Patient involvement in surgical treatment decisions and satisfaction with the treatment results after lumbar intervertebral discectomy

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Abstract

Purpose To evaluate involvement of patients in surgical treatment decision making (STDM) in relations to satisfaction with the results of lumbar discectomy.

Methods We evaluated prospectively 150 surgically treated patients with radicular pain due to lumbar disc herniation (LDH). The patients completed self-reported questionnaires about preferences for involvement and actual involvement in STDM. Global satisfaction with the results of the treatment was assessed at 1 year after the operation.

Results Most of the patients (129 patients, 86 %) stated that they had been sufficiently informed about LDH to be involved in the treatment decisions, almost half of the patients (47 %) preferred active or collaborative involvement and 58 % of the patients reported higher actual involvement in STDM. Congruence between preferred and actual roles in decision making was 64 %. Most of the patients (77 %) were satisfied with the results of the operation, but satisfaction was not associated with involvement of patients in STDM.

Conclusion A significant proportion of patients with LDH prefer to be actively involved in treatment decisions and experience an STDM process that matches their

preferences for participation. However, individual differences in preferences for involvement in STDM are common and global satisfaction with the treatment results is not significantly related to the activity of involvement in STDM.

Keywords Lumbar disc herniation · Radiculopathy · Lumbar discectomy · Surgical treatment · Decision making

Introduction

Increased patient involvement has been advocated in making decisions about medical care and patient-centered approach has been identified as an important priority for improvement of healthcare [1–4]. The participation of patients in clinical decision making depends on the growing body of information available to patients, on the development of the patient–physician relationship and expansion of the shared decision-making model for patients, who desire to actively participate in their healthcare decisions. However, it has been emphasized that not all patients are comfortable with or want to participate in medical decision making [5]. Furthermore, some researchers have reported that the level of participation itself (passive, collaborative, active) has no impact or might even have negative impact and only a good concordance between the preferred and the actual decision-making role, i.e., patient-centered decision making could result in higher patient satisfaction and better clinical outcome [6–9]. Despite the attention paid to this issue, there has been relatively little research on the feasibility of patient-centered decision making in orthopedic practice [10], and it is not possible to confirm with certainty whether increased patient involvement in medical decisions

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could bring long-term benefit to patients, in what situations they are most usefully applied and where they are not.

Radiculopathy caused by lumbar disc herniation (LDH) is a common condition and leading reason for lumbar spine surgery, however, both conservative management and surgical interventions are viable options for treatment. Surgical intervention may result in faster relief of symptoms and earlier return to function, although long-term results appear to be similar regardless of the type of management [11, 12]. The choice of surgical or nonsurgical treatment can depend importantly on surgeon–patient discussion and patients' knowledge about the disease, which is critical for involvement of patients in decision making. In 2013, de Boer et al. [13] evaluated differences in the importance ascribed to patient-centered care between various patient groups, including spinal disc herniation, and found that the patient groups considered patient-centered care of significant importance. However, there is a lack of information about the clinical practice of involvement of patients in surgical treatment decision making (STDM) before lumbar disc surgery and it is unclear whether involvement in STDM could have an impact on patients' satisfaction with the results of the treatment.

The aim of the present study was to explore the process of STDM in patients with LDH and more specifically: (1) to evaluate patients' perceptions about involvement in treatment decisions; (2) to analyze the level and the quality of information available for the patients before the operation; (3) to compare preferred participation in treatment decisions and actual roles in STDM; (4) to determine whether involvement in STDM is associated with satisfaction with the results of the operations.

Methods

Patient selection and data collection

We evaluated prospectively a consecutive sample of patients with radicular pain due to LDH, admitted to the department of neurosurgery and deemed surgical candidates by local neurosurgeons. The patients were included into the study if they had: (1) radicular pain; (2) nerve root tension signs (straight leg raising test) or neurologic deficits (decreased sensation or weakness in a myotomal distribution, asymmetrical diminished reflexes) due to LDH; (3) LDH (protrusion, extrusion, or sequestration) verified by magnetic resonance imaging or computed tomography at a level and side corresponding to the clinical symptoms. Exclusion criteria included caudal equina syndrome, acute pain and severe radicular deficits requiring urgent operation (acute paralysis), prevalence of

symptoms indicating spinal stenosis over radicular signs, progressive neurologic deficit, malignancy, significant lumbar deformity, and general contraindications to elective surgery.

