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Surgical results in patients with chronic low back pain who failed multidisciplinary rehabilitation with cognitive intervention.

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ABSTRACT

Introduction:

Surgery for chronic low back pain (CLBP) is a controversial topic. One randomized controlled trial (RCT) showed superiority of surgery to physiotherapy only, whereas two more RCTs failed to show that surgery was better than multidisciplinary rehabilitation including cognitive intervention. The latter is therefore regarded as the golden standard of conservative treatment and in our unit it is whenever possible offered to patients prior to lumbar surgery for CLBP.

The objective of this study was to compare results of lumbar surgery between one group of patients who failed to improve despite such rehabilitation and a second group of patients who underwent surgery following usual conservative therapies. Our hypothesis is that patients who failed such a comprehensive treatment would respond poorly to surgery.

Patients and Methods:

43 patients (age 41.2 ± 8.1 years, number of men 20) were operated between 2003 and 2009 by a single surgeon for CLBP due to degenerative disc disease (36) or isthmic spondylolisthesis (7). Patients with sciatica or neurological abnormalities were excluded.

Seventeen (40%) patients were operated having failed to improve following the aforementioned rehabilitation programme (Surgery following rehabilitation group) whereas the remaining 26 (60%) were operated having failed to improve with physiotherapy of varying intensity (Surgery following physiotherapy group). Oswestry disability index (ODI) pre operatively and at 2 years following surgery was prospectively evaluated. Fisher's exact test was used to compare groups.

Results:

At two years following surgery, with an average follow up of 22 month, a 15 points ODI improvement was achieved for 9 (53%) patients of the surgery following rehabilitation group and in 15 (58%) patients of the surgery following physiotherapy group ($p=1.0$). A 50% ODI improvement was observed for 6 (35%) and 12 (46%) patients respectively ($p=0.54$).

Discussion:

The main finding of this study was that surgery following failed multidisciplinary rehabilitation yields similar results to those of patients who only received usual physiotherapy treatment for CLBP prior to surgery. But surprisingly we found that it is possible with surgery to improve the quality of life of those CLBP sufferers who failed to respond to a comprehensive rehabilitation program and with a similar success rate to those reported in other series.

But rehabilitation should still be offered as a treatment option in all CLBP patients prior to surgery, given that it is devoid of complications and that it will spare the need of surgery to a significant proportion of CLBP patients while not compromising surgical results in the remaining subjects who failed to improve.

INTRODUCTION

Low back pain is one of the most important health problems in the general population. The lifetime prevalence is close to 60-70% and approximately 10% of low back pain will progress to a chronic situation with pain that will last more than 3 months. This pathology has negative impacts on quality of life, increasing work absenteeism and resulting in important social, economical and therapeutic costs.¹⁻⁶

There is no standard treatment available to treat chronic low back pain (CLBP) and in the literature the use of surgery is contradictory. A Swedish randomized controlled trial (RCT) showed that surgical treatment had better outcomes than physiotherapy alone,⁷ whereas English and Norwegian RCTs showed similar results between surgery and multidisciplinary treatment with cognitive intervention.^{8 9} Even so, an American study assessed that CLBP have increased rapidly the number of spinal fusion in the United States during the last 20 years.¹⁰

But to our knowledge, no previous RCT analyzed the results of surgery for CLBP patients who failed all conservative treatments, and this was the aim of our study.

Recent RCTs assessed that surgery is not the first option to consider in this pathology, and that a multidisciplinary treatment remains the best alternative to improve the quality of life for these patients.^{8 9 11-13} So, in our unit, surgery is considered as the last step in taking care of patient with CLBP. They are primarily oriented towards the rehabilitation unit of the spine (RUS), which offers a multidisciplinary approach that includes: cardiovascular rehabilitation, muscle strengthening, ergonomics measures and a cognitive-behavioural approach.^{13 14}

In this study we did not compare two different treatments like the studies mentioned above. We tried to analyse how will respond to a surgical treatment those CLBP patients who failed multidisciplinary rehabilitation, with the hypothesis that patients with negative results after such comprehensive treatment would respond poorly to surgery.

