



THE NATIONAL SWEDISH REGISTER  
FOR LUMBAR SPINE SURGERY  
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**SWEDISH SOCIETY FOR SPINAL SURGERY**

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## Introduction

Due to an enlarging interest, improved imaging techniques (CT, MRI), and an increasing number of surgical options, especially based on an increased number of implant techniques, spinal surgery is rapidly growing. Beneficial effects of lumbar spine surgery have been demonstrated but most studies are either surgery performed by a small group of especially interested spine surgeons, or pilot studies or RCTs on new implant techniques. For our speciality to adopt to the principles of EBM, Evidence Based Medicine, it is mandatory to demonstrate the surgical results when implanted in general practice. This is the basic aim of the national Swedish register for lumbar spine surgery which to date is the only register presenting outcomes of spinal operations.

The register started in 1993, funded by the National Board of Health and Welfare, but did not become widely disseminated until 1998 when a revised version of the protocol was presented including a patient based protocol and a comprehensive computer application. In addition, a support function, helping departments and individuals from a theoretical and practical point of view. This has increased the number of registering departments in Sweden and today around 80% of the total number of lumbar spine operations are calculated to be included in the register.

Current evolutions are the development of a web based register version to be introduced from the year of 2003, and discussions with Maurice E. Müller-Foundation in Bern about European collaboration in registering lumbar spine surgery with the Swedish national register as a basis.

The current presentation is a demographic description of lumbar spine operations performed in Sweden in the year of 2001 and (Part I), and a report on one-year follow-ups of patients operated on in the year of 2000 (Part II).

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## The protocol

The protocol has gradually been changed through the years in order to optimise information and since 1999 all data except the surgical report are patient based.

### *Preoperative data*

The preoperative data registered are age, sex, smoking habits, working conditions, sick listing time, pain duration, walking distance and consumption of analgesics. Further, the patient reports back and leg pain on a visual analog (VAS) scale and completes a pain drawing as well as the SF-36 and EuroQol questionnaires. From the year of 2003, the Oswestry score is added as a disease specific instrument.

### *Surgical data*

The diagnosis for surgery, type of operation and, if applicable, type of implant are registered. Side and level for surgery, antibiotic prophylactics and hospitalisation time are included. Complication reporting is performed by the surgeon as well as by the patient at follow-up.

### *Postoperative data*

Postoperatively at one, two (and later on 5 and 10) years, the patient completes a protocol which includes the preoperative questions but also included are the patient's opinion on back as well as leg pain as compared to preoperatively, categorised into one of 5 categories. Finally, patient satisfaction with outcome of surgery is given on a 3-grade Likert scale.

## Register data assembled in 2002

### I. Demographics and surgical treatment of a one-year cohort (2001)

In total, 33 departments, orthopaedic and neurosurgical, registered degenerative lumbar spine surgery in 2001. At the time of compiling the data, however, only 29 departments had reported their data. These 29 departments reported on in total 2 106 patients, 1 431 of which were registered according to the old protocol and 675 according to the new protocol introduced during the year of 2001. Only data included in both databases are presented.

The distribution of diagnoses for surgery during the year was as follows: disc herniation 39.9%, central spinal stenosis 30.8%, lateral spinal stenosis 8.1%, spondylolisthesis 6.7%, segmental pain (disc degenerative pain) 10.1% and others 4.4% (Figure 1).

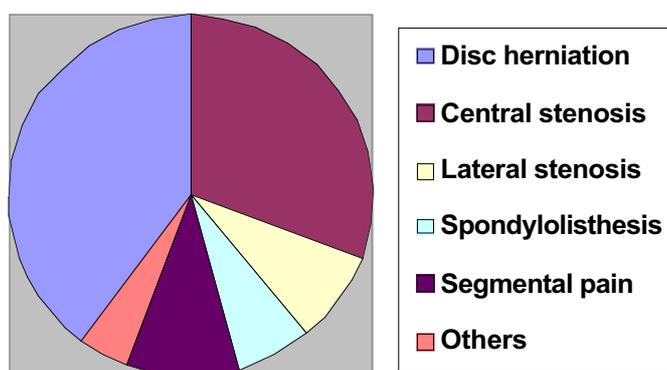


Fig 1. Distribution of diagnoses in the total material 2001, 2 106 patients.

### Disc herniation

#### *Demographics*

Total number of patients: 839, mean age 43.5 (16–84) years. The age distribution is presented in Figure 2. Sex distribution: 55% males and 45% females.

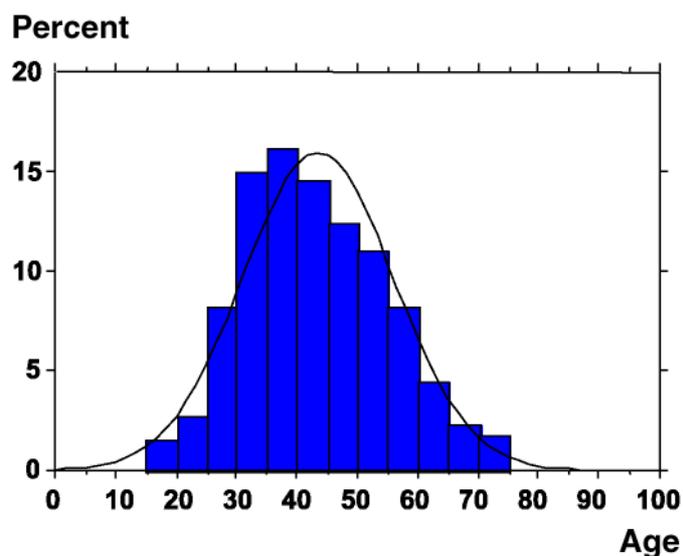


Fig 2. Age distribution, disc herniation, n = 839 patients.

Previous operations: 10.6% of the patients had gone through one surgical procedure of the lumbar spine previously, 2.2% had been operated on twice before and one patient (0.1%) had undergone three operations before the disc herniation surgery. No patients had undergone more than three operations.

Mean preoperative duration of back pain for the patient group was 14 months (1–200) and mean preoperative duration of leg pain 11 months (1–180). The mean preoperative back pain on the VAS scale was 50.7 (0–100) and the mean preoperative leg pain 67.3 (0-100), Figures 3 and 4.

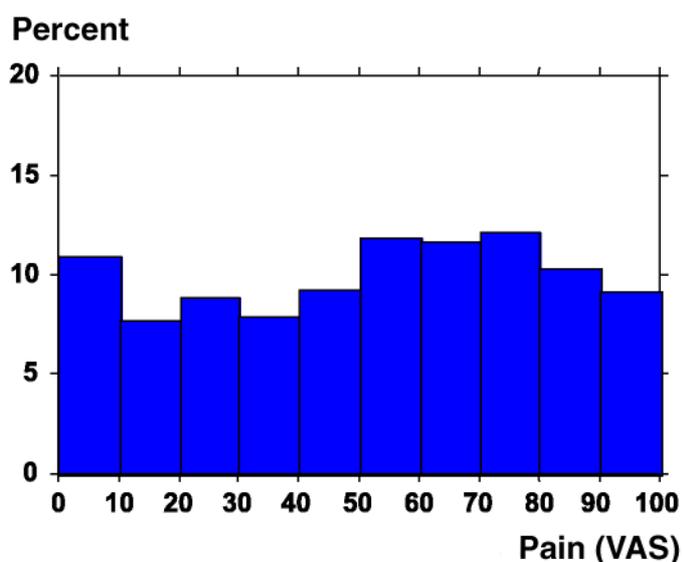


Fig 3. Back pain, according to the visual analog scale (VAS) preoperatively in patients suffering from disc herniation (%).

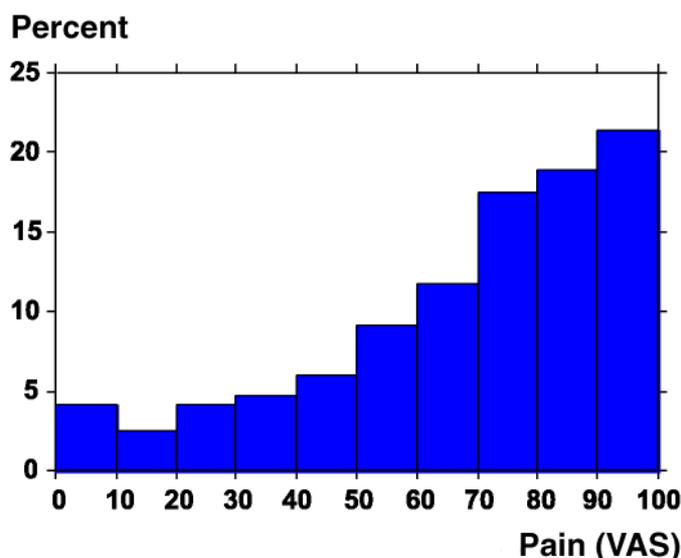


Fig 4. Leg pain, according to the visual analog scale (VAS) preoperatively in patients suffering from disc herniation (%).

Regular consumption of analgesics was reported by 55% of the patients, intermittent consumption by 32% while 13% did not use any analgesics. Working conditions were as follows: 24.3% reported heavy work, 31.8% intermediate and 25.4% light work. 5.6% were out of work, 6.7% had disability pension while 6.2% were age pensioners. 28% were smokers.

#### *Surgical technique*

In 42% of the operations, conventional open disc surgery was performed while microscopic disc surgery was performed in 44% and percutaneous nucleotomy in 1% of the cases. The remaining 13% were mainly either decompressive procedures or decompressive procedures combined with posterior instrumented fusion.

