. Differences between the sexes here were small. Grouping all improvement categories together (table 9), well over half of the group reported lasting improvement to at least some extent. A considerable percentage (32.5 per cent), however, did not report any overall change for the better, and some continued to report that they were worse. Comparing the overall ratings in this table with the preceding data reveals quite reasonable consistency. This suggests that patients were not simply giving socially desired or supposedly expected responses in their overall evaluations.

SUBSEQUENT OPERATIONS FOR PAIN

Recourse to subsequent surgical treatment remains an important indication of failure of nerve blocks and concurrent treatment, although a one-two-year follow-up period may not allow the optimum time for such inquiry. The hope is that alternatives to surgery can be found, and the results, as indicated in table 10, are encouraging. Within the period of study only 23 (15.2 per cent) of the 151 patients underwent back surgery. No data are available as to their subsequent courses since they were beyond the scope of this study. In the absence of any controls, it is of course impossible to ascertain how many in the sample would have undergone surgery had the nerve blocks not been available to them.

PRIOR OPERATIONS

Of the 151 respondents, 48 (32 per cent) were identified as having had back surgery prior to treatment with nerve blocks. The median age of this group was 50.5 years, which is not significantly different from that of the total group ($X^2 > P .05$), but there is a somewhat greater representation of women (60.4 per cent). Comparisons between this subgroup and the group as a whole did not reveal overall meaningful differences in any response category. However, ten (20.8 per cent) of those who had previously had surgical treatment did report that they were *worse* following nerve-block treatment. This is discussed in the next section.

WORSE FOLLOWING TREATMENT

A total of 27 patients indicated that they felt that they were worse in one or more ways following treatment. Each of these questionnaires was individually examined and the responses tabulated for the group as a whole. The median age was not significantly different from that of the entire group ($X^2 > P .05$), but the male-female ratio was somewhat lower: 44.4 per cent (12) men and 55.6 per cent (15) women. Almost 52 per cent reported an accident as responsible for the onset of pain and, of these, 37 per cent reported that the accident had occurred at work. In both categories, these percentages are considerably higher than those for the total group, described earlier (table 2). Ten of these patients (37 per cent) had had anywhere from one to six prior operations on the back. Seven (25.9 per cent) reported surgical treatment subsequent to the nerve block treatment, and of these seven, only two reported that the operation had brought relief of pain. Eight of the 12 men (66.7 per cent) were currently unemployed; of the group of 27 patients, 16 (59.3 per cent) were unemployed, whereas they had been employed prior to the initial onset of pain.

Analyses of the dimensions on which a rating of worse could be indicated reveals the complexity of the issues involved. Only two items (ability to walk and ability to bend) could be considered directly related to physical impairment *per se*. Other functions reported in the tables can be considered derivative issues relating to various aspects of life functions. Using ability to walk and/or bend as the criteria, 18 patients reported that they were worse on one or both. On the other hand, some patients reported no change or even improvement in gait and bending, yet stated that they were able to work less, or lost more time from work, or that their social and/or recreational functioning was worse. It was evident from the data that in addition to whatever purely somatic factors exist, a complex of psycho-social and economic factors entered into the patients' evaluation of the results of treatment. Adequate understanding of these relationships would depend upon additional evaluations by the physician, as well as the spouse or other persons with significant relationships to the patient.

Discussion

The analyses presented indicate favorable overall results of nerve-block treatment for low-back pain, particularly so since the majority of the patients had chronic pain that had been unresponsive to other treatment modalities. Furthermore, the data show that prior surgical treatment, even a history of two or more operations on the back, should not be considered *prima facie* evidence to exclude other therapeutic approaches, specifically nerve blocks.

In contrast to much of the reported literature, which either deals primarily with male patients or in which sex differences are neither shown nor analyzed, the respondents in the present study were predominantly female, with frequent large differences appearing between male and female patients in the reported results. Future studies must allow for such analyses, particularly since the employment and living circumstances, as well as conditions related to onset of pain, are frequently different for male and female patients.

The data clearly indicate that the criteria of pain reduction and/or return to work are too narrow for the evaluation of treatment outcome. Pain may well persist after treatment, even in patients who view themselves as "cured" (see, for example, Duffy⁶ on surgical treatment), but the intensity and frequency of pain may be reduced and/or become more bearable. Return to work is most meaningful when recent employment was interrupted by pain, but becomes equivocal or even inappropriate as a criterion for improvement where chronic conditions with concomitant unemployment are involved. Return to work must be precisely defined for women who are not employed outside the home. Treatment goals, as well as criteria for evaluating success, must necessarily take into consideration the nature of the patient's employment, with the attendant and differential physical demands. Thus, a large number of the male patients in this study were engaged in manual labor, and their continued difficulties in bending would be expected to be related to their difficulty or inability to work.

Furthermore, many of these people were unemployed and had been unemployed for long periods prior to treatment. Consequently, by virtue of their lengthy unemployment, age, lack of occupational skills, and the economic conditions of the labor market, many could not realistically be considered as continuing members of the labor force regardless of their somatic problems. These considerations do indicate the limited utility and often inappropriateness of "return-to-work" as a primary index of treatment outcome. Despite these issues and differences, it is important to note that in each area questioned, improvement to some meaningful extent was reported frequently by both men and women.

While the data on medications for pain deal only with reported amounts taken before and after treatment, this is clearly not enough. The majority of patients in the survey did report that they continued to take medications for pain, and, of these, about a third reported that they were taking less; no data were obtained on the types of medications taken, since it was not meaningful to attempt this in a retrospective survey. Yet reductions in narcotic and tranquilizer intakes, with their associated high risk of habituation and addiction, are therapeutic goals and outcomes of considerable import.

It is precisely such treatment outcomes as are presented here that raise nerve-block therapy to a position of primary consideration in the early conservative treatment of low-back pain. What remains unknown, however, is the precise therapeutic role of nerve blocks—for which specific conditions and under which specific circumstances—uncontaminated by the complex circumstances enumerated above. Future studies of nerve-block therapy need consider three essential points, only one of which was addressed here. These data have shown that relatively long-term positive effects of this treatment can be expected in a sizeable proportion of patients. This is true for a variety of life's functions representing criteria of improvement. Evaluation of treatment, therefore, should no longer be restricted narrowly to the incidences of pain reduction and return to work. A second point of major focus must be the precise diagnosis of the syndrome loosely described as "low-back pain," which has been a neglected aspect of nerve-block studies to date. The difficulties and complexities of evaluating this condition have been repeatedly described, along with the inherent problems of unreliability and error in the diagnoses of low-back conditions.³²⁻³⁸ Increased diagnostic precision is essential in future studies, so that nerve blocks can be utilized for those conditions with the greatest potential for benefit.

Finally, appropriate experimental design and statistical methods for the evaluation of treatment remain unapplied in clinical studies of nerve-block effects. The complexities of the total treatment situation discussed above are not unique to nerve block therapy, but rather are the known and accepted factors in most treatment situations. Appropriate methodologic procedures to isolate direct treatment effects are available and widely used in other areas of medicine; it is essential that they be applied in nerve block studies. Using such relevant methodology and the incorporation of a broad range of variables will permit specific understanding of those factors which are often loosely grouped together under the rubric of "placebo response." In this manner, the specific effects of nerve blocks *per se* may be isolated. So, too, the extremely complex issues of economic factors (*e.g.*, compensation, litigation, job availability, etc.) need to be examined and/or controlled where appropriate, since their potential effects are widely understood by physicians. Until precisely controlled studies that deal with these issues emerge, evaluation of the broadest range of patient variables, in addition to pain relief itself, must continue.

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