

Microsurgery versus standard removal of the herniated lumbar disc

A 3-year comparison in 150 cases

Carlos Barrios¹, Mahmood Ahmed¹, José Arrótegui², Aron Björnsson² and Per Gillström¹

The outcome of 150 patients with herniated lumbar disc treated by either microsurgical or standard discectomy were retrospectively reviewed after an average of 3 years. Both techniques provided satisfactory results, with 85 percent good or excellent outcome. Microsurgery gave less intraoperative bleeding, shorter hospitalization, and more rapid return to work. The main drawback was a higher recurrence rate of disc prolapse.

A microsurgical technique for removing herniated disc was introduced by Yasargil (1977) and Williams (1978). All the reported series on lumbar disc herniations removed by microsurgery have had a success rate of 75-90 percent (Casper 1977, Wilson and Kenning 1979, Goald 1980, Hudgins 1983, Maroon and Alba 1986).

We report a retrospective comparison of the microsurgery and standard discectomy.

Patients and methods

From 1982 to 1986, 235 patients at our hospital had either microsurgery (M) or a standard operation (S) for classical sciatica due to herniated lumbar discs. From these patients, two groups of 75 patients each were selected for comparison of operation techniques with a follow-up period of an average of 3 (2-6) years (Table 1).

Both groups were comparable except for loss of reflexes (33 in M, 47 in S). The duration of symptoms was more than 1 year in almost half of the patients in both groups. Diagnostic studies in all the patients included a myelogram and/or a CT scan.

Patients with previous lumbar disc surgery at any level were excluded.

The standard operation consisted of unilateral partial hemilaminectomy with removal of a variable amount of the medial facet and routine nucleotomy. The microsurgical technique resembled that described by Wilson and Harbaugh (1981); a needle indicator was used with an image intensifier to locate the intervertebral space. This procedure was not a routine in the standard operation. In both groups a standard postoperative physiotherapy program was usually followed.

A questionnaire was sent to all the patients at the time of review, and the patients' hospital records were reviewed. Outcome was classified as excellent to poor according to Hudgins (1983).

Results

The duration of surgery was almost the same in both procedures (Table 2). Blood loss was lower with microsurgery. Although there was a wide scatter of results, standard operations at the L4-L5 level led to more bleeding than those performed at the L5-S1 level.

Dural tears were more frequent in microsurgery (6 cases) than in the standard operation (4 cases), but there were more level errors in the standard operation (4 cases) than in microsurgery (1 case).

Departments of Orthopedics¹ and Neurosurgery², Karolinska Hospital, S-104 01 Stockholm, Sweden