The patients were asked whether they had been sufficiently informed about LDH and to reveal the sources of the information. All patients received a written educational booklet, composed as a preoperative decision aid, containing anatomic illustrations of the lumbar spine, a discussion of surgical and nonsurgical treatment methods for LDH, potential complications and a general description of expected outcomes. The patients were asked whether the booklet contained novel information about the disease and whether the information encouraged to make the treatment decision towards surgical or conservative treatment.

The control preferences scale (CPS) [14] was used to evaluate patients' preferences for participation in treatment decision making and the same scale was adapted to evaluate patients' actual involvement in STDM (Table 1). For the purpose of statistical analysis, CPS data were dichotomized for higher preferences for participation, i.e., active and collaborative involvement in the treatment decision making (A–C), and lower preferences for participation, i.e., passive involvement in treatment decision-making process (D–E). Data about actual involvement were also dichotomized for the purpose of statistical analysis for a higher actual involvement (1, 2, and 3), and lower actual involvement (4 and 5) in STDM.

Table 1 Evaluation of patients' preferences for participation and actual involvement in treatment decision making

Preferences for participation in treatment decision making	Actual involvement in surgical treatment decision making
A I prefer to make the final selection about which treatment I will receive	1 I made the surgery decision with little input from my doctor
B I prefer to make the final selection of my treatment after seriously considering my doctor's opinion	2 I made the surgery decision after seriously considering my doctor's opinion
C I prefer that my doctor and I share responsibility for deciding which treatment is best for me	3 My doctor and I made the surgery decision together
D I prefer that my doctor makes the final decision about which treatment will be used, but seriously considers my opinion	4 My doctor made the surgery decision but seriously considered my opinion
E I will prefer to leave all decisions regarding treatment to my doctor	5 My doctor made the surgery decision with little input from me

The patients provided basic information about sociodemographic and disease characteristics. Visual analog scales (VAS), ranging from 0 to 100 were used for assessment of pain (indicating average radicular or lumbar pain in the last 2 days) and Oswestry Disability Index (ODI) scores [15] were used to evaluate functional disability of the patients.

All patients were operated upon using a standard posterior microdiscectomy approach.

Informed consent was obtained from all participating individuals, and ethics approval for the study was given by the institutional ethics committee.

Postoperative evaluation

Follow-up evaluation was performed 1 year after the operation. The patients were interviewed and asked to describe the average frequency/severity of postoperative lumbar/radicular pain and continuing health care needs (pain medications and doctor's consultations after the operation). VAS was used for assessment of pain (indicating average severity of radicular or lumbar pain in the last 2 weeks) and ODI scores to evaluate functional disability of the patients.

Global satisfaction with the results of the surgical treatment was assessed on a 3-point scale in response to the question: "How satisfied are you with the results of the operation?" Patients were asked to rate if they were 'satisfied', 'somewhat dissatisfied' or 'dissatisfied' and the patients, who were dissatisfied or somewhat dissatisfied were categorized as dissatisfied for further analysis.

To evaluate general subjective health (GH) status, the patients were asked to answer the question about the perception of personal health status: "How would you describe your general health lately?" The categories of answer included: 5 = excellent, 4 = good, 3 = so so, 2 = not so good, and 1 = bad [16]. For the purpose of statistical analysis, suboptimal health was defined as the three lower scores (1–3) and optimal health was defined as the two higher scores (4–5).

Statistical analysis

Statistical analyses included descriptive statistics for all measures. All continuous variables were checked for normality using Shapiro–Wilk's *W* test. Statistical comparisons between groups for the continuous variables were done by *t* test for independent samples. The paired *t* test was used to compare the continuous variables before and after surgery. Chi-square test was used to compare the differences in proportions. The Kappa statistic was selected to assess the level of agreement between patients' desired decision-making role, and what they perceived they actually received. Multivariate stepwise logistic regression

model was built to determine predictors of higher involvement in surgical treatment decisions and dissatisfaction with the results of the treatment, while all explanatory variables with a *p* value <0.25 in bivariate analysis were included in the models. The analyses were performed using the JMP software (version 8.0.1, SAS Institute Inc., Cary, NC, USA). A *p* value <0.05 was considered statistically significant.