#### *Comments*

The mean age in the group is somewhat higher than in most reports presented while the rate of smokers is lower, consistent with the decrease of smoking in the nation as a whole. The mean preoperative duration of sciatica was almost a year in mean which is a high figure and probably reflects the fact that the register has problems in covering patients admitted as emergency cases and mainly elective surgery is included. Back pain is very evenly distributed on the VAS scale from 0 to 100 whereas leg pain as would be expected, mainly is present in the higher ranges. The lower figures were mainly seen in the groups with other procedures than discectomy. The rate of nucleotomy is decreasing in Sweden.

## Central spinal stenosis

### *Demographics*

Total number of patients: 647, mean age 67 (32–90) years. The age distribution is presented in Figure 5. Sex distribution: 56% males and 44% females.

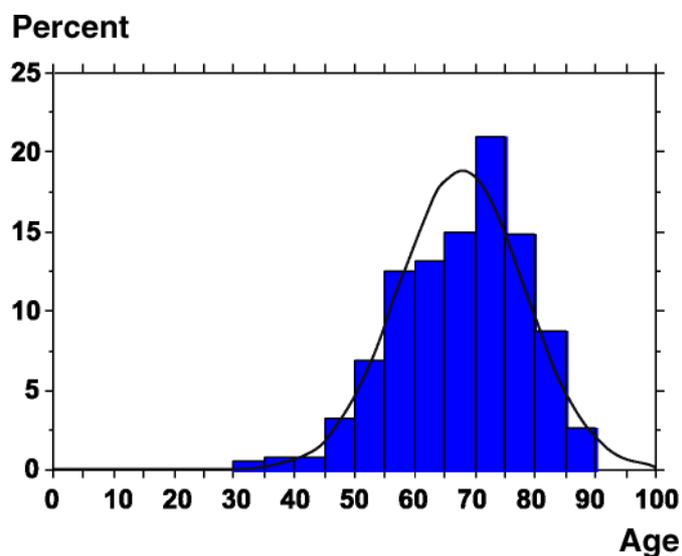


Fig 5. Age distribution, central spinal stenosis, n = 647 patients.

Previous operations: 11.9% of the patients had gone through one surgical procedure of the lumbar spine previously, 2.4% had been operated on twice before. Only six patients had undergone more than 2 operations before the central spinal stenosis surgery.

Mean preoperative duration of back pain for the patient group was 39 months (0–600) and mean preoperative duration of leg pain 32 months (0–600). The mean preoperative back pain on the VAS scale was 61 (0-100) and the mean preoperative leg pain 67 (0-100), Figures 6 and 7.

Regular consumption of analgesics was reported by 52%, intermittent consumption by 29% while 19% did not use any analgesics. Walking distance: 44% of the patients had a walking distance less than 100 m, 35% between 100–500 m and 12% 500–1000 m. The remaining 9% had a walking distance exceeding one km.

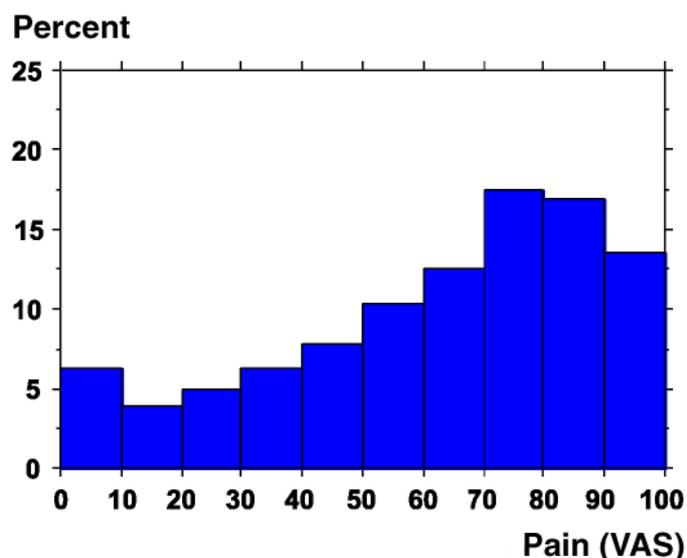


Fig 6. Back pain, according to the visual analog scale (VAS) preoperatively in patients suffering from central spinal stenosis (%).

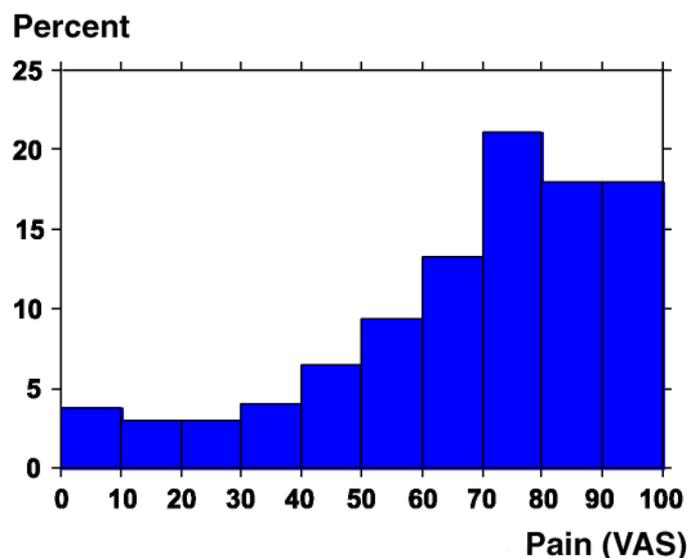


Fig 7. Leg pain, according to the visual analog scale (VAS) preoperatively in patients suffering from central spinal stenosis (%).

### *Surgical technique*

Decompressive surgery/laminectomy alone was performed in 77% of the cases. In 4% decompression was combined with posterior uninstrumented fusion and in 16% combined with posterior instrumented fusion. The remaining 3% mainly consisted of instrumented fusions as sole procedures. Microsurgical and conventional decompression were reported as one group.

Decompression for central spinal stenosis was the second most common procedure performed during the year in Sweden. The mean age is consistent with that reported in the literature but also patients in their 30ies were included. The sex distribution was similar to that in disc herniation and only 22% were smokers. A very long duration of back and leg pain preoperatively was reported, mean 3 years and maximum 50 years! It is obvious that the

patient group is functionally very restricted, with 80% having a walking distance less than 500 m. Very high pain levels on the VAS scale were reported on concerning leg as well as back pain. The vast majority of patients with central spinal stenosis had a decompressive procedure.

## Lateral spinal stenosis

### *Demographics*

Total number of patients: 171, mean age 58 (21-89) years. The age distribution is presented in Figure 8. Sex distribution: 54% males and 46% females.

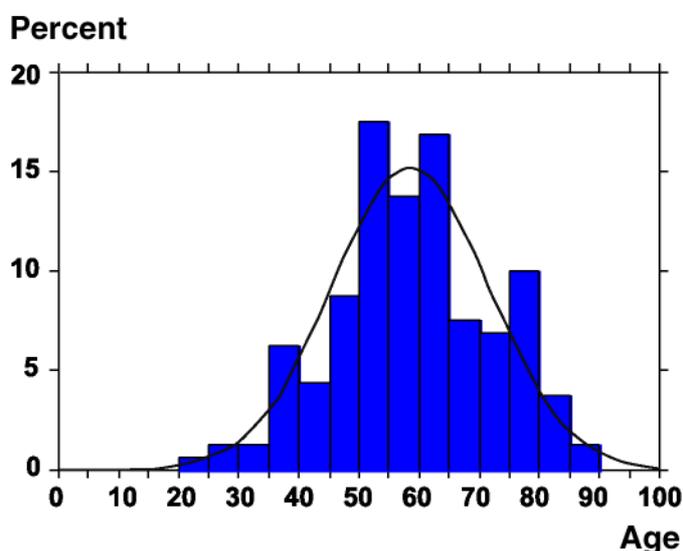


Fig 8. Age distribution, lateral spinal stenosis, n = 171 patients.

Previous operations: 26% of the patients had gone through one surgical procedure of the lumbar spine previously, 5% had been operated on twice before. One patient had been operated on three times before and one patient had more than 4 operations before the lateral spinal stenosis surgery. No patient had been operated on more than 4 times.

Mean preoperative duration of back pain for the patient group was 35 months (1-440) and mean preoperative duration of leg pain was 31 months (1-300). The mean preoperative back pain on the VAS scale was 58 (0-100) and the mean preoperative leg pain 65 (3-100), Figures 9 and 10.

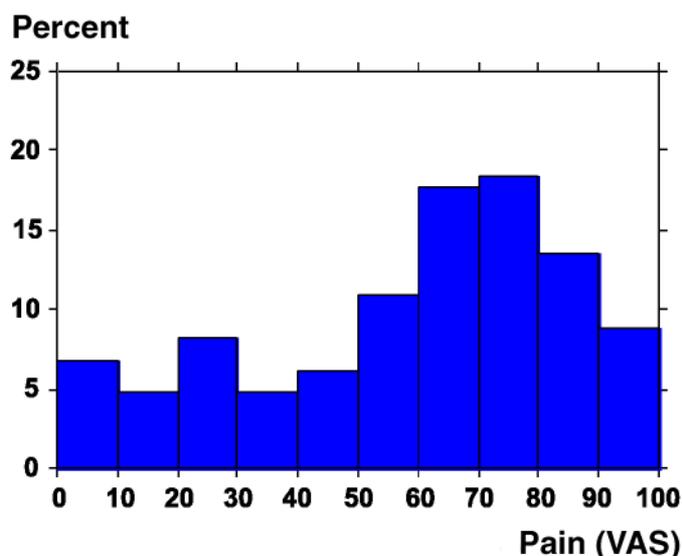


Fig 9. Back pain, according to the visual analog scale (VAS) preoperatively in patients suffering from lateral spinal stenosis (%).

