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Observational study

Obesity has an impact on outcome in lumbar disc surgery

Voitto Järvimäki[a,*], Hannu Kautiainen[b,c,d], Maija Haanpää[e,f], Seppo Alahuhta[a], Merja Vakkala[a]

[a] Department of Anaesthesiology, Medical Research Center Oulu, Oulu University Hospital, Oulu, Finland
[b] Department of Primary Health Care, Helsinki University Central Hospital, Helsinki, Finland
[c] Department of General Practice and Primary Health Care, University of Helsinki, Helsinki, Finland
[d] Unit of Primary Health Care, Kuopio University Hospital, Kuopio, Finland
[e] Department of Neurosurgery, Helsinki University Central Hospital, Helsinki, Finland
[f] Mutual Insurance Company Etera, Helsinki, Finland

HIGHLIGHTS

- Of 355 responders after lumbar disc surgery 34% were pre-obese and 38% obese.
- Obese patients had mild mood disturbances.
- Obese patients had moderate functional disabilities.
- Obese patients had significantly less activity and mobility functions.
- Obese patients need special attention before and after lumbar disc surgery.

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ABSTRACT

Purpose: To investigate the effect of obesity on outcome in lumbar discectomy.
Methods: A cross-sectional postal survey; a self-made questionnaire, Beck depression inventory IA (BDI IA) and the Oswestry low back disability questionnaire (ODI) were sent to the patients, who had undergone lumbar disc surgery in the Oulu University Hospital between June 2005 and May 2008. Patients were divided into three groups according to BMI: normal, pre-obese and obese. The ODI was also examined in the framework of the international classification of functioning, disability and health (ICF) to investigate its ability to describe various dimensions of functioning (body structure and functions, activities and participation).
Results: The postal survey was sent to 642 patients, of whom 355 (55%) replied. Males dominated in the pre-obese (66%) and obese (62%) groups ($p = 0.01$). Normal-weighted and pre-obese patients had lower BDI scores compared to obese patients (mean BDI: 8.0, 7.6, 11.2, respectively, $p = 0.035$). Total ODI score was highest in the obese group compared to normal-weighted or pre-obese (20.3, 18.6, 26.4, respectively, $p = 0.011$). When ODI was linked to the ICF there were significant differences in all activity domains (mobility, self-care and interpersonal interactions and relationships) and the mobility component of the participation domain between the weight groups.
Conclusions and implications: Obesity has an impact on outcome in lumbar discectomy. Obese patients had higher scores in BDI and ODI indicating mild mood disturbances and moderate functional disability. According to ICF, functional disability of obese patients was observed to some extent in all activity domains. Obese patients will be more frequently present for disc surgery and increased morbidity risk must be recognized. We need a strategy to rehabilitate and activate obese patients pre- and postoperatively.

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* Corresponding author at: Department of Anaesthesiology, Oulu University Hospital, PO Box 21, 90029 Oulu University Hospital, Finland. Tel.: +358 8 315 2011; fax: +358 8 315 6227.
E-mail address: voitto.jarvimaki@ppshp.fi (V. Järvimäki).

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1. Introduction

Lumbar discectomy is the most common procedure performed for patients experiencing back and leg pain from herniated lumbar disc in Western countries. In Finland the annual number of disc surgery is about 5800, showing a light preponderance of males (1.14:1) [1]. A herniated lumbar disc can often be improved by conservative treatment and only 10–15% of cases require surgery [2]. Surgery is considered in patients with persistent and severe symptoms. The outcome of surgical treatment is encouraging if patients are carefully selected and the timing is appropriate [3,4]. Our previous study confirmed a good outcome after disc surgery in the Oulu University Hospital with regards pain, functional capacity and quality of life [5]. The patients' physical and psychological well-being pre- and postoperatively has an impact on the clinical outcome of surgical procedures. Depression and avoidance of social and physical activity are risk factors for chronification of pain and non-success in surgery [6].

Studies have shown that obesity increases the risk of low back pain [7]. There is a strong association between obesity and higher rates of complications, increased resource utilization and unfavourable outcomes after spinal surgery [7–10]. The number of obese people has dramatically increased in Western countries [11]. The risk of higher morbidity must be taken into account during the decision making process for surgery.

