

Pain during sex before and after surgery for lumbar disc herniation: A multicenter observational study

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Acknowledgements: We thank the Norwegian Registry for Spine Surgery (NORspine). The registry receives funding from the University of Northern Norway and Norwegian health authorities. We thank all patients and spine surgeons who participate in NORspine registration.

Funding: The study received no funding.

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Abstract

Study design: Observational multicenter study

Objective: To evaluate changes in pain during sexual activity after surgery for lumbar disc herniation (LDH)

Summary of background data: There are limited data available on sexual function in patients undergoing surgery for LDH.

Methods: Data were retrieved from the Norwegian Registry for Spine Surgery. The primary outcome was change in pain during sexual activity at one year, assessed by item number eight of the Oswestry disability index (ODI) questionnaire. Secondary outcome measures included ODI, EuroQol-5D (EQ-5D), and numeric rating scale (NRS) scores for back and leg pain.

Results: Among the 18529 patients included, 12103 (64.8%) completed one-year follow-up. At baseline 16729 patients (90.3%) provided information about pain during sexual activity, whereas 11130 (92.0%) among those with complete follow-up completed this item. Preoperatively 2586/16729 patients (15.5%) reported that pain did not affect sexual activity and at one year 7251/11130 patients (65.1%) reported a normal sex-life without pain. Preoperatively 2483 (14.8%) patients reported that pain prevented any sex-life, compared to 190 patients (1.7%) at

one year. At baseline 14143 of 16729 patients (84.5%) reported that sexual activity caused pain, and among these 7232 of 10509 responders (68.8%) reported an improvement at one year. A multivariable regression analysis showed that having a life partner, college education, working until time of surgery, undergoing emergency surgery, and increasing ODI score were predictors of improvement in pain during sexual activity. Increasing age, tobacco smoking, increasing body mass index, comorbidity, back pain >12 months, previous spine surgery, surgery in ≥ 2 lumbar levels, and complications occurring within three months were negative predictors.

Conclusion: This study clearly demonstrates that a large proportion of patients undergoing surgery for LDH experienced an improvement in pain during sexual activity at one year.

Key words: back pain, lumbar disc herniation, pain related disability, sexual activity, observational study, improvement.

Level of evidence: 2

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Introduction

Lumbar disc herniation (LDH) is a common cause of lower back and radiating leg pain, and it is occasionally also associated with sensory and motor deficits ¹. In most patients the natural course is favorable, and surgery is typically offered to patients with persistent pain despite conservative treatment, intractable pain, or acute serious paresis including cauda equina syndrome ². LDH is a major contributor to the global burden of disease and remains the most frequent indication for spinal surgery ^{3,4}. Further, degenerative lumbar spine conditions such as LDH represent a major economic burden for patients, families, and society ⁵. LDH may greatly impact patients' quality of life and functional level, including sexual health which is important for physiological well-being and relationships ^{6,7}. Despite its fundamental role in human life, there are limited data available on sexual function and health in patients undergoing surgery for LDH.

The aim of this study was to evaluate improvement in pain during sexual activity after surgery for LDH using prospectively collected data from the Norwegian Registry for Spine Surgery (NORspine).

Methods

Reporting is consistent with the strengthening the reporting of observational studies in epidemiology (STROBE) statement ⁸. The Regional Committee for Medical Research and Health

Research Ethics in Central Norway approved the study (2016/840), and all participants provided written informed consent.

Study population

NORspine is a comprehensive registry for quality control and research and currently includes all forty centers performing spinal surgery in Norway⁹. Approximately 70% of all patients who undergo lumbar spine surgery in Norway are included in NORspine. Patients were eligible if they had a primary diagnosis of LDH and underwent either lumbar microdiscectomy or open lumbar discectomy between 2007 and 2017. Participation in the registration by patients was not mandated, nor was participation required for a patient to gain access to healthcare.

Surgical procedures

Variations in the surgical management and surgical procedures can only be described in general terms and in accordance with the data available in NORspine. Microsurgical discectomy involves preoperative fluoroscopy for detection of the target level, paramedian or median skin incision of about 3–4 cm, opening of the paravertebral muscular fascia, and subperiosteal release of the paravertebral musculature from the spinous process and lamina above and below the target disc-level¹⁰. Self-retaining retractors are introduced and a microscope or loupes are utilized. In most cases a flavectomy and limited arcotomy of the lamina above the disc-level are done. Careful mobilization of the nerve-root medially is performed before evacuating the herniated disc. Evacuation might involve entering the disc space, or just removing a free sequestered disc fragment. The traditional open discectomy was performed without visual enhancement and typically requires a larger incision and more soft tissue exposure^{11,12}.

