

Private and Non-Private Disc Herniation Patients: Do they Differ?

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Abstract: Objectives: In the 2006 yearly report from the Swedish National Register for Lumbar Spine Surgery it was claimed that international studies show obvious differences between private and non-private patients with regard to results from back surgery. Therefore our aim was to reveal such possible differences by comparing the two categories of patients at a private clinic.

Material and Methods: The material comprises 1184 patients operated on for lumbar disc herniation during the period of 1987 to 2007. Basic pre-operative data were obtained from the medical records and follow-up was performed by a questionnaire around 5 years post-operatively.

Results: Small but statistically significant differences between private and non-private patients were seen pre-operatively regarding the proportions of a/ men and women in the samples, b/ those with physically demanding jobs, c/ those on sick leave and d/ those with lumbar pain. Over the years the admitted private patients had a decreasing mean duration of symptoms which was not seen in the non-private patients. No apparent differences (n.s.) were seen between the two categories of patients pre-operatively regarding age, presence and level of leg pain or the proportion who smoked. Post-operative improvement in leg and lumbar pain was very similar in private and non-private patients as was satisfaction with the results and the proportion of patients returning to work.

Conclusion: Despite small pre-operative differences concerning some variables and a significant difference in symptom duration between private and non-private disc herniation patients, the final clinical results were very similar.

Keywords: Lumbar disc herniation, non-private patients, outcome, private patients, prognostic factors, surgery.

INTRODUCTION

During the last ten years increasing interest has been evident in Sweden regarding comparisons of outcome following treatment at different clinics. A number of medical registers have been created [1] and results from various clinics are being compared on the basis of data obtained from these registers. However, comparisons between different clinics do not reflect only the effectiveness and skill of these clinics, but they are also influenced by the so-called patient mix.

In the discussion of results following back surgery, it has been claimed that the results from private clinics are not directly comparable to those from other clinics because private clinics might have a considerable proportion of private patients who are presumed to have a different and more favorable situation right from the very beginning [2]. In the 2006 yearly report from the Swedish National Register for Lumbar Spine Surgery [2] it was stated that “Most international studies show obvious differences between private patients and non-private patients with regard to the results from back surgery and it can be expected that the circumstances are the same in Sweden.” However, no references were given, nor were any found in a literature

search. The question therefore remains as to whether there really are any noticeable differences between private and non-private patients undergoing back surgery. No answer can be obtained by comparing results between private and non-private clinics. This can be done only by an investigation of the two categories of patients within the individual clinics.

On the basis of data from a considerable number of patients operated on due to lumbar disc herniation (LDH) at the private Clinic of Spine Surgery in Strängnäs (CSS), we investigated such possible differences in detail.

MATERIALS AND METHODS

The material comprises 1184 patients operated on for LDH at the CSS between 1987 and 2007. Basic pre-operative data were obtained from the medical records of the patients. Follow-up was performed by a questionnaire similar to that of the National Swedish Register for Lumbar Spine Surgery [3]. The questionnaire differed slightly for the patients operated on between 1987 and 1996 (period I, 493 patients), between 1997 and 1999 (period II, 208 patients), and between 2000 and 2007 (period III, 483 patients). However, the main questions were the same, i.e. level of persisting leg and/or lumbar pain, return to work, and during periods II and III the patient's statement regarding the result, i.e. whether the patient was satisfied with the results, was in some doubt, or was not satisfied. The patients during period

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III filled in the Swedish National Register for Lumbar Spine Surgery questionnaire pre-operatively as well as post-operatively at 1 and 2 years, including the generic SF-36. Mean follow-up time: period I: private patients 63 months (range 5-117) and non-private patients 77 months (range 30-117); period II: private patients 127 months and non-private patients 126 months (range 111-146 for both); and period III: private patients 81 months (range 27-110) and non-private patients 59 months (range 22-109).

All operations were performed using microsurgical technique [4].

The term “private” in this paper includes patients who paid for their operation themselves, those who had private insurance that paid for the operation, and also those whose operations were paid for by their employer. The term “non-private” refers to patients whose operations were paid for by the county or by universal health insurance. The numbers of patients in each category during the three time periods are seen in Table 1. Since the three time periods comprise a total of two decades, and the questionnaire differed slightly between the different periods, analysis of the data from all three periods as a whole was not a clear option.