METHODOLOGY

Study design:

This is a retrospective study conducted between August 2010 and November 2011, elaborated within the Orthopaedic's Department of the Centre Hospitalier Universitaire Vaudois (CHUV), where all patients included in the study were operated by a single surgeon. All data were collected in the patients' electronic or paper files.

Patients and interventions

We selected all persons aged from 18 to 60 years old, with CLBP of degenerative origin, who underwent 1 or 2 level lumbar surgery between 2003 and 2009 at the Orthopaedic's Department of the CHUV. We divided them in two groups depending on the treatment before surgery: patients who have participated to an intensive multidisciplinary support with RUS (surgery following rehabilitation group) or patients who have been treated by conservative treatment with simple physiotherapy of varying intensity (surgery following physiotherapy group). We excluded people with neurological compression, spinal stenosis, tumour, or infection. The excluded cases, as referred leg pain, could improve too much the results of this study, because these patients would have a greater improvement than those with CLBP only.¹⁵

Table 1 Baseline characteristics of the patients*

Outcome	Surgery following rehabilitation group (n=17)	Surgery following physiotherapy group (n=26)
Age when operated (years)	37.6±6.8	43.6±8.0
Gender, No of men (%)	7 (41)	13 (50)
Oswestry disability index	55.2±10.2	48.4±12.3
Pain VAS**	7.0±1.3	7.2±1.9
Work status preoperatively - no (%)		
Working 100%	2 (12)	7 (27)
Working 50%	1 (6)	3 (12)
On sick leave	7 (41)	8 (30)
Homemaker, unemployed	1 (6)	3 (12)
Disability pension	1 (6)	0 (0)
No information	5 (29)	5 (19)

* Mean values ± SD otherwise noted

** VAS = visual analogue scale

Data collection:

For each patient, we collected the following information: demographic data (gender, date of birth), work status, treatment before surgery, Oswestry Disability Index (ODI) and pain Visual Analogue Scale (VAS) preoperatively and until two years postoperatively (at 3 weeks, 3 months, 6 months, 1 year and 2 years), and surgical complications.

The ODI is a quality of life and function score of 10 questions quantifying pain and disability on a scale from 0 (no pain or disability) to 100 (maximum pain and disability).¹⁶ The pain VAS is a line of 10cm, which allows the patient to assess his pain, with the lowest value on the left corresponding to no pain (0) and the highest on the right corresponding to the worst pain of his life (10).¹⁷

Outcome measures:

Our goal was to evaluate the utility of surgery for CLBP patients who failed a multidisciplinary rehabilitation program. The criterion of success was a minimum clinically important difference (MCID) for the ODI of 15 points in the medium term, which means until 2 years postoperatively. We used the surgery following physiotherapy group as comparative group.

The MCID describes the smallest change in scores for which patients feel a beneficial effect from treatment.^{18 19} The MCID for the ODI varies between 4 and 20 points in the littérature.²⁰⁻³⁰ One study concluded that an improvement of the ODI is clinically significant when the score decreased of 30% after treatment and another one when the score varies from 50%.^{31 32} So a MCID of 50% was evaluated too.

Secondary parameters were pain VAS and work status which gave us a qualitative improvement of the quality of life for these patients. Fisher's exact test was used to compare groups.

RESULTS

Patients

A total of 43 patients were included in the study: 17 (40%) in the surgery following rehabilitation group and 26 (60%) in the surgery following physiotherapy group. Table 1 shows the baseline characteristics of each group, which were similar to preoperative values in the corresponding literature. The average follow-up was 22 months postoperatively.

Surgical protocols and complications:

We did not consider difference in respect of surgical protocols as they depend on the clinical history of each patient, and because the majority performed a spinal fusion ALIF (anterior lumbar interbody fusion) or PLIF (posterolateral lumbar interbody fusion). Here is the list of the different surgical protocols performed: 34 (79%) patients with spinal fusion (including 14 ALIF and 20 PLIF), 5 (12%) total disc arthroplasty, and 4 (9%) hybrids (spinal fusion ALIF with total disc arthroplasty).