Outcome measures

The primary outcome was change in item no. 8 of the Oswestry disability index (ODI) version 2.0¹³. Item no. 8 contains the following response alternatives:

0p My sex life is normal and causes no extra pain

1p My sex life is normal but causes some extra pain

2p My sex life is nearly normal but is very painful

3p My sex life is severely restricted by pain

4p My sex life is nearly absent because of pain

5p Pain prevents any sex life at all

Secondary outcome measures were change in disease specific functional outcome between baseline and one-year follow-up was measured with the ODI which has been translated into Norwegian and tested for psychometric properties¹⁴. The ODI questionnaire is used to quantify disability for degenerative conditions of the lumbar spine and covers intensity of pain, ability to lift, ability to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and ability to travel. For each topic there are six statements describing potential scenarios. The index is scored from 0 to 100 (no disability to 100 bedridden). Both ODI raw score or ODI percentage change can be used to define a successful outcome 12 months after surgery with high accuracy¹⁵.

Changes in generic health related quality of life were measured with the Euro-QoL-5D 3L (EQ-5D) between baseline and one-year follow-up. EQ-5D contains a short descriptive system questionnaire and a visual analogue scale (EQ VAS) which provides a simple descriptive profile

of the respondent's health state. The EQ VAS records the respondent's overall current health on a vertical visual analogue scale, where the endpoints are labelled 'The best health you can imagine' and 'The worst health you can imagine'. The Norwegian version of EQ-5D has shown good psychometric properties¹⁶. Changes in low back pain and leg pain were measured with numeric rating scales (NRS).

Surgeons provided the following data on perioperative complications: unintentional durotomy, cardiovascular complications, respiratory complications, anaphylactic reactions, wrong level of surgery, and intraoperative haemorrhage requiring blood replacement or postoperative haematoma. Patients reported the following complications if occurring within three months of surgery: wound infection, urinary tract infection, micturition problems, pneumonia, pulmonary embolism, and deep vein thrombosis.

Data collection

On admission for surgery (baseline) the patients completed a self-administered questionnaire, which included questions about demographics and personal characteristics (marital status, education, body mass index, and smoking) in addition to the outcome measures. Using a standard registration form, surgeons recorded data on diagnosis, comorbidity (including rheumatic diseases, hip or knee osteoarthritis, depression or anxiety, musculoskeletal pain, neurological disorder, cerebrovascular disease, cardiovascular disease, vascular claudication, lung disease, cancer, osteoporosis, hypertension, endocrine disorders), American Society of Anesthesiologists (ASA) grade, image findings, surgical procedure, and complications. The NORspine registry distributed self-administered questionnaires to the patients by mail three and 12 months after surgery, without involving the treating hospitals. Non-responders received one reminder with a new copy of the questionnaire.

Statistical analysis

All statistical analyses were performed with SPSS version 26.0 (IBM Corporation). For statistical comparison tests, we defined the significance level as $P \leq 0.05$. Frequencies were used for demographic variables at baseline, and changes in ODI, EQ-5D and NRS from baseline to 1-year scores were compared with paired sample T-test. For correlation between EQ-5D VAS and changes in sexual function at one year, we used paired sample t-test with Spearman's correlation procedure. A multivariable logistic regression analysis was performed to identify patient and treatment characteristics that could be associated with improvement in pain during sexual activity at one year.

Missing data

Mixed linear model analyses were used for handling missing data on outcome variables. This was in line with previous studies showing that imputations are not needed before performing a mixed model analysis on longitudinal data¹⁷. In the mixed model, patients were not excluded from the analysis if a variable was missing at some, but not all, time points after baseline.

Results

A total of 18529 patients were included in our study, and 12103 (64.8%) completed one-year follow-up. At baseline 16729 patients (90.3%) completed item no. 8 about sexual activity in the ODI, whereas 11130 (92.0%) among those with complete one-year follow-up answered this question. Baseline characteristics and information on surgical treatment and events are presented in Table 1. The mean age at baseline was 46.8 (± 14.0) years and 41.3% were women.