Results

We prospectively collected data on 150 consecutive patients. No patients refused to take part in the study; but 3 patients failed to respond 1 year after operation (1 patient has moved to another country and 2 patients could not be found), leaving 147 patients for follow-up evaluation. The characteristics of the patients and disease variables are presented in Table 2.

Preoperatively received information

Most of the patients (129 patients, 86 %) stated that they had been sufficiently informed about the disease to be involved in the treatment decisions. The patients had received information from different and usually multiple sources (112 patients, 75 %). Common sources of the information were surgeons (114 patients, 76 %), other doctors (71 patients, 47 %), other patients (39 patients, 26 %), colleagues and friends (62 patients, 41 %), medical literature and internet (51 patients, 34 %). However, 113 (74 %) patients said that the educational booklet contained new information for them and 123 (82 %) patients considered reading the booklet useful. The patients said that the booklet encouraged to make the treatment decisions in favor of surgical treatment in 108 (72 %) cases and in favor of conservative treatment in only 4 (3 %) cases.

Involvement in surgical treatment decisions before lumbar discectomy

Almost half of the patients (70 patients, 47 %) preferred active or collaborative involvement in decision-making process and more than half of the patients (87 patients, 58 %) reported higher actual involvement in surgical treatment decisions (Fig. 1). Congruence between preferred participation in treatment decision making and actual roles in STDM was 66 %, however, 51 patients (34 %) did not attain their role preferences. Surprisingly, most of the cases (34 patients) reported that they had to be more actively involved in STDM than they would have preferred and only 17 patients reported that the doctors had been more involved in the decision making than they

Table 2 Patients characteristics

Variable	Patients (<i>N</i> = 150)
Personal variables	
Age	47.0 ± 12.8
Gender (F:M)	84 (56 %):66 (44 %)
Education >12 years	18 (12 %)
Married	116 (77 %)
Working	103 (69 %)
Disease variables	
Comorbidities	57 (38 %)
Pain duration (months)	4.63 ± 6.1
Pain intensity (VAS)	42.5 ± 14.7
Pain intensity (VAS >40)	70 (47 %)
ODI	52.4 ± 7.9
Preoperative course of physical therapy	80 (53 %)
Preoperative reduction of pain and radicular signs	44 (29 %)
Affected levels	
L5/S1	56 (37 %)
L5/L6	3 (2 %)
L4/L5	80 (53 %)
L3/L4	9 (6 %)
L2/L3	2 (1 %)
Herniation type	
Contained herniation	91 (61 %)
Noncontained herniation	
Sequestration	50 (33 %)
Extrusion	9 (6 %)
Radicular deficit	110 (73 %)
Paresis	51 (34 %)
Sensory disturbances	106 (71 %)
Previous spine operations	28 (19 %)
Postoperative variables	
Patients (<i>N</i> = 147)	
General subjective health status	
Excellent	13 (9 %)
Good	49 (33 %)
So-so	57 (39 %)
Not so good	24 (16 %)
Bad	4 (3 %)
Satisfaction with the results of the operations	
Satisfied	114 (77 %)
Somewhat dissatisfied	22 (15 %)
Dissatisfied	11 (7 %)
Pain intensity (VAS)	11.8 ± 11.4
Pain intensity (VAS >10)	56 (38 %)
Decrease of pain <50 % (VAS)	38 (25.9 %)
Daily lumbar/radicular pain	57 (39 %)
ODI	13.8 ± 12.2

VAS visual analog scale, ODI Oswestry disability index

would have liked. The Kappa coefficient for the level of agreement between patients' decision making preferences and their assessments of what actually happened was 0.33.

