Reoperation after lumbar intervertebral disc surgery

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This retrospective study includes 53 patients who underwent reoperation after failure of lumbar disc surgery to relieve pain. All patients had leg pain before reoperation, which was successful in 28% of cases. Most clinical features, such as persistence or mode of recurrence of pain, radicular quality of pain, positive straight-leg raising, and myelographic root sleeve defects, were not helpful in predicting successful and unsuccessful reoperations. However, a significantly larger percentage of women than men had successful reoperations. Patients who had past or pending compensation claims, who had sensory loss involving more than one dermatome, or who failed to have myelographic dural sac indentations resembling those caused by a herniated disc did poorly with reoperation. A very convincing myelographic defect appears to be needed to justify reoperation at a previously unoperated location. Excision of scar alone or dorsal rhizotomy was of no avail in these cases.

Key Words • lumbar disc surgery • intervertebral disc • reoperation • pain relief

Although usually successful, lumbar disc surgery fails to provide adequate long-term pain relief for 8% to 25% of patients.\(^1,5,6,8,10,12-14\) Such patients often continue to suffer with persistent or recurrent back pain and sciatica despite prolonged attempts at nonsurgical therapy. When these measures fail, the possibility of attempting another operation arises.

We warn those patients whom we consider candidates for further surgery that the likelihood that reoperation will relieve their pain is less than at the original surgery. However, we have been unable to give them a definite estimate of the chances that reoperation would be successful or to select accurately those patients who might benefit from another procedure. Widely varying success rates have been recorded for reoperation, ranging from 37% to 100%.\(^1,4,6,9,10\) Unfortunately, the postoperative follow-up period is not mentioned in the reports with the most successful results.\(^1,4,10\) This wide range of results may well be the result of different methods of selecting cases for reoperation, and suggests that certain clinical features of these patients might prove helpful in choosing those apt to improve from another operation. We have therefore undertaken a retrospective study of this problem.

Clinical Material and Methods

All patients who underwent reoperation between June, 1970, and December, 1976, at the Colorado General (CGH) and Denver Veterans Administration (DVAH) Hospitals for persistent or recurrent pain after lumbar
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intervertebral disc surgery were reviewed. In most cases, previous surgery had been performed at another hospital. No patient who underwent reoperation within 1 month of previous surgery was included. Clinical features were obtained from the patients' records and by letter or telephone. Adequate follow-up information about the result of reoperation was obtained in all 53 cases, but in some of the cases other clinical information was lacking. Patients were considered to have had a successful result after their reoperation if at the time of final follow-up examination all of the following were true: the patient declared the procedure a success; use of medication for pain was limited to aspirin or acetaminophen; outdoor activity was not restricted in any major fashion or employment involved moderate, non-sedentary activity. The average postoperative follow-up period was 35 months (range 8 to 66 months) in those considered successes, and 33 months (range 4 to 58 months) in the failures.

All of the available myelograms were reviewed and graded subjectively by the authors. A myelogram immediately preceding the reoperation being evaluated was available for review in 38 cases, and in 18 of these the myelogram preceding the previous operation was also available. Grades ranging from 0 to 5 were assigned to indentations upon the dural sac, with higher values given for those defects judged to bear the closest resemblance to that produced by a ruptured intervertebral disc. Nerve root sleeve defects were also graded from 0 to 5 with 5 being assigned to instances of total root sleeve obliteration at the level in question when the opposite root sleeve appeared normal.

All reoperations as well as previous operations consisted of extradural exploration after hemilaminectomy or total laminectomy with excision of whatever scar and herniated disc material was found. When the latter was present, the disc space was emptied of additional material. Fusions were not performed. In those cases in which reoperation involved more than one site, the reasons for this decision were not apparent retrospectively. Intradural dorsal rhizotomy was performed in 18 cases, but the factors leading to the decision to perform root section are also unknown.

Results were analyzed for significance or nonsignificance (NS) by two-tailed Fisher's exact 2 × 2 test (FET), chi-square (χ²) analysis, or Student's two-tailed t-test (t-test). Where information was lacking, the number (n) of patients for whom information was available is given.