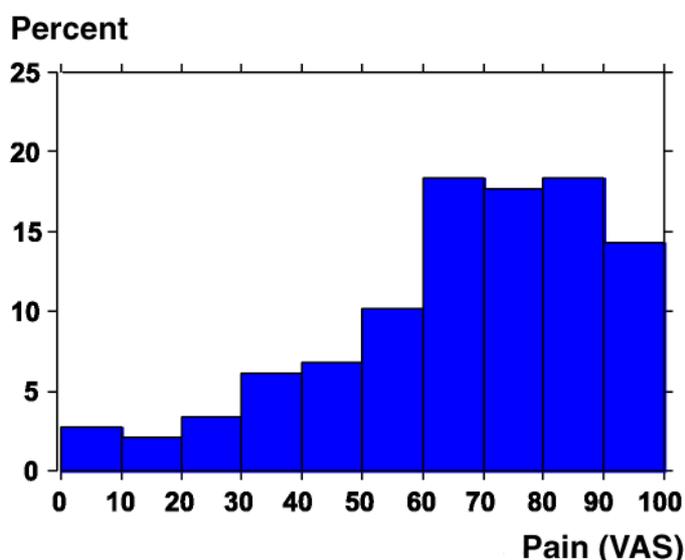


Fig 10. Leg pain, according to the visual analog scale (VAS) preoperatively in patients suffering from lateral spinal stenosis (%).

Regular consumption of analgesics was reported by 56%, intermittent consumption by 23% while 21% did not use any analgesics. Walking distance: 34% of the patients had a walking distance less than 100 m, 34% between 100-500 m and 12% 500-1000 m. The remaining 20% had a walking distance exceeding one km. Working conditions were as follows: 21% reported heavy work, 19% intermediate and 15% light work. 3% were out of work, 14% had pension disability while 28% were age pensioners. 31% were smokers.

### *Surgical technique*

In 80% of the cases with lateral spinal stenosis the surgical procedure was a decompressive procedure of one or more nerve roots. 12% of the patients had a decompressive procedure combined with posterior instrumented fusion and 4% decompression and posterior non-instrumented fusion. In rare cases other measures were taken.

### Comments

Patients operated on for lateral spinal stenosis were more widely distributed regarding age than the other diagnoses but mean age was higher than in disc herniation but lower than in central spinal stenosis. The preoperative duration of back and leg pain was similar to that in central spinal stenosis whereas reported back and leg pain did not differ very much. 70% of the patients had a walking distance less than 500 m and decompressive surgery/laminectomy only was the dominant procedure performed.

## Spondylolisthesis (isthmic)

### Demographics

Total number of patients: 141, mean age 43 (13-77) years. The age distribution is presented in Figure 11. Sex distribution: 40% males and 60% females.

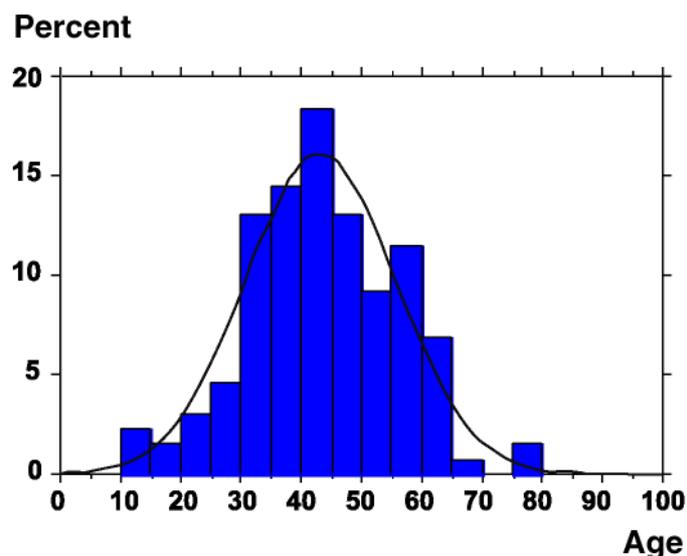


Fig 11. Age distribution, spondylolisthesis, n = 141 patients.

Previous operations: 9% of the patients had gone through one surgical procedure of the lumbar spine previously, 4% had been operated on twice before. No patient had undergone more than 3 operations.

Mean preoperative back pain for the patient group was 57 months (33–480) and mean preoperative leg pain 36 months (1–480). The mean preoperative back pain on the VAS scale was 63 (0–100) and the mean preoperative leg pain 51 (0–100), Figures 12 and 13.

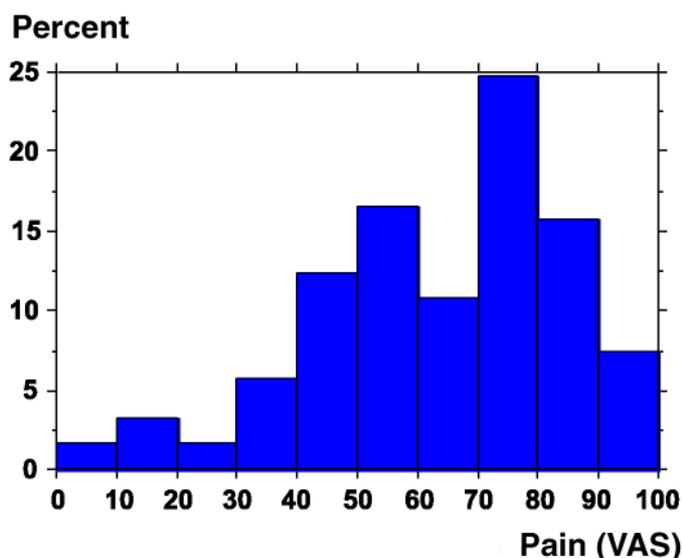


Fig 12. Back pain, according to the visual analog scale (VAS) preoperatively in patients suffering from spondylolisthesis (%).

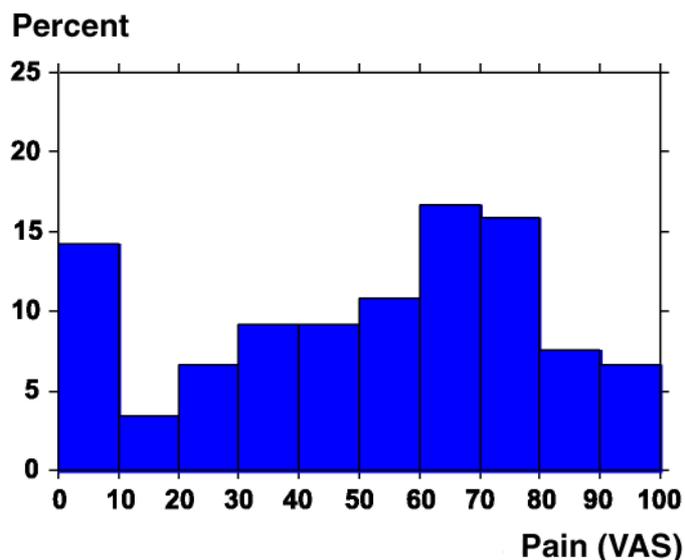


Fig 13. Leg pain, according to the visual analog scale (VAS) preoperatively in patients suffering from spondylolisthesis (%).

Regular consumption of analgesics was reported by 44% of the patients, intermittent consumption by 42% while 14% did not use any analgesics. Working conditions were as follows: 19% reported heavy work, 31% intermediate and 24% light work. 7% were out of work and 16% had disability pension while 3% were age pensioners. 30% were smokers.

### *Surgical technique*

The surgical procedures were more varied in this patient group than in the previous ones. Decompression + posterior instrumented fusion was performed in 38% of the cases and decompression combined with posterior uninstrumented fusion in 10%. 19% had a posterior instrumented fusion without decompression, 19% had an anterior instrumented fusion and 7% a posterolateral fusion only. The remaining 3% of the procedures consisted of decompression as sole procedure.

### Comments

This patient group, isthmic spondylolisthesis, was dominantly female (60%) and 30% were smokers. Preoperative pain duration was long, mean back pain was 4.5 years and leg pain 3 years. Mean age at surgery was 43 years but adolescents as well as elderly were included.

As patients with isthmic spondylolisthesis display back and leg pain in a varying degree, the surgical attitude differs. Because of this and because of differing patient age, the disparity of surgical procedures is not surprising but probably related to the clinical findings, symptoms and age of the individual patients.

## Segmental pain

### Demographics

Total number of patients: 212, mean age 46 (23-78) years. The age distribution is presented in Figure 14. Sex distribution: 43% males and 57% females.

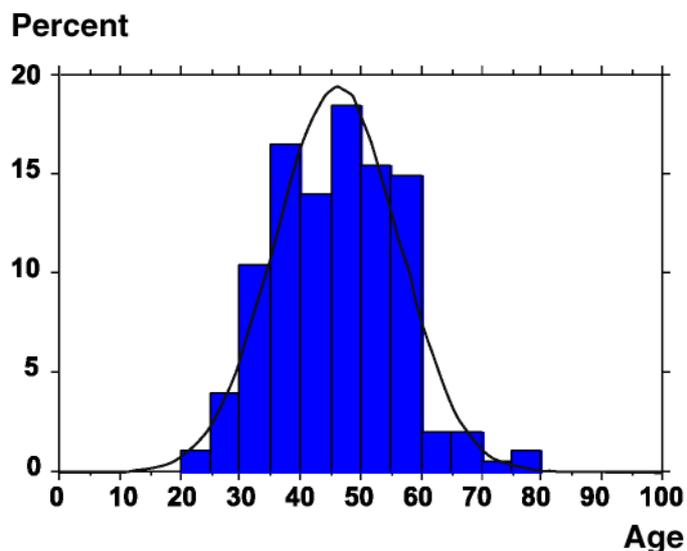


Fig 14. Age distribution, segmental pain, n = 212 patients.