Table 1. The number of patients during each period and their manner of payment.

	Period I 1987-1996 n = 493	Period II 1997-1999 n = 208	Period III 2000-2007 n = 483
Private Patients			
Private	232	103	60
Employer	117	46	35
Insurance company	24	25	36
Other	10	3	1
Some sort of insurance	45		
Non-Private Patients			
County	62	31	351
Universal health insurance	3		

Ethics

The study was approved by the Central Ethics Committee, Stockholm, July 18, 2012, no. Ö 24-2012.

Table 2. Ages of the patients.

Age	Mean	S.D.	Sample Size	Age Range	Confidence Interval of Difference
Private (Period I)	42.9	10.0	428	(17-79)	(-1.98, 4.08)
Non-private (Period I)	41.9	11.8	65	(15-68)	
Private (Period II)	42.5	10.6	177	(17-72)	(-4.51, 5.35)
Non-private (Period II)	42.1	13.3	31	(18-63)	
Private (Period III)	44.3	11.4	132	(20-78)	(-1.55, 3.07)
Non-private (Period III)	43.5	12.1	351	(19-84)	

RESULTS

Pre-Operative State

The proportions of private and non-private patients changed markedly during the time period studied, with a very high proportion of private patients during periods I and II, but who then comprised a clear minority during period III (Table 1). This change over time was due to political decisions that made it easier for patients to be treated at private clinics with payment coming from the county.

The categorization of patients as private and non-private is definitely not a random selection. Therefore it can be expected that even statistically significant differences between these two categories can be found regarding potentially important background variables. The question is whether these differences are of such a magnitude that they might distort the subsequent analyses of the final treatment results. In the following we will concentrate on each variable in detail with regard to possible discrepancies between private and non-private patients.

Age: The age of the youngest patient was 15 years and that of the oldest was 84 years, with a mean for all patients of 42.8 years (S.D. = 10.3 years). There were only minor (n.s.) differences in age between private and non-private patients during the three time periods (Table 2).

Gender: The proportion of males was 73% for the private patients and 61% for the non-private patients (95% C.I. 13±7 p.u.), thus a statistically significant difference. The proportion of males decreased somewhat over time and, for the whole material, was 75%, 67% and 61%, respectively, for the three time periods.

Physical work: For all patients physical work was less common among the private patients (16%) than among the non-private patients (27%). The 95% C.I. for the difference was 6 to 16 p.u. Thus the difference was statistically significant. The pattern was similar during the three time periods.

Smoking: Smoking habits seemed to be practically equal among private and non-private patients during periods I and III but different during the middle period (Table 3). It is worth noting, however, that the number of non-private patients was quite small during this period.

Initial attack: The proportions of patients who got their initial attack of disc herniation symptoms “in relation to a special event” like lifting, falling, etc., were roughly equal for private and non-private patients during all three time

Table 3. Proportions of patients with different characteristics among private and non-private patients before surgery.

Variable	Period I n=428 n=65		Period II n=177 n=31		Period III n=132 n=351	
	Private	Non-Private	Private	Non-Private	Private	Non-Private
Physical work	15.2	28.8	17.2	22.7	15.3	24.8
Leg pain	96.3	96.9	94.9	93.8	93.2	94.0
Lumbar pain	83.8	92.2	85.9	64.5	79.4	75.0
Sick leave	73.9	61.0	53.2	47.8	65.8	60.1
Smoking	26	25	19	3	17	16

periods. The differences were not statistically significant (not shown).

Leg pain: Among the private and non-private patients 95% and 94%, respectively, suffered from leg pain pre-operatively. No real differences between the two categories could be demonstrated (n.s.) (Table 3).

Lumbar pain: Although lumbar pain was somewhat more prevalent among the private patients (83%) than among the non-private patients (77%) for all patients (95% C.I. 7±5%) there was no clear pattern over time (Table 3).