Summary of Cases

Clinical History and Results

There was no mortality. Of 53 patients undergoing reoperation, 28% had a successful result. One patient had a postoperative interspace infection. He continued to have pain after its cure and has been excluded from further analysis since the occurrence of this complication makes it impossible to judge whether his reoperation would have succeeded if infection had not occurred. The success rate of 33% at CGH was not significantly different from that of 15% at DVAH (FET, p = NS). The 16 females had a 50% success rate for reoperation and this was significantly greater than the 19% success rate of the 36 males (FET, p = 0.03). The same poor success rate among males was evident at both hospitals. Review of the records revealed that 29 cases had records of past or pending compensation claims whereas 23 did not. The success rate of reoperation in the former group (10%) was significantly less than in those without evidence of such claims (52%) (FET, p = 0.001).

Except for these features, the clinical history of patients with successful and unsuccessful reoperations was indistinguishable. The average age of successfully treated cases was 38 years and that of failures was 37 years at the time of reoperation. The average duration of pain relief from the preceding operation was respectively 40 (n = 13) and 30 months (n = 21) in these two groups (t-test, p = NS). Nor did the number of previous operations influence the rate of success and failure. Of those who had had only one previous operation, the success rate was 28% (n = 36), while pain relief was obtained in 31% (n = 16) of those with more than one previous back operation (FET, p = NS).

Neither persistence of pain despite the previous operation nor the mode of its onset in recurrent cases were helpful indicators of which patients might benefit from reoperation. There were 18 patients with sudden return of pain after the previous operation, 18 with gradual return of pain, and 14 in whom
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pain had never been relieved (two unknown). The success rates of reoperation in these groups were 33%, 33%, and 21%, respectively ($\chi^2 = 0.94$, $p = \text{NS}$). Of the 18 patients in whom pain returned suddenly after a period of relief, eight had a precipitating accident, and only one of these had successful pain relief following reoperation.

The pain prior to reoperation was never located in the back alone. In cases in which pain involved one leg there was a 30% success rate of reoperation and in the seven cases in which both legs hurt, reoperation was successful in 29%. Of 42 patients who described at least part of their pain as radiating down the leg in the sciatic distribution, only 33% had good pain relief postoperatively. Exacerbation of pain on coughing or sneezing did not predict a successful result since this feature was present in 70% ($n = 10$) of the successful cases and 64% ($n = 25$) of the failures in which this history was available.

The clinical records before the first disc surgery were reviewed in all 52 cases, and the presence of sciatica, increased pain on straight-leg raising, and clear neurological deficits was noted. None of these features, alone or in combination, were of any aid in predicting the subsequent success or failure of reoperation ($FET, p = \text{NS}$).

Clinical Findings and Results

Mechanical signs were tested in all cases. Of patients with increase of pain upon straight-leg raising, only 26% achieved a successful result from reoperation. This percentage is smaller than the 29% success rate for the group of patients analyzed.

Neurological findings were also generally unhelpful in distinguishing patients who might benefit from reoperation. Motor and reflex abnormalities were similar in frequency in both the successful and failure groups. However, sensory changes involving more than one dermatome were present before reoperation in 11 patients who underwent reoperation unsuccessfully. In two additional reoperative failures, the sensory loss was judged nonanatomical as well. None of the 15 patients in whom reoperation was successful had such changes ($FET, p = 0.006$).

Cerebrospinal fluid protein averaged 63 mg% (range 24 to 150 mg%) in the successes, and 47 mg% (range 15 to 131 mg%) in the failures ($t$-test, $p = \text{NS}$).

Myelographic Findings and Results

The authors' subjective grading of the indentation of the dural sac seen on myelography did not distinguish success or failure at a statistically significant level, although only one of eight patients with minimal or no dural sac defects was a reoperative success, as compared to six of the 17 with the most convincing defects ($FET, p = \text{NS}$). Estimates of the severity of myelographic root sleeve defects did not help prognosticate success and failure of the ensuing reoperation. Paradoxically, the myelographic appearance of matted and especially prominent root shadows within the dural sac ($n = 9$) was seen in a higher percentage of the myelograms from patients who subsequently had a successful reoperation than in cases in which reoperation failed. A high-grade block was seen in five cases. Three failed to improve while two had good pain relief after reoperation.