Contributors to higher involvement in surgical treatment decisions

From sociodemographic and disease related factors, only desire to get more information about the disease was associated with higher preference for involvement in surgical treatment decisions (15/70 vs 6/80; $\chi^2 = 6.1$; $p = 0.01$). In the bivariate analyses, higher actual involvement in surgical treatment decisions was significantly related to the results of CPS, illustrating the congruence between preferred participation in treatment decision making and actual involvement in STDM ($\chi^2 = 17.4$; $p < 0.001$) (Table 3). The patients, who had not improved during a preoperative course of physical therapy, were more active in the decision making process ($\chi^2 = 8.2$; $p = 0.004$) and the patients, who had demonstrated diminishing pain and radicular signs already before the operation, were also more actively involved in surgical treatment decisions ($\chi^2 = 4.07$; $p = 0.04$). In the multivariate logistic regression analysis, failed preoperative course of physical therapy ($\chi^2 = 6.2$; OR = 1.58; 95 % CI 1.11–2.29; $p = 0.01$), preoperative reduction of pain and radicular signs ($\chi^2 = 4.3$; OR = 1.55; 95 % CI 1.03–2.38; $p = 0.03$) and results of CPS ($\chi^2 = 12.8$; OR = 1.95; 95 % CI 1.36–2.83; $p = 0.0002$) remained to be significantly associated with higher actual involvement of patients in surgical treatment decisions before lumbar discectomy.

Postoperative evaluation

Most of the patients (114 patients, 77 %) were satisfied with the results of the operation (Table 2). The mean preoperative VAS score 42.5 ± 14.7 fell to 11.8 ± 13.9 ($t = 18.5$ $p < 0.0001$). The mean preoperative ODI 52.4 ± 7.9 decreased to 13.8 ± 12.2 ($t = 19.2$ $p < 0.0001$). Most of the patients experienced decrease of pain >50 % according to VAS after surgery (109 patients, 74.1 %). Still, 39 % of patients reported daily lumbar or radicular pain, 70 patients (48 %) continued to use pain medications and 65 patients (44 %) had repeatedly visited doctor's office because of lumbar/radicular pain. GH status was graded as optimal in 62 patients (42 %) and suboptimal in 85 patients (58 %).

Contributors to dissatisfaction with the results of the operations

Global dissatisfaction with the results of the surgical treatment was not associated with involvement of the

Fig. 1 Patients' preferences for involvement and actual involvement in surgical treatment decision making before lumbar discectomy [presented as *N* (%)]

patients in surgical treatment decisions or congruence between preferred participation and actual roles in STDM (Table 4; Fig. 2). Postoperative pain intensity and postoperative ODI were significantly higher in dissatisfied patients (Table 4). Dissatisfaction with the treatment results was significantly related to female gender, suboptimal GH status after the operation, registration of comorbidities, daily occurrence of postoperative lumbar/radicular pain and decrease in pain intensity <50 % after the operation (Table 4). In the multivariate logistic regression analysis, only suboptimal GH status remained significantly associated with dissatisfaction with the results of the operations ($\chi^2 = 17.4$; OR = 3.29; 95 % CI 1.90–6.82; $p < 0.0001$).

Discussion

The present study showed that most of the patients with LDH prefer to be well informed about the disease and almost half of them prefer shared decision-making model or active involvement in treatment decisions. Congruence between preferred participation in the treatment decision making and actual roles in STDM was rather high, however, neither higher involvement nor matching of actual and preferred roles in decision making were associated with satisfaction with the results of lumbar discectomy.

Nearly half of our patients preferred active involvement or collaborative role in treatment decisions before lumbar discectomy. Our study is the first to describe the utilization of CPS in patients with LDH. The scale was developed for use in cancer care, however, to date CPS has proven to be a clinically relevant, easily administered, valid, and reliable measure also outside of the cancer field [17–21]. Chewning et al. [21] found that CPS is one of the most frequently used measures to evaluate preferred roles in health care decision making. Our study showed that the methodology is applicable for evaluation of patients with LDH, but there is no comparative data about patients' preferences for participation in the treatment decision making before lumbar disc surgery. Still, several authors have evaluated utilization of shared decision making models while exploring the effect of decision aids on decision-making process in patients with LDH [22–26]. We found that even if the patients had been confronted with a large amount of information available from many different sources, creating accurate, evidence-based materials in the form of patients' decision aids were still highly valued. The earlier studies have also verified that implementation of a decision aid could significantly improve patients' knowledge about the disease, modify decision-making process, reduce decisional conflict and provoke changes in surgical treatment choices. The process of medical decision making has been evaluated most frequently in patients with cancer and