Sick leave: There was a somewhat higher proportion of sick leave among the private patients (67%) than among the non-private patients (59%), (95% C.I. 8±6). The same pattern was found during all three periods (Table 3).

Duration of pain: As seen in Table 4, the mean duration of symptoms was shorter for the private patients than for the non-private patients during all three periods, and the difference was highly statistically significant during period III.

Post-Operative State

Leg pain: No noticeable differences were found concerning post-operative improvement in leg pain when comparing private and non-private patients, or when comparing men and women (Table 5). Nor was there any noticeable difference between men and women within the private group, or within the non-private group.

The intensity of leg pain was assessed by the patients during period III before and at 2 years after the operation (VAS, 0-100). The intensity changed from 68 (mean) pre-operatively to 11 post-operatively for the private patients and from 65 to 12 for the non-private patients (not shown). In Fig. (1) the VAS results for private and non-private patients during period III are presented graphically by means of cumulative frequencies before surgery and at follow-up. It is obvious that the distributions of values before surgery are almost identical for the two groups of patients and the same also holds true for the values at follow-up. However, there is a dramatic difference between the VAS distributions before and after the operation.

Table 4. Symptom duration in months.

Duration	Mean	S.D.	Sample Size	Range	Duration ≥48
Private (Period I)	8.9	12.8	428	(0.25, 120)	10
Private (Period II)	7.8	8.5	177	(0.25, 50)	3
Private (Period III)	6.3	6.5	132	(0.5, 60)	1
Non-private (Period I)	10.1	11.0	65	(0.25, 48)	2
Non-private (Period II)	10.9	14.8	31	(1,84)	1
Non-private (Period III)	10.0	16.1	351	(0.25, 186)	10

Table 5. Patient assessments (proportions) regarding post-operative leg pain.

Patients' Assessments	Women		Men	
	Private	Non-Private	Private	Non-Private
	n=189	n=160	n=511	n=246
Completely pain-free	64	58	71	62
Much better	27	26	24	31
Somewhat better	5	12	3	4
Unchanged	2	2	1	3
Worse	2	2	1	0

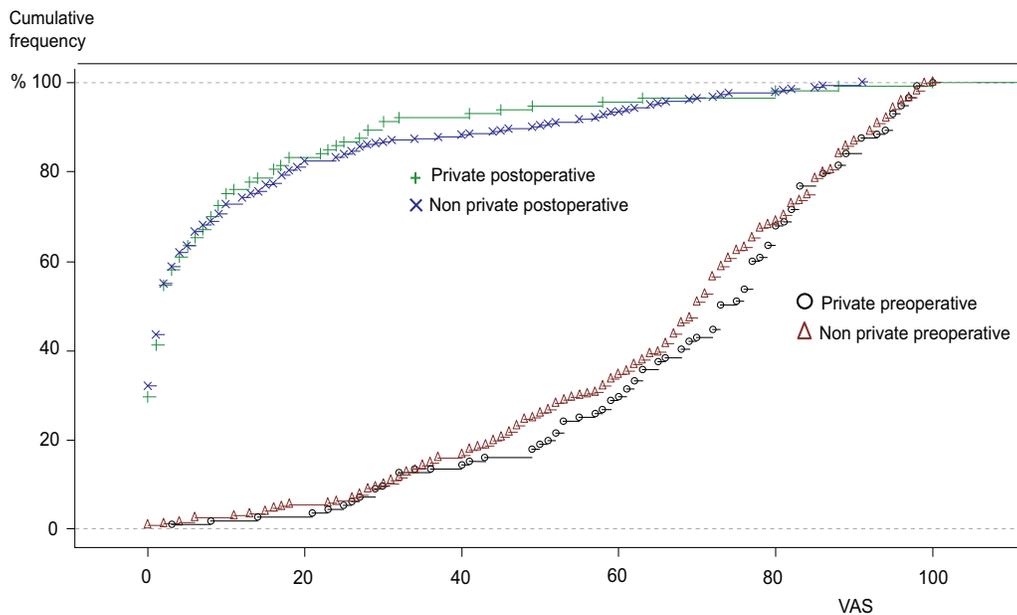


Fig. (1). Cumulative frequency of VAS values for leg pain as assessed by private and non-private disc herniation patients before surgery and at follow-up (period III).

