SWESPINE

THE SWEDISH SPINE REGISTER

2007 REPORT

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SWEDISH SOCIETY OF SPINAL SURGEONS

Björn Strömqvist Peter Fritzell Olle Hägg Bo Jönsson

Introduction

This report presents data from SWESPINE, the lumbar spine surgery register, for 2006. A total of 40 departments registered data in 2006 for a total of 4559 patients. Demographic and surgery data apply to patients operated in 2006. Patients referred to in 1-year follow-up data were operated in 2005 and followed up in 2006, while 2-year follow up data include patients who received follow up through 2006. As previously, basic and follow-up data dominate the report, but the analysis section we introduced in 2006 has now been expanded and we aim to continue to do so in order to use the register data in future quality improvement work.

As of summer 2006, we now have a complete register of spinal surgery procedures, include degenerative conditions in the entire spinal column, deformities, fractures, infections and tumors. Many members of the Swedish Society of Spinal Surgeons have participated in formulating these protocols and it has been a challenging effort. We welcome your reports if you should discover any errors so that we can make further improvements.

On behalf of the Swedish Society of Spinal Surgeons

Sept. 27, 2007

Carina Blom	Peter Fritzell	Olle Hägg
Bo Jönsson	Lena Oreby	Björn Strömqvist

The study was carried out with support from the National Board of Health and Welfare's 2006 grant for national quality registers.

I. Preoperative and surgical data on lumbar spine procedures in 2006

A total of 4570 patients who had had lumbar spine surgery at a total of 40 departments were registered in 2006. In 2005, 4152 patients from 39 departments were registered.

The distribution of diagnoses for patients operated in 2006 was as follows: Lumbar disc herniation 34%, central spinal stenosis 38%, lateral spinal stenosis 7%, spondylolisthesis 6%, segmental pain/DDD (disc degenerative disorder) 12% and other 3%, see figure 1.

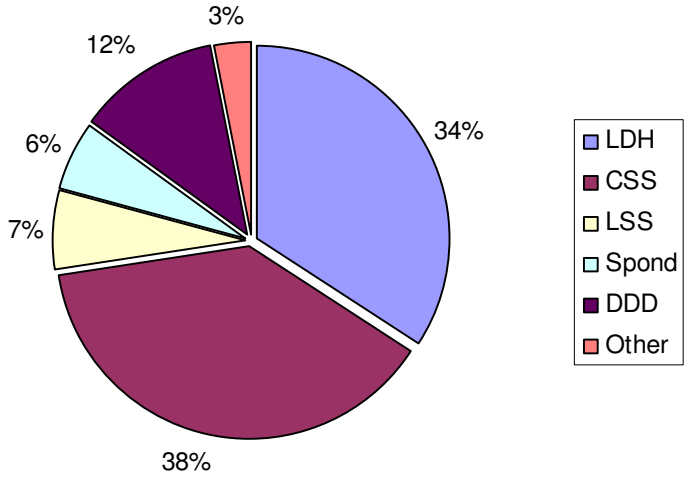

Fig. 1. Breakdown by diagnosis in the total material 2006, 4570 patients.

Diagnosis-related patient demographics and surgical data are presented below. For each variable a number is missing that is not included in the percent calculations

Lumbar disc herniation

Demographic data

In 2006, 1561 lumbar disc herniation surgeries were registered. The patients included 57% men and 43% women. The proportion of smokers was 22%. Mean patient age was 44 (15–92) years and figure 2 shows the age distribution.

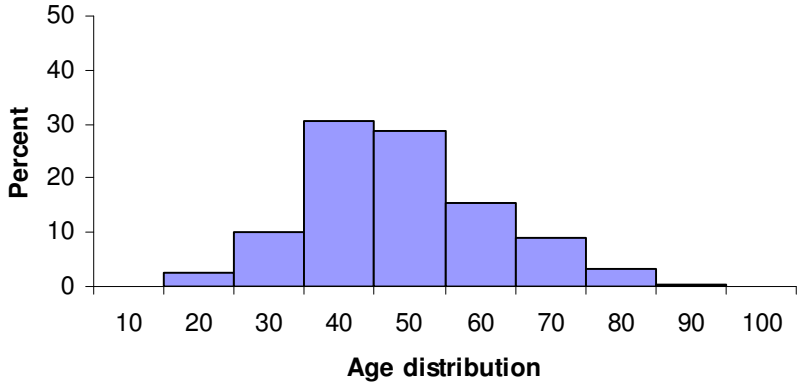

Fig 2. Distribution by age, lumbar disc herniation, n = 1561.

For 87% of patients this disc herniation operation was their first lumbar spine surgery, while 13% had been previously operated.

Preoperative duration of back pain was as follows: 7% had no back pain, 12% had a history of less than 3 months of back pain, 44% 3-12 months, 15% 1-2 years and 23% more than 2 years. Preoperative duration of leg pain/sciatica was as follows: Regarding leg pain, 2% had no leg pain, 15% of patients leg pain for less than 3 months, 51% 3-12 months, 17% 1-2 years and more than 2 years for 16%. Mean back pain on the visual analog scale (VAS) was 44 with a spread from 0–100, while mean leg pain/sciatica on the VAS was 64 with the same spread from 0–100. Distribution regarding both back and leg pain can be seen in figures 3 and 4.

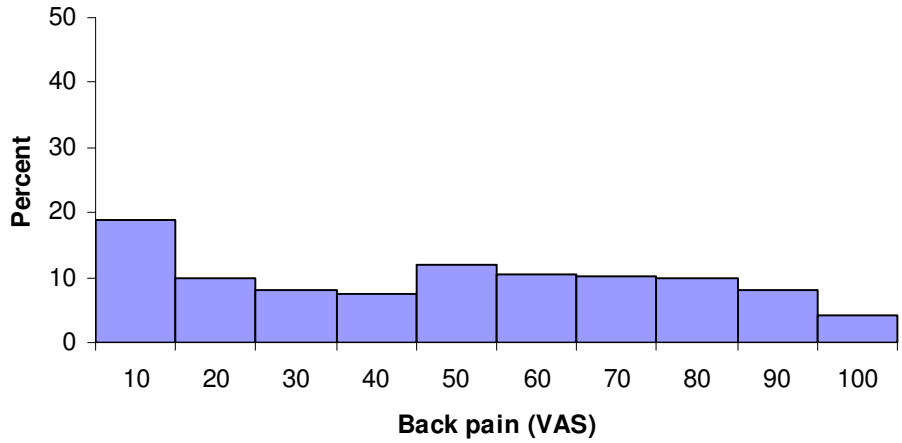

Fig 3. Back pain on the visual analog scale preoperatively in patients with lumbar disc herniation (%).

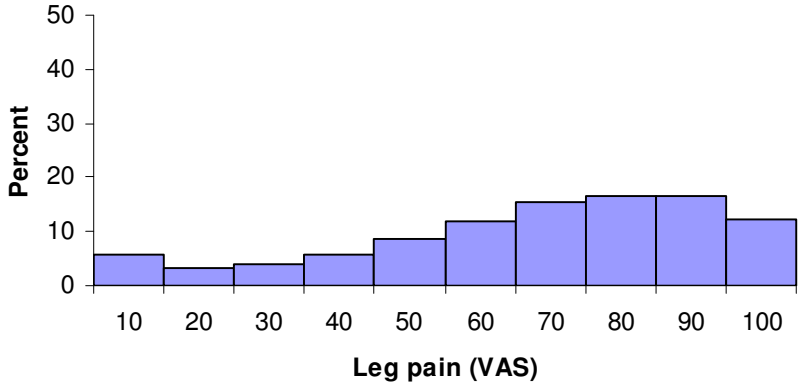

Fig 4. Leg pain on the visual analog scale preoperatively in patients with lumbar disc herniation (%).

Regular analgesic use was reported by 58% of patients, intermittent use by 30%, while 12% reported that they did not take any form of analgesics.

Walking distance was estimated at less than 100m by 33% of patients, 100–500m by 22% of patients, 500 m–1km for 17% of patients and more than 1 km by 28% of patients.

Surgical data

Conventional disc surgery was carried out in 46% of cases and microscopic disc surgery in 42%. The remaining procedures consisted of various combinations mainly involving decompressive surgery for patients with disc herniation with spinal stenosis. Mean length of stay in days, i.e., time from admission through discharge, for conventional surgery was 3.2 and microscopic surgery 3.3.

Central spinal stenosis

Demographic data

A total of 1740 patients were registered for operations for central spinal stenosis in 2006. Mean age was 67 (22–92) years. Figure 5 shows the age distribution.

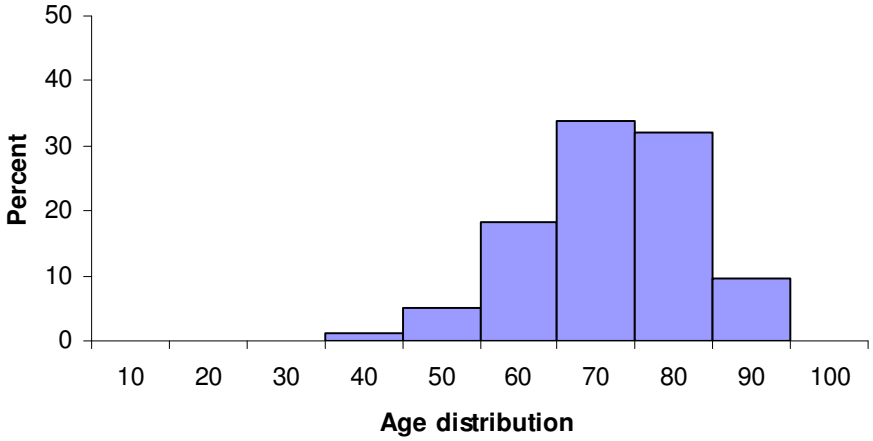

Fig 5. Distribution by age, central spinal stenosis, n = 1740 patients.

The patients included 43% men and 57% women. The proportion of smokers was 19%. For 81% of patients this operation was their first surgery, while 19% had been previously operated one to three times.

Preoperative duration of back pain was as follows: 5% had no back pain, 1% had a history of less than 3 months of back pain, 14% 3-12 months, 21% 1-2 years and 58% more than 2 years. Regarding leg pain, 4% of patients had no leg pain, 2% of patients with central spinal stenosis reported leg problems for less than 3 months, 20% for 3-12 months, 29% for 1-2 years and 45% reported problems for more than 2 years.

Mean back pain on the VAS in the group was 55 (0-100) and mean leg pain/sciatica (VAS) 62 (0–100). Figures 6 and 7 present the distribution of reported VAS.