Primary outcome

Figure 1 demonstrates patient reported pain during sexual activity at baseline and one year after surgery. At baseline, 2586 of 16729 patients (15.5%) reported having a normal sex life with no pain, and at one year 7251 of 11130 patients (65.1%) reported a normal sex-life without pain. Preoperatively 2483 (14.8%) patients reported that pain prevented any sex-life, compared to 190 patients (1.7%) at one year. At baseline 14143 out of 16729 patients (84.5%) reported that sexual activity caused pain, and among these 7232 out of 10509 responders (68.8%) reported an improvement in pain during sexual activity at one year.

The multivariable analysis is presented in Table 2 and demonstrates that having a life partner (OR 1.26, 95% CI 1.05-1.51, $P = 0.014$), college education (OR 1.26, 95% CI 1.08-1.45, $P = 0.004$), currently working (OR 1.52, 95% CI 1.26-1.84, $P < 0.001$), undergoing emergency surgery (OR 1.50, 95% CI 1.17-1.92, $P < 0.001$), and increasing ODI score (OR 1.04, 95% CI 1.03-1.04, $P < 0.001$) were independent predictors of improvement in pain during sexual activity.

Age (OR 0.99, 95% CI 0.99-1.00, $P = 0.011$), tobacco smoking (OR 0.65, 95% CI 0.55-0.76, $P < 0.001$) higher body mass index (OR 0.97, 95% CI 0.95-0.98, $P < 0.001$), ASA>2 (OR 0.76, 95% CI 0.56-1.04, $P = 0.084$), back pain >12 months (OR 0.35, 95% CI 0.31-0.41, $P < 0.001$), previous lumbar spine surgery (OR 0.72, 95% CI 0.54-0.96, $P = 0.024$), previous surgery in the same level (OR 0.64, 95% CI 0.47-0.89, $P = 0.008$), surgery in ≥ 2 lumbar levels (OR 0.77, 95% CI 0.59-1.01, $P = 0.060$), complications occurring within three months (OR 0.55, 95% CI 0.43-0.70, $P < 0.001$) were predictors for less improvement of pain during sexual activity.

Secondary outcomes

The overall outcomes for the total population are presented in Table 3. For the total study population there were large and statistically significant improvements in all patient reported outcome measures. The mean difference in EQ-5D at one year represents a clinically important change with an effect size of 1.39 (Cohen's *d*). Mixed linear model analyses showed similar results for all patient-reported outcomes. As shown in Figure 2, there was a positive correlation (Spearman's ρ -0.646, $P < 0.001$) between pain during sexual activity at one year and perceived overall health status measured with the EQ-5D VAS score.

Discussion:

This study clearly demonstrates that a large proportion of patients undergoing surgery for LDH experience an improvement in pain during sexual activity at one year. Among those who reported pain during sexual activity prior to surgery, approximately 69% experienced an improvement at one year. There was also a large reduction in the number of patients who reported that pain prevented any sexual activity at all at the end of follow-up. Further, there were large clinically important improvements in all patient reported outcomes for the total study population at one year and few serious complications.

The baseline factors of having a partner, working until the time of surgery, higher preoperative ODI score, and higher education were associated with improvement in pain during sexual activity. Increasing preoperative back pain related disability has also been identified as a strong predictor for improvement in other studies.¹⁸⁻²⁰ Duration of back pain exceeding one year prior to surgery seems to be a negative predictor for improvement in pain during sexual activity, adding

to the evidence that chronic pain is associated with unfavorable outcomes and that timing of surgery is important.²¹⁻²⁴

Tobacco smoking was also identified as a negative predictor, supporting the existing evidence that smoking is associated with inferior outcomes following surgery²⁵. Previous studies have shown that tobacco smokers are less likely to achieve clinically important improvement following surgery for lumbar spinal stenosis and LDH,^{20,26,27} and that smokers have an increased risk of postsurgical recurrent disc herniation²⁸. Our study cannot establish a definite causal relationship between daily tobacco smoking and lower treatment effects following microdiscectomy for LDH, and smoking may be a marker for other characteristics responsible for the association that are unadjusted for in the regression model. It is known that patient reported quality of life is lower among smokers in a general population and it is possible that this may affect disease specific questionnaires such as the ODI²⁹.

Increasing age, serious comorbidity, and complications within three months were also identified as negative predictors. There is a wide range of factors that may impact sexual health with age,³⁰ including comorbidity that can limit physical activity and contribute to pain during sexual activity. Further, many common general medical disorders have negative effects on sexual health³¹. Still, there is solid evidence supporting that both lumbar microdiscectomy and decompressive surgery for lumbar spinal stenosis can improve functional status and quality of life in selected elderly patients including those with comorbidity³²⁻³⁴. That increasing BMI was identified as a negative predictor of improvement in pain during sexual activity might not come as a surprise as obesity has been linked to impairments in sexual quality of life^{35,36}.