Lumbar pain: There were very minor differences concerning improvement in lumbar pain between private and non-private patients during all three periods (n.s., not shown).

The intensity of lumbar pain was assessed by the patients during period III before and at 2 years after the operation (VAS, 0-100). It changed from 36 (mean) pre-operatively to 12 post-operatively for the private patients and from 40 to 15, respectively, for the non-private patients.

Satisfaction with the results: During period II the level of satisfaction (satisfied, in some doubt or not satisfied) seemed to be somewhat higher for private patients (90.4%, 5.6%, 3.4%) than for non-private patients (84.4%, 15.5%, 0%) but during period III there was almost no difference at all between the two categories.

Back to work: During period I, 403 of the private patients were employed and 385 (95.5%) went back to work. Of the non-private patients 89.8% returned to work. During period II the figures for private and non-private patients were 96.8% and 91.3%, respectively. However, there were very few non-private patients during this period (Table 1). During period III the figures were 94.7% and 93.5%, respectively.

Reoperation: The frequencies (percentages) of reoperations due to recurrence during the first 12 post-operative months were 3.9, 6.2 and 3.9 for the private patients during periods I, II and III, respectively, compared to 7.7, 0.0 and 6.3 for the non-private patients, respectively, with no statistically significant differences between the two categories of patients.

DISCUSSION

We could not demonstrate any substantial differences between private and non-private patients concerning the mean age of patients with a lumbar disc herniation, which range from 40-44 years, and this is in accord with previous reports from general Scandinavian hospitals [5-8] as well as

international reports [9]. There was, however, a difference between private and non-private patients regarding the proportion of men, generally reported to be around 56-60% [2, 8,10,11]. During period I the proportion of men was over 70%, but this was the case for both private and non-private patients, and this figure has also been reported in a previous, larger Swedish material [5].

Results from the Swedish National Spine Register have shown better outcomes following operation for lumbar disc herniation in private hospitals as a group than in general hospitals [12]. This observation has been analyzed in several of the yearly reports from the Register, and factors reported to be of possible importance regarding this difference are fewer smokers among private patients, a shorter duration of pre-operative pain, and a higher proportion of men [2, 11, 12]. Since the outcome following disc herniation surgery has been reported to be better in men than in women [2], the proportion of men and women in the samples would affect the results. There was, however, no obvious difference in outcome in our material when analyzing the results concerning improvement in leg pain separately for men and for women (Table 5), as also reported by Kotilainen *et al.* [10].

Concerning smoking, Strömqvist *et al.* [12] reported smokers to be more frequent among non-private patients. In contrast, we found the proportion of smokers to be nearly equal for private and non-private patients during periods I and III, and during period II, smokers were in fact more frequent among the private patients (Table 3), although it should be kept in mind that there were few non-private patients during this period.

In the 2008 report from the Swedish National Spine Register [12] the outcome at 2 years after operation for lumbar disc herniation in 771 patients was presented. The mean VAS value (0-100) for lumbar pain pre-operatively was 46, and at 2 years following operation it was 23. The respective values for leg pain were 66 and 21. The VAS values are simply an order of assessment by the patients, as they are sequences on an ordinal

scale. The values are therefore not arithmetic and mean values should not be calculated, even if this is done habitually. Following this questionable tradition, our results are in agreement with the observation made in the Register, with a somewhat better outcome in our private clinic than reported in the Register. The post-operative value for leg pain (mean) in the Register was 21 and in our material it was very similar for private (11) and non-private (12) patients.

It would be logical for a long duration of pain before surgery, especially leg pain which is due to nerve root compression, to result in an inferior result compared to situations with short pain duration, and this has been reported by the Swedish National Register Group [2, 11,12] as well as by others [6, 13]. As seen in Table 4, the mean duration of pain decreased markedly over the years for private patients (periods II and III) but not at all for non-private patients, probably reflecting the situation of queues and waiting lists for operation in the Swedish healthcare system. Despite this marked difference in pain duration before operation, we found no differences between private and non-private patients regarding outcome, measured as improvement in leg pain (Table 5, Fig. 1), satisfaction with the results and return to work. It should, however, be pointed out that the mean duration of pain for private patients during period III, around 6 months, is also a long duration of pain, and a markedly shorter duration might result in even better clinical outcomes.