Table 1. Clinical data from 150 patients operated on for lumbar disc herniation

| Case | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|------|---|----|---|---|---|---|---|---|-----|------|---|---|----|-----|---|-----|----|---|
| 1 | F | 34 | 2 | 1 | 1 | 1 | 3 | 1 | 55 | 450 | 3 | 5 | 12 | 2 | 3 | 32 | 45 | 3 |
| 2 | M | 61 | 3 | 1 | 2 | 1 | 2 | 1 | 50 | 200 | 3 | 1 | 7 | 2 | 4 | - | 48 | 2 |
| 3 | F | 29 | 1 | 2 | 2 | 2 | 3 | 1 | - | 500 | 3 | 1 | 10 | 1 | 4 | 16 | 40 | 2 |
| 4 | F | 44 | 3 | 1 | 2 | 2 | 3 | 1 | - | 200 | 3 | 5 | 5 | 3 | 3 | 16 | 58 | 3 |
| 5 | F | 58 | 3 | 1 | 2 | 1 | 2 | 1 | 60 | 300 | 4 | 1 | 11 | 2 | 4 | 32 | 57 | 2 |
| 6 | M | 55 | 3 | 2 | 1 | 1 | 2 | 1 | 110 | 300 | 1 | 1 | 8 | 2,3 | 3 | - | 24 | 3 |
| 7 | M | 27 | 1 | 1 | 2 | 1 | 3 | 1 | 60 | 100 | 3 | 1 | 6 | 1 | 4 | 6 | 55 | 1 |
| 8 | M | 31 | 1 | 2 | 1 | 2 | 1 | 1 | - | - | 3 | 1 | - | 1 | 4 | 4 | 53 | 1 |
| 9 | F | 46 | 1 | 2 | 2 | 2 | 3 | 1 | - | 400 | 3 | 1 | 6 | 1 | 4 | - | 36 | 2 |
| 10 | M | 30 | 3 | 2 | 2 | 1 | 2 | 1 | 130 | 400 | 3 | 1 | 6 | 1 | 4 | 8 | 40 | 2 |
| 11 | M | 41 | 3 | 1 | 2 | 1 | 3 | 1 | 100 | 100 | 3 | 1 | 5 | 1 | 4 | 8 | 35 | 2 |
| 12 | M | 51 | 1 | 2 | 2 | 1 | 2 | 1 | 120 | 200 | 3 | 1 | 4 | 3 | 4 | 8 | 38 | 1 |
| 13 | M | 40 | 3 | 2 | 2 | 2 | 3 | 1 | 150 | 100 | 3 | 1 | 6 | 1 | 4 | 4 | 37 | 1 |
| 14 | M | 38 | 3 | 2 | 2 | 2 | 2 | 1 | 135 | 150 | 3 | 1 | 7 | 1 | 4 | 8 | 36 | 1 |
| 15 | F | 49 | 3 | 2 | 2 | 2 | 3 | 1 | 200 | 100 | - | - | 6 | - | 3 | 8 | 38 | 3 |
| 16 | M | 25 | 1 | 2 | 2 | 2 | 4 | 1 | 110 | 150 | 3 | 1 | 5 | 1 | 4 | 10 | 38 | 1 |
| 17 | M | 25 | 3 | 1 | 2 | 1 | 3 | 1 | 120 | 250 | 3 | 1 | 6 | 1 | 4 | 8 | 36 | 1 |
| 18 | M | 30 | 2 | 1 | 2 | 2 | 3 | 1 | 95 | 100 | 3 | 1 | 3 | 2,3 | 4 | 20 | 38 | 2 |
| 19 | M | 55 | 2 | 1 | 1 | 1 | 2 | 1 | 100 | 100 | 3 | 1 | 6 | 1 | 4 | 8 | 30 | 1 |
| 20 | M | 33 | 3 | 1 | 2 | 1 | 3 | 1 | 70 | 100 | 3 | 5 | 6 | 2,3 | 2 | 16 | 39 | 2 |
| 21 | M | 43 | 3 | 2 | 1 | 2 | 3 | 1 | 75 | 150 | 3 | 1 | 6 | 1 | 4 | 6 | 38 | 1 |
| 22 | F | 44 | 3 | 1 | 2 | 2 | 3 | 1 | 100 | 650 | 3 | 1 | 10 | 4 | 4 | 12 | 39 | 1 |
| 23 | M | 42 | 3 | 1 | 1 | 1 | 2 | 1 | 60 | 100 | 3 | 1 | 6 | 1 | 4 | 76 | 29 | 1 |
| 24 | M | 48 | 1 | 2 | 2 | 2 | 4 | 1 | 85 | 500 | 4 | 1 | 6 | 2,3 | 2 | 96 | 24 | 3 |
| 25 | M | 41 | 3 | 2 | 2 | 2 | 3 | 1 | 100 | 100 | 3 | 1 | 6 | 2,3 | 4 | 12 | 41 | 2 |