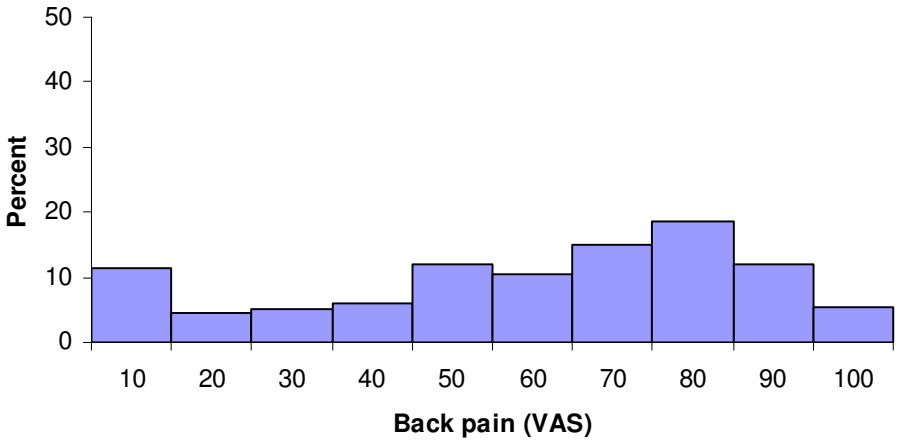

Fig 6. Back pain on the visual analog scale preoperatively in patients with central spinal stenosis (%).

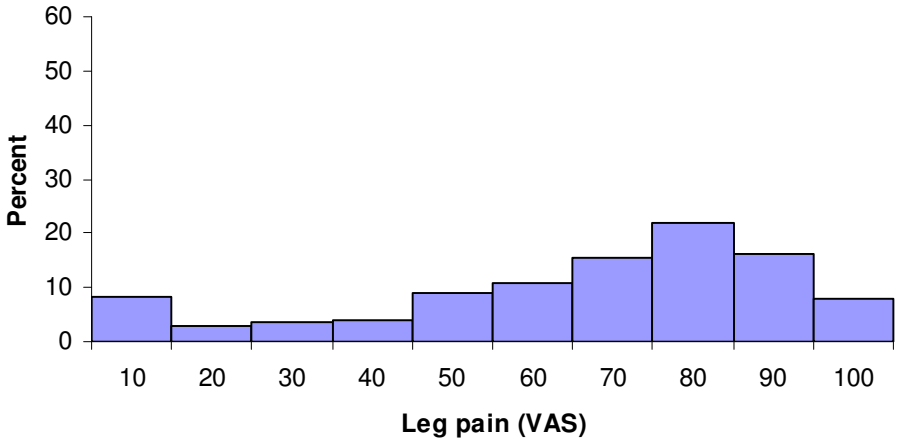

Fig 7. Leg pain on the visual analog scale preoperatively in patients with central spinal stenosis (%).

Among patients with central spinal stenosis, 54% reported regular use of analgesics, 29% reported intermittent use and 17% reported that they did not take any analgesic medication.

Walking distance was estimated at less than 100m by 43% of patients, 100–500m by 32% of patients, 500 m–1km for 12% of patients and more than 1 km by 13% of patients.

Surgical data

In 71% of cases only decompressive surgery was carried out, in 44% conventional surgery and in 27% of cases microscopic surgery. Decompression combined with posterior instrumented fusion was carried out in 17% of cases and decompression together with PLIF in 1% of cases. Decompression + posterior non-instrumented fusion were carried out in 4% of cases.

Mean length of stay in days for patients with conventional decompression was 5.3, for patients with microscopic decompression, 5.1 and for patients with decompression + posterior instrumented fusion 7.9.

Lateral spinal stenosis

Demographic data

During the year 310 patients were operated for lateral spinal stenosis. The patients included 52% men and 48% women. The group included 24% smokers.

Mean age was 60 (28–86) years and Figure 8 shows the age distribution.

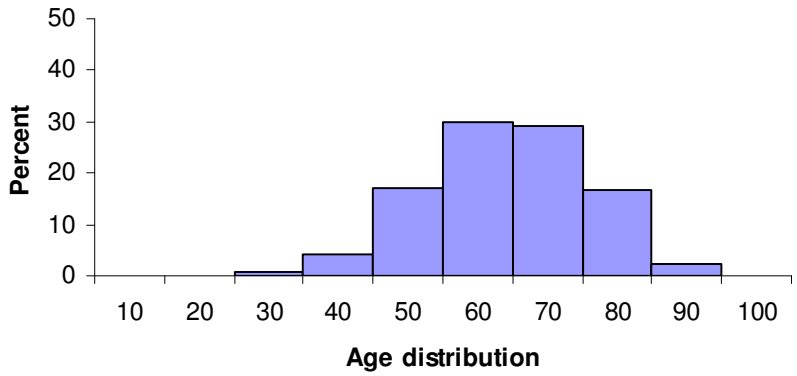

Fig 8. Distribution by age, lateral spinal stenosis, n = 310.

The majority of patients with lateral spinal stenosis, 79%, had had no previous spine surgery while 21% had been operated on one or more times before the current procedure.

Preoperative duration of back pain was as follows: 6% had no back pain, 2% had a history of less than 3 months of back pain, 21% 3-12 months, 20% 1-2 years and 51% more than 2 years. Regarding leg pain, 4% of patients with lateral spinal stenosis had no leg pain, 3% of patients reported leg problems for less than 3 months, 27% for 3-12 months, 24% for 1-2 years and 43% reported problems for more than 2 years. Mean back pain on the VAS in the group was 54 (0–100) and mean leg pain (VAS) 65 (0–100). Figures 9 and 10 present the distribution of reported VAS.

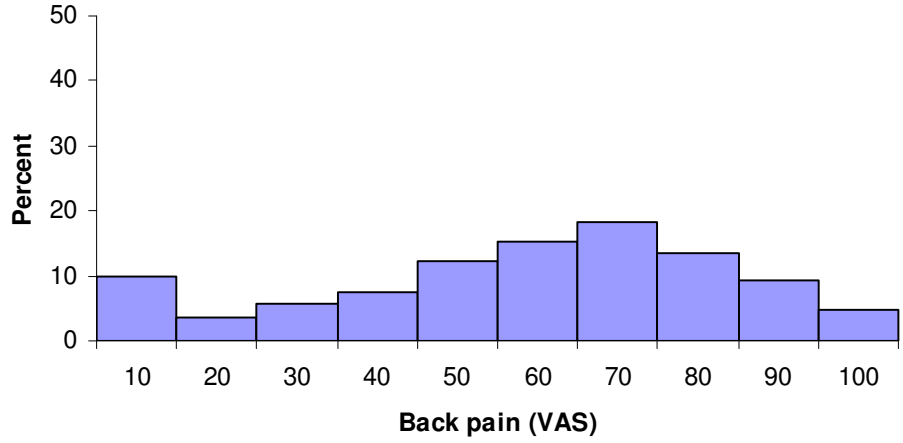

Fig 9. Back pain on the visual analog scale preoperatively in patients with lateral spinal stenosis (%).

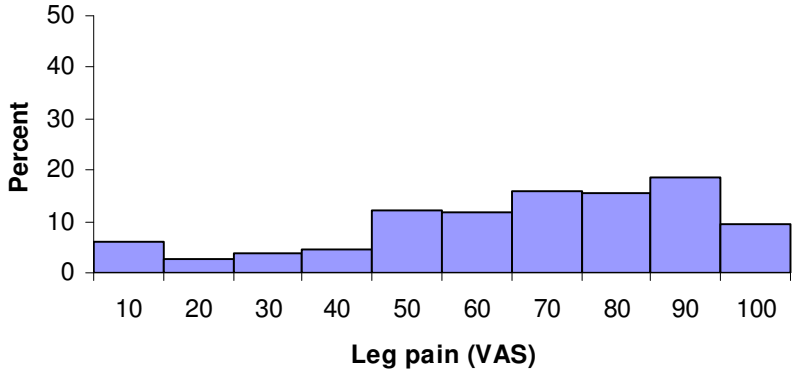

Fig 10. Leg pain on the visual analog scale preoperatively in patients with lateral spinal stenosis (%).

Regular analgesic use was reported by 54% of patients, intermittent use by 27%, and 20% reported they did not take any analgesics. The majority of patients reported limited walking ability, 27% reported they were able to walk less than 100m, 32% were able to walk 100–500m, 18% 500 m–1 km and 23% had a walking distance of more than 1 km.

Surgical data

Decompression surgery was the type of operation in the majority of cases, 94% including 49% conventional with a mean length of stay in days of 3.8 and 35% microscopic decompression with a mean length of stay of 3.2.

Spondylolisthesis

Demographic data

A total of 260 patients, including 50% men and 50% women, were reported for 2006. This group included 22% smokers. Mean age was 47 (15–78) years and figure 11 shows the age distribution.

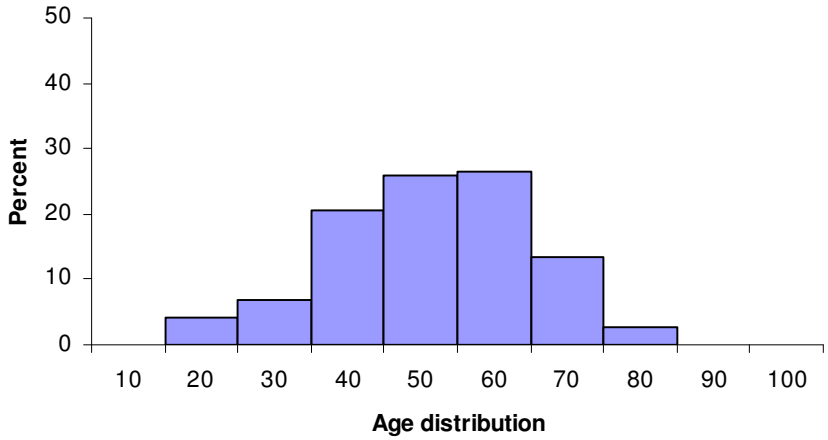

Fig 11. Distribution by age, spondylolisthesis, n = 260 patients.

For 90% of patients the current procedure was the first time they had surgery on the lumbar spine, while the remainder had one or two previous procedures.

Preoperative duration of back pain was as follows: 4% had no back pain, 1% had a history of less than 3 months of back pain, 9% 3-12 months, 15% 1-2 years and 72% more than 2 years. Regarding leg pain, 11% of patients with spondylolisthesis had no leg pain, 1% of patients with spondylolisthesis reported leg problems for less than 3 months, 14% 3-12 months, 23% 1-2 years and 50% reported problems for more than 2 years.

Patients reported that preoperative leg pain on the VAS was 51 (0–100) and preoperative lumbar pain was 57 (0–99). Figures 12 and 13 present the distribution of pain on the VAS.

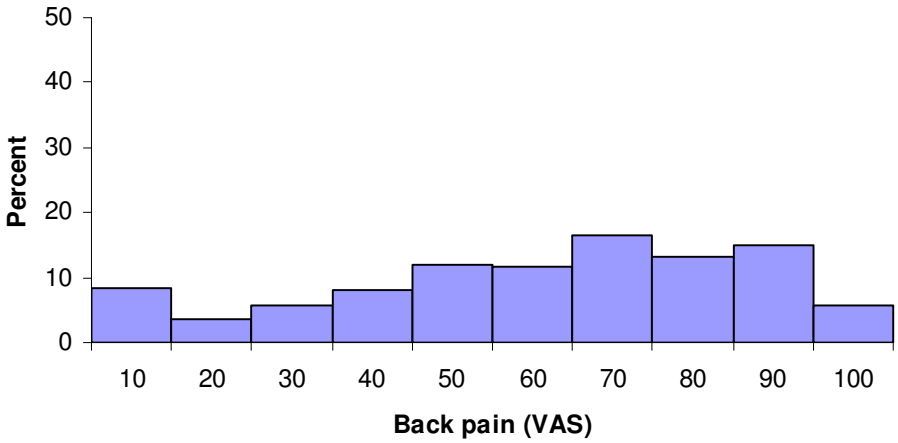

Fig 12. Back pain on the visual analog scale preoperatively in patients with spondylolisthesis (%).