Previous operations: 27% had gone through one surgical procedure of the lumbar spine previously, 10% had been operated on twice before. 5% had been operated on three times before and a few patients had been operated on 4-7 times.

Mean preoperative duration of back pain for the patient group was 60 months and mean preoperative duration of leg pain was 45 months. The mean preoperative back pain on the VAS scale was 68 (8–100) and the mean preoperative leg pain 47 (0–100), Figures 15 and 16.

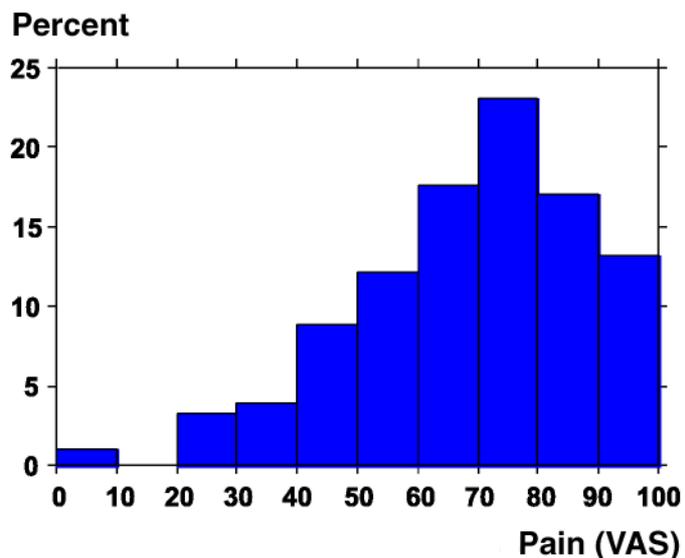


Fig 15. Back pain, according to the visual analog scale (VAS) preoperatively in patients suffering from segmental pain (SRS) (%).

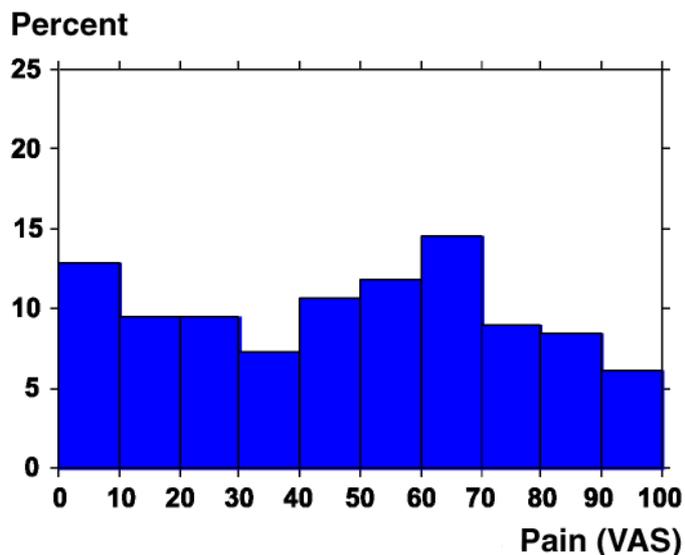


Fig 16. Leg pain, according to the visual analog scale (VAS) preoperatively in patients suffering from segmental pain (SRS) (%).

Regular consumption of analgesics was reported by 57%, intermittent consumption by 28% while 15% did not use any analgesics. Walking distance: 23% of the patients had a walking distance less than 100 m, 28% between 100-500 m, 22% 500-1000 m. The remaining 27% had a walking distance exceeding one km. Working conditions were as follows: 15% reported heavy work, 30% intermediate and 14% light work. 6% were out of work, 31% had disability pension while 4% were age pensioners. 31% were smokers.

### *Surgical technique*

Also in this diagnostic category, the procedures varied. Most common procedure was anterior instrumented fusion using cages (39%), followed by posterior instrumented fusion (29%). In 13% of the cases decompression was performed combined with posterior instrumented fusion

while anterior uninstrumented fusion was performed in 6% and posterior uninstrumented fusion in 4% of the cases.

### *Comments*

The age profile of patients operated on for segmental pain was similar to that of patients with isthmic spondylolisthesis. A very high level of back pain (VAS) was reported, mean 68, but also leg pain was frequent and pronounced. Most patients were females (57%) and almost half of the patients had been subjected to surgical procedures, mainly discectomy, previously. As many as 7 previous operations were reported for one patient before the operation for segmental pain. Heavy manual workers were infrequent and 1/3 of the group was on disability pension. The vast majority of procedures were fusions, 45% anterior and 33% posterior, mainly instrumented (68%).

## **Implants**

The implants reported in the instrumented fusions performed during 2001 were in total of 14 types. Pedicle screw systems with rods or plates were most common and anteriorly, cages as well as ramps were utilised. Table 1 shows the most commonly performed posterior fixations.

Table 1. The most common types of posterior implants used during 2001.

|      |                            |
|------|----------------------------|
| 27 % | VSP (Steffee)              |
| 25 % | Posterior fixator (Olerud) |
| 15 % | Isola                      |
| 8 %  | VSP + anterior device      |
| 7 %  | Click-X                    |
| 6 %  | Diapason                   |
| 4 %  | Diapason + anterior device |
| 2 %  | Synergy                    |
| 2 %  | USS                        |
| 4 %  | Others                     |

## II. ONE-YEAR FOLLOW-UP OF A COHORT OF PATIENTS OPERATED ON IN THE YEAR OF 2000

### Introduction

In the year of 2000, 2 282 patients were registered from 32 departments in Sweden. The demographics of these patients were reported last year. At the time of collection of data for the current presentation, 26 of these departments had submitted data so the total number of patients available for follow-up was 1 832. For 285 patients (15%) no follow-up data were at hand, some of the patients were operated on during the last months of the year 2000 and had not been subjected to follow-up yet and for the remainder follow-up was lacking. The presentation thus consists of 85% of the patients from 2000, 1 547 patients. 119 had been reoperated before the one-year follow-up (7%). In the register, the patients that become reoperated on are followed up regarding their last operation which means that the 119 patients reoperated on are not included in the data presented below. The patients are grouped according to diagnosis as in the 2001 presentation.

### Disc herniation

Total number of patients: 811, mean age 43 (13-80) years. Sex distribution: 54% males and 46% females. Surgical techniques used: 49% conventional disc excision, 42% microscopic disc excision, 1% percutaneous nucleotomy, 4% decompressive procedures and the remaining 4% other procedures.

Results: Mean back pain before surgery (VAS) 53, at 12 months postoperatively 27 (mean reduction 26). Mean leg pain before surgery (VAS) 68, at 12 months postoperatively 24 (mean reduction 44). Figures 17 and 18 display VAS distribution regarding back and leg pain pre- and postoperatively.

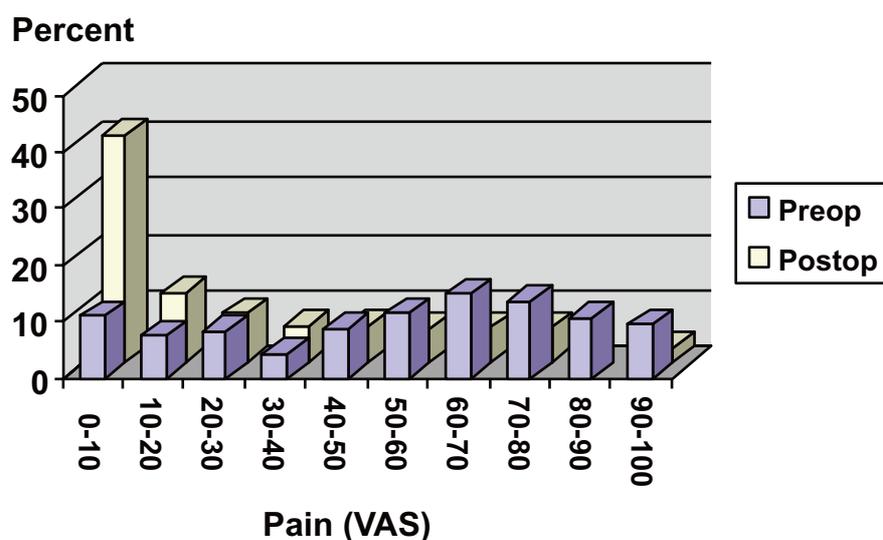


Fig 17. Back pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for lumbar disc herniation (%).

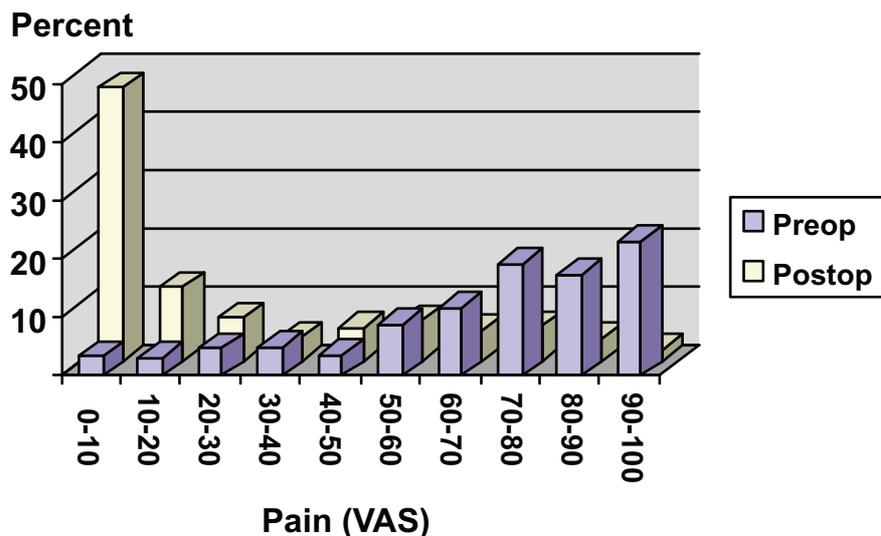


Fig 18. Leg pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for lumbar disc herniation (%).

