Outpatient Microdiscectomy for Lumbar Disc Herniation in Adolescent Patients: Long-Term Follow-up Study

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Abstract

Study Design: Data collected prospectively were reviewed for patients aged 19 years or younger who had a discectomy procedure without arthrodesis as an outpatient.

Objective: The purpose of our article is to investigate the clinical outcome of discectomy on the lumbar spine in adolescent patients.

Summary of Background Data: Standard discectomy has been proven to be effective in adult patients and can be done successfully as an outpatient. Controversy remains over the best surgical solution for adolescent patients with lumbar disc herniation. Some have advocated fusion along with discectomy.

Methods: Standard discectomy has been proven to be effective in adult patients and can be done successfully as an outpatient. Controversy remains over the best surgical solution for adolescent patients with lumbar disc herniation. Some have advocated fusion along with discectomy.

Results: No patients were hospitalized following the procedure. Two patients (6.5%) had complications. One had a post-operative hematoma, and the other had a recurrent herniation requiring a subsequent operation. Patient reported outcomes were favorable with 84.6% stating a good or better outcome.

Conclusions: Results have confirmed favorable results following lumbar decompression without arthrodesis in adolescent patients for disc herniation. Few required subsequent operations or had recurrent herniations.

Introduction

Standard discectomy has been routinely performed by surgeons since it was first used by Mixter and Barr in 1934.1 Microlumbar discectomy (MLD) has since become a standard procedure to decompress the nerve resulting in relief of many of the common symptoms of leg pain, numbness, and weakness. Many studies have justified the use of discectomy without arthrodesis in adult patients for the treatment of lumbar disc herniations.2-11 However, there has been controversy over the procedure for lumbar herniation in the adolescent spine due to reports of poor results prompting some to recommend simultaneous arthrodesis.12-22

The incidence of lumbar herniation in pediatric patients is relatively rare, and the exact number has been debated. In adolescent patients presenting with back pain, 3-3.7% have been reported to have a disc herniation.12,14,17,20 Out of the total population of discectomy procedures, 0.4-3% have been reported to be on adolescent patients.12,15,16,20,21 and up to 15.4% in a study out of Japan.18 Although not common, the prevalence of lumbar disc herniation in adolescent patients remains, along with the difficulty in determining the correct course of action for these patients. This study aims to validate the efficacy of outpatient discectomy without arthrodesis in adolescent patients.

Materials and Methods

Patient Population

From February, 1992 to August, 2001, 1377 decompression procedures on the posterior lumbar spine without fusion were retrospectively studied. Thirty-one of these procedures (2.3%) were performed on teenage patients 19 years of age or younger. All were performed by one spine surgeon at one of four facilities. The two main facilities were suburban teaching hospitals. The other facilities were suburban surgery centers. The demographics of the patients were largely suburban, mid-to large metropolitan US city residents. Patients were all diagnosed with herniated nucleus pulposus (HNP), which required the decompression procedure due to unsatisfactory non-operative treatment. Patients with structural abnormalities or previous instrumentation were excluded from the study. All procedures were performed on one level. Specifically, decompression procedures included microdiscectomy. Most patients had a unilateral hemilaminotomy. General anesthesia was used on all procedures. Each procedure was counted separately. There were no exclusions due to sex or medical condition.

Data Collection

A retrospective review was done on all patients by examining their medical records. A comprehensive study was done recording demographic information, diagnosis, preoperative visual analog scale (VAS) score (recorded by the patient on a scale of 1-10 at their pre-operative appointment 3-4 weeks prior to surgery), level of surgery, and any complications including recurrence. In addition, it was noted whether the surgery was done as an inpatient and if so, for what reason. A procedure was considered outpatient if the patient left the hospital the same day of surgery, without being hospitalized. Patients were then contacted by either telephone or mail in
order to complete an outcome questionnaire. This ques-
tionnaire was developed by the principal investigator and
evaluated patient satisfaction with the procedure. An
unbiased observer not involved in the surgical procedures
made the follow-ups 2.5-7.8 years following their surgical
procedure. A minimum follow-up of 2.5 years was chosen
in order to capture all of the complications directly resulting
from the surgery as well as to rate patient satisfaction with the
procedure. Follow-up was first attempted by the telephone.
If the patient could not be reached, a questionnaire was sent
to the patient with the same wording as what was said over
the telephone. VAS scores were done on a scale of 1-10, 10
described as the worst pain imaginable. On the mailed ques-
tionnaire, this was done by circling one number from 1-10.