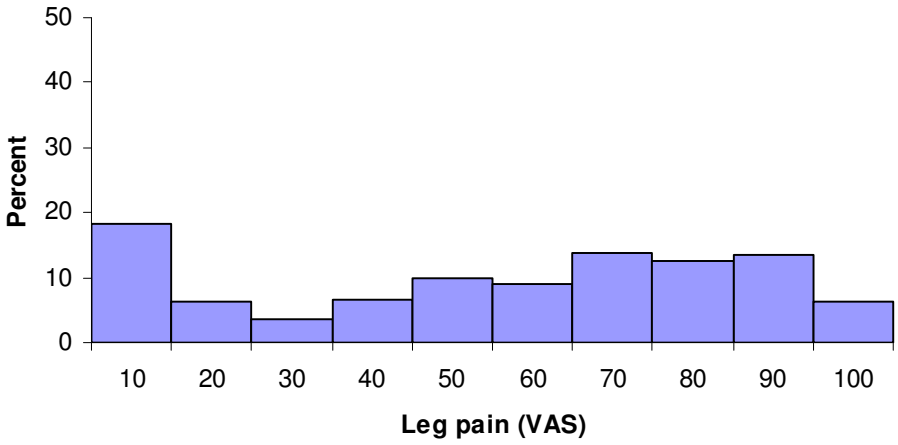

Fig 13. Leg pain on the visual analog scale in patients with spondylolisthesis (%).

Regular analgesic use was reported by 39% of patients, intermittent use by 42% of patients while 20% did not use analgesics.

Walking distance was estimated at less than 100m by 17% of patients, 100–500m by 25% of patients, 500 m–1km for 18% of patients and more than 1 km by 40% of patients.

Surgical data

Patients with spondylolisthesis had a variety of different procedures. They are presented in descending order of frequency: Decompression + instrumented fusion 45%, posterior instrumented fusion 17%, ALIF with or without foreign implant 2%, decompression + non-instrumented fusion 5%, posterior non-instrumented fusion 2%, decompression + PLIF 6%, PLIF with or without foreign implant 14% and decompressive interventions in remaining cases.

Mean length of stay in days varied from 6.1 for decompressive surgery + posterior instrumented fusion, 7.1 for posterior instrumented fusion to 7.6 for PLIF.

Segmental pain/DDD

Demographic data

A total of 540 patients were registered for operations for DDD in 2006, including 48% men and 52% women. The proportion of smokers was 18%. Mean age was 46 (20–80) years and figure 14 shows the age distribution.

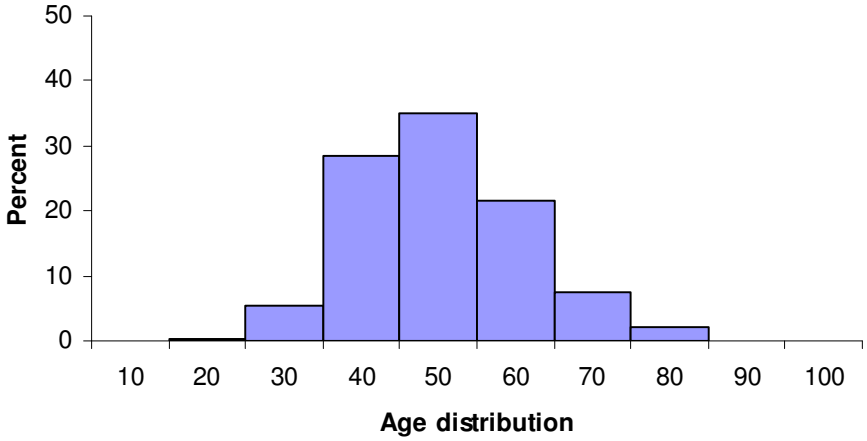

Fig 14. Distribution by age, segmental pain, n = 540 patients.

In this group of patients, 68% had surgery for the first time, while 32% had been operated one or more times previously.

Preoperative duration of back pain in patients with segmental pain was as follows: 0% had no back pain, 1% had a history of less than 3 months of back pain, 9% 3-12 months, 15% 1-2 years and 78% more than 2 years. Regarding leg pain, 13% of patients with segmental pain had no leg pain, 1% reported leg problems for less than 3 months, 13% 3-12 months, 15% 1-2 years and 57% reported problems for more than 2 years.

Estimation on the VAS for back pain showed a mean of 63 (0-100) and leg pain, 45 (0-100). Figures 15 and 16 present the distribution of pain on the VAS.

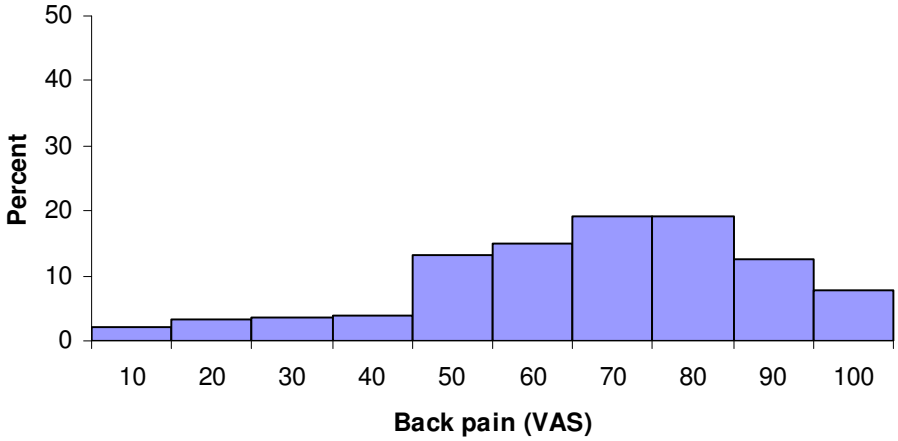

Fig 15. Back pain on the visual analog scale preoperatively in patients with segmental pain (%).

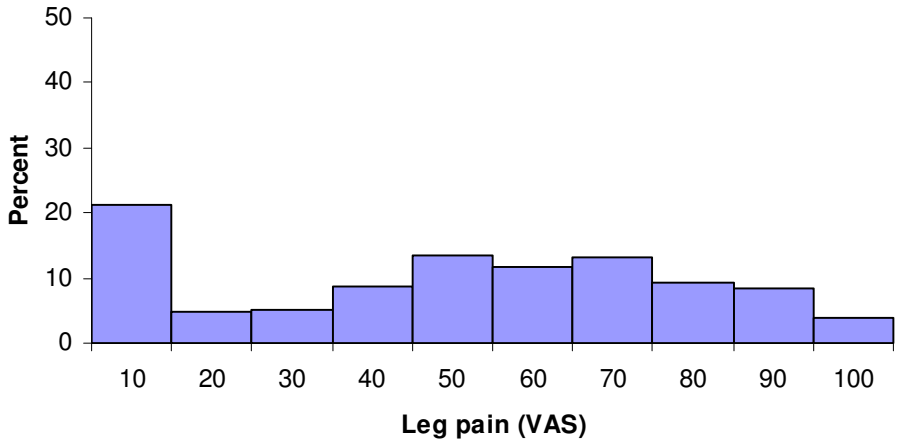

Fig 16. Leg pain on the visual analog scale preoperatively in patients with segmental pain (%).

Regular analgesic use was reported by 54% of patients, intermittent use by 32% while 14% never took analgesics.

Walking distance was estimated at less than 100m by 13% of patients, 100–500m by 23% of patients, 500 m–1km for 26% of patients and more than 1 km by 39% of patients.

Surgical data

A heterogenous surgical treatment spectrum was also seen for this diagnosis as follows: Posterior instrumented fusion 21%, ALIF with or without foreign implant 2%, PLIF with or without foreign implant 21%, disc prosthesis 13%, decompression + PLIF 8%, decompression + instrumented fusion 12%, posterior non-instrumented fusion 5%, decompression + posterior non-instrumented fusion 2%, decompression 1% and a small quantity of other interventions. Mean length of stay varied between 3.9 and 8.3 days for the different types of procedure.

II. 1-year follow-up of lumbar spine procedures in Sweden in 2006

A total of 4152 patients were operated in 2005 and 3004 completed 1-year follow-up. The distribution is as follows: lumbar disc herniation 1000, central spinal stenosis 1160, lateral spinal stenosis 228, spondylolisthesis 194 and segmental pain 343. Patients with "other operations" (79) are not presented in following results.

Lumbar disc herniation

Of 1000 patients who were operated for lumbar disc herniation and completed one year follow-up, 55% were men and 45% women, with a mean age of 44 (14–85) years.

Mean preoperative VAS for back pain was 46, compared with mean postoperative of 26. The corresponding figures for leg pain were 65 preoperatively, and 22 postoperatively . Figures 17 and 18 show preoperative and postoperative VAS for back and leg pain, respectively.

Surgical interventions: 41% conventional herniated disc surgery, 41% microscopic disc surgery, 14% decompression surgery and 4% other procedures.

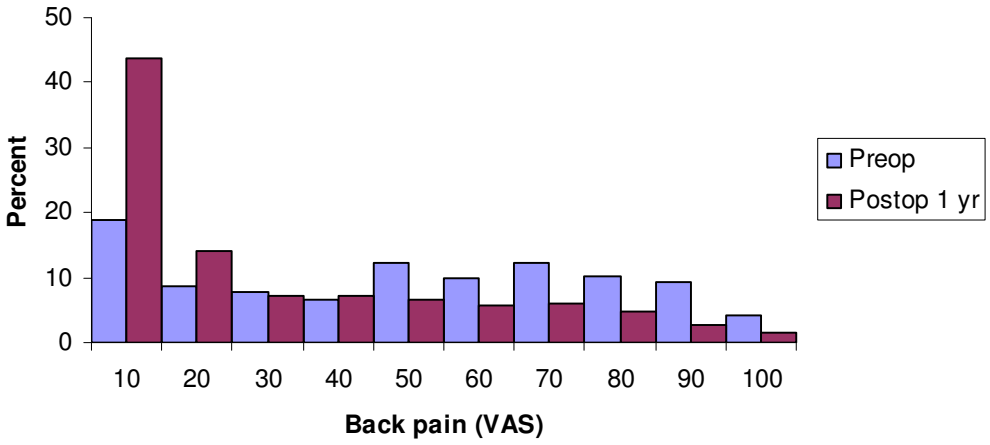

Fig 17. Back pain on the visual analog scale pre- and postoperatively in patients operated for lumbar disc herniation (%).