There were 5 (12%) patients who developed complications from surgery: 2 (12%) from the surgery following rehabilitation group and 3 (12%) from the surgery following physiotherapy group. 3 made hematomas, one made a pulmonary embolus and one made a nerve root irritation requiring hardware removal. The other 38 (88%) patients made uneventful recoveries.

Table 2 Outcome of the 2 groups*

Outcome	Surgery following rehabilitation group (n=17)	Surgery following physiotherapy group (n=26)
Oswestry disability index		
Baseline (preoperatively)	55.2±10.2	48.4±12.3
6 Weeks	46.4±19.2	41.1±17.9
3 Months	39.3±17.8	35.5±17.8
6 Months	36.1±20.4	26.5±15.6
1 Year	34.4±22.6	23.2±15.0
2 Years	34.0±21.5	29.7±20.8
Success of surgery at 2 years follow up – no (%)		
≥15 points ODI improvement	9 (53)	15 (58)
≥50% ODI improvement	6 (35)	12 (46)
Pain VAS**		
Baseline (preoperatively)	7.0±1.3	7.2±1.9
6 Weeks	4.4±2.3	4.1±2.2
3 Months	4.6±2.5	3.3±1.8
6 Months	4.7±2.7	3.4±2.2
1 Year	4.5±3.0	3.4±2.5
2 Years	4.4±2.8	3.8±2.7
Work status at 1 year postoperatively – no (%)		
Working 100%	6 (35)	11 (42)
Working 50%	3 (18)	4 (15)
Sick leave	3 (18)	4 (15)
Homemaker, unemployed	2 (12)	2 (8)
Disability pension	1 (6)	2 (8)
No information	2 (12)	3 (12)

* Mean value ± SD otherwise noted

** VAS=visual analogue scale

Main treatment effect:

We found that 9 (53%) patients of the surgery following rehabilitation group and 15 (58%) patients of the surgery following physiotherapy group achieved at least a 15 points ODI improvement at two years postoperatively with an average of 38.8 points and 33 points respectively ($p=1.0$). An ODI improvement of 50% was observed for 6 (35%) patients and 12 (46%) patients respectively ($p=0.54$).

The VAS of patients who achieved at least a 15 points ODI improvement decreased with an average of 4.3 points (from 7.1 to 2.8) in the surgery following rehabilitation group and 5 points (from 7.6 to 2.6) in the surgery following physiotherapy group (table 2 and 3). All differences between the 2 groups were not statistically significant.

Table 3 Outcome of the 2 groups according to the success or not of surgery*

Outcome	Surgery following rehabilitation group (n=17)		Surgery following rehabilitation group (n=26)	
	≥15 points ODI improvement (n=9)	<15 points ODI improvement (n=8)	≥15 points ODI improvement (n=15)	<15 points ODI improvement (n=11)
Oswestry disability index				
Baseline	57.6±11.7	52.5±7.4	50.7±12.0	44.8±11.9
6 Weeks	34.2±16.6	60.0±11.0	36.0±17.7	48.3±15.4
3 Months	27.0±12.8	55.7±6.9	30.5±16.1	46.1±16.4
6 Months	21.0±15.8	51.3±11.2	22.0±15.0	33.9±11.5
1 Year	20.0±18.2	52.3±11.6	16.1±12.7	33.8±11.6
2 Years	18.8±15.0	55.2±4.8	17.8±16.4	44.0±15.6
Pain VAS**				
Baseline	7.1±1.5	6.9±0.9	7.6±1.8	6.6±1.7
6 Weeks	3.0±2.4	5.9±0.8	3.1±2.0	5.3±1.9
3 Months	2.9±2.0	6.8±1.1	2.6±1.4	4.6±1.8
6 Months	3.2±2.0	6.2±0.9	3.0±2.3	4.1±1.8
1 Year	2.8±2.7	6.6±1.7	2.3±2.0	5.0±2.3
2 Years	2.8±2.5	6.7±1.2	2.6±2.4	5.1±2.2

* Mean value ± SD

** VAS = visual analogue scale

Work status:

At 1 year follow-up there were 9 (53%) patients in the surgery following rehabilitation group and 15 (58%) in the surgery following physiotherapy group working at 100% or 50%. Respectively there were 1 (6%) and 2 (8%) patients with a disability pension (table 2). These results were not significantly different.