Statistical Methods

Descriptive statistics (number, mean/frequency, stan-
dard deviation/percentage, and range) were provided for age,
gender, previous surgery, and pre-operative VAS score for
pain. Summary statistics were listed for both the total patient
population and the patients with post-operative follow-up.
Frequency tables were provided for each of the categorical
variables (number of hospitalizations, number of inpatient
conversions, number of complications, surgical outcome,
and whether the procedure would be repeated). The primary
outcome measurement in this study was conversion to an
inpatient procedure. A Wilcoxon matched pairs test was used
to test for the mean difference between pre-operative and
post-operative VAS scores.

Results

Study Population

In the final study population, 31 consecutive
procedures on patients aged 19 or younger were included.
Thirteen (42%) had a minimum 2.5 year follow-up. The
demographic information for these patients is presented in
Table 1. Eighteen (58%) of the total 31 patient population
were male. Mean age was 17.2. No cases were worker’s
compensation patients, and none were taking part in litiga-
tion in relationship to their injury. All procedures were done
on one level. All 31 procedures were done on an outpatient
basis. The average follow-up time was 4.6 years (range 2.5-
7.8 years, SD=1.6). The demographic data for the follow-up
population are in Table 2. Follow-up questionnaires were not
completed due to incorrect contact information, inability to
reach, or refusal to participate. Due to the age of the patients
included in this population, it was difficult to find accurate
contact information two years following their surgery. Many
had moved away or likely changed names due to marriage.
For the patients who did complete the questionnaire, 5 of the
13 (38.5%) were male; the mean age was 17.3. The overall
demographic characteristics of all patients and patients with
follow-ups are similar, except for a lower percentage of male
patients in the follow-up population.

<table>
<thead>
<tr>
<th>Table 1. Demographic Information</th>
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<tbody>
<tr>
<td><strong>Total Population</strong></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender - Male</td>
</tr>
<tr>
<td>Previous Surgery</td>
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<tr>
<td>Pre-Operative VAS (Pain)</td>
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<table>
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<tr>
<th>Table 2. Demographic Information in Follow-up Population</th>
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<tr>
<td><strong>Follow-Up Population</strong></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender - Male</td>
</tr>
<tr>
<td>Previous Surgery</td>
</tr>
<tr>
<td>Pre-Operative VAS (Pain)</td>
</tr>
</tbody>
</table>
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Inpatient Procedures

Reasons for hospitalization were identified from the operative notes, discharge summaries, and medical charts. Out of the 31 procedures, none were hospitalized. This information is detailed in Table 3. All of the patients reported that they were able to leave the same day as the procedure.

Complications

Two of the 31 patients (6.5%) had a complication. One patient had a recurrent HNP, and the other had a post-operative hematoma. The one patient who had a recurrent herniation (3.2%) underwent a revision laminectomy at the same level 4.5 years later. This was the only patient with a revision in this population. The complication rate is listed in Table 3.

Patient Reported Outcome

Surgical outcome was reported as excellent, very good, good, fair or poor by all 13 follow-up participants. Eleven of the 13 patients (84.6%) stated that their surgical outcome was good or better, and one (7.7%) reported a poor outcome. When asked whether they would repeat the procedure again as an outpatient, 10 (76.9%) stated that they would.

Based on patients who had both pre-operative and post-operative pain VAS scores, a calculated mean difference between these scores was determined. The mean difference was 6.8 (p<.001). All patient-reported outcome results are detailed in Table 3.