Reanalysis of data from a randomized trial comparing four different types of fusion surgery with non-surgical management of chronic low back pain showed that patients who underwent surgery experienced less pain during sexual activity at two years follow-up³⁷. However, the improvement following anterior fusion was counteracted by disturbances of ejaculation and genital sensation in male patients and a trend towards disturbed orgasm and genital sensation in female patients. In a reanalysis of a trial comparing total disc replacement via an anterior retroperitoneal approach versus instrumented posterior lumbar fusion, similar improvement in pain during sexual activity was reported³⁸. However, impaired ability to achieve orgasm was more common in the posterior lumbar fusion group. With the role of fusion surgery under increasing scrutiny because of increased costs, risk of complications, and questionable added value compared to decompressive surgery alone,³⁹⁻⁴¹ it is important to assess changes in sexual function following more common and less invasive spine procedures such as lumbar microdiscectomy.

We found a strong correlation between pain during sexual activity at one year and patients' perceived overall health status (Figure 2). A recent study involving US adults showed that sexual health is in fact a highly important aspect in quality of life⁷. Sexual health and function are multifaceted and not only limited to pain during sexual activity as we measured in our study.

Strengths and limitations

The strengths of this study were the use of prospective registry data with high external validity and the large sample size. The main limitations of our study were the inability to capture other aspects of sexual health and function such as enjoyment, desire, genital sensation, ability to achieve orgasm and ejaculation. It is therefore especially difficult to assess changes in sexual function in the subgroup of patients with cauda equina syndrome. Further, we do not know

whether those patients who reported that pain did not limit sexual function, actually resumed an active sexual life or were limited by other factors. Loss to follow-up at one year is a concern, but a previous study on a similar population from NORspine showed no difference in outcomes between responders and non-responders ⁴².

Conclusion

This study clearly demonstrates that a large proportion of patients undergoing surgery for LDH experienced important improvement of pain during sexual activity at one year.