| 26 | F | 46 | 3 | 1 | 2 | 2 | 3 | 1 | 80 | 150 | 3 | 1 | 6 | 1 | 4 | 4 | 42 | 1 |
| 27 | M | 36 | 3 | 1 | 2 | 2 | 3 | 1 | 120 | 75 | 3 | 1 | 4 | 3 | 3 | 8 | 42 | 3 |
| 28 | M | 21 | 3 | 1 | 1 | 2 | 3 | 1 | 65 | 100 | 3 | 1 | 7 | 1 | 4 | 10 | 44 | 1 |
| 29 | F | 42 | 1 | 2 | 1 | 2 | 3 | 1 | 45 | 50 | 3 | 1 | 8 | 3 | 4 | 12 | 43 | 2 |
| 30 | M | 29 | 1 | 2 | 2 | - | 2 | 1 | 140 | 200 | 3 | 2 | 18 | 2,3 | 1 | - | 48 | 3 |
| 31 | F | 37 | 3 | 1 | 2 | 2 | 4 | 1 | 85 | 250 | 3 | 2 | 5 | 1 | 4 | 16 | 42 | 1 |
| 32 | M | 41 | 1 | 2 | 2 | 2 | 2 | 1 | 150 | 800 | 3 | 2 | 3 | 5 | 4 | 12 | 41 | 1 |
| 33 | M | 38 | 3 | 2 | 2 | 2 | 3 | 1 | 50 | 100 | 3 | 5 | - | 2,3 | 3 | 28 | 24 | 3 |
| 34 | F | 35 | 3 | 1 | 2 | - | 2 | 1 | 95 | 100 | 3 | 1 | 4 | 2,3 | 3 | 41 | 42 | 3 |
| 35 | M | 25 | 3 | 1 | 2 | 2 | 3 | 1 | 40 | 150 | 3 | 1 | 6 | 1 | 4 | 8 | 43 | 1 |
| 36 | F | 33 | 3 | 2 | 2 | 1 | 3 | 1 | 85 | 100 | 3 | 1 | 6 | 2 | 4 | 16 | 46 | 2 |
| 37 | M | 70 | 3 | 1 | 1 | 1 | 2 | 1 | 80 | 75 | 3 | 1 | 6 | 5 | 4 | - | 24 | 2 |
| 38 | M | 32 | 3 | 1 | 2 | 2 | 3 | 1 | 50 | 200 | 3 | 1 | 5 | 1 | 4 | 8 | 65 | 1 |
| 39 | M | 43 | 3 | 2 | 1 | 2 | 4 | 1 | 95 | 200 | 1 | 1 | 5 | 3 | 4 | 10 | 59 | 1 |
| 40 | M | 42 | 1 | 2 | 2 | 1 | 3 | 1 | 50 | 100 | 3 | 1 | 8 | 1 | 4 | 10 | 68 | 1 |
| 41 | F | 41 | 1 | 2 | 1 | 1 | 2 | 1 | 80 | 300 | 3 | 1 | 9 | 3 | 4 | 12 | 62 | 2 |
| 42 | M | 26 | 1 | 1 | 2 | 1 | 2 | 1 | 75 | 150 | 3 | 1 | 7 | 1 | 4 | 10 | 60 | 2 |
| 43 | M | 56 | 2 | 1 | 2 | 2 | 2 | 1 | 40 | 150 | 3 | 1 | 6 | 2 | 4 | 4 | 63 | 2 |
| 44 | F | 42 | 2 | 2 | 2 | 2 | 2 | 1 | 60 | 100 | 3 | 1 | 7 | 3 | 4 | 8 | 30 | 2 |
| 45 | M | 32 | 2 | 2 | 2 | 2 | 3 | 1 | 80 | 100 | 3 | 1 | 7 | 1 | 4 | 8 | 65 | 2 |
| 46 | F | 21 | 3 | 2 | 1 | 2 | 2 | 1 | 80 | 150 | 1 | 2 | - | 3 | 4 | 6 | 69 | 2 |
| 47 | F | 37 | 2 | 2 | 2 | 1 | 2 | 1 | - | - | 3 | 1 | - | 1 | 4 | 12 | 48 | 2 |
| 48 | M | 48 | 1 | 2 | 2 | 1 | 2 | 1 | 150 | 400 | 3 | 1 | 4 | 2 | 4 | - | 67 | 2 |
| 49 | F | 43 | 2 | 2 | 1 | 2 | 3 | 1 | 80 | 50 | 3 | 1 | 7 | 1 | 4 | 12 | 66 | 1 |
| 50 | M | 45 | 1 | 2 | 1 | 2 | 2 | 1 | 70 | - | 3 | 1 | 6 | 1 | 4 | 8 | 25 | 2 |
| 51 | M | 38 | 1 | 1 | 2 | 2 | 3 | 1 | 60 | 200 | 3 | 1 | 3 | 1 | 4 | 10 | 65 | 1 |
| 52 | M | 31 | 1 | 2 | 1 | 1 | 2 | 1 | 40 | 150 | 3 | 1 | 5 | 2 | 4 | 8 | 64 | 2 |
| 53 | F | 45 | 1 | 2 | 2 | 2 | 3 | 1 | 75 | 100 | 1 | 1 | 7 | 2 | 3 | 66 | 68 | 3 |
| 54 | F | 33 | 1 | 2 | 2 | 2 | 3 | 1 | 75 | 50 | 3 | 1 | 6 | 3 | 4 | 12 | 60 | 2 |