Comparison of 18 available myelograms performed before the preceding operation with those performed before reoperation revealed an increase in the size of the dural sac indentation in four of six patients with successful reoperation and in three of 12 failures ($FET, p = \text{NS}$). Increasing obliteration of a nerve root sleeve between myelograms also failed to predict operative improvement.

Reoperative Features and Results

Table 1 indicates the locations of reoperation for the two groups. Bilateral reoperation at the level of previous unilateral

<table>
<thead>
<tr>
<th>Location</th>
<th>Success</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>previous site only</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>new site only</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>new and previous site</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>previous site unknown</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>total</td>
<td>15</td>
<td>37</td>
</tr>
</tbody>
</table>

**TABLE 1**

Results of reoperation at various locations in 52 patients

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TABLE 2
Surgical findings at reoperation in 52 patients

<table>
<thead>
<tr>
<th>Findings</th>
<th>Success</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>herniated disc and scar</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>herniated disc only</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>scar only</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>total</td>
<td>15</td>
<td>37</td>
</tr>
</tbody>
</table>

surgery was classified as being at a new and a previous site. Clearly, exploration with excision of any pathological tissue at previously unoperated sites did not improve the success rate of reoperation.

The surgeons' report of findings at reoperation is shown in Table 2. If herniated disc was found, the success rate averaged 37%. The presence of scar did not worsen this result if herniated disc was present. However, the finding of epidural scar only was followed by a bad result in all but one case. The results when only scar was found were significantly worse than if a herniated disc was found and removed (FET, $p = 0.03$). In nine of the cases in which only epidural scar was found, rhizotomy was performed and all of these patients failed to achieve pain relief. Of the total of 18 cases in which rhizotomy was performed, 15 failures (83%) resulted. This is an insignificantly higher percentage of failures than the 59% in cases in which rhizotomy was not performed (FET, $p = 0.07$).

Discussion

In this experience, less than one-third of patients with persistent or recurrent pain after previous lumbar disc surgery had long-term pain relief after reoperation. With few exceptions the clinical history and physical findings were of little help in predicting a successful outcome. The only clinical features that appeared to be helpful were that women fared significantly better than men, that patients with compensation claims did poorly, that patients with sensory loss involving more than one dermatome were rarely improved, and a suggestion that patients with small or unconvincing myelographic indentations of the dural sac tended to do poorly. The latter impression is reinforced by Cronqvist's study of myelography in patients about to undergo reoperation for disc disease. He found that irrespective of any superimposed irregularities, unless the myelogram revealed a dural sac defect strongly suggesting a herniated disc, reoperation rarely disclosed a recurrent herniation.

Greenwood, et al., also reported poorer results for reoperation in patients who had past or pending compensation claims than in those who did not. The compensation factor also probably accounts for at least part of the difference in our reoperative results in the two sexes. A significantly higher proportion of males (67%) than of females (31%) were known to be involved in compensation claims (FET, $p = 0.02$).

It might be thought that a pain-free period following a previous operation, particularly if followed by a sudden return of pain, might signal a recurrent disc herniation. This would lead one to expect that patients with such a history would be more apt to benefit from reoperation than those in whom there was no pain-free period after a previous operation, or those in whom pain returned gradually. This, however, was not the case.

Reoperation at a new site did not improve the success rate and was actually associated with an increased percentage of failures. This experience is consistent with that of Love, who stated that recurrent symptoms were only rarely associated with disc protrusion at a new site. Kelley, et al., however, reported a new site of herniation in four of 15 cases of disc herniation among a total of 27 patients undergoing reoperation. We would think that a very convincing myelographic defect at a new site or a neurological deficit clearly suggesting a new site of disc herniation is needed to justify surgery at a previously unoperated location.

Dorsal rhizotomy was rarely of help to our patients. This contrasts with the overall 61% success rate achieved in 85 collected cases of continued pain after lumbar disc surgery reported by Echols, Greenwood, et al., and White and Sweet, but is similar to the results noted by Loeser, and the 13% success rate in 45 such cases reported by Onofrio and Campa.

In those instances in which only epidural scar was found, failure was almost universal over a long-term period, although the immediate results were often falsely encouraging. That excision of scar is without
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long-term benefit is suggested by the poorer results reported when reoperation failed to reveal a disc herniation.4,6,9

References


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