Table 3 Comparison between the groups with lower and higher actual involvement in surgical treatment decisions before lumbar discectomy (150 patients)

Variable	Lower actual involvement in surgical treatment decisions ($N = 63$)	Higher actual involvement in surgical treatment decisions ($N = 87$)	χ^2	t	p value
Personal variables					
Age	46.2 $\pm$ 13.7	47.5 $\pm$ 12.2		0.61	0.73
Age >60 years	9	15	0.24		0.62
Gender, % female	58.7	54	0.33		0.57
Education >12 years	8	10	0.05		0.82
Married	50	66	0.26		0.6
Working	44	59	0.07		0.79
Disease variables					
Comorbidities	25	32	0.13		0.71
Pain duration (months)	4.5 $\pm$ 7.4	4.7 $\pm$ 5.0		0.15	0.56
Pain duration >60 days	35	61	3.35		0.07
Pain intensity (VAS)	44.6 $\pm$ 14.4	41.0 $\pm$ 14.8		1.49	0.07
Pain intensity (VAS >40)	31	39	0.28		0.59
ODI	51.8 $\pm$ 13.2	53.2 $\pm$ 14.1		0.91	0.26
Radicular deficit	46	64	0.01		0.94
Previous spine operations	13	15	0.28		0.60
Preoperative course of physical therapy	25	55	8.2		0.004
Preoperative reduction of pain and radicular signs	13	31	4.07		0.04
Other factors					
Higher preference for involvement in treatment decisions (Degner scale a,b,c)	17	53	17.4		<0.0001
Sufficiently informed about the disease	53	76	0.31		0.57

VAS visual analog scale, ODI Oswestry disability index

chronic diseases [21]. Chewning et al. described that in three quarters of the cancer studies and invasive procedure studies, the majority of patients preferred shared or autonomous decision making. In contrast, this was true for only about half of the studies with nondisease specific study populations or other chronic conditions and all studies identified a subset of patients, who wanted to delegate decisions [21]. Say et al. [27] showed that patients' preferences for involvement in decision making are highly variable and 30–80 % of patients suffering from cancer or chronic diseases prefer active or collaborative role in treatment decisions. Unfortunately, these numbers cannot be directly as compared to our data because the health problem at issue as well as the nature of the decision also determines whether patients prefer active or passive involvement in treatment decisions.

More than half of our patients were actively involved or reported collaborative involvement in actual STDM and even 66 % of them attained their role preferences before lumbar disc surgery. In a recent review, Hubbard et al. [8] showed that 34–72 % of patients with cancer attained their role preferences for involvement in the treatment decision

making and Tariman et al. [28] found that the majority of the patients wanted more involvement initially than what actually occurred. When compared with patients with cancer, the congruence between preferred and actual involvement in our group was quite high, but most of the discrepancies between preferred and actual involvement in STDM were related to the higher activity in actual decision making than the patients would have preferred by themselves. There are no comparative data in patients with LDH, however, Deyo et al. [22] evaluated the impact on outcomes and surgical choices of an interactive videodisk program for informing patients about treatment choices in a group of 393 elective back surgery candidates and found that 62–70 % of patients reported that they had as much input as they had wanted in the choice of treatment. Still, only part of these patients had LDH and less than half of them had surgical treatment. Selection of the optimal treatment method in cases of radiculopathy due to LDH can be challenging and a small mismatch between patients' preferred and actual roles is probably inevitable even in cases of enhanced patient-centered decision making. We found that the failed course of preoperative physical

Table 4 Comparison between satisfied and dissatisfied patients after lumbar discectomy (147 patients)