| 55 | F | 62 | 1 | 1 | 2 | 2 | 3 | 1 | 90 | 100 | 3 | 1 | 6 | 1 | 4 | 12 | 61 | 1 |
| 56 | M | 37 | 1 | 1 | 2 | 1 | 2 | 1 | 85 | 400 | 3 | 1 | 4 | 1 | 4 | 6 | 63 | 1 |
| 57 | F | 29 | 1 | 1 | 2 | 2 | 2 | 1 | 60 | 50 | 2 | 1 | 7 | 2,3 | 4 | 12 | 30 | 2 |
| 58 | F | 34 | 1 | 2 | 2 | 1 | 3 | 1 | 60 | 100 | 4 | 1 | 7 | 3 | 3 | 12 | 59 | 3 |
| 59 | M | 59 | 1 | 1 | 2 | 1 | 3 | 1 | - | - | 3 | 1 | 13 | 1 | 4 | - | 60 | 2 |
| 60 | M | 37 | 3 | 1 | 2 | 1 | 3 | 1 | 70 | 50 | 3 | 1 | 2 | 2,3 | 3 | 128 | 32 | 3 |
| 61 | M | 20 | 2 | 2 | 2 | 1 | 4 | 1 | 65 | 150 | 3 | 1 | 5 | 1 | 4 | - | 22 | 2 |
| 62 | M | 61 | 1 | 1 | 2 | 2 | 3 | 1 | 50 | 150 | 3 | 1 | 5 | 1 | 4 | 12 | 26 | 2 |
| 63 | M | 35 | 3 | 1 | 2 | 1 | 3 | 1 | 40 | 50 | 3 | 3 | 6 | 1 | 4 | 8 | 22 | 1 |
| 64 | F | 46 | 3 | 2 | 2 | 2 | 3 | 1 | 40 | 50 | 3 | 1 | 5 | 2 | 4 | 12 | 30 | 2 |
| 65 | F | 64 | 3 | 1 | 2 | 2 | 4 | 1 | 180 | 1100 | 4 | 1 | 9 | 3,4 | 3 | - | 29 | 3 |
| 66 | F | 45 | 2 | 2 | 1 | 2 | 3 | 1 | 65 | 50 | 3 | 1 | 6 | 1 | 4 | 12 | 25 | 1 |
| 67 | F | 27 | 3 | 2 | 2 | 2 | 4 | 1 | 75 | 250 | 3 | 1 | 6 | 1 | 4 | 10 | 23 | 1 |
| 68 | M | 40 | 3 | 2 | 2 | 1 | 2 | 1 | - | - | 3 | 2 | 15 | 2,3 | 4 | 48 | 34 | 2 |
| 69 | M | 59 | 1 | 1 | 2 | 2 | 3 | 1 | 50 | 200 | 3 | 1 | 6 | 1 | 4 | 8 | 31 | 1 |
| 70 | F | 45 | 1 | 1 | 2 | 2 | 3 | 1 | 85 | 100 | 3 | 1 | 5 | 1 | 4 | 16 | 30 | 2 |
| 71 | M | 57 | 1 | 2 | 2 | 2 | 2 | 1 | 120 | 200 | 3 | 2 | 18 | 3 | 4 | 20 | 68 | 1 |
| 72 | M | 32 | 1 | 1 | 2 | 1 | 3 | 1 | 70 | 300 | 3 | 1 | 6 | 1 | 4 | 6 | 60 | 1 |
| 73 | M | 41 | 1 | 2 | 2 | 2 | 3 | 1 | 60 | 50 | 3 | 1 | 7 | 1 | 4 | 8 | 70 | 1 |
| 74 | F | 32 | 1 | 2 | 2 | 2 | 3 | 1 | 75 | 150 | 3 | 1 | 8 | 1 | 4 | 12 | 69 | 1 |
| 75 | M | 38 | 3 | 1 | 2 | 2 | 2 | 1 | 90 | 800 | 3 | 1 | 12 | 1 | 4 | 8 | 70 | 1 |
| 76 | F | 36 | 3 | 2 | 2 | 1 | 2 | 2 | 90 | 15 | 3 | 1 | 3 | 2 | 4 | - | 48 | 1 |
| 77 | M | 37 | 1 | 2 | 1 | 1 | 3 | 2 | 180 | 400 | 3 | 1 | 2 | 2 | 4 | 3 | 47 | 2 |
| 78 | M | 45 | 1 | 2 | 2 | 1 | 3 | 2 | 150 | 15 | 3 | 1 | 6 | 3 | 4 | - | 50 | 2 |
| 79 | M | 49 | 3 | 2 | 2 | 2 | 3 | 2 | 70 | 50 | 3 | 1 | 2 | 1 | 4 | 4 | 41 | 1 |
| 80 | F | 45 | 3 | 1 | 2 | 2 | 3 | 2 | 65 | 50 | 3 | 1 | 3 | 3 | 4 | 5 | 41 | 2 |
| 81 | M | 38 | 3 | 2 | 2 | 1 | 2 | 2 | 120 | 500 | 3 | 1 | 7 | 2 | 4 | 6 | 42 | 1 |
| 82 | M | 42 | 1 | 2 | 2 | 2 | 3 | 2 | 100 | 150 | 3 | 1 | 3 | 2,3 | 3 | 24 | 25 | 3 |