DISCUSSION

The main finding of this study was that the differences between the surgery following rehabilitation group and the surgery following physiotherapy group were not statistically significant at improving the ODI, the VAS and the return to work after surgery (table 2 and 3). But the success rate of surgery at two years postoperatively was unexpected for CLBP patients who failed a comprehensive rehabilitation. In addition, most patients were working after 1 year follow-up and only 3 patients had a disability pension.

Comparison with the literature:

To our knowledge, this is the first study who tried to analyze surgical results for CLBP patients who failed all comprehensive treatments, even though recent RCTs compared the results between surgery and non invasive treatment.⁷⁻⁹ Given that intensive rehabilitation was found in those RCTs to yield equivalent results to surgery

some authors have rightly postulated that it might be inappropriate to offer surgery unless all properly conducted therapies have been exhausted. We hypothesized that patients who failed such a comprehensive treatment would respond poorly to surgery but surprisingly we found this not to be the case. It is therefore possible to improve the quality of life of those CLBP sufferers who failed to respond to a comprehensive rehabilitation program and with a similar success rate to those reported in other series.^{7-9 33}

The complication rate for spine surgery and the number of re-operation are similar to previous study.⁸ They are undesirable outcome and reasons why surgical treatment should be reserved as the last option for CLBP patients.

In comparison with the Norwegian RCT,⁹ we had more patients who returned to work after 1 year follow-up and fewer patients who received a disability pension. This last outcome was surprising, we thought that more patients would depend on it. One possible explanation is the difficulty in Switzerland to be accepted for a disability pension with pathology without organic components.

A MCID of 50% has been proposed by an American study like a valid threshold to define a successful outcome for patients with low back pain.³² Their results were that 45% of patients reached a 50% ODI improvement with a high sensitivity (84%) and specificity (88%). In our study, we found similar result with 18 (42%) patients that improved their ODI of 50% after surgery. In further studies a 50% MCID of the ODI should be used to evaluate the success of surgical treatment for CLBP patients.

Patients of the surgery following physiotherapy group started to increase their ODI already between 1 and 2 years of follow-up and this was not the case for the surgery following rehabilitation group (Table 2). It was possibly an effect of the rehabilitation program previous to surgery that helped patients to have better and longer control on their pain and disability. In addition, a French RCT showed that CLBP patients with previous spine surgery improved more the results of a rehabilitation program than those who didn't have it.³⁴ It would be interesting to evaluate if a second rehabilitation program following CLBP surgery could help more patients and for longer time.

Limitations of the study:

The main limitation, common to retrospective studies, was the incompleteness of data, especially for working status and disability pension. This didn't allow us to analyze properly those two important outcomes and gave us an average follow-up of only 22 months for the ODI and pain VAS.

Two other limitations were the lack of functional measures to make a comprehensive comparison with the relevant RCTs and the small number of patients. For this last

reason it will be interesting to conduct a second study including patients from other Orthopaedic's Department with similar multidisciplinary rehabilitation program.

Conclusion:

Even though surgical success rates are similar in both rehabilitation and physiotherapy resistant groups, rehabilitation should still be offered as a treatment option in all patients with CLBP prior to surgery, given that it is devoid of complications unlike an invasive treatment.

More importantly such a rehabilitation program will spare the need of surgery to a significant proportion of CLBP patients while not compromising surgical results in the remaining subjects who failed to improve.

Key words: Chronic low back pain, surgery, Oswestry disability index

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