Estimated improvement back pain: Total pain relief 23%, significant improvement 44%, slight improvement 17%, pain unchanged 10%, deteriorated 4%.

Estimated improvement leg pain: Total pain relief 32%, significant improvement 37%, slight improvement 19%, pain unchanged 9% and deteriorated 3%.

Patient satisfaction with surgery: Satisfied 72%, uncertain 19%, dissatisfied 9%.

Consumption of analgesics at 12 months: Regularly 18%, intermittently 37% and no consumption 45%.

Self reported complication rate: 22%, mainly consisting of remaining sensory or motor affliction or remaining lumbar pain.

SF-36: The pre- and postoperative SF-36 profiles are given in Figure 19, showing improvement postoperatively in all domains except general health.

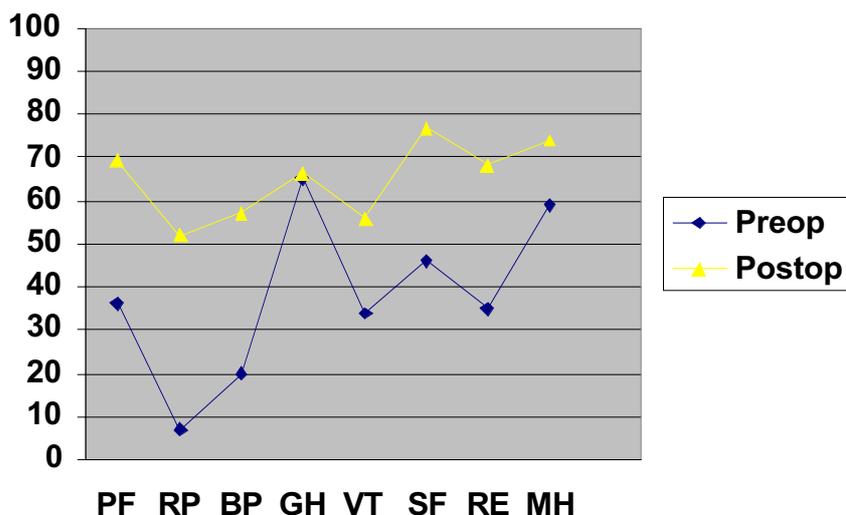


Fig 19. SF-36 scores (mean) pre- and postoperatively for patients operated on for lumbar disc herniation.

#### *Comments*

Graphically, the improvement of back and leg pain is obvious in Figures 17 and 18 and mean VAS pain regarding sciatica decreased from 68 to 25 (44 units). While 70% were painless or almost painless regarding leg pain after surgery, and 19% somewhat improved, the figures regarding back pain were almost as good which is somewhat surprising. The SF-36 profiles show that disc herniation patients are afflicted to a high extent in physical as well as mental domains before surgery and they improve in all categories but not to the same level as the level of normative data for Swedes of the same age.

### **Central spinal stenosis**

Total number of patients: 449, mean age 68 (22-86) years. Sex distribution: 55% males, 45% females.

Results: Mean back pain before surgery (VAS) 61, at 12 months postoperatively 34 (mean reduction 27). Mean leg pain before surgery (VAS) 67, at 12 months postoperatively 35 (mean reduction 32). Figures 20 and 21 display VAS distribution regarding back and leg pain pre- and postoperatively.

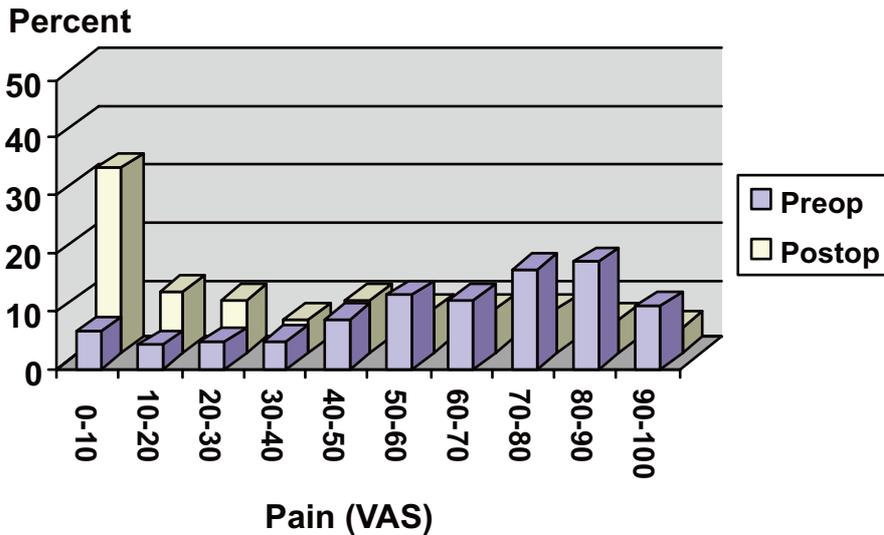


Fig 20. Back pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for central spinal stenosis (%).

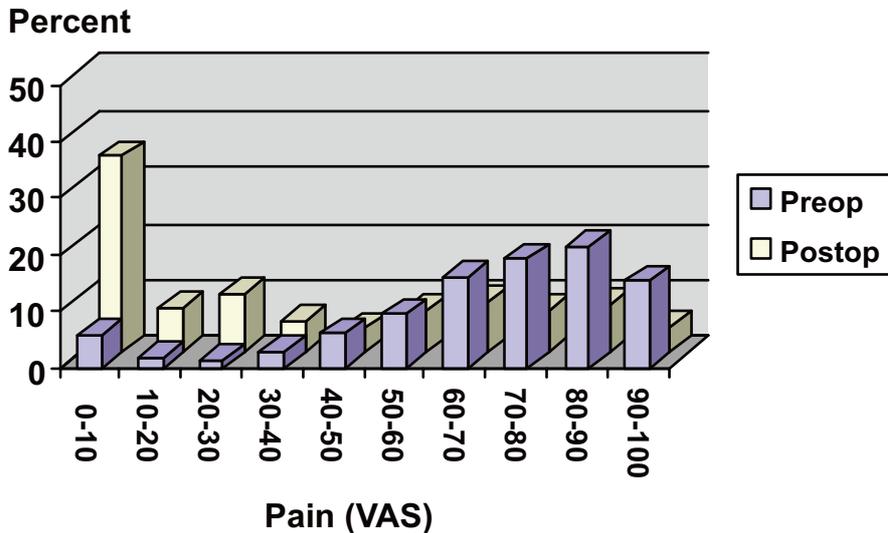


Fig 21. Leg pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for central spinal stenosis (%).

Estimated improvement leg pain: Total pain relief or significant improvement 54%, slight improvement 22%, pain unchanged 14%, deteriorated 10%.

Patient satisfaction with surgery: Satisfied 67%, uncertain 21%, dissatisfied 12%.

Consumption of analgesics at 12 months: Regularly 26%, intermittently 41% and no consumption 33%.

Walking capacity: 12 months after surgery 18% of the patients had a walking capacity less than 100 m, 21% 100-500 m, 18% 500-1000 m and 43% reported a walking capacity exceeding 1 kilometre, (Figure 22), where preoperative values were compared to those presented in part I on demographics on spinal stenosis.

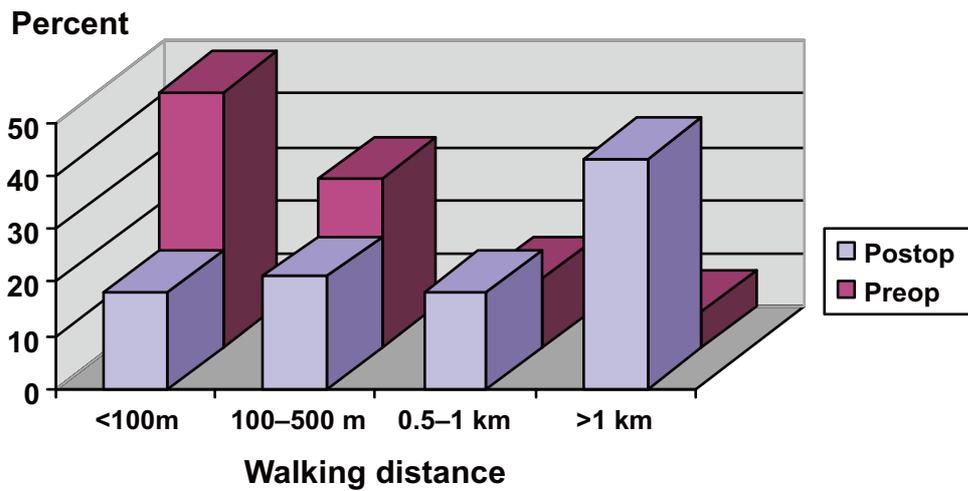


Fig 22. Walking capacity (patient estimated) before and 12 months after surgery for central spinal stenosis.

SF-36: The pre- and postoperative SF-36 profiles are given in Figure 23, showing improvement postoperatively in all domains except GH.