Table 1. Continued

| Case | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|------|---|----|---|---|---|---|---|---|-----|-----|---|---|---|-----|---|----|----|---|
| 83 | M | 45 | 3 | 1 | 1 | 2 | 3 | 2 | 180 | - | 3 | 1 | 3 | 2 | 4 | - | 46 | 3 |
| 84 | M | 28 | 3 | 1 | 2 | 1 | 2 | 2 | 360 | - | 4 | 1 | 6 | 2 | 1 | 2 | 37 | 2 |
| 85 | M | 37 | 3 | 2 | 2 | 1 | 3 | 2 | 90 | - | 3 | 1 | 4 | 1 | 2 | 8 | 40 | 1 |
| 86 | M | 31 | 2 | 1 | 2 | 2 | 3 | 2 | 120 | - | 3 | 1 | 6 | 2 | 4 | 8 | 44 | 3 |
| 87 | M | 46 | 2 | 2 | 2 | 2 | 2 | 2 | 120 | 500 | 1 | 1 | 4 | 1 | 4 | 3 | 44 | 3 |
| 88 | M | 29 | 3 | 2 | 2 | 2 | 2 | 2 | 135 | 100 | 3 | 1 | 4 | 2 | 4 | 7 | 37 | 2 |
| 89 | M | 57 | 3 | 1 | 2 | 1 | 3 | 2 | 140 | 15 | 3 | 1 | 4 | 1 | 4 | - | 38 | 1 |
| 90 | M | 59 | 3 | 2 | 1 | 2 | 3 | 2 | 90 | 15 | 1 | 1 | 3 | 3 | 4 | 7 | 37 | 2 |
| 91 | M | 66 | 3 | 2 | 2 | 2 | 3 | 2 | 180 | 15 | 3 | 1 | 3 | 3 | 4 | - | 38 | 2 |
| 92 | F | 53 | 1 | 1 | 2 | 2 | 3 | 2 | 120 | 15 | 3 | 5 | 7 | 1 | 4 | 8 | 38 | 1 |
| 93 | F | 21 | 3 | 2 | 1 | 1 | 2 | 2 | 120 | 15 | 3 | 1 | 4 | 2 | 4 | - | 38 | 1 |
| 94 | M | 42 | - | 1 | 2 | 2 | 2 | 2 | 120 | 15 | 3 | 1 | 4 | 1 | 4 | - | 31 | 1 |
| 95 | F | 43 | 1 | 1 | 1 | 2 | 3 | 2 | 90 | 15 | 3 | 1 | 4 | 1 | 4 | 7 | 28 | 1 |
| 96 | F | 26 | 2 | 1 | 2 | 1 | 2 | 2 | 90 | 15 | 3 | 1 | 3 | 1 | 4 | 12 | 28 | 1 |
| 97 | M | 29 | 2 | 1 | 2 | 1 | 2 | 2 | 180 | 115 | 3 | 1 | 4 | 1 | 4 | 8 | 31 | 1 |
| 98 | M | 49 | 3 | 1 | 2 | 2 | 3 | 2 | 150 | 100 | 3 | 1 | 8 | 1 | 4 | 5 | 32 | 1 |
| 99 | M | 36 | 3 | 1 | 1 | 1 | 2 | 2 | 120 | 15 | 3 | 4 | - | 2 | 1 | 20 | 32 | 3 |
| 100 | M | 48 | 3 | 2 | 2 | 1 | 2 | 2 | 135 | 15 | 3 | 1 | 7 | 1 | 4 | 10 | 32 | 2 |
| 101 | F | 19 | 1 | 1 | 1 | 2 | 3 | 2 | 120 | 15 | 3 | 1 | 5 | 1 | 4 | 3 | 32 | 1 |
| 102 | M | 51 | 1 | 1 | 1 | 2 | 3 | 2 | 120 | 15 | 3 | 1 | 7 | 1 | 4 | 20 | 32 | 1 |
| 103 | F | 37 | 3 | 1 | 1 | 1 | 2 | 2 | 120 | 15 | 3 | 1 | 6 | 1 | 4 | 10 | 31 | 1 |
