

Results of discectomy compared with discectomy and fusion

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Although lumbar spine fusion is performed far less commonly than laminectomy or discectomy, it has shown the greatest percentage increase among lumbar spine operations in the United States during the last decade. Furthermore, analysis of national survey data for 1986 demonstrated that there are wider geographic variations in the use of lumbar spine fusion than other forms of back surgery. For large regions of the United States, there were two-fold differences in laminectomy rates, but almost nine-fold differences in lumbar fusion rates (1).

Administrative databases such as insurance claims and automated discharge registries offer an opportunity to examine some of the differences in morbidity, mortality, and reoperation rates following different surgical procedures on the lumbar spine. Three recently reported studies have utilized this type of information and produced strikingly concordant results regarding surgery with and without lumbar spine fusions.

Methods

Data sources. One of the three studies utilized a hospital discharge registry for the State of Washington in the United States (2). This study included 18,122 surgical hospitalizations from the years 1986 through 1988. Cases were selected using an algorithm that excluded surgery in parts of the spine other than the lumbosacral spine, and also excluded spinal neoplasms, infections, or major trauma (3).

The second study has been reported only in abstract form (3). This study utilized insurance claims from the U.S. Medicare program, a government program which serves primarily retired older persons. This study included only patients who underwent surgery during 1985, with exclusions similar to those noted above. Altogether, there were 27,111 eligible patients, of whom 1,524 received a lumbar spine fusion. The mean age was 72 years, and 57% were women.

The third study also made use of Medicare insurance claims (5). That study utilized a cohort of subjects who underwent surgery in 1986, again with a mean age of 72 years. Although the exclusion criteria appeared to be somewhat different, there were 28,028 patients who were eligible.

Definitions of complications. The Washington State study and the 1985 Medicare study defined complications strictly by the ICD-9-CM codes for complications of operative and medical treatment (996-999) or misadventures of patients during operative or medical treatment (E870-E876). Three additional diagnoses which could logically only occur postoperatively were also included: acute myocardial infarction, pulmonary embolism, and pneumonia.

The Washington State study identified only in-hospital mortality. The 1985 Medicare study identified mortality during the hospital stay or within six weeks following hospital discharge. The 1986 Medicare study included both in-hospital and one-year post-discharge mortality.

Results

In the Washington State study, spine fusion (as opposed to surgery without fusion) was found to be associated with a higher rate of complications, longer hospitalization, and greater hospital charges (Table 1). In addition, a multivariate logistic regression analysis controlling for patient age, sex, and primary diagnosis showed that the performance of fusion was associated with a relative risk of approximately 2.5 for complications, and 2.2 for prolonged hospitalization (2).

In the 1985 Medicare study, operations involving fusions (n 1524) were also compared to back surgery not involving fusion. Among the group who had surgery with fusion, the complication rate was 1.9 times greater, length of stay 1.2 times greater, and hospital charges 1.5 times greater. Furthermore, reoperation rates at four years were not improved among those

Table 1. Data from Washington State (United States) concerning complications and resource use for different lumbar spine operations, 1986-1988 (2)

Procedure	In-hospital complications (%)	Mean hospital stay (days)	Mean hospital charges (U.S.dollars)
Discectomy	5.4	5.1	3,640
Discectomy and fusion	12.1	7.6	6,395
Laminectomy	13.9	7.2	4,936
Laminectomy and fusion	19.6	8.0	6,899
Any procedure without fusion	7.6	5.7	3,973
Any procedure with fusion	17.4	7.6	6,491

who had fusions. Six-week postoperative mortality was significantly higher (twice as high) among these elderly patients when a fusion was performed. These overall differences were similar for various diagnostic subgroups including herniated disc and degenerative disc disease. The short-term disadvantages of fusion were not due to age or comorbidity, since fusion patients were younger and had less comorbidity (4).

The 1986 Medicare study has also been reported only in abstract form (5). However, the population appears to have been very similar to that of the 1985 Medicare study, and the average length of hospital stay was virtually identical. Like the 1985 Medicare study, this report indicated that spine fusion was associated with a striking increase in in-hospital mortality and in overall one-year postoperative mortality.

Discussion

Together, these three studies suggest that lumbar spine fusion, when compared to surgery without fusion, is associated with a substantial increase in complications, mortality, and resource use during the index surgical episode. While they do not offer data on symptoms and functioning following different types of back surgery, the 1985 Medicare study suggests that four-year reoperation rates are not improved among those with fusions compared to those who have surgery without fusions.

These data fail to support the hypothesis that, for most patients, lumbar spine fusion reduces the need for future back surgery, and indicate that there is a high short-term cost to this procedure, both medically and financially. Thus, there is an urgent need for a uniform definition of spinal instability and of the indications for lumbar spine fusion. Because non-randomized comparisons are hazardous, we believe that the effectiveness of lumbar spine fusions should be tested in randomized trials among carefully defined patient samples.

We believe that there are likely to be clinical subsets of patients who benefit from lumbar fusion with a reduced need for further back surgery. One comparative study has suggested that patients with single level spondylolisthesis and spinal stenosis may be an example for which fusion has a clear benefit (6). However, other indications need to be tested with equally rigorous comparative studies.

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