Variable	Satisfied (N = 114)	Dissatisfied (N = 33)	χ^2	t	p value
Personal variables					
Age	46.7 ± 12.8	48.5 ± 12.8		0.74	0.23
Age >60 years	15	9	3.39		0.07
Gender, % female	50.9	78.8	8.67		0.003
Education >12 years	13	5	0.32		0.57
Married	87	27	0.46		0.50
Working	78	22	0.04		0.85
Disease variables					
Comorbidities	39	18	4.37		0.04
Pain duration (months)	4.8 ± 6.8	4.2 ± 2.7		0.48	0.68
Pain duration >60 days	72	22	0.14		0.71
Pain intensity (VAS)	42.5 ± 14.1	43.0 ± 16.6		0.20	0.42
Pain intensity (VAS >40)	52	17	0.36		0.55
ODI	52.1 ± 13.1	50.8 ± 14.2		0.72	0.24
Radicular deficit	80	27	1.86		0.17
Previous spine operations	20	8	0.71		0.40
Preoperative reduction of pain and radicular signs	33	10	0.02		0.88
Other factors					
Higher actual involvement in surgical treatment decisions	68	17	0.69		0.41
Discrepancies between preferred and actual involvement in surgical treatment decisions	39	11	0.01		0.93
Sufficiently informed about the disease	97	29	0.17		0.68
Postoperative variables					
Optimal subjective general health status	59	3	22.2		<0.0001
Pain intensity (VAS)	9.1 ± 10.9	21.2 ± 18.4		4.7	<0.0001
Decrease of pain <50 % according to VAS	20	18	16.7		<0.0001
Pain intensity (VAS >10)	37	19	6.69		0.01
ODI	10.1 ± 11.8	24.5 ± 20.1		5.2	<0.0001
Daily postoperative lumbar/radicular pain	39	18	4.37		0.04

VAS visual analog scale, ODI Oswestry disability index

therapy and the results of CPS were significantly associated with higher actual involvement of patients in surgical treatment decisions before lumbar discectomy. The patients, who had demonstrated diminishing pain and radicular signs already before the operation, were also more actively involved in surgical treatment decisions. The finding is rather difficult to explain, but perhaps the surgeons might tend to rely more on the patients decisions in these circumstances. Several other factors that could impact patient's decision making about surgical treatment have been presented earlier and include severity of pain, degree of disability and effect on quality of life, medical information sources, physician opinion of the operation, social impact of others, knowledge and concerns about recovery, cultural, and socioeconomic factors [10].

The majority of our patients were satisfied with the treatment results, but postoperative disease characteristics

and GH status contributed more to dissatisfaction with the treatment results than the level of preoperative involvement or congruence between preferred and actual involvement in surgical treatment decisions. Earlier studies have focused on measures of satisfaction with decision-making process in patients with LDH, leaving the potential impact on the outcome of the decision unknown [22, 24, 26]. Only few earlier studies have demonstrated that participation in decision making can improve satisfaction with the results of the treatment and most of the studies have been performed in primary care patients or in patients with chronic diseases [1, 2, 4, 29, 30]. Today, the process of decision making continues to be investigated most frequently among patients with cancer and several authors have described positive relations between participation in decision making and satisfaction with type of surgery received [7], satisfaction with decision-making process [9],

Fig. 2 Satisfaction with the results of lumbar discectomy in patients with higher and lower actual involvement in surgical treatment decisions

satisfaction with treatment choice [6], satisfaction with consultation, information about treatment and emotional support [31], satisfaction with doctor's shared decision-making skills, cognitive and emotional aspects of shared decision making [32]. Thus, the idea that patient-centered decision making could lead to improved patient satisfaction with the results of the treatment has not been sufficiently explored, however, McCaffery et al. [33] suggested that patient outcomes extending into the long term are of primary importance and take priority over the process measures of decision making as is currently emphasized in the literature. We have used global assessment of satisfaction with the treatment outcome which has been earlier used in patients with LDH [34–36]. However, as global measures can mask specific dissatisfactions, utilization of a multi-item measure should be recommended in the next studies. Furthermore, as patient expectations of care, surgeon–patient interaction and psychosocial factors are known to contribute to patient satisfaction scores, these aspects deserve also further attention.

We can conclude that a significant proportion of patients with LDH prefer to be well informed about the disease, actively involved in treatment decisions and experience an STDM process that matches their preferences for participation. However, global satisfaction with the treatment results is not significantly related to the activity of involvement in decision-making process. Nevertheless, clinicians need to be aware that individual differences in preferences for involvement in treatment decisions are common in patients with LDH and further studies are warranted to explore the influence of the decision-making process and patient-centered care on patient satisfaction and clinical outcome after lumbar disc surgery.

Conflict of interest None.

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