There are few questionnaires that by themselves cover all dimensions of life. The international classification of functioning, disability and health (ICF) is a framework for organizing and documenting information on functioning and disability. It conceptualizes functioning as dynamic interactions between a person's health, environmental factors and personal factors. The ICF is also helpful in mixed methods research by providing common terminology for analyzing and linking the content of quantitative and qualitative measures [12–14].

The aim of this study was to investigate the results of lumbar disc surgery in a Finnish population-based cohort concentrating on working-aged patients. The impact of obesity on outcome was also analyzed. The relationship between physical and psychological well-being and functional disability were studied in three different weight groups (normal, pre-obese and obese). The ODI was also examined in the ICF framework to investigate its usefulness in describing various dimensions of functioning in day-to-day life.

2. Materials and methods

2.1. Patients and data collection

Over 200 lumbar disc operations are performed per year in the Oulu University Hospital. To investigate the results of herniated disc surgery in Oulu University Hospital, the patients were identified using the ICD-10 procedure codes for disc operations between 1 June 2005 and 31 May 2008. Only working-aged (18–65 years of age) patients were included. Each patient was listed only once, and the index operation was defined as the latest lumbar disc surgery during the above-mentioned period. Based on medical records, patient who had undergone lumbar spine reoperation after 1 June 2008 and patients with insufficient capacity of Finnish language, major abuse problem or progressive severe illness (e.g., cancer, dementia) were excluded. These disc surgery patients are part of a larger lumbar surgery material, the basic outcome results of which have been published earlier [5].

The study protocol was approved by the local ethics committee, and the 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 IA (BDI IA) and the 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 (NRS 0–10) and pain-associated disability (NRS 0–10). Axial low back pain and radicular pain were assessed separately. Regularly and occasionally used medication for low back pain as well as self-reported leisure time physical activities were asked. Weight and height were queried for the calculation of the body mass index (BMI). BMI was also collected from the preoperative information. The BDI IA is a 21-item questionnaire to assess possible depression and it has been validated in a Finnish population [15,16]. The BDI IA scores are interpreted as follows: 1–10 normal, 11–16: mild mood disturbances, 17–20: borderline clinical depression, 21–30: moderate depression, 31–40: severe depression, over 40: extreme depression [15]. The ODI contains 10 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 [17]. Scores are defined by 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 [18]. The Finnish version of ODI has been validated in 2011 [19].

The ODI was linked to the ICF framework according the published guidelines [14]. The linkage of the ODI to ICF is illustrated demonstratively in the paper published by Pekkanen et al. [20]. Ten dimensions of ODI were linked into the ICF components for body functions and structures, activities and participation. Body functions were divided into "mental functions" and "sensory functions and pain". Activities components were "mobility", "self-care" and "interpersonal interactions and relationships". Participations components were "mobility" and "community, social and civic life". The total score was expressed using a relative scale of 0 to 100 [20].

2.2. Statistical methods

The data are presented as means with standard deviations (SD) or as counts with percentages. The most important outcomes are given with 95% confidence intervals (95% CIs). The comparisons between the groups were made by analysis of variance (ANOVA), Kruskall–Wallis test or chi square test, when appropriate. ODI scores were compared between groups using a bootstrap type analysis of covariance (ANCOVA) with the appropriate contrast. The bootstrap method is significantly helpful when the theoretical distribution of the test statistic is unknown or in the case of a violation of the assumptions. No adjustment was made for multiple testing. The STATA 13.1, StataCorp LP (College Station, TX, USA) statistical package was used for analyses. P-values < 0.05 were considered significant.

3. Results

During the study period 1 June 2005 to 31 May 2008, lumbar disc surgery was performed on 715 patients in the Oulu University Hospital. Of these, three had passed away by the beginning of this study. Of the surviving patients, 32 were excluded due to age, 23 due to other diseases, seven due to subsequent lumbar spine surgery after the index operation, four due to severe abuse problem and four due to an insufficient capacity in the Finnish language to complete the questionnaires. Hence the postal survey was mailed to 642 patients, of whom 355 (55%) replied. Of those who replied, operation was performed minimally invasive in 97% of the cases, the mean age was 42 (10) years and the number of females was 147