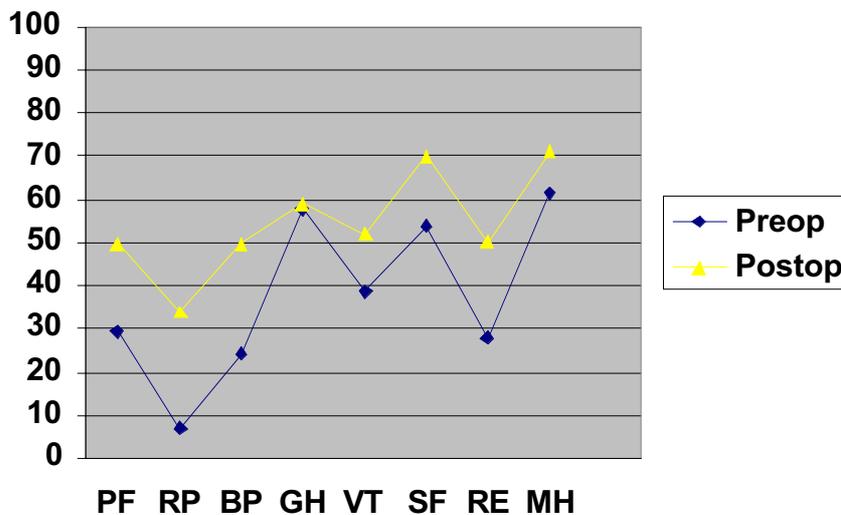


Fig 23. SF-36 scores (mean) pre- and postoperatively for patients operated on for central spinal stenosis.

For patients with central spinal stenosis, patient satisfaction and postoperative pain on the VAS scale related to type of procedures performed divided into decompression only and decompression combined with fusion have been analysed. Patient satisfaction as well as mean back and leg pain on the VAS scale postoperatively was identical in the two groups (Table 2)

Table 2. Patient satisfaction and VAS pain related to type of operation for central spinal stenosis.

|                        | Satisfied (%) | Uncertain (%) | Dissatisfied (%) | VAS back postop | VAS leg postop |
|------------------------|---------------|---------------|------------------|-----------------|----------------|
| Decompression          | 66            | 22            | 12               | 35              | 35             |
| Decompression + fusion | 68            | 17            | 15               | 33              | 35             |

### *Comments*

The improvement in back and leg pain was not as good in central spinal stenosis as in disc surgery. Still, as shown in Figures 20 and 21, significant pain relief was experienced by most patients. Two patients out of 3 were satisfied with the effects of surgery but remaining back pain is a frequent complaint. Walking capacity as well as SF-36 profiles showed obvious changes for the better postoperatively. When the results for patients with decompression only were compared with the results for patients having a concomitant fusion, there was no difference concerning patient satisfaction, mean VAS back pain or mean VAS leg pain at 12 months. However, the preoperative data have not been compared in these two groups but still this fact is of interest.

### **Lateral spinal stenosis**

Total number of patients: 98, mean age 58 (25–86) years. Sex distribution: 52% males, 48% females. Surgical techniques used: Decompression 88%, decompression and fusion (mainly posterior instrumented) 12%.

Results: Mean back pain before surgery 12 (VAS) 58, at 12 months postoperatively 42 (mean reduction 16). Mean leg pain before surgery (VAS) 65, at 12 months postoperatively 40 (mean reduction 25), Figures 24 and 25 display VAS distribution regarding back and leg pain pre- and postoperatively.

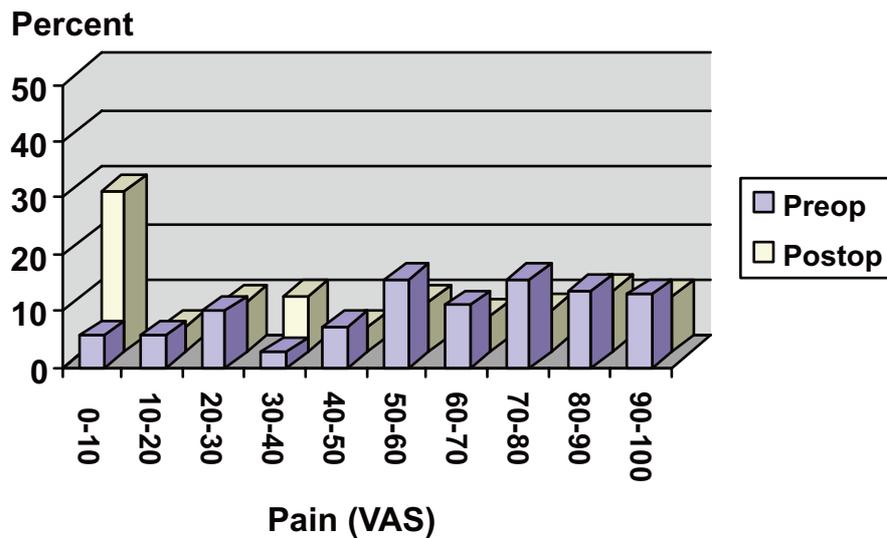


Fig 24. Back pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for lateral spinal stenosis (%).

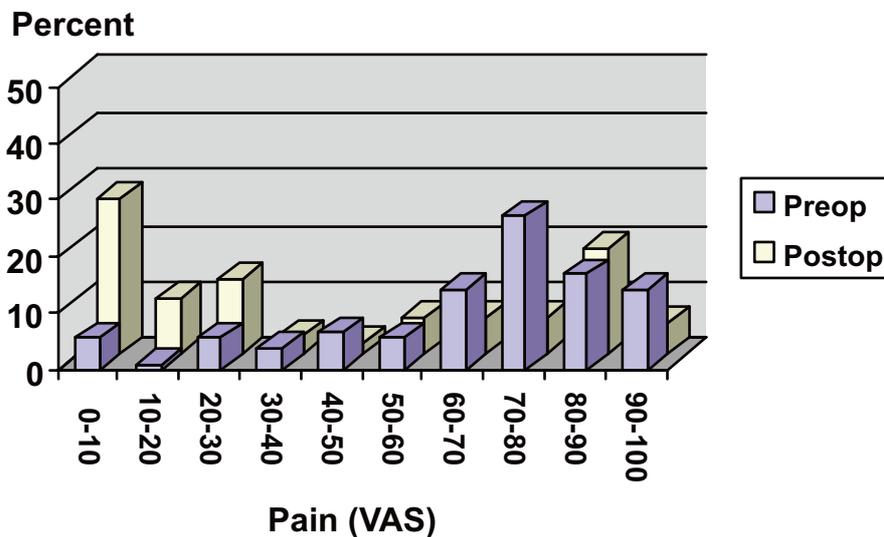


Fig 25. Leg pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for lateral spinal stenosis (%).

Estimated improvement after 12 months: Total pain relief or significant improvement 50%, slight improvement 23%, pain unchanged 16%, deteriorated 11%.

Patient satisfaction with surgery: Satisfied 50%, uncertain 19%, dissatisfied 23%.

Walking capacity: 12 months after surgery 43% of the patients had a walking capacity exceeding 1 km, Figure 26, where preoperative values were compared to those presented in part I on demographics on lateral spinal stenosis.

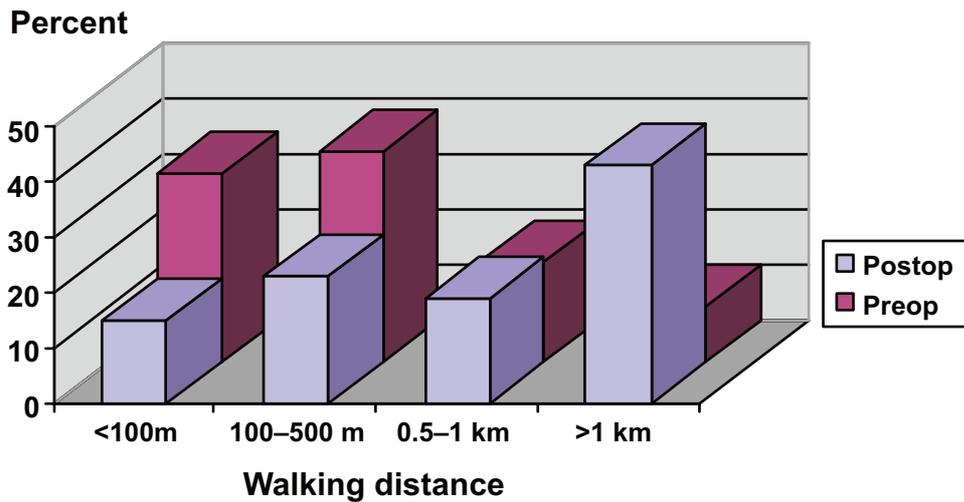


Fig 26. Walking capacity (patient estimated) before and 12 months after surgery for lateral spinal stenosis.

SF-36: The pre- and postoperative SF-36 profiles are given in Figure 27, showing improvement postoperatively in all domains except general health.

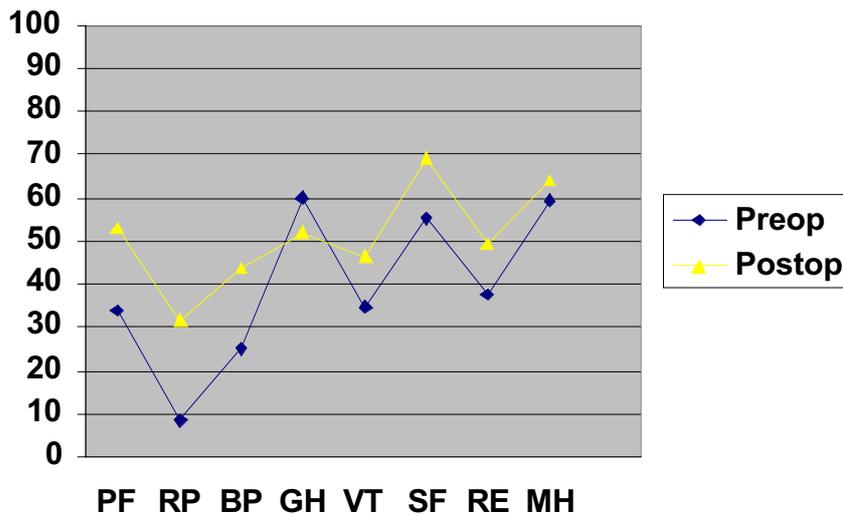


Fig 27. SF-36 scores (mean) pre- and postoperatively for patients operated on for lateral spinal stenosis.

