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Depressive symptoms are associated with poor outcome for lumbar spine surgery

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HIGHLIGHTS

- Of 537 responders after lumbar surgery 39% had Beck Depression Inventory ≥ 10.
- Of these 28% had non-melancholic (NmDS) and 11% melancholic depression (MDS).
- MDS patients had more pain, sleep disturbances by pain and poorer functional disability.
- MDS patients used more regular pain medication and received less benefit from its use.
- MDS patients need tailored pre- and postoperative rehabilitation programme.

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ABSTRACT

Background and aims: The symptoms of pain and depression often present concomitantly, but little is known as to how the different subtypes of depression affect surgical outcome. The aim of this study was to determine whether there is a difference in outcome after lumbar spine surgery between non-depressed patients and patients with different subtypes of depressive symptoms: non-melancholic (NmDS) and melancholic depression (MDS).
Methods: This was a cross-sectional postal survey. A self-made questionnaire, the Beck Depression Inventory (BDI) and the Oswestery Low Back Disability Questionnaire (ODI) were sent to patients who had undergone lumbar spine surgery in the Oulu University Hospital between June, 2005 and May, 2008. BDI ≥ 10 were further classified into NmDS or MDS.
Results: A total of 537 patients (66%) completed the survey. Of these, 361 (67%) underwent disc surgery, 85 (16%) stabilizing surgery and 91 (17%) decompression. Participants were divided into three groups: BDI < 10 $N = 324$ (60%), NmDS $N = 153$ (29%) and MDS $N = 60$ (11%). The mean ODI (SD) in the BDI < 10 group was 16 (15), in the NmDS group 36 (15), and in the MDS group 41 (18) ($p < 0.001$). The ODI profiles were different between the groups ($p < 0.001$). Pain was more frequent in depressive patients (88% of MDS, 81% in NmDS and 40% in BDI < 10 patients experienced pain, $p < 0.001$). The intensity of pain and pain-related disability was lowest among the patients in the BDI < 10 group and highest among the MDS patients. Regular pain medication was used by 87% of patients in the MDS group, 93% of patients in the NmDS group, and 71% of patients in the BDI < 10 group ($p < 0.001$). Response to pain medication with NRS (0–10) was 5.6 among MDS, 5.8 among NmDS and 6.5 among BDI < 10 patients ($p < 0.001$).
Conclusion: Different types of depressive symptoms are associated with poor outcome after lumbar spine surgery. The outcome was worst in patients suffering from the MDS subtype. This was observed in pain intensity, functional disability and response to pain medication.
Implication: It would be important to evaluate depression pre- and postoperatively. Offering a tailored rehabilitation programme to MDS patients should be considered.

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1. Introduction

Depression is one of the most prevalent diseases globally: 6% of the population meets the major depressive disorder criteria at some point in time [1]. According to the Health 2000 Study, the prevalence of depression is 6.5% in Finland [2]. The lifetime prevalence of depressive disorders was almost 18% in the latest Finnish study among younger population subjects [3]. Depression affects one out of every six adults during their lifetime, women being affected twice as often as men [4]. The biological mechanisms behind depression include the autonomous nervous system and monoamine neurotransmission dysfunction, cytokine-mediated inflammatory reactions [5–7], and overactivity of the hypothalamic-pituitary-adrenal (HPA) axis [8–10]. Psychological factors may also play a significant role, as the metabolic syndrome is associated with a passive life attitude and negative self-image, both of which may contribute to the development of depression [11,12].

Patients seeking care for a pain problem often also report symptoms of depression. Depression is associated with the development of chronic pain as well as with poor results for treatment [13]. On average, 65% of patients seeking care for depression have comorbid pain problems and about half of the patients with chronic pain fulfil the criteria for depression [14].

Depression can be divided into two main subgroups: melancholic (MDS, 'typical') and non-melancholic (NmDS, 'atypical') depression [15]. These two depression types have different symptom profiles. NmDS is marked by fatigue, increased appetite and weight gain, mood reactivity and interpersonal rejection sensitivity. MDS is characterized by anhedonia, non-reactive mood, and symptoms of insomnia, loss of appetite, mood variation and impaired concentration [1]. Approximately 45–70% of depressive individuals are MDS type and 15–30% are NmDS type [16,17]. Melancholic depression is considered to be a more multifaceted biological condition [1,18]. Reduced, dysfunctional serotonergic and noradrenergic neurotransmission may contribute to pain perception [19].