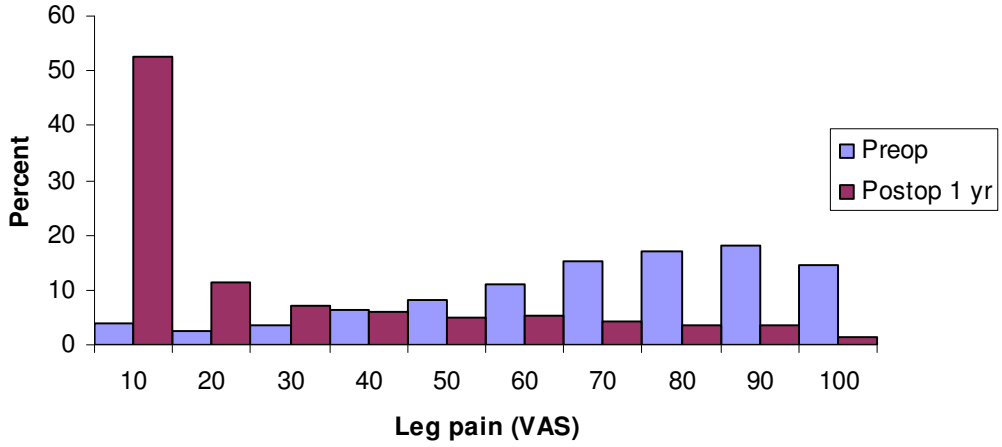

Fig 18. Leg pain on the visual analog scale pre- and postoperatively in patients operated for lumbar disc herniation (%).

Perceived improvement relating to back pain: Completely pain-free 22%, significantly improved 43%, somewhat improved 18%, unchanged 8% and deteriorated 5%; 6% did not have preoperative back pain.

Perceived improvement relating to leg pain: Completely pain-free 35%, significantly improved 39%, somewhat improved 15%, unchanged 6% and deteriorated 4%; 1% had no preoperative leg pain.

Overall patient satisfaction with surgical outcome: 74% were satisfied, 18% uncertain and 8% dissatisfied.

Use of analgesics one year postoperatively: Regular 17%, intermittent 33%, none 50%.

Ability to walk one year postoperatively: < 100m 3%, 100-500m 9%, 500m-1 km 13%, >1 km 75%, a substantial improvement compared with preoperatively.

Figure 19 shows preoperative and one year postoperative status regarding health-related quality of life as measured with the SF-36. The improvement is significant in all domains except “General health”.

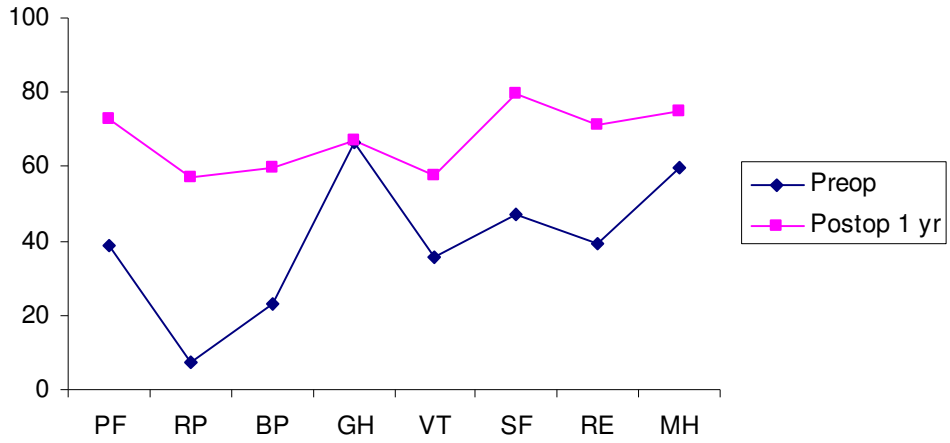

Fig 19. SF-36 preoperatively and 1 year postoperatively for patients operated for lumbar disc herniation.

The results from the EQ-5D-analysis are presented both as EQ-5D 5, i.e. the answers of the 5 questions included in the questionnaire, and also on the VAS scale, EQ-VAS. The results for lumbar disc herniation are as follows: Mean figure for EQ-5D 5 preoperatively: 25, 1 year postoperatively 70. Mean VAS preoperatively (max 100): 45, 1 year postoperatively 70.

Central spinal stenosis

This group includes 1319 patients with a mean age of 68 (25–89) years.

Gender distribution: 45% men, 55% women.

Surgical intervention: Decompression alone 73%, decompression + posterior instrumented fusion 14%, decompression + posterior non-instrumented fusion 4%, posterior instrumented fusion only 2%.

Mean preoperative VAS for back pain was 56, compared with mean postoperative of 33. The corresponding figures for leg pain were 62 and 33 respectively. Figure 20 and 21 show pre- and postoperative VAS for both back and leg pain.

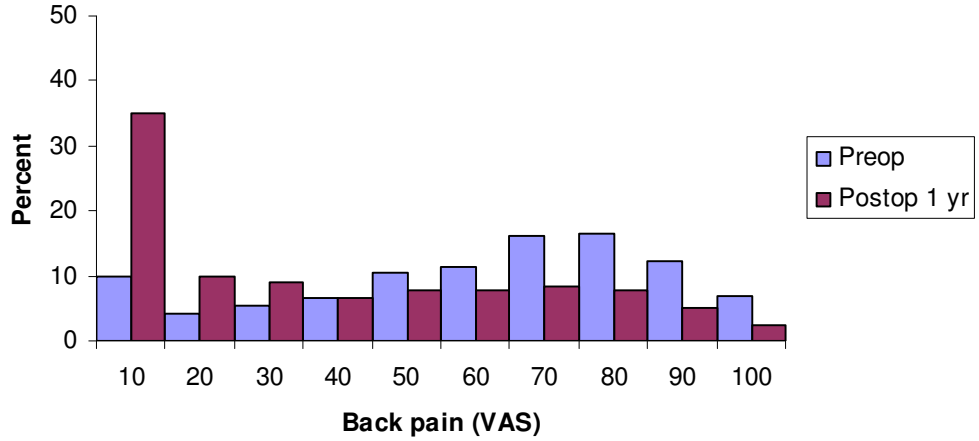

Fig 20. Back pain on the visual analog scale pre- and postoperatively in patients operated for lumbar central spinal stenosis (%).

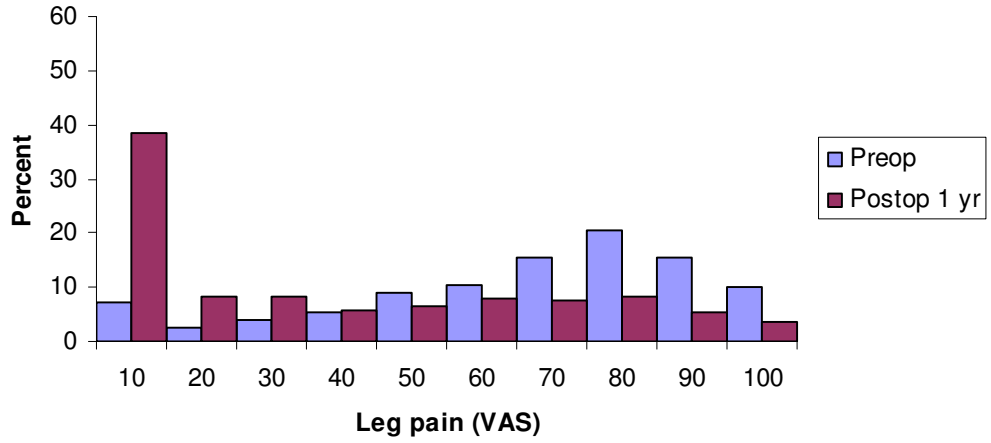

Fig 21. Leg pain on the visual analog scale pre- and postoperatively in patients operated for lumbar central spinal stenosis (%).

One year postoperatively, 18% of patients felt they were completely pain-free, 34% significantly improved, 21% somewhat improved, 11% unchanged and10% deteriorated with regard to back pain. 7% had no preoperative back pain. The corresponding figures for leg pain were 26% completely pain-free, 27% significantly improved, 18% somewhat improved, 13% unchanged and 11% deteriorated. 6% reported no preoperative leg pain.

Overall patient satisfaction with the procedure was as follows: 63% were satisfied, 25% uncertain and 12% dissatisfied with the surgical outcome.

Analgesic use one year postoperatively: Regular 31%, intermittent 31%, none 38%.

Ability to walk one year postoperatively: < 100m 20%, 100-500m 22%, 500m-1 km 17%, >1 km 42%. a substantial improvement compared with preoperatively.

Improvement of SF-36 score was also found one year postoperatively in the category central spinal stenosis in all aspects except "General health". However, the improvement was less pronounced than in lumbar disc herniation, though probably equal when adjusted for age, see figure 22.

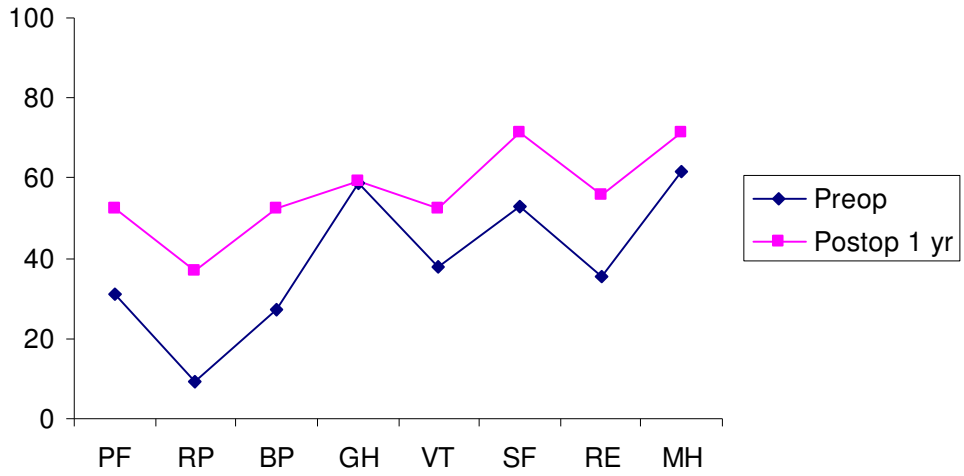

Fig 22. SF-36 preoperatively and postoperatively for patients operated for lumbar central spinal stenosis.

Mean figure for EQ-5D 5 preoperatively: 34, 1 year postoperatively 61. Mean VAS preoperatively (max 100): 48, 1 year postoperatively 63.

Lateral spinal stenosis

This patient group included 271 patients with a mean age of 61 (29–86) years. Gender distribution was 48% men and 52% women. Decompression alone was used in 82% of cases, decompression + posterior fusion in 13% (10% instrumented and 3% non-instrumented), other procedures 5%.

