



HEALTH-RELATED QUALITY OF LIFE IN PATIENTS BEFORE AND AFTER SURGERY FOR A HERNIATED LUMBAR DISC DURING THE ERA OF COVID 19 PANDEMIC

General Surgery

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ABSTRACT

A herniated lumbar disc occurs when the nucleus pulposus or annulus fibrosis of the disc protrudes beyond the intervertebral disc space. The patient frequently complains of lower back pain, and radiological evaluation confirms the diagnosis. The most frequent spinal operation is lumbar disc herniation surgery. The study aims to compare patients' health-related quality of life before and after surgery for a herniated lumbar disc during the timeframe of the COVID 19 epidemic. Patients who had elective lumbar discectomy at SRN hospital in Prayagraj between September 2020 and September 2021 were selected for this cross-sectional research. Euroqol (EQ-5D) and VAS scores were used to measure health-related quality of life. Scores were taken before surgery and again after 6 months of follow-up. An analysis of variance (ANOVA) was used to undertake a multivariate analysis of the pre-operative ratings. Similarly, 6 months following surgery, an analysis was performed, and a comparison was made. The major risk factor in patients who did not improve or who had a lower quality of life was smoking. The findings of our study can be used as part of a patient's pre-operative agreement to raise awareness and cooperation, as well as to aid rehabilitation during Pandemic times.

KEYWORDS

Herniated lumbar disc, COVID-19, surgery, Euroqol and Health-related quality of life.

INTRODUCTION

COVID-19 is characterized by strong infectivity, rapid spread, and general susceptibility, which brought a great challenge to spine surgery. Optimizing the diagnosis and treatment for spinal diseases under the condition of blocking the pandemic transmission is a problem that spine surgeons need to solve. [1]

During the COVID-19 pandemic, the condition of patients in spinal outpatient and emergency departments is more critical and serious than usual, which mainly includes spinal fracture, lumbar disc herniation, and spine surgery complications. Meanwhile, the proportion of patients with anxiety increased, manifested by excessive worry about their illness and fear of possible infection during hospital visits. [2]

A disc herniation was first described by Mixter and Barr [3] as a rupture of the annulus fibrosus with leakage of the nucleus pulposus into the intervertebral space. Today, herniation is categorized as a protrusion without perforation of the posterior longitudinal ligament (contained), an extrusion with perforation of the posterior longitudinal ligament (complete/non-contained) or extrusion with free disc material within the spinal canal (sequestered/non-contained). This phenomenon usually occurs dorsally or dorsolaterally in the back, between the fourth and fifth lumbar vertebrae, or between the fifth vertebra and the sacrum. Herniation can cause compression and deformation of adjacent nerve structures and result in sciatic and/or back pain. [4]

The lifetime prevalence of disc herniation is 1-2% [5]. Men are more often affected than women (1.5-1.0). According to MRI analysis, the occurrence of disc herniation among symptom-free individuals is 20-30% (volunteers, aged 20-80 years).

In comparison, the corresponding proportion is 76% in symptomatic individuals matched for age, sex and work-related factors. The only highly significant difference between individuals with and without symptoms was shown to be the extent of nerve root compression [6].

Symptoms of a disc herniation may be induced by mechanical compression of the nerve root/s, but the pathogenesis also involves inflammatory and immunological components.

In general, functions related to medical variables (e.g. pain duration, previous spine operations) are best predicted by pain and symptom-specific impairment, whereas disability, general well-being, and return to work are better predicted by psychosocial variables. Positively associated with a favourable outcome of disc surgery are factors such as sciatic pain duration of less than one year, a short period of preoperative sick leave, disc herniation not being caused by an occupational injury, and high socioeconomic status and minimal psychosocial stress. [7]

Surgery for herniation of a lumbar disc is the most common spinal operation; the mean annual operation rate in India was 24 operations per 100 000 inhabitants during the past decade. Health-related quality of life (HRQOL) refers to those dimensions of life which may be affected by a disease and its treatment. Several generic and disease-specific instruments are available to measure HRQOL. Generic tools, one of which is the Euroqol (EQ-5D), have several advantages. They are tested and validated in different populations, diseases, settings and languages which enable comparisons of HRQOL. No studies have reported the quality of life according to the EQ-5D in patients who have undergone treatment for herniation of a lumbar disc. [8] The most performed surgeries done for herniated lumbar discs done in our setup are Microdiscectomy and microdiscectomy. This paper summarized the recent experiences in herniated lumbar disc surgery and provided recommendations on how to carry out the standardized diagnosis and treatment for spinal diseases during and after the COVID-19 pandemic.

MATERIALS AND METHODS

Study Design - Cross-sectional study.

Study Area Population - This study was conducted on patients visiting the Neurosurgery OPD of SRN hospital, Prayagraj

Study Place: MLN Medical college and SRN Hospital.

Sampling Methods - Convenient Sampling

Sample Size Calculation

Calculated using the formula, $N = 4PQ/LXL$.

The minimum sample size thus obtained was 23.