Discussion

Recent studies have shown favorable results for discectomy in adolescent patients. However, the debate over whether a fusion is necessary in such patients remains. A 2008 study by Dewing reported that young, active patients do well following lumbar microdiscectomy without arthrodesis. Many returned to unrestricted active military duty and had high satisfaction with their outcome. Recurrent herniation rate was 3% with four out of the six requiring additional surgery. Patients included in that particular study were between the ages of 19-46 years with a mean age of 27 years. In our study, the age was restricted to patients aged 14-19. Our recurrent HNP rate was 3.2%, which was similar to the above study with older patients.

The age restriction for adolescent patients has not been consistent. When looking at the literature, there was no consensus on what the restriction should be. For this study, we chose the age of 19 years or younger. Due to the inconsistency of age limitation, it is difficult to compare incidence rates, and there has been some debate about what the true incidence is. In this study, 2.3% of all patients who underwent a discectomy were aged 19 years or younger. This is comparable to other published rates of 0.4% to 3%. Less than 1% of the total population were 16 years of age or younger, which is also within the published range.

One difference in this study compared to many of the other studies on adolescent patients is that we excluded all patients with structural abnormalities and those who had previous instrumentation. This would likely affect the results as some patients might have required instrumentation and fusion as well as hospitalization following their procedure. In this population, all patients received only a microdiscectomy.

Numerous studies have attempted to evaluate treatment of lumbar herniation in adolescent patients. Some studies have recommended conservative therapy while others have stated surgery is necessary in many of these patients due to conservative therapy resulting in unsatisfactory results. Recent studies have shown favorable results in lumbar surgery in adolescent patients for HNP. The debate has been over the necessity of fusing such patients. Most of the studies done have included patients who had instrumentation or fusion done. This has resulted in varying results. Some have recommended the use of fusion, and have shown better follow-up results with less reinterventions. Other studies have stated that fusion is not necessary and that laminotomy

Table 3: Complication Rates, Patient Reported Outcomes

<table>
<thead>
<tr>
<th>Patients Age 14-19</th>
<th>N</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Procedures</td>
<td>31</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Unplanned Inpatient Procedures</td>
<td>31</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Complications</td>
<td>31</td>
<td>2</td>
<td>6.5%</td>
</tr>
<tr>
<td>Outcome of Good-Excellent</td>
<td>13</td>
<td>11</td>
<td>84.6%</td>
</tr>
<tr>
<td>Would Repeat Procedure</td>
<td>13</td>
<td>10</td>
<td>76.9%</td>
</tr>
</tbody>
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without fusion is the best option.\textsuperscript{17,18,20,22} In order to make a uniform study population, this study only included patients who did not have fusion or instrumentation. All patients were therefore able to have the procedure as an outpatient and did not necessitate hospitalization.

One criticism of performing discectomy procedures on adolescent patients is the high incidence of reoperation and recurrent herniations. In this study, only one patient needed a revision. Higher rates of reoperations have been reported, ranging from 24-28\% of all adolescent patients requiring a subsequent operation.\textsuperscript{12,13,20} Our experience has been more favorable with only one patient needing a revision. Certainly, these patients are susceptible to having a subsequent herniation, but with adequate follow-up, there does not appear to be worse results following discectomy alone without arthrodesis.

To compare these results with results of the total population would better characterize whether adolescent patients should be treated similarly to adult patients. A study published by the above authors showed that microlumbar discectomy could be performed successfully and safely in patients on an outpatient basis.\textsuperscript{2} That study had a complication rate of 8.6\% and a recurrent herniation rate of 6.4\%. The rates in this study are lower. Although this study population is much smaller, patients did as well as the older patient population. And, the adolescent patients also had their operations performed on an outpatient basis with no readmissions or hospitalizations in the total population. Patients were satisfied with their operation and would have the operation again as an outpatient.

For young patients with disc herniation, outpatient microlumbar discectomy without arthrodesis is a good surgical solution with a low complication rate and high patient satisfaction. Patients will continue to need follow-up for recurrent herniation or involvement of another level, but as these results show, patients do very well following this initial operation.

References