Mean preoperative VAS for back pain was 51, compared with mean postoperative of 33. The corresponding figures for leg pain were 63 and 39 respectively. Figures 23 and 24 show the distribution of pre- and postoperative VAS for back and leg pain.

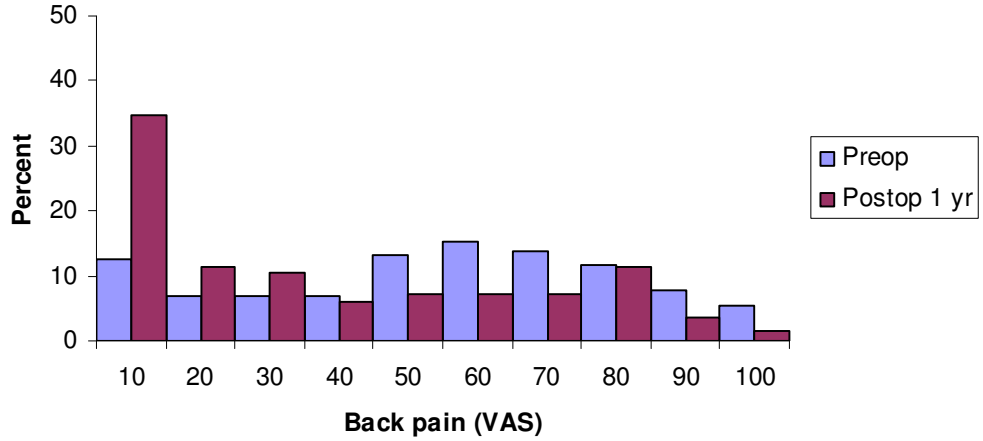

Fig 23. Back pain on the visual analog scale pre- and postoperatively in patients operated for lumbar lateral spinal stenosis (%).

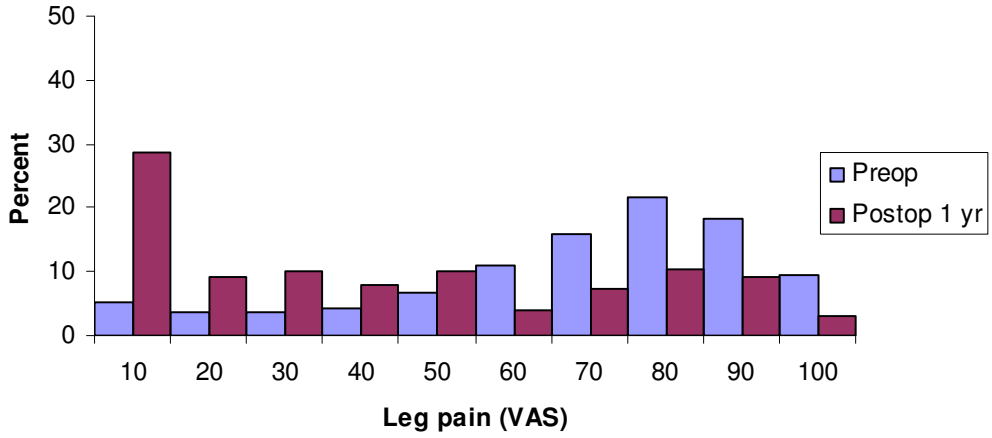

Fig 24. Leg pain on the visual analog scale pre- and postoperatively in patients operated for lumbar lateral spinal stenosis (%).

One year postoperatively 15% of patients were completely pain-free, 33% significantly improved, 22% somewhat improved,15% unchanged and 10% deteriorated regarding back pain. 7% had no preoperative back pain. The corresponding figures for leg pain were 17% completely pain-free, 30% significantly improved, 24% somewhat improved, 15% unchanged and 9% deteriorated; 4% did not have any leg pain previously.

Patient satisfaction with surgical outcome: 60% satisfied, 25% uncertain and 15% dissatisfied.

Medication use 1 year postoperatively: 31% regularly, 34% intermittently and 35% took no medication.

Ability to walk one year postoperatively: < 100m 11%, 100–500 m 23%, 500 m–1 km 18% and >1 km 48%.

The patient group operated for lateral spinal stenosis also showed improvement in SF-36 scores, though somewhat less pronounced; see figure 25.

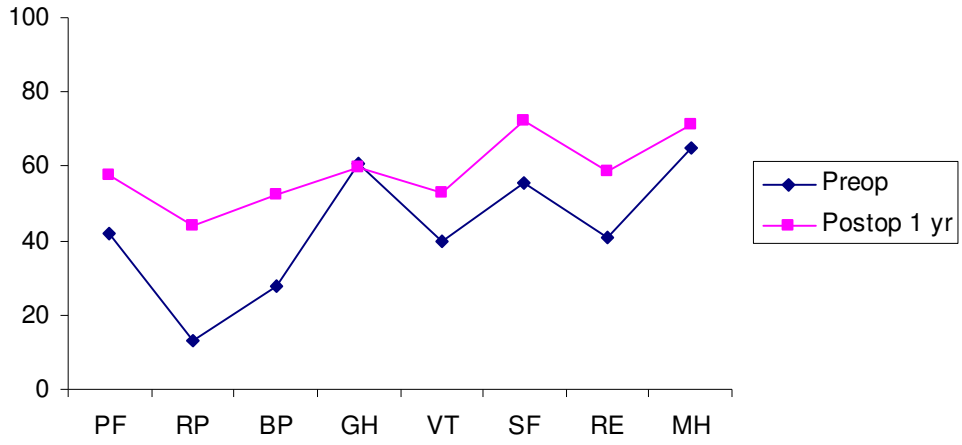

Fig 25. Pre- and postoperative SF-36 for patients operated for lumbar lateral spinal stenosis.

Mean figure for EQ-5D 5 preoperatively: 37, 1 year postoperatively 60. Mean VAS preoperatively (max 100): 50, 1 year postoperatively 61.

Spondylolisthesis

In all, 238 patients operated during the period for spondylolisthesis completed 1-year follow-up. Mean age was 47 (12–81) years, gender distribution 52% men and 48% women.

Among patients with spondylolisthesis 39% were operated with decompression and posterior instrumented fusion, 15% with posterior instrumented fusion alone, 16% with PLIF, 8% with decompression + PLIF, 7% with decompression + posterior non-instrumented fusion, 7% with posterior non-instrumented fusion, 3% with only decompression surgery and 5% other procedures.

Mean preoperative VAS for back pain was 57, compared with mean postoperative of 33. The corresponding figures for leg pain were 51 and 25 respectively. Figures 26 and 27 show preoperative and postoperative VAS relating to back and legs.

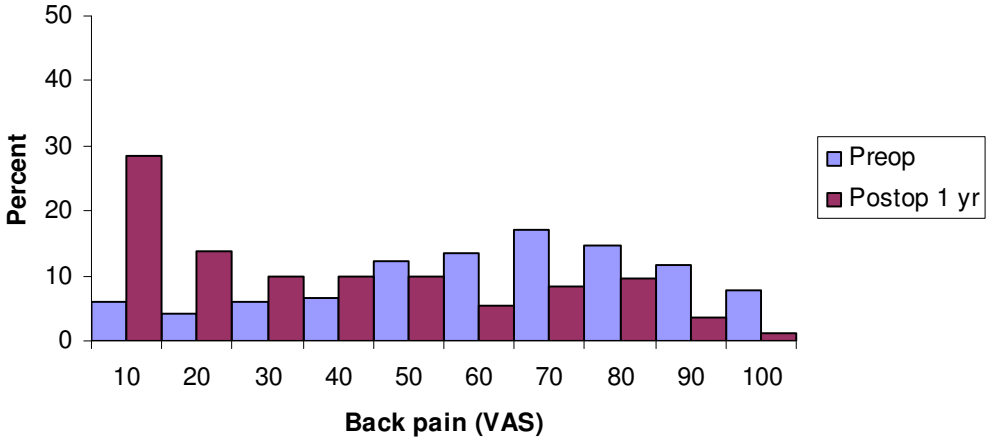

Fig 26. Back pain on the visual analog scale pre- and postoperatively in patients operated for spondylolisthesis (%).

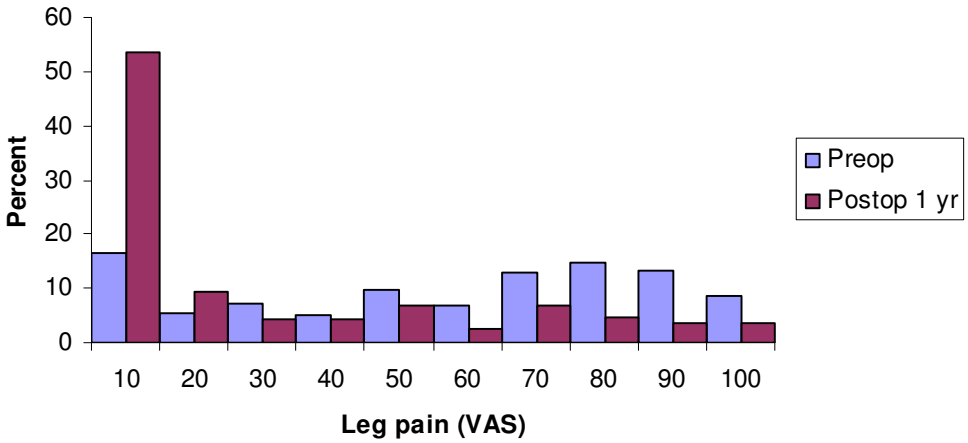

Fig 27. Leg pain on the visual analog scale pre- and postoperatively in patients operated for spondylolisthesis (%).

At the 1-year follow-up, 12% of patients felt they were completely pain-free, 49% significantly improved, 23% somewhat improved, 5% unchanged and 7% deteriorated with regard to back pain; 4% did not have back pain previously. The corresponding figures for leg pain were 25% completely pain-free, 35% significantly improved, 11% somewhat improved, 10% unchanged and 8% deteriorated. 11% reported no preoperative leg pain.

Overall patient satisfaction with the operation: 72% satisfied, 17% uncertain and 10% dissatisfied.

Regular intake of analgesics one year postoperatively was reported by 29%, intermittent use by 34% and no intake of analgesics at all by 37%.

Ability to walk one year postoperatively: < 100m 8%, 100-500m 13%, 500m-1 km 16%, >1 km 64%, a substantial improvement compared with preoperatively.

Spondylolisthesis patients showed good improvement in their SF-36 scores one year postoperatively compared with preoperatively, see figure 28.