We have previously reported functional capacity and quality of life after lumbar spine surgery in a Finnish, working-aged patient cohort [20]. Pain and depression often present together, but little is known as to what extent the different subtypes of depression affect surgical outcome. The aim of this study was to investigate how the two main subtypes of depressive symptoms (NmDS, MDS) influence outcome in lumbar spine surgery.

2. Materials and methods

To investigate the postoperative results of lumbar spine surgery in patients treated in the Oulu University Hospital, patients were identified using ICD-10 procedure codes for lumbar spine operations during the period 1.6.2005 to 31.5.2008. Surgical procedures due to acute traumas were excluded. Only working-aged patients (18–65 years) were included. Each patient was listed only once, and the index operation was defined as the last lumbar spine surgery during the above-mentioned period. Based on medical records, patient who had undergone lumbar spine reoperation after 1.6.2008 and patients with insufficient capacity in the Finnish language, major abuse problem or progressive, severe illness (e.g., cancer, dementia) were excluded. The ICD-10 diagnosis code for spinal disease and previous lumbar spine operations before the index operation were recorded. The study protocol was approved by the local ethics committee, and patients gave their written informed consent.

The questionnaires and a consent form were sent to all traceable patients in September 2009. The patients were asked to fill in a self-made questionnaire, the Beck Depression Inventory (BDI) and the Oswestery Low Back Disability Questionnaire (ODI).

The self-made questionnaire included questions regarding the occurrence of pain (never, occasionally, daily or almost daily, and all the time), the average intensity of pain (on a numerical rating scale, NRS, 0–10) and pain-associated disability (NRS 0–10). Axial low back pain and radicular pain were assessed separately. Regularly and occasionally used medications for low back pain were queried. Patients evaluated the efficacy of pain medication with an NRS (0 = no relief at all, 10 = complete pain relief). Patients were asked to record their weight (kg) and height (m), from which their body mass index (BMI) was calculated. Leisure-time physical activity was assessed by asking how many periods of over 30 min exercise sessions per week each patient practised. Sleep disturbance caused by pain was queried using options 0 = "not at all", 1 = "mild, wakenings, but easily falls asleep again", 2 = "moderate, sleep disturbed many nights a week" and 3 = "severe, sleep severely disturbed every night".

The Beck Depression Inventory is a 21-item self-report questionnaire to assess possible depression and has been validated in Finnish [21–23]. The cut-off point for increased depressive symptoms (DS) was 10, and has thereby been reported to be a feasible instrument for depression screening [22]. In order to examine the effect of the subtypes of DS, we used a summary score of melancholic symptoms in BDI based on the DSM-IV defined criteria for melancholic depression (sadness, past failure, loss of pleasure, guilty feelings, punishment feelings, loss of interest, irritability, change of sleeping and appetite), dividing the participants with increased DS into melancholic (MDS) and non-melancholic depressive symptom (NmDS) subgroups in a manner similar to that which has been previously published [24,6,25,26].

The ODI contains ten items each with six statements graded from zero (lowest disability) to five (greatest disability). The total score is calculated as a sum of each completed item and expressed as a percentage of the maximum number of possible points, i.e. related to the number of items the patient has answered [27]. Scores are defined on a scale according to the original publication: 0–20 minimal, 20–40 moderate and 40–60 severe disability. A score 60–80 indicates a crippled patient and 80–100 indicates that the patient is either bed-bound or exaggerating their symptoms [28].

2.1. Statistical methods

The data are presented as means with standard deviations (SD) or as counts with percentages. Statistical comparisons were made using the analysis of variance (ANOVA), chi-square test or Fisher–Freeman–Halton exact test. When adjusting for confounding factors, an analysis of covariance (ANCOVA) or logistic models was applied. The bootstrap (10,000 replications) method was used when the theoretical distribution of the test statistics were unknown or in the case of violation of the assumptions (e.g. non-normality). Differences in the ODI item-profiles between the groups were determined using a bootstrap-type, multivariate approach with the Hotelling T-squared test; it is a method to compare means of all variables of interest simultaneously (in the present analysis the ODI items) while maintaining the chosen magnitude of Type I error. The normality of variables was evaluated by the Shapiro–Wilk W test. The Stata 14.0, StataCorp LP (College Station, TX, USA) statistical package was used for the analyses.

3. Results

During the study period 1.6.2005 to 31.5.2008, a lumbar spine operation due to non-traumatic lumbar disease was performed in 1180 patients in our hospital. Of these, 11 had passed away by