Study Period - September 2020 – September 2021

Inclusion Criteria:

The research covered all volunteers who were willing to participate and were between the ages of 20 and 65 years.

Exclusion Criteria:

Participants who were younger than 20 years old or older than 65 years old. Participants who had lower back pain from a source other than a ruptured lumbar disc. Patients who refused to take part in the research. Patients who are unwilling to cooperate.

Study Place: Prayagraj, Uttar Pradesh, India.

METHODOLOGY

Our analysis comprised patients who underwent the main procedure for lumbar disc herniation between September 2020 and September 2021. Euroqol (EQ-5D) and VAS scores were used to measure health-related quality of life. They were evaluated and validated in a variety of demographics, illness conditions, and languages, allowing for HRQOL comparison. Mobility, self-care, typical activities, pain or discomfort, and anxiety or depression are the five aspects of the EQ-5D. Scores were taken before surgery and again after 6 months of follow-up.

Statistical Analysis:

Age, gender, smoking status, type of surgery, duration of leg and back pain, the severity of leg pain (measured by visual analogue scale), and preoperative walking distance were included as factors in a multivariate analysis of the pre-operative scores using an analysis of variance (ANOVA). Similarly, 6 months following surgery, an analysis was carried out, and relationships were discovered. The correlation was determined by paired t-test and intervariable calculations were determined by ANOVA analysis.

RESULTS

About 23 patients had undergone a primary operation for herniation of

a lumbar disc between September 2020 to September 2021. Among the 23 patients, 4 were excluded because of inconvenience in 6 months follow up periods. Two of the four patients stayed for another three months, while the other two dropped out after the first month. In several dimensions, we estimated the observed and predicted proportion of patients reporting moderate or severe difficulties. Different age and gender distributions were used to calculate the relative differences pre-and post-operatively.

Socio-demographic Profiles

There were 19 patients in the trial, 58 per cent of whom were men and 42 per cent of whom were women. Gender discrepancies in this study were not significant. In our study, males outnumbered females by a 3:2 ratio. The patients in this study were mostly between the ages of 20 and 60. The average mean value was in the range of 46.4. Out of 19 patients, 5 were smokers. Out of 19 patients, 7 had leg pain for less than 6 months. 12 patients had leg pain for more than 6 months. Out of 19 patients, 10 had back pain for less than 6 months. And 9 patients had back pain for more than 6 months. Patients were tested for their capacity to walk 1km before surgery. Out of 19 patients, 8 were able to walk less than 1 kilometre and 11 were able to walk more than 1 kilometre.

Baseline Characteristics:

Baseline characteristics were presented in Table 1. Two of 19 patients 20-30 years of age (11%) and 2 of 19 patients older than 45 years of age (11%) have participated in the follow-up. ($P < .001$). Table 1 shows a detailed analysis of the EQ5D and VAS comparing the pre and post-test of participants after the application of the surgical protocol. This statistical analysis made with the quantitative data revealed a statistically significant difference between the pre-op group and post-op group and also within the group.

The post-test means value of the visual analogue scale in the post-op group was 3.42 and the preop group was 8.34. The post mean value of EQ5D in the post-op group was 0.72 and in the preop group was 0.34. Statistical analysis in t-test shows post-test for visual analogue scale and EQ5D revealed that there was a high statistically significant difference seen between pre-op group and post-op group. [Figure: 1]

Table: 1 Correlation Between Different Base Line Parameters Of Preliminary Operation Witheq5d And Vas Results

Variables	Number Of Patient	EQ5D score Preoperative Mean (SD)	6 months postoperative Mean (SD)	P value	VAS score Preoperative (mean)	6 months postoperative (mean)	P-value
Gender							
Women	8	0.335 (0.091)	0.733 (0.049)	<0.0001	8.5	4.3	<0.0001
Men	11	0.36 (0.0738)	0.74 (0.037)	<0.0001	9.4	3.9	<0.0001
Age							
20-30	2	0.27 (0.038)	0.72 (0.040)	<0.0001	8.78	3.2	<0.0002
30-40	8	0.26 (0.036)	0.75 (0.014)	<0.0001	8.9	2.5	<0.0001
40-50	7	0.29 (0.050)	0.70 (0.061)	<0.0001	9.1	3.33	<0.0001
50-60	2	0.33 (0.028)	0.65 (0.022)	<0.0001	9.54	4.5	<0.0002
Smokers	5	0.33 (0.028)	0.60 (0.022)	0.72	9.24	5.45	0.56
Non-smokers	6	0.32 (0.05)	0.74 (0.062)	<0.0001	8.52	3.23	<0.0002
Leg pain							
<6months	7	0.24 (0.051)	0.73 (0.083)	<0.0001	9.4	3.34	<0.0001
>6months	12	0.31 (0.073)	0.65 (0.063)	0.521	8.6	5.45	0.33
Back pain							
<6months	10	0.22 (0.048)	0.70 (0.062)	<0.0001	8.9	3.35	0.0002
>6months	9	0.34 (0.029)	0.75 (0.013)	<0.0001	7.98	4.45	0.0045
Preoperative walking distance							
<1km	8	0.266 (0.061)	0.66 (0.049)	<0.0234	8.76	4.34	0.0002
>1km	11	0.48 (0.051)	0.73 (0.052)	<0.0001	7.87	2.65	0.0001