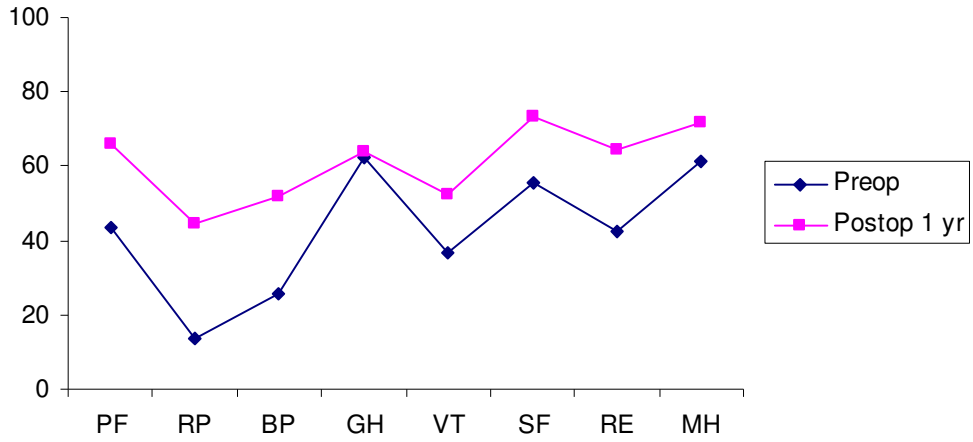

Fig 28. Pre- and postoperative SF-36 for patients operated for spondylolisthesis.

Mean value for EQ-5D preoperatively: 34, 1 year postoperatively 62. Mean VAS preoperatively (max 100): 48, 1 year postoperatively 62.

Segmental pain

In all, 1-year follow-up was completed by 437 patients operated during the period. Mean age was 44 (19–80) years, gender distribution 44% men and 56% women.

Patients with segmental pain became were operated in 26% of cases with posterior instrumented fusion, in 26% with PLIF, in 4% with TLIF, in 7% with decompression + posterior instrumented fusion, in 8% with decompression + PLIF, in 12% with disc prosthesis, in 8% with posterior non-instrumented fusion and in 9% other procedures were used.

Mean preoperative VAS for back pain was 63, compared with mean postoperative of 37. The corresponding figures for leg pain were 45 and 26 respectively. Figures 29 and 30 show preoperative and postoperative VAS for back and leg pain.

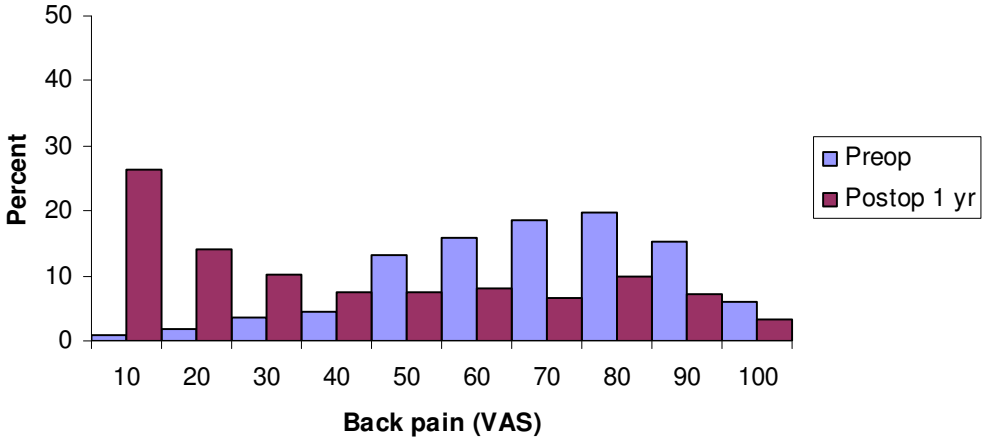

Fig 29. Back pain on the visual analog scale pre- and postoperatively in patients operated for segmental pain (%).

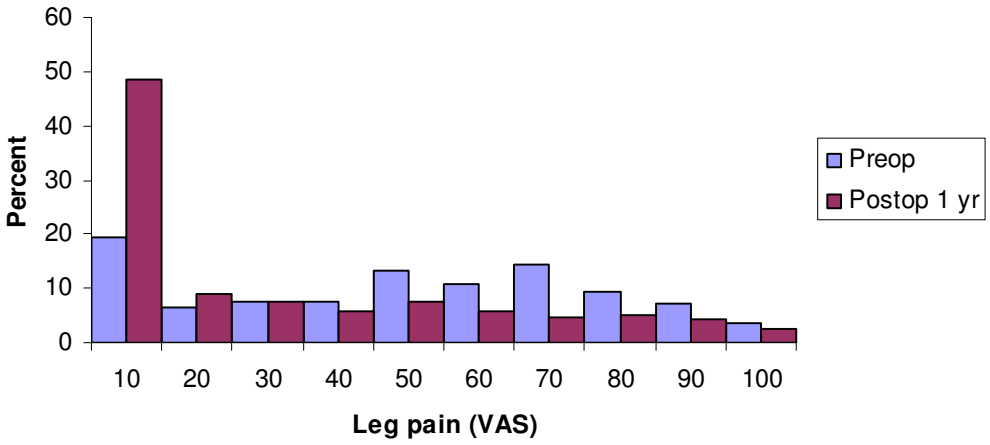

Fig 30. Leg pain on the visual analog scale pre- and postoperatively in patients operated for segmental pain (%).

One year postoperatively, patients operated for segmental pain perceived back pain as follows: Completely pain-free 11%, significantly improved 43%, somewhat improved 23%, unchanged 12% and deteriorated 11%; 0.3% did not have back pain previously.

Corresponding figures for leg pain: Completely pain-free 21%, significantly improved 32%, somewhat improved 15%, unchanged 16% and deteriorated 7%. 11% reported no preoperative leg pain.

Regarding patient satisfaction with the operation, 66% were satisfied, 22% uncertain and 13% dissatisfied.

Among these patients, 28% took analgesics regularly one year postoperatively, 38% did so intermittently and 33% reported that they did not use any analgesics.

Ability to walk one year postoperatively: < 100m 9%, 100-500m 10%, 500m-1 km 21%, >1 km 61%, a substantial improvement compared with preoperatively.

Figure 31 shows pre- and postoperative SF-36 profiles for patients operated for segmental pain; the profiles are similar to other diagnoses. Both the physical and mental domains show improvement.

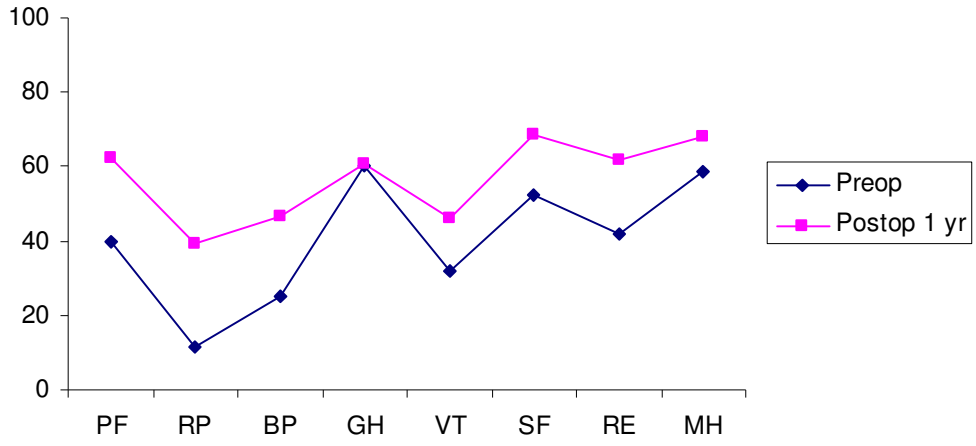

Fig 31. Pre- and postoperative SF-36 for patients operated for segmental pain.

Mean figure for EQ-5D 5 preoperatively: 30, 1 year postoperatively 55. Mean value on the scale preoperatively (max 100): 44, 1 year postoperatively 63.

Oswestry Disability index, ODI, before and 1 year after surgery for all diagnoses

This is first the year we have been able to compare pre- and postoperative disability as measured by the Oswestry index. All diagnoses show a significant reduction in measured functional limitation; most pronounced is disc herniation, see figure 32.

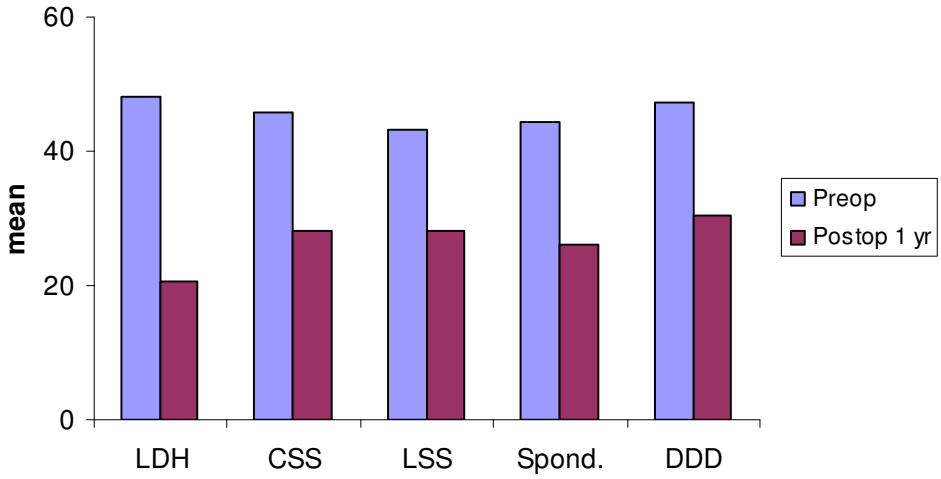

Fig 32. ODI score before and one year after lumbar spine surgery, related to diagnosis.

III. 2-year follow-up of lumbar spine procedures in Sweden in 2006

A total of 2042 patients completed 1 and 2-year follow-up after having undergone lumbar spine surgery in 2004. The most common diagnoses are lumbar disc herniation, 719 and central spinal stenosis, 765 patients. In all, 135 patients had been operated for lateral spinal stenosis, 118 for spondylolisthesis and 227 for segmental pain. The remaining 78 had other diagnoses. Below is a comparison of several parameters assessed at 1-year and 2-year follow-up.

Table 1 presents pain on the VAS, diagnosis-related, over time.

Table 1. Pain on the VAS (mean), diagnosis-related.

	Back			**Leg**		
	Preop	**1 year**	**2 years**	**Preop**	**1 year**	**2 years**
Disc herniation	48	24	26	67	22	24
Central stenosis	56	35	37	64	37	38
Lateral stenosis	54	33	36	64	37	42
Spondylolisthesis	56	28	29	50	27	25
Segmental pain	64	34	36	41	24	26

Tables 2-6 present walking distance after the different procedures preoperatively as well as 1 and 2 years postoperatively.

Table 2. Walking distance, disc herniation (%)

	Preoperatively	**1 year**	**2 years**
< 100m	36	5	5
100m– 500m	20	9	10
500m– 1 km	16	11	11
>1 km	28	75	74

Table 3. Walking distance, central spinal stenosis (%)

	Preoperatively	**1 year**	**2 years**
< 100m	45	20	23
100m– 500m	33	22	21
500m– 1 km	11	19	18
>1 km	12	39	38

Table 4. Walking distance, lateral spinal stenosis (%)

	Preoperatively	**1 year postop**	**2 years postop**
< 100m	28	14	18
100m– 500m	37	20	24
500m– 1 km	15	15	13
>1 km	20	52	45

Table 5. Walking distance, spondylolisthesis (%)

	Preoperatively	**1 year postop**	**2 years postop**
< 100m	14	9	6
100m– 500m	25	8	9
500m– 1 km	24	14	17
>1 km	37	68	68

Table 6. Walking distance, segmental pain (%)

	Preoperatively	**1 year postop**	**2 years postop**
< 100m	18	5	7
100m– 500m	18	12	13
500m– 1 km	26	19	16
>1 km	38	63	67

Tables 7-11 show consumption of analgesics preoperatively and 1 and 2 years postoperatively, related to diagnosis for surgery.