| 104 | M | 48 | 3 | 2 | 2 | 1 | 2 | 2 | 60 | 75 | 1 | 1 | 2 | 1 | 4 | 4 | 30 | 1 |
| 105 | M | 39 | 3 | 2 | 2 | 2 | 2 | 2 | 135 | 15 | 3 | 1 | 5 | 2 | 4 | - | 24 | 2 |
| 106 | M | 38 | 3 | 1 | 2 | 1 | 3 | 2 | 135 | 500 | 3 | 1 | 3 | 2 | 4 | 8 | 24 | 2 |
| 107 | M | 38 | 1 | 1 | 1 | 2 | 3 | 2 | 120 | 15 | 3 | 1 | 2 | 1 | 4 | 5 | 24 | 1 |
| 108 | F | 38 | 1 | 1 | 2 | 2 | 3 | 2 | 105 | 15 | 3 | 1 | 2 | 1 | 4 | - | 26 | 1 |
| 109 | M | 58 | 1 | 1 | 1 | 1 | 3 | 2 | 105 | 15 | 3 | 2 | 3 | 5 | 3 | - | 26 | 1 |
| 110 | M | 55 | 3 | 2 | 2 | 2 | 2 | 2 | 180 | 100 | 3 | 1 | 2 | 1 | 4 | 2 | 50 | 1 |
| 111 | M | 56 | 1 | 1 | 1 | 1 | 3 | 2 | 150 | 15 | 3 | 1 | 1 | 1 | 4 | 6 | 47 | 1 |
| 112 | F | 24 | 3 | 1 | 1 | 1 | 2 | 2 | 190 | 50 | 3 | 1 | 5 | 1 | 4 | 4 | 24 | 1 |
| 113 | M | 69 | 3 | 1 | 1 | 1 | 3 | 2 | 45 | 15 | 3 | 1 | - | 1 | 4 | 2 | 26 | 1 |
| 114 | M | 33 | 3 | 1 | 2 | 1 | 2 | 2 | 190 | 15 | 3 | 1 | 3 | 2 | 4 | 8 | 26 | 3 |
| 115 | F | 31 | 2 | 1 | 2 | 2 | 3 | 2 | 210 | 200 | 3 | 4 | 3 | 3 | 1 | 7 | 50 | 1 |
| 116 | M | 36 | 1 | 2 | 2 | 2 | 3 | 2 | 105 | 50 | 3 | 1 | 3 | 1 | 4 | 10 | 24 | 1 |
| 117 | F | 48 | 2 | 1 | 1 | 1 | 1 | 2 | 90 | 50 | 3 | 1 | 5 | 3 | 4 | 10 | 24 | 1 |
| 118 | M | 65 | 2 | 1 | 2 | 2 | 2 | 2 | 90 | 15 | 3 | 1 | 4 | 2 | 4 | - | 24 | 1 |
| 119 | M | 47 | 2 | 1 | 2 | 2 | 3 | 2 | 75 | 15 | 3 | 1 | 5 | 1 | 4 | 8 | 28 | 1 |
| 120 | F | 53 | 3 | 1 | 2 | - | 2 | 2 | 90 | 15 | 3 | 1 | 5 | 2,3 | 4 | - | 25 | 2 |
| 121 | M | 42 | 3 | 2 | 1 | 2 | 2 | 2 | 120 | 100 | 3 | 5 | 6 | 2 | 3 | - | 26 | 3 |
| 122 | M | 50 | 3 | 2 | 2 | 1 | 2 | 2 | 165 | 200 | 3 | 1 | 6 | 1 | 4 | - | 24 | 2 |
| 123 | M | 39 | 3 | 2 | 2 | 1 | 3 | 2 | 120 | 100 | 3 | 1 | 5 | 5 | 3 | 5 | 24 | 3 |
| 124 | F | 32 | 1 | 2 | 2 | 2 | 2 | 2 | 45 | 15 | 3 | 1 | 3 | 1 | 4 | 4 | 24 | 1 |
| 125 | F | 36 | 2 | 1 | 1 | 1 | 2 | 2 | 90 | 100 | 3 | 1 | 3 | 1 | 4 | 12 | 24 | 2 |
| 126 | M | 36 | 3 | 2 | 2 | 2 | 2 | 2 | 75 | 50 | 3 | 1 | 4 | 3 | 4 | 6 | 25 | 2 |
| 127 | M | 13 | 1 | 1 | 1 | 1 | 3 | 2 | 90 | 100 | 3 | 1 | 2 | 1 | 4 | 3 | 27 | 1 |