*Comments*

The subjective outcome of surgery for lateral spinal stenosis was less favourable than previously reported in the literature; only 50 % were painless or almost painless. This corresponds to the 50% patient satisfaction with surgery reported. Improvement in walking capacity was abundant but the changes in the SF-36 profiles moderate, mean value for general health was even lower post- than preoperatively!

### Spondylolisthesis (isthmic)

Total number of patients: 78, mean age 48 (21-86), sex distribution: 47% males, 53% females. Surgical techniques used: 32% decompression + posterior instrumented fusion, 17% posterior instrumented fusion, 15% decompression + posterior uninstrumented fusion, 15% anterior instrumented fusion 10% posterior uninstrumented fusion, 4% decompression and 7% various other procedures.

Results: Mean back pain before surgery (VAS) 61, at 12 months postoperatively 34 (mean reduction 27). Mean leg pain before surgery (VAS) 58, at 12 months postoperatively 25 (mean reduction 33). Figures 28 and 29 display VAS distribution regarding back and leg pain pre- and postoperatively.

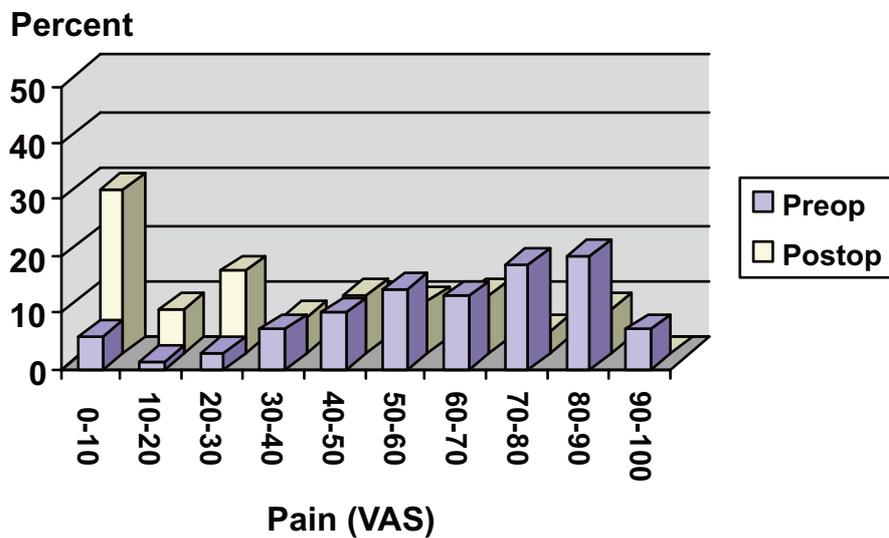


Fig 28. Back pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for spondylolisthesis (%).

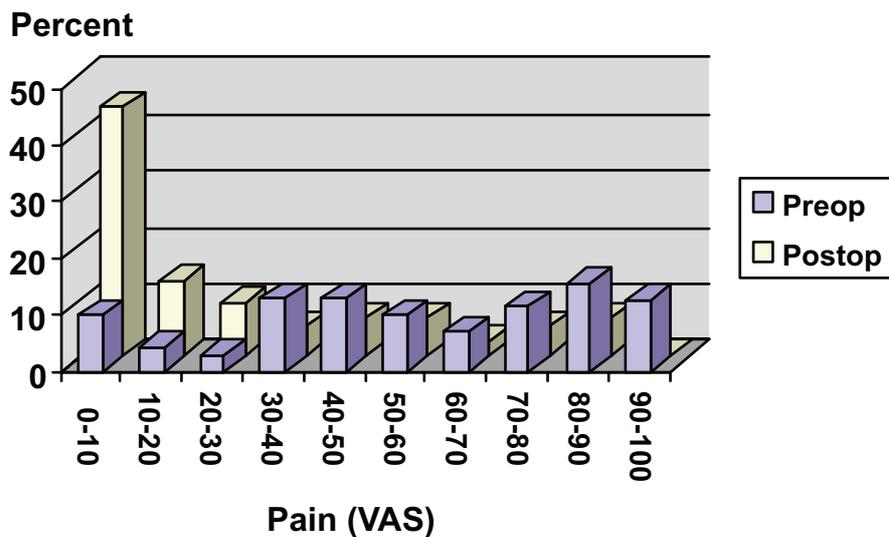


Fig 29. Leg pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for spondylolisthesis (%).

Estimated improvement back pain: Total pain relief or significant improvement 56%, slight improvement 23%, pain unchanged 12%, deteriorated 9%.

Estimated improvement leg pain: Total pain relief or significant improvement 65%, slight improvement 17%, pain unchanged 11%, deteriorated 7%.

Patient satisfaction with surgery: Satisfied 68%, uncertain 26%, dissatisfied 6%.

Consumption of analgesics at 12 months: Regularly 27%, intermittently 33% and no consumption 40%.

SF-36: The pre- and postoperative SF-36 profiles are given in Figure 30, showing improvement postoperatively in all domains except GH.

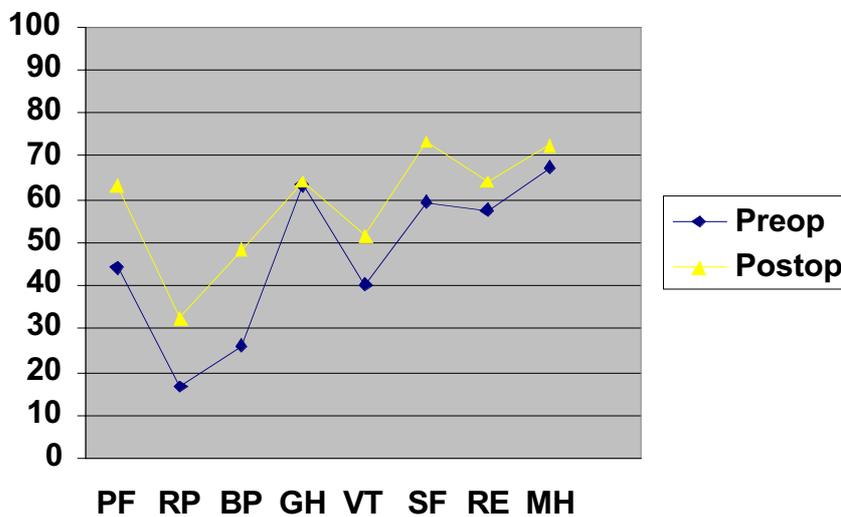


Fig 30. SF-36 scores (mean) pre- and postoperatively for patients operated on for spondylolisthesis.

#### *Comments*

68% of patients operated on for isthmic spondylolisthesis were satisfied with the effect of surgery and 6% dissatisfied. The effect on leg pain was better than on back pain and mean VAS back pain on follow-up was 34 as compared to leg pain 24. The SF-36 profiles of these patients improved less than for example disc herniation patients, in part due to the fact that they had a better preoperative mental as well as physical score.

### Segmental pain

Total number of patients: 93, mean age 46 (27-78), sex distribution 40% males, 60% females. Surgical techniques used: 31% anterior instrumented fusion, 27% posterior instrumented fusion, 18% decompression + posterior instrumented fusion, 10% anterior uninstrumented fusion, 7% posterior uninstrumented fusion, 7% various other procedures.

Results: Mean back pain before surgery (VAS) 69, at 12 months postoperatively 39 (mean reduction 30). Mean leg pain before surgery (VAS) 48, at 12 months postoperatively 23 (mean reduction 25). Figures 31 and 32 display VAS distribution regarding back and leg pain pre- and postoperatively.

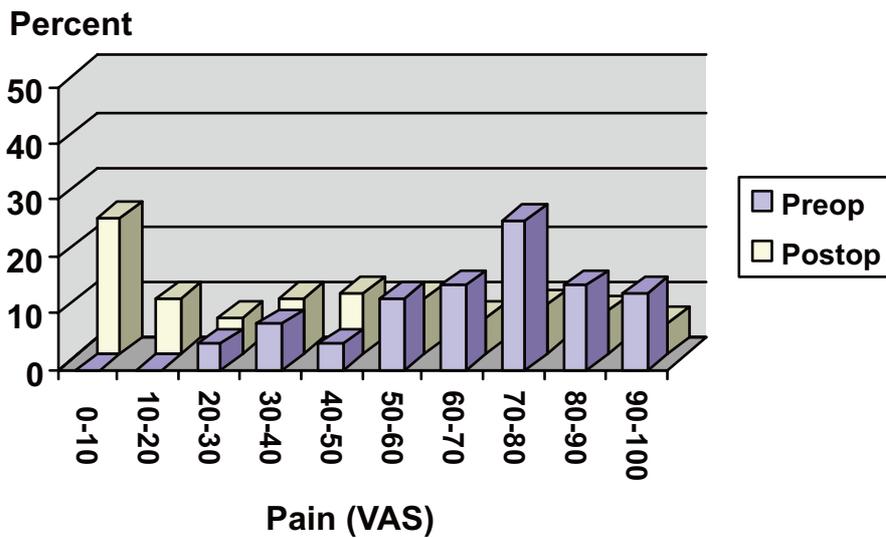


Fig 31. Back pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for segmental pain (%).