Table 7. Consumption of analgesics, lumbar disc herniation, preoperatively, 1 and 2 years postoperatively (%).

	Preoperatively	**1 year postop**	**2 years postop**
Regular	58	15	17
Intermittent	31	32	31
None	11	53	52

Table 8. Consumption of analgesics, central spinal stenosis preoperatively, 1 and 2 years postop (%).

	Preoperatively	**1 year postop**	**2 years postop**
Regular	55	30	32
Intermittent	28	38	34
None	17	32	34

Table 9. Consumption of analgesics, lateral spinal stenosis preoperatively, 1 and 2 years postop (%).

	Preoperatively	**1 year postop**	**2 years postop**
Regular	59	36	41
Intermittent	31	34	29
None	10	30	30

Table 10: Consumption of analgesics, spondylolisthesis preoperatively, 1 and 2 years postop (%).

	Preoperatively	**1 year postop**	**2 years postop**
Regular	42	16	20
Intermittent	38	34	35
None	20	50	45

Table 11: Consumption of analgesics, segmental pain preoperatively, 1 and 2 years postop (%).

	Preoperatively	**1 year postop**	**2 years postop**
Regular	55	30	30
Intermittent	35	36	34
None	10	34	36

Table 12 presents patient-assessed satisfaction with surgical outcome after 1 and 2 years.

Table 12: Attitude toward surgical outcome 1 and 2 years postop, diagnosis-related.

	1 year postop			**2 years postop**		
	Satisfied	**Uncertain**	**Dissatisfied**	**Satisfied**	**Uncertain**	**Dissatisfied**
Disc herniation	78	15	6	77	15	8
Central stenosis	65	24	11	62	24	14
Lateral stenosis	64	21	14	61	22	17
Spondylo-listhesis	68	24	7	73	16	11
Segmental pain	71	20	9	68	21	11

Tables 13-14 and figure 33 present quality of life as measured by EQ-5D and by VAS. All patient groups experience a significant improvement in quality of life postoperatively.

Table 13: EQ-5D means preoperatively, 1 year and 2 years postop, diagnosis-related.

	Preop	**1 year postop**	**2 years postop**
Disc herniation	23	71	70
Central spinal stenosis	36	61	59
Lateral spinal stenosis	33	59	57
Spondylolisthesis	35	66	69
Segmental pain	31	60	59

Table 14: EQ-5D health assessment according to the VAS, means.

	Preop	**1 year postop**	**2 years postop**
Disc herniation	44	72	70
Central spinal stenosis	48	61	60
Lateral spinal stenosis	46	62	61
Spondylolisthesis	50	66	68
Segmental pain	49	64	61

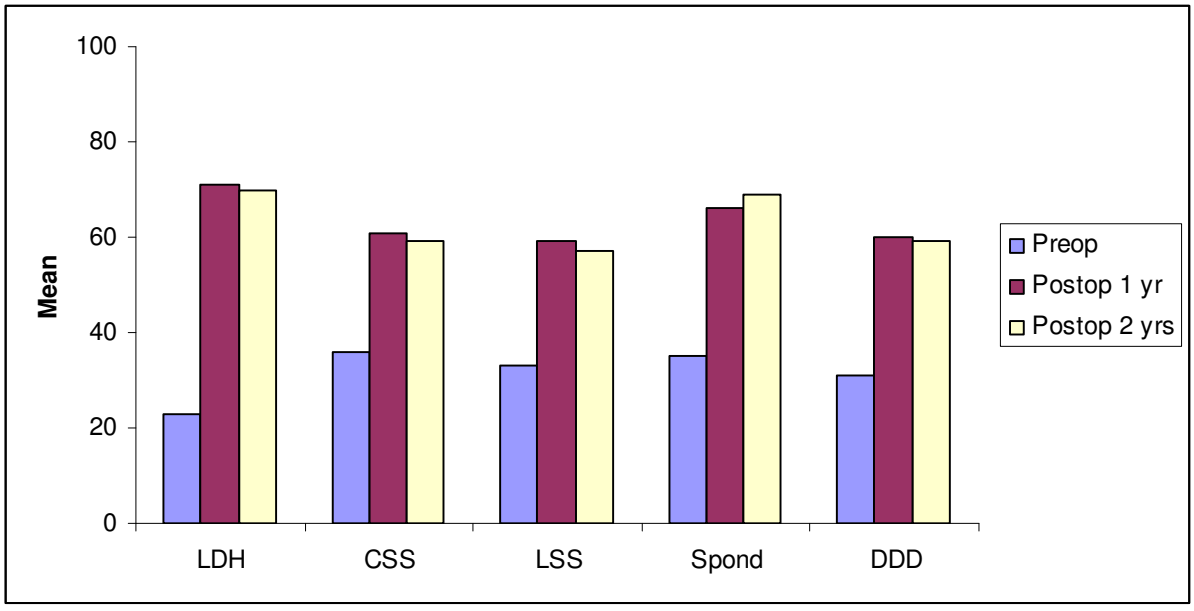

Fig 33. Quality of life pre- and postoperatively, as measured by EQ-5D.

IV. Surgery for spinal stenosis and segmental pain in the lumbar region 1998-2006

An analysis from a gender perspective

Introduction

This report presents data from SWESPINE, the lumbar spine surgery register, for 2006, as well as an analysis from a gender perspective with respect to surgery for spinal stenosis and segmental pain. Last year's report analyzed surgery for lumbar disc herniation, where we concluded that there were many significant differences between men and women. For example, women had a significantly poorer quality of life preoperatively, along with more leg pain and longer sick leave than men. They were significantly older, had longer duration of symptoms, used more pain medication and had a higher frequency of other illnesses than men.

At both the 1-year and 2-year follow-up, both men and women were equally satisfied with the treatment and no difference in improvement in leg pain was found with VAS or quality of life as measured by EQ-5D. However, women were on sick leave to a greater extent after 1 and 2 years.

This year's report focuses on an analysis of spinal stenosis and segmental pain in the lumbar region. As shown in the analysis of treatment outcomes in the previous section, outcomes at 1-year and 2-year follow-up were very similar. We have therefore limited this analysis to the 1-year follow-up data. The data are based on patients operated through July 31, 2006, which means a two month margin for the 1-year follow-up (= total number operated). In order to be available (meaningful) for follow-up, both questionnaires with basic information and the surgery questionnaire had be completed (= Available for FU1).

Segmental pain

Between 1998 and July 31, 2006, 3036 operations were entered in the register. Of these, 2382 were available for follow-up after 1 year, including both preoperative data and information about the procedure and length of stay. A total of 1704 (72%) of these patients responded to the follow-up questionnaire, see table 35.

Table 15. Total number of operated patients with segmental pain in lumbar region beginning in 1998

		%	**Women**	%	**Men**	%
Total no. surg.	3036					
Accessible for FU1	2382			54		46
FU1 carried out	*1704*	*72*		*55*		*45*

FU1= 1-year follow-up

Table 16 shows that preoperatively, women had significantly poorer quality of life (EQ-5D) and poorer physical function (SF36-PCS). They also had significantly more severe leg pain and back pain than men. However, no difference was found in duration of either back pain or leg pain. Women

reported a significantly poorer ability to walk, they used significantly more pain medication and had a higher rate of co-morbidity.
Unfitness to work was equal in both sexes, while women received disability pensions somewhat more often.

Table 16. Preoperative differences between men and women operated for segmental pain in the lumbar region.

	Women	**Men**	**P**
Age (years)	46.0	44.9	
EQ-5D*	0.26	0.32	<0.0001
SF-36 – PCS*	31	33	<0.0001
SF-36 - MCS*	36	36	ns
VAS leg pain*	48	40	<0.0001
VAS back pain*	66	59	<0.0001
Duration of pain back			
< 1 year (%)	9	11	
> 2 years (%)	71	72	ns
Duration of pain leg			
< 1 year (%)	25	29	
> 1 year (%)	53	53	ns
Walking ability			
< 100m (%)	23	15	
>1 km (%)	31	39	<0.0001
Completely unfit to work (%)	69	65	
Completely on disability pension (%)	34	28	<0.0001
Retirement pension (%)	4	3	ns
Unfitness to work (%)			
< 3 months (%)	6	5	
> 1 year (%)	62	63	ns
Unemployed (%)	12	14	ns
Smoker (%)	25	21	ns
Analgesics regular use (%)	61	48	<0.0001
Other illness (%)	24	15	<0.0001
Prior back surgery (%)	37	37	ns

* Variable Description: EQ-5D measures quality of life, range 0 – 1; a higher score is better.
SF-36 PCS measures the physical component of quality of life; a higher score is better.
SF-36 DM measures the mental component of quality of life; a higher score is better.
VAS measures pain intensity, 0 – 100, high score = more pain

The different types of fusion procedures are fairly evenly distributed between the sexes. The most common procedure is instrumented posterior fusion, followed by PLIF (intercorporal fusion carried out from behind). Both sexes had surgery to the same extent at the different types of hospitals, table 17.

Table 17. Operations carried out for segmental pain in the lumbar region on patients followed up at 1 year.

Type of procedure	**Number**	**%**	**Women (%)**	**Men (%)**
Non-instr posterior fusion	117	7	55	45
Instr posterior fusion	619	36	55	45
ALIF	154	9	60	40
PLIF	479	28	53	47
TLIF	41	2	49	51
Disc prosthesis	148	9	55	45
Other	146	9	57	43
Type of hospital				
Private hospital	997	-	56	57
University hospital	293	-	17	16
County hospital	414	-	27	27

Postoperatively, women experienced a significantly larger improvement of leg pain, back pain and quality of life (table 18). They were also more satisfied with their treatment than men. However, they still took more painkillers and although significantly more women returned to work postoperatively, at the 1-year follow-up a higher proportion of women were still on sick leave or on disability pension.

Table 18. Surgical outcome for segmental pain in the lumbar region, women and men, respectively, at 1-year follow-up (FU1).