| 128 | M | 40 | 1 | 1 | 1 | 1 | 2 | 2 | 240 | 600 | 3 | 1 | 5 | 1 | 1 | 6 | 26 | 2 |
| 129 | F | 38 | 1 | 2 | 2 | - | 2 | 2 | 60 | 100 | 3 | 4 | 7 | 2 | 4 | - | 24 | 2 |
| 130 | M | 43 | 1 | 2 | 1 | 2 | 3 | 2 | 60 | - | 3 | 2 | 6 | 1 | 4 | 11 | 25 | 2 |
| 131 | M | 54 | 1 | 2 | 2 | 1 | 2 | 2 | 90 | - | 1 | 1 | 4 | 1 | 4 | 12 | 25 | 1 |
| 132 | M | 41 | 1 | 2 | 1 | 1 | 2 | 2 | 90 | 100 | 3 | 1 | 6 | 1 | 4 | - | 28 | 1 |
| 133 | M | 57 | 2 | 1 | 2 | 1 | 2 | 2 | 90 | 100 | 1 | 1 | 3 | 1 | 4 | 5 | 24 | 2 |
| 134 | M | 43 | 2 | 2 | 2 | 2 | 4 | 2 | 105 | 200 | 3 | 5 | - | 2 | 3 | 15 | 28 | 3 |
| 135 | F | 49 | 3 | 1 | 2 | 2 | 3 | 2 | 75 | 50 | 3 | 1 | 5 | 3 | 4 | 9 | 27 | 2 |
| 136 | M | 49 | 1 | 2 | 1 | 1 | 2 | 2 | 60 | 15 | 1 | 1 | 4 | 1 | 4 | 4 | 26 | 1 |
| 137 | M | 45 | 2 | 1 | 2 | 2 | 3 | 2 | 75 | 15 | 3 | 1 | 4 | 1 | 4 | 16 | 24 | 1 |
| 138 | F | 19 | 3 | 2 | 1 | 1 | 4 | 2 | 210 | 50 | 3 | 2 | 5 | 1 | 4 | 12 | 25 | 1 |
| 139 | F | 35 | 1 | 1 | 2 | 1 | 3 | 2 | 90 | 15 | 3 | 1 | 4 | 1 | 4 | 8 | 24 | 1 |
| 140 | F | 67 | 3 | 2 | 2 | 1 | 2 | 2 | 75 | 15 | 3 | 1 | 7 | 1 | 4 | - | 24 | 1 |
| 141 | M | 45 | 1 | 2 | 2 | 1 | 3 | 2 | 45 | 15 | 3 | 1 | 6 | 1 | 4 | 6 | 24 | 2 |
| 142 | M | 40 | 2 | 2 | 2 | 1 | 2 | 2 | 130 | - | 3 | 1 | 6 | 1 | 4 | 35 | 25 | 2 |
| 143 | M | 34 | 3 | 1 | 2 | 1 | 3 | 2 | 65 | - | 3 | 1 | 2 | 1 | 4 | 5 | 28 | 2 |
| 144 | M | 33 | 3 | 2 | 2 | 1 | 2 | 2 | 160 | - | 3 | 1 | 3 | 1 | 1 | 8 | 24 | 2 |
| 145 | F | 37 | 3 | 2 | 2 | 2 | 3 | 2 | 110 | 50 | 3 | 1 | 3 | 3 | 4 | 20 | 24 | 2 |
| 146 | F | 35 | 3 | 2 | 1 | 1 | 2 | 2 | 120 | 100 | 3 | 1 | 5 | 1 | 4 | 9 | 25 | 1 |
| 147 | M | 27 | 1 | 2 | 1 | 1 | 2 | 2 | 110 | 150 | 3 | 1 | 5 | 1 | 4 | 16 | 28 | 2 |
| 148 | M | 24 | 2 | 1 | 1 | 1 | 2 | 2 | 180 | 50 | 3 | 1 | 5 | 1 | 4 | 4 | 24 | 1 |
| 149 | M | 14 | 1 | 1 | 1 | 1 | 3 | 2 | 110 | 100 | 3 | 1 | 2 | 1 | 4 | 4 | 26 | 1 |
| 150 | M | 31 | 3 | 1 | 2 | 2 | 3 | 2 | 145 | 100 | 3 | 1 | 2 | 3 | 4 | 6 | 26 | 1 |