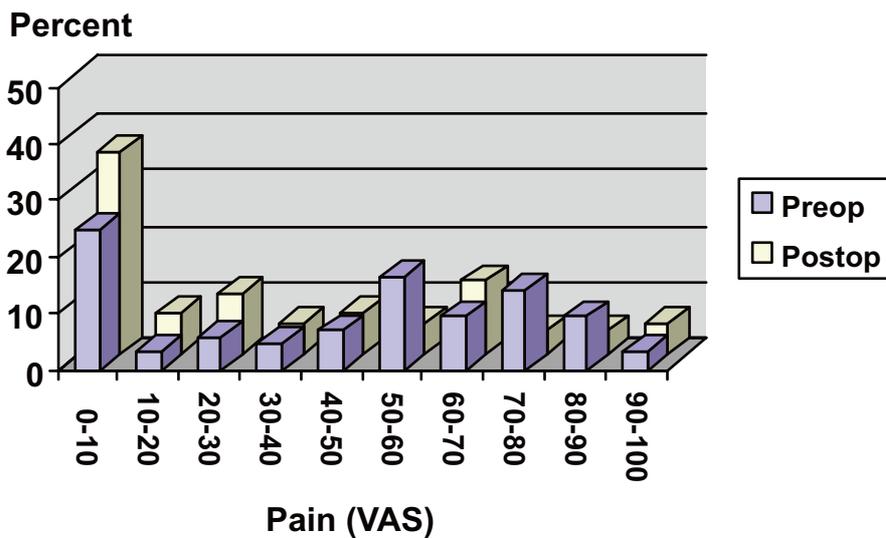


Fig 32. Leg pain, according to visual analog scale (VAS) pre- and postoperatively in patients operated on for segmental pain (%).

Estimated improvement back pain: Total pain relief/significant improvement 46%, slight improvement 29%, pain unchanged 11% and deteriorated 14%.

Estimated improvement leg pain: Total pain relief/significant improvement 46%, slight improvement 23%, pain unchanged 21% and deteriorated 10%.

Patient satisfaction with surgery: Satisfied 61%, uncertain 31%, dissatisfied 8%.

Consumption of analgesics at 12 months: Regularly 43%, intermittently 26% and no consumption 31%.

SF-36: The pre- and postoperative SF-36 profiles are given in Figure 33, showing improvement in all domains except GH.

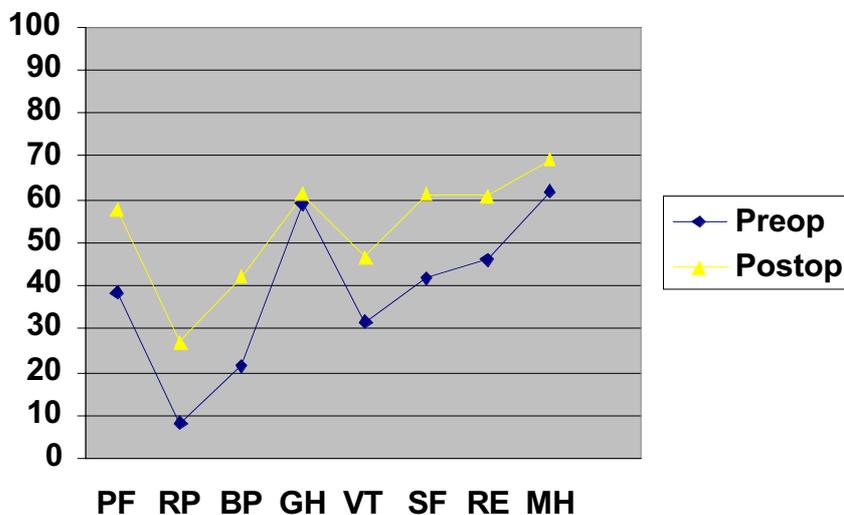


Fig 33. SF-36 scores (mean) pre- and postoperatively for patients operated on for segmental pain.

#### *Comments*

In all aspects recorded, these patients fared less well than the other patient groups which is consistent with the literature; we are dealing with a very problematic patient group where the patient selection for surgery is crucial. When the results are compared to those of the randomised Swedish study on fusion versus controls for chronic low back pain the results are slightly inferior but within the same range. In spite of the fact that 61% were satisfied with the effect of the operation and only 8% dissatisfied, 43% still consumed analgesics regularly at follow-up and 26% intermittently. The preoperative SF-36 profiles was severely afflicted in all domains for these patients and improved slightly in most domains but showed low values when compared to normative data.

## Conclusion

This presentation concerns surgery for degenerative lumbar spine disorders in Sweden 2001 and one-year follow-up of patients operated on in the year of 2000. It is most inspiring that the degree of coverage for the nation is about 80% and this year the prognosis is that we will reach over 85%. Unfortunately the data from 4 departments could not be included in the compilation which was performed in the end of August 2002, as they could not be submitted in time from the 4 departments. This is probably to a great extent due to the lack of resources which is evident in many orthopaedic and neurosurgical departments in Sweden but in part it might also be ascribed to the report system. We hope that the web-based version where departments participating can feed their data directly via Internet will change this. We see two obvious improvements, one step in the data handling disappears, moreover, the individual department can on line have their own data aggregated at any time. Another minor problem that somewhat affects the presentation above is the fact that the protocol for registration was changed during the year with some resulting incongruencies between the data bases. These changes of the protocol are the result of desires of improvement, partly from the register group, partly from representatives for recording departments in the country and they will improve the quality of the data in the future. When the web-version is presented we will have to make some further adjustments in the protocol, for example the Oswestry score will be included.

This report is the first one including 12 months follow-up to a large extent. The reoperation rate within 12 months of 7% will be analysed and the patient follow-up rate seems acceptable at its present level.

The figures demonstrate that operations for central spinal stenosis are increasing in number in Sweden while disc surgery has decreased slightly. All groups of diagnoses demonstrate significant improvement regarding back as well as leg pain on the VAS scale and in the SF-36 domains but with significant variation and, as is well known, far from all patients with spinal operations are painless and satisfied. The data presented can form a background for the individual physician when discussing with patients, giving information on the prognosis of a certain procedure for a certain diagnosis. It is very important to give the patient realistic expectations on surgery; if somebody with a pronounced pain condition expects total absence of pain postoperatively and is left with slight remaining problems, the risk is that the patient is disappointed. If the patient is informed that these remaining problems are likely to appear, there is a mental preparation for acceptance.

In Table 3 pre- and postoperative mean VAS figures regarding back and leg pain related to diagnosis are presented. Disc surgery yields the most pronounced difference between pre- and postoperative leg pain (44 mm) while operation for segmental pain induces the most pronounced reduction regarding back pain (30 mm). The table also shows that all surgical procedures improve back as well as leg pain in mean but this is most variable with a very wide distribution as has been demonstrated in the figures of the presentations. It is also notable that decompressive operations such as disc excision and decompression for spinal stenosis, in spite of the fact that they are aimed at relieving leg pain, often also improves the back pain. The figures of Table 3 are aimed at illustrating outcomes but of course have to be taken with great

care. A change in VAS pain from pre- to postoperatively of 44 of course is more beneficial if it changes from 44 preoperatively to 0 postoperatively than if it changes from 94 preoperatively to 50 postoperatively!

Table 3. Visual analog scores (VAS) pre- and postoperatively related to diagnosis.

|                           | VAS back preop | VAS back postop | $\Delta$ -VAS back | VAS leg preop | VAS leg postop | $\Delta$ -VAS leg |
|---------------------------|----------------|-----------------|--------------------|---------------|----------------|-------------------|
| Disc herniation           | 53             | 27              | 26                 | 68            | 24             | 44                |
| Central spinal stenosis   | 61             | 34              | 27                 | 67            | 35             | 32                |
| Lateral spinal stenosis   | 58             | 42              | 16                 | 65            | 40             | 25                |
| Isthmic spondylolisthesis | 61             | 34              | 27                 | 58            | 25             | 33                |
| Segmental pain            | 69             | 39              | 30                 | 48            | 23             | 25                |

The techniques utilised for fusion of spondylolisthesis and segmental pain are most variable from department to department and also within departments. Anterior instrumented as well as uninstrumented fusion is utilised and posterior uninstrumented and instrumented fusion, sometimes combined with decompressive procedures are included. The literature has, so far not given specific indications on what techniques are best and the individual surgeon's familiarity with a specific technique probably makes him/her better suited for using this technique than using an unfamiliar one. However, it is a little surprising that in spite of the fact that the Swedish lumbar spine study (Fritzell *et al* 2001) as well as the two Volvo Award reports from 1997 (Thomsen *et al* 1997, Fischgrund *et al* 1997) indicate that the addition of instrumentation in conjunction with fusion does not improve the results but increases the risk of complications, in Sweden 4 out of 5 fusions in conjunction with spinal stenosis, are instrumented.

Comparison has been performed between results for decompression versus decompression with fusion for central spinal stenosis (Table 1) and show patient satisfaction as well as postoperative leg and back pain identical in the two groups. These figures are interesting and important and well worth to consider but of course this does not mean that no patient with spinal stenosis should have a fusion or that all fusions should be performed without instrumentation, as the preoperative demographic variables have not yet been compared in the register and we are not dealing with a RCT. It, however, emphasises one of the significant aspects of spine surgery registration, i.e. to identify points where a closer analysis and scrutiny is required firstly from the total material, secondly in focused studies.

To conclude, the coverage of the national Swedish register is continuously improving and the data will be more interesting with longer follow-up. We hope and believe that the web-based

version will simplify the handling of the register and be user friendly, and also to enable even more complete follow-up than to date. The Swedish spine register is unique in the world, documenting multiple pre- as well as postoperative variables. This is necessary as the effects of spinal surgery on patients are difficult to measure in hard data. We strive to reach 90% degree of coverage in order to be able to document changes in indications and results over time and effects of newly introduced implants and surgical techniques in the future. We want to express our sincere thanks to all colleagues and secretaries at the recording departments for their efforts to supply patient data for the improvement of spinal patients' care in the future.s