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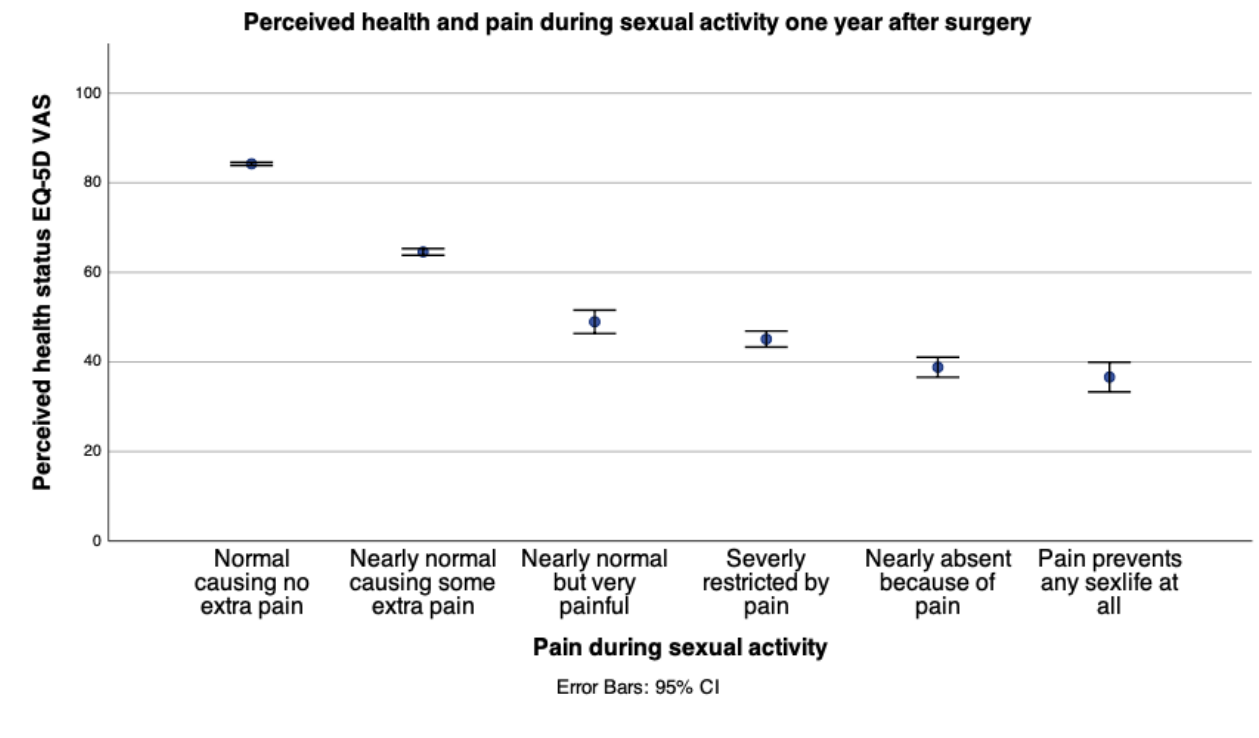
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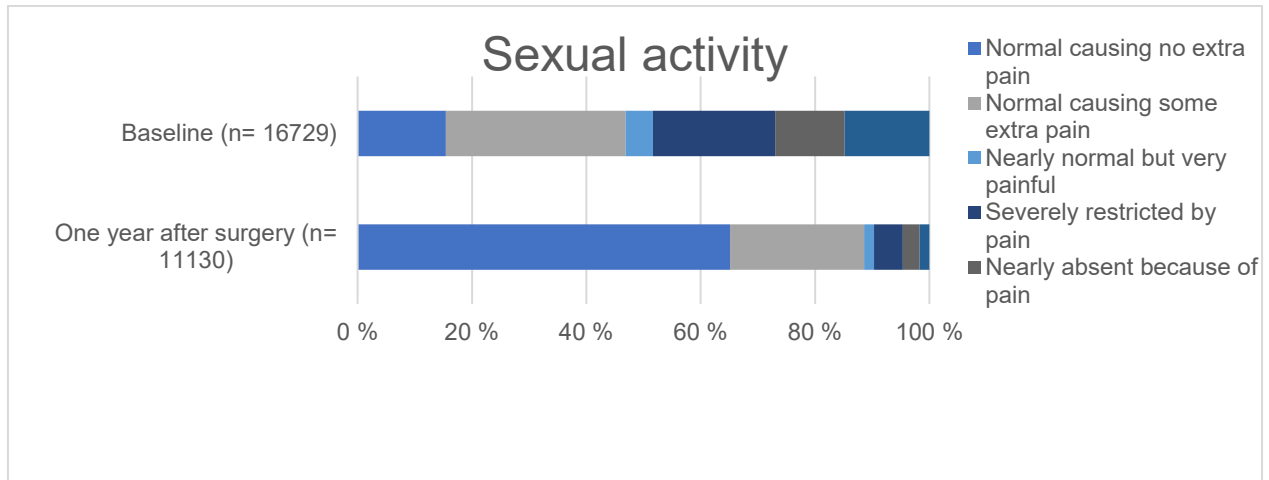
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Figure legends.

Figure 1. Patient reported pain during sexual activity at baseline and one year after surgery in relation to the Oswestry disability index item 8.

Figure 2. Correlation between pain during sexual activity at one year after surgery and perceived overall health status measured with the EQ-5D VAS score.



**Table 1. Characteristics for the total population (n=18529)**

Demographic variables	N (%) or Mean (SD)
Age, years	46.8 ± 14.0
Female	7647 (41.3%)
Married or partner	13811/18391 (75.1%)
Current tobacco smoker	4962/18374 (27.0%)
Education >12 years	6996/18374 (38.1%)
Working	4111/18007 (22.8%)
Body Mass Index	26.9 ± 4.4
Comorbidity	5321/18529 (28.7%)
ASA Grade >2	1051/18292 (5.7%)
Back pain history	
Absence of back pain	599/17747 (3.4%)
Back pain between 3 and 12 months	7820/17747 (44.1%)
Back pain >12 months	6398/17747 (36.1%)
Radiculopathy history	
Absence of radiculopathy	586/17617 (3.3%)
Radiculopathy less than 3 months	2843/17617 (16.1%)
Radiculopathy between 3 and 12 months	7620/17617 (43.3%)
Radiculopathy >12 months	6275/17617 (35.6%)
Previous lumbar spine surgery	3509/18363 (19.1%)
Previous surgery in the same level	2396/18529 (12.9%)
Indication of surgery cauda equina syndrome	216/18529 (1.2%)
Surgical treatments, complications, and events	