A Sex

B Age, years

C Duration of symptoms: 1 < 6 months, 2 6-12 months, 3 > 1 year

D Motor deficit: 1 absent, 2 present

E Sensory deficit: 1 no, 2 yes

F Reflexes: 1 normal, 2 decreased

G Disc herniation level: 1 L3-L4, 2 L4-L5, 3 L5-S1, 4 two or more levels.

H Surgical technique: 1 standard surgery, 2 microsurgery

I Operative time, minutes

J Blood loss, mL

K Intraoperative complications: 1 dural tear, 2 root damage, 3 no complication, 4 level error

L Postoperative complications: 1 no, 2 wound infection, 3 peroneal palsy, 4 reoperation because of herniated disc recurrence, 5 back pain exacerbation

M Hospitalization, days

N Residual complaints: 1 no, 2 persisting back and/or radicular pain, 3 persisting sensory loss or weakness, 4 increased pain after surgery, 5 no improvement

O Late complications: 1 recurrent disc prolapse, 2 new disc herniation, 3 failed back surgery, 4 no complications

P Weeks of convalescence before starting work

Q Follow-up, months

R Outcome: 1 excellent, 2 good, 3 fair or poor

Table 2. Mean operative time and blood loss for disc surgery

| | Microtechnique | Standard |
|----------------------|----------------|----------|
| Operative time (min) | 91 | 84 |
| L4-L5 | 95 | 91 |
| L5-S1 | 87 | 77 |
| Blood loss (mL) | 89 | 207 |
| L4-L5 | 103 | 251 |
| L5-S1 | 72 | 154 |

Table 3. Postoperative results of operations for lumbar disc syndrome

| | Microtechnique | Standard |
|--------------------------------|----------------|----------|
| Number of patients | 75 | 75 |
| Postoperative complications | 9 | 7 |
| Wound infection | 3 | 4 |
| Exacerbation of back pain | 3 | 3 |
| Reoperation within 1 month | 3 | - |
| Recurrent disc herniation | 5 | 1 |
| New disc prolapse ¹ | 1 | 2 |

¹At another spinal level.

There was no relationship between the occurrence of surgical complications and the final outcome.

Patients who underwent microsurgery had shorter hospitalization, mean 4 days, as compared with 7 days. Patients returned to their usual activities in almost half the time after microsurgery.

There were no serious postoperative complications (Table 3). Wound infection rate and exacerbations of postoperative low back pain were similar in both techniques. However, 3 patients undergoing microsurgery had to be reoperated on within the first month because of incomplete disc removal with persistence or worsening of symptoms. All 3 patients achieved excellent results after the second operation.

Residual complaints were analyzed during follow-up in order to document the efficacy and morbidity of the operations. Regardless of the result, 20 patients of the M and 22 patients of the S group complained of persistent back and/or radiating pain lasting 3 to 24 weeks after surgery. Persisting sensory loss or weakness were more often referred in the S (25 cases) than in the M group (14 cases). Recurrent disc herniation at the same level after an asymptomatic period was more frequent after microsurgery.

Excellent or good results were seen in almost equal numbers after both surgical techniques, microsurgery being slightly more successful. After microsurgery, 41 patients were asymptomatic at review as compared with 32 after the standard operation. There were 13 cases without improvement after the standard operation and 9 cases after microsurgery.

Discussion

The theoretical disadvantage of the standard operation for disc herniation is that it may induce scar-tissue formation around nerve roots (LaRocca and

Macnab 1974, Mayfield et al. 1977). In addition to bone removal and perhaps excessive manipulation of neural structures, profuse bleeding during discectomy may lead to postoperative perineural scarring.

Dural tears have been reported as the major intraoperative complication during microsurgical discectomy (Wilson and Kenning 1979, McCulloch 1987, Stolke et al. 1989), which also seems to have a high recurrence rate of the disc prolapse. While performing microsurgical discectomy, our approach was to remove as much as possible from the entire disc space as suggested by Casper (1977), Yasargil (1977), and Wilson (1979), and not only the protruded disc portion as proposed by Williams (1978).

The major advantage of microsurgery shown by our study lies in earlier hospital discharge of patients and a shorter period of convalescence before returning to usual work activities. The use of a microscope for removing the herniated disc has not been found to prolong the operation (Stolke et al. 1989). The fact that we had fewer level errors in microsurgery may be due to the more accurate technique for locating the level of the prolapsed disc.

References

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