A statistically significant difference between private and non-private patients was seen in the proportion of patients who were on sick leave before the operation, which was somewhat higher for private than non-private patients during all three periods. This seems surprising given the assumption that private patients were thought to have non-physical jobs and a good financial situation. This difference, however, did not seem to affect the clinical results.

CONCLUSION

A statistically significant difference between private and non-private disc herniation patients was found pre-operatively concerning a/ the proportion of males and females in the samples, b/ the duration of symptoms (periods II and III), c/ the proportion of patients with physically demanding work, d/ the presence and level of lumbar pain, and e/ the proportion of patients on sick leave. This, however, did not seem to affect the clinical results.

Only minor differences (statistically n.s.) were found between private and non-private disc herniation patients pre-operatively concerning a/ the age of the patients, b/ the presence and level of leg pain, and c/ the proportion of smokers in the samples.

No statistically significant differences between private and non-private patients could be demonstrated post-operatively concerning a/ improvement in leg pain, b/ improvement in lumbar pain, c/ the level of satisfaction with the results, d/ the frequency of reoperations during the first year, or e/ the proportion of patients returning to work.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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Declared none.

REFERENCES

- [1] National Healthcare Quality Registries in Sweden, 2007. www.kvalitetsregister.se
- [2] Strömquist B, Fritzell P, Hägg O, Jönsson B. Uppföljning av ländryggskirurgi i Sverige. Rapport år 2006. (Yearly report from the Swedish national register for lumbar spine surgery, 2006).
- [3] Strömquist B, Jönsson B, Fritzell P, Hägg O, Larsson B-E, Lind B. The Swedish national register for lumbar spine surgery. *Acta Orthop Scand* 2001; 72: 99-106.
- [4] Caspar W. A new surgical procedure for lumbar disc herniation causing less tissue damage through a microsurgical approach. *Adv Neurosurg* 1977; 4: 74-7.
- [5] Spangfort EV. The lumbar disc herniation. *Acta Orthop Scand Suppl* 1972; 142: 1-95.
- [6] Nygaard ÖP, Romner B, Trumpy JH. Duration of symptoms as a predictor of outcome after lumbar disc surgery. *Acta Neurochir* 1994; 128: 53-6.
- [7] Graver V, Haaland AK, Magnaes B, Loeb M. Seven-year clinical follow-up after lumbar disc surgery: results and predictors of outcome. *Brit J Neurosurg* 1999; 13: 178-84.
- [8] Strömquist F, Ahmad M, Hildingsson C, Jönsson B, Strömquist B. Gender differences in lumbar disc herniation surgery. *Acta Orthop* 2008; 79: 643-49.
- [9] Weinstein JN, Tosteson TD, Lurie JD, *et al.* Surgical vs nonoperative treatment for lumbar disk herniation. The Spine Patient Outcome Research Trial (SPORT): A randomized trial. *JAMA* 2006; 296: 2441-2450.
- [10] Kotilainen E, Valtonen S, Carlson C-Å. Microsurgical treatment of lumbar disc herniation: Follow-up of 237 patients. *Acta Neurochir* 1993; 120: 143-49.
- [11] Strömquist B, Fritzell P, Hägg O, Jönsson B. Uppföljning av ländryggskirurgi i Sverige. Rapport år 2010. (Yearly report from the Swedish national register for lumbar spine surgery, 2010).
- [12] Strömquist B, Fritzell P, Hägg O, Jönsson B. Uppföljning av ländryggskirurgi i Sverige. Rapport år 2008. (The national Swedish register for lumbar spine surgery. Report 2008. www.4s.nu/pdf)
- [13] Nygaard ÖP, Kloster R, Solberg T. Duration of leg pain as a predictor of outcome after surgery for lumbar disc herniation: a prospective cohort study with 1-year follow up. *J Neurosurg (Spine)* 2000; 92: 131-34.