	Women	Men	P
Leg pain significantly improved (%)	59	59	ns
Back pain significantly improved (%)	57	54	ns
Satisfied with treatment (%)	68	62	<0.05
Analgesics daily use (%)	34	29	<0.001
Unfitness to work postop (%)	48	44	<0.05
Disability pension (%)	32	29	ns
Returned to work full/part-time (%)	30	27	<0.01
Sick leave postop (%)			
< 3 months	11	12	
< 6 months	22	26	
1 year	24	20	ns
Walking ability			
< 100m (%)	9	8	
>1 km (%)	59	63	ns
Improvement leg pain (VAS)	20	12	<0.0001
Improvement back pain (VAS)	30	23	<0.0001
improvement EQ-5D	0.31	0.22	<0.0001
EQ-5D	0.58	0.56	ns
SF-36 PCS	39	40	ns
SF-36 MCS	41	40	ns
VAS leg pain	28	26	ns
VAS back pain	36	37	ns

Spinal stenosis in the lumbar region

Between 1998 and July 31, 2006, a total of 9527 procedures for spinal stenosis were reported; 7086 of them were available for follow-up after one year. Surgery for spinal stenosis, like surgery for segmental pain, is somewhat more common among women than men (55% versus 45%) among the registered patients who received follow-up. The follow-up rate (78%) is somewhat higher than the follow-up rate for segmental pain (72%), table 19.

Table 19. Total number of operated patients with central spinal stenosis beginning in 1998

		%	**Women**	%	**Men**	%	**P**
Total no. surg.	9527						
Accessible for FU1	7086			55		45	
FU1 carried out	*5536*	*78*		*55*		*45*	
Specific diagnosis:							
Stenosis without spondylolisthesis	4657	84	2423	52	2234	48	<0.0001
Stenosis + spondylolisthesis	879	16	632	72	247	28	

FU1= 1-year follow-up

Preoperatively, quality of life, physical function and walking ability were significantly poorer for women than for men. They used more pain medication and also had a higher rate of co-morbidity (table 20).

Table 20. Preoperative differences between men and women operated for spinal stenosis in the lumbar region.

	Women	**Men**	**P**
Age (years)	68.0	67.2	
EQ-5D	0.3	0.37	<0.0001
SF-36 - PCS	30	32	<0.0001
SF-36-MCS	35	38	<0.0001
VAS leg pain	65	60	<0.0001
VAS back pain	61	51	<0.0001
Duration of pain back			
< 1 year (%)	27	25	
> 2 years (%)	50	48	<0.0001
Duration of pain leg			
< 1 year (%)	27	27	
> 1 year (%)	38	41	<0.05
Walking ability			
< 100m (%)	48	42	
>1 km (%)	9	12	<0.0001
Completely on disability pension (%)	21	17	<0.0001
Retirement pension (%)	63	62	ns
Smoker (%)	19	17	<0.05
Analgesics regular use (%)	62	43	<0.0001
Other illness (%)	41	34	<0.0001
Type of hospital			ns

Spinal stenosis may be associated with slippage of one vertebra over another (spondylolisthesis). The presence of spondylolisthesis is sometimes an indication for a fusion procedure (arthrodesis) in connection with decompression. Since spondylolisthesis is significantly more common among women than men who are operated for spinal stenosis (20% vs 10%), women also underwent a combined procedure to a higher extent (decompression + fusion) (See table 21).

Table 21. Operations carried out for central spinal stenosis on patients followed up at 1 year.

Type of procedure	**Number**	**%**	**Women (%)**	**Men (%)**	**P**
Decompression	3799	68	51	49	
Decompression + fusion	1036	19	71	29	<0.0001
Other procedure	701	13			
Type of hospital					
Private hospital	1776	-	31	29	ns
University hospital	1258	-	23	23	
County hospital	2502	-	46	48	

Postoperatively, improvement in quality of life and back pain was greater among women than men. However, walking ability, the pain situation and quality of life continued to be poorer for women (see table 22).

Table 22. Surgical outcome for spinal stenosis in the lumbar region, women and men, respectively, at 1-year follow-up (FU1).

	Women	**Men**	**P**
Leg pain significantly improved (%)	55	56	<0.05
Back pain significantly improved (%)	56	59	<0.001
Satisfied with treatment (%)	63	64	ns
Analgesics daily use (%)	35	24	<0.0001
Walking ability			
< 100m (%)	21	19	
>1 km (%)	35	43	<0.0001
Improvement leg pain (VAS)	30	28	ns
Improvement back pain (VAS)	24	21	0.002
Improvement EQ-5D	0.27	0.23	0.003
EQ-5D	0.58	0.62	<0.0001
SF-36 PCS	38	41	<0.0001
SF-36 MCS	40	42	<0.0001
VAS leg pain	37	33	<0.0001
VAS back pain	37	31	<0.0001

Analysis of spinal stenosis with and without spondylolisthesis

Women had complex procedures (decompression + fusion) for spinal stenosis more frequently than men, due to the higher incidence of spondylolisthesis among women. The reason for the complex procedures was to stabilize the decompressed segment in order to reduce continued discomfort. Whether or not this is necessary has not yet been determined. The body of evidence for this surgical technique is still unclear.

A closer analysis of the relationship between specific diagnosis (spinal stenosis with and without spondylolisthesis, respectively) and surgical technique (decompression with or without fusion) shows that no differences were found in quality of life or pain intensity among either women or men with or without concurrent spondylolisthesis, tables 23-24.

Table 23. Preoperative conditions with/without spondylolisthesis, both genders.

	Spondylolisthesis	**No spondylolisthesis**	**P**
EQ-5D	0.34	0.34	ns
VAS leg pain	63	63	ns
VAS back pain	57	56	ns
Walking ability			
< 100m (%)	46	45	
>1 km (%)	12	10	ns

Table 24. Preoperative conditions with/without spondylolisthesis in men and women, respectively.

	Women			**Men**		
	Spondylolisthesis	**No**	**P**	**Spondylolisthesis**	**No**	**P**
EQ-5D	0.32	0.30	ns	0.38	0.39	ns
VAS leg pain	64	66	ns	60	60	ns
VAS back pain	59	61	ns	52	51	ns
Walking ability						
< 100m (%)	43	49		51	41	
>1 km (%)	13	8	<0.01	9	13	0.001

The improvement patients experienced after surgery does not appear to be clearly linked to specific diagnosis, type of surgery or gender. Tables 25 and 26 show no obvious differences in improvement in quality of life or leg pain, nor any consistent differences in walking ability when comparing gender, type of surgery and specific diagnosis. The results possibly suggest that back pain improved when decompression was combined with fusion. This appears to apply irrespective of whether or not the patient had concurrent spondylolisthesis and among both men and women, table 25.

Table 25. Outcome measured as improvement (difference between score preoperatively and at FU1) in EQ-5D and VAS leg/back pain, and walking ability at FU1, both genders.

	Spondylolisthesis		**P**	**No spondylolisthesis**		**P**
	Decom	**+Fusion**		**Decom**	**+Fusion**	
EQ-5D	0.28	0.27	ns	0.23	0.30	<0.0001
VAS leg pain	28	34	<0.05	27	30	<0.05
VAS back pain	20	32	<0.0001	20	29	<0.0001
Walking ability			ns			<0.0001
< 100m (%)	20	20		23	17	
>1 km (%)	43	48		36	35	<0.0001

Table 26. Outcome measured as improvement (difference between value preoperatively and at FU1) in EQ-5D and VAS leg/back pain, and walking ability at FU1, women and men, respectively.

	Women						**Men**					
	Spondylolisthesis			**No spondylolisthesis**			**Spondylolisthesis**			**No spondylolisthesis**		
	Decom	**Decom+ fusion**	**P**	**Decom**	**Decom +fus**	**P**	**Decom**	**Decom +fus**	**P**	**Decom**	**Decom +fus**	**P**
EQ-5D	0.28	0.28	ns	0.25	0.31	0.004	0.27	0.25	ns	0.22	0.31	0.005
VAS leg pain	30	34	ns	27	31	0.03	24	38	0.008	27	29	ns
VAS back pain	22	33	<0.0001	20	29	<0.0001	17	30	0.02	20	29	<.0.0001
Walking ability												
< 100m (%)	19	19	ns	25	18	0.005	23	24	ns	21	15	ns
>1 km (%)	41	48		31	32		47	49		41	42	

Discussion

The analysis of data on spinal stenosis and segmental pain in the lumbar region shows clear gender differences. While surgery for lumbar disc herniation is more common among men (55%), surgery for spinal stenosis and segmental pain is more common among women (55%). However, the pattern is similar for all three diagnoses: Preoperatively, women experienced poorer quality of life, higher pain intensity and poorer physical function. Unlike the lumbar disc herniation group, women appeared to experience greater pain relief and improvement in quality of life than men. But due to the poorer baseline status, the outcome was not better than among men.

The analysis of surgical outcomes for spinal stenosis suggests that combining decompression with fusion may possibly reduce back pain more effectively than decompression alone, regardless of whether or not spondylolisthesis is present. However, these results must be interpreted with great caution, since other factors may have influenced the choice of surgical technique. These detected differences should be regarded more as a hypothesis, which should be scientifically evaluated. As a result, a national randomized multicenter study was initiated during the past year.

Conclusion

In what appears to be becoming a tradition, we can conclude that the number of registered patients for the previous year increased once again; in 2006, 4559 patients were registered, compared with 3908 in 2005. Diagnosis-related differences in outcomes are small and the spread is narrowing, probably because of the gradual increase in total number of patients.

The beneficial effect of lumbar spine surgery on health-related quality of life is sustained and has now been documented in many prospective studies. The monitoring parameters that the national spine register uses are those most commonly found in most large prospective studies on the subject that have been presented in recent years. Since disability has only been measured in the register (through Oswestry Disability index) in recent years, this is the first year we can present figures about preoperative and 1-year postoperative ODI. The data substantiate the beneficial effect of low back surgery, interpreted here as improvement in function.

The analysis last year demonstrated that prior to disc herniation surgery women have considerably more serious problems, in regard to both pain and quality of life, than men and that the subjective results one year postoperatively are also poorer for women. For this reason we have gone further and studied gender-related factors regarding spinal stenosis and segmental pain. Both of these disorders are operated to a greater extent in women than in men, 55% compared with 45%, while the figures for lumbar disc herniation are the reverse. As in disc herniation patients, women with spinal stenosis and segmental pain have more pronounced pain, poorer quality of life and poorer physical function than men, but experience significant improvement in terms of both pain and quality of life postoperatively. One year after stenosis surgery about 2/3 of both genders are satisfied with the operation, while women still estimate somewhat higher back pain (VAS) and poorer quality of life (EQ-5D). We see a similar trend in the group operated for segmental pain, but here women are satisfied with the surgical outcome to a somewhat greater extent than men. This is probably because women experience significantly greater improvement in both leg pain and back pain than men. The final outcome of these surgical procedures is based on multiple factors and further analysis is required. The current analysis is viewed from the perspective of gender, but shows the potential when registering a large patient material as found in the spine register.

Spinal stenosis with and without spondylolisthesis results in fusion procedures combined with decompression more often among women than among men, given the fact that spondylolisthesis is more common in women. Analysis of the material shows a more pronounced reduction of back pain in patients who underwent fusion. This interesting observation should be further studied. The comparison does not involve randomized patients, but other selection factors may also play a role when deciding whether or not to combine decompression with fusion.

In conclusion we would like to thank everyone involved in the work with the register: colleagues in spinal surgery, secretaries and other personnel. We would also appreciate hearing opinions about the new protocol that covers other surgery of the lumbar spine, as well as the thoracic and cervical spine. We appreciate the financial support provided by the National Board of Health and Welfare.