Perioperative complications	419/18529 (2.3%)
Unintentional durotomy	309/18529 (1.7%)
Nerve injury	34/18529 (0.2%)
Blood replacement (transfusion), postoperative hematoma	32/18529 (0.2%)
Cardiovascular complications	8/18529 (0.0%)
Respiratory complications	5/18529 (0.0%)
Anaphylactic reaction	10/18529 (0.1%)
Wrong-level surgery	32/18529 (0.2%)
Emergency surgery	3389/18415 (18.4%)
Patient reported complications after hospital discharge (<3 months)	982/12758 (7.7%)
Wound infection	382/12758 (3.0%)
Urinary tract infection	295/12758 (2.3%)
Pneumonia	58/12758 (0.5%)
Pulmonary embolism	11/12758 (0.1%)
Deep venous thrombosis	16/12758 (0.1%)
Urinary and/or fecal incontinence	331/12758 (2.6%)
Surgical procedure	
Microscope and/or surgical loupes	17095/18529 (97.2%)
Levels of surgery ≥ 2	1075/18529 (5.8%)
Level of surgery	
L2-L3	421 (2.3%)
L3-L4	1748 (9.4%)
L4-L5	8960 (48.4%)
L5-S1	8375 (45.2%)

Table 2. Multivariable regression analysis with predictors of improvement in sexual function one year after surgery (n=7232/10509)

Variable	OR	95% CI	P-Value
Age	0.99	0.99-1.0	0.011
Female	0.90	0.78-1.05	0.166
Partner	1.26	1.05-1.51	0.014
Current tobacco smoker	0.65	0.55-0.76	<0.001
Education >12 years	1.26	1.08-1.45	0.004
Body Mass Index	0.97	0.95-0.98	<0.001
Working	1.52	1.26-1.84	<0.001
ASA >2	0.76	0.56-1.04	0.084
ODI Score Preoperative	1.04	1.03-1.04	<0.001
Pain >12 months	0.35	0.31-0.41	<0.001
Previous lumbar spine surgery	0.72	0.54-0.96	0.024
Previous surgery in the same level	0.64	0.47-0.89	0.008
Levels of surgery ≥ 2	0.77	0.59-1.01	0.060
Perioperative complications	1.16	0.70-1.90	0.569
Complications after hospital discharge (<3 months)	0.55	0.43-0.70	<0.001
Surgical microscope or loupes	1.11	0.84-1.39	0.546
Emergency surgery	1.50	1.17-1.92	0.001
Cauda equina syndrome	1.17	0.47-2.91	0.740
Abbreviations: ASA, American Society of Anesthesiologists; ODI, Oswestry Disability Index.			

Table 3. Outcome variables at baseline and one year after surgery

Outcome variable (complete case analysis)	Baseline - mean (SD)	One year - mean (SD)	Mean difference (95% CI)	P-Value
ODI (n=11958)	45.9 (19.0)	16.9 (16.5)	29.0 (28.6-29.4)	<0.001
EQ-5D (n=10659)	0.28 (0.36)	0.73 (0.28)	-0.45 (-0.46 to -0.44)	<0.001
VAS (n=10285)	44.9 (21.8)	74.4 (21.7)	-29.5 (-30.0 to -29.0)	<0.001
NRS Back pain (n=11659)	6.3 (2.5)	3.0 (2.6)	3.3 (3.2-3.4)	<0.001
NRS Leg pain (n=11665)	6.9 (2.2)	2.5 (2.7)	4.5 (4.4-4.5)	<0.001
Outcome variable (mixed linear model analysis)	Baseline - mean (SD)	One year - mean (SD)	Mean difference (95% CI)	P-Value
ODI (n=18505)	45.8 (18.9)	17.2 (19.5)	28.5 (28.2-28.9)	<0.001
EQ-5D (n=18284)	0.27 (0.41)	0.72 (0.41)	-0.45 (-0.45 to -0.44)	<0.001
VAS (n=18173)	44.8 (22.1)	73.8 (26.8)	-29.0 (-29.5 to -28.5)	<0.001
NRS Back pain (n=18394)	6.3 (2.4)	3.0 (3.1)	3.3 (3.2-3.3)	<0.001
NRS Leg pain (n=18405)	6.9 (2.2)	2.5 (3.3)	4.4 (4.4-4.5)	<0.001
Abbreviations: ODI, Oswestry Disability Index; VAS, Visual Analog Scale; NRS, Numeric Rating Scale.				