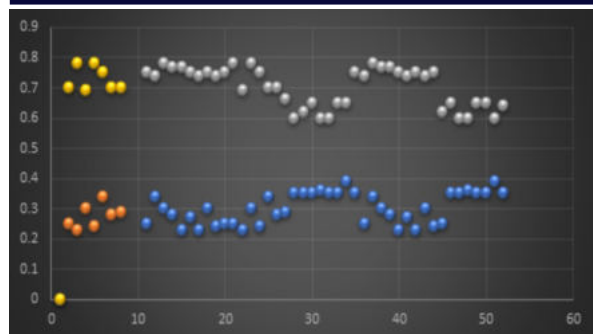


Figure: 1 Variable Distribution

Inter Variable Calculation –ANOVA Analysis

Table 2 shows a multivariate analysis of the postoperative scores by an analysis variance (ANOVA) with age, gender, smoking status, duration of leg and back pain and distance covered <1km and >km.

Except for the sex ratio, the mean value for the sociodemographic characteristics was declared statistically significant [Table: 2]. Even though the sex distribution and leg pain duration imply $p > 0.005$, the f ratio [2 mean square values] = 0.678 and 0.34 respectively, which is nearly around 1. This indicates that regardless of the significance level used in the test, the two variances were equivalent.

Associated Factors And EQ-5D

Smokers: Pre-operatively, the mean scores were similar but smokers experienced lower scores at 6 months than non-smokers, with EQ-5D values of 0.60 and 0.74, respectively. In addition, a higher proportion of smokers had not improved at all by the follow-up at 12 months.

Duration Of Leg Pain: Patients with leg pain for lesser than six months scored a mean of 0.08 higher post-operatively than those with pain for longer periods.

Duration Of Back Pain: Patients with back pain for less than six months improved by a mean of 0.05 more than those with back pain for longer.

Walking Ability:

A total of 11 patients improved their ability to walk ≥ 1 km with a marked increase in the mean EQ-5D score from 0.48 to 0.73. However, 8 patients still had difficulty in walking < 1 km. Their mean HRQOL changed only from 0.26 to 0.66.

Table 2 shows Multivariate analyses. The bimodal distribution of the preoperative EQ-5D scores could be explained by the pre-operative variables of walking distance, duration and intensity of leg pain. Patients with a walking distance of < 1 km had scores that were 0.027 SEM (0.006) p -value 0.01 units lower than those who could walk ≥ 1 km. Those who had experienced leg pain more than six months before surgery scored 0.027(0.006) with a p -value of 0.054 units lower than those with pain for less than six months. Those who had suffered from back pain for more than six months before surgery scored 0.068 (0.012) p -value 0.0023 units lower than those with pain for less than six months. Finally, smokers scored 0.017 (SEM 0.051, $p = 0.0001$) units lower than non-smokers. Pre-operatively, the mean scores were similar but smokers experienced lower scores at 6 months than non-smokers, with EQ-5D values of 0.60 (0.022). Age, smoking and duration of leg pain were not significantly associated with the pre-operative score. Our analysis of the post-operative score at 6 months by covariance modelling included the same variables as in the analysis of the pre-operative score, together with the preoperative score. We found that the pre-operative score did not influence the score at 6 months. Significant predictors for poorer quality of life 6 months after surgery were a short pre-operative walking distance, smoking and a long duration of leg pain.

Table: 2 Inter Variable Calculation For EQ5D

Variables	f-ratio	D (SEM)	P-value
Sex	0.6788	0.012(0.0086)	0.40
Age distribution	8.75	0.10(0.016)	0.0001
Smoking habits	26.05	0.017(0.051)	0.0001
Leg pain duration	0.34	0.027(0.006)	0.54

Back pain duration	0.54	0.068(0.012)	0.0023
Preop walking duration	8.11	0.039(0.0544)	0.001

A detailed analysis of the five EQ-5D dimensions, comparing the severity of problems perceived before surgery with that 6 months later, showed that most patients got improvement. (Table 3)

Mobility:

Post-operatively, 12 (63%) of these patients reported no impaired mobility. Self-care: Post-operatively, 12 (63%) had no problems after the operation. Usual activities: A total of 8 (42%) improved after the operation. Pain/discomfort: Six months later, 8 patients (42%) with severe pain had improved. Anxiety/depression: Six months later, 8 of them (42%) still felt the same.

Most patients reported an improvement but did not reach the level reported by the population sample. The mean difference 6 months after surgery was 0.65 lower. Before the operation, the relative risk of having moderate or severe problems in the five dimensions was between 2.2 and 21.87 times higher than expected compared with the reference population. The EQ-5D dimension values for patients with a moderate or severe problem before and 6 months after surgery were compared. [Table: 3 and figure: 2]

Table: 3 Pre And Post-operative Distribution Of The EQ-5D Dimensions

Pre-op	Post-op			
	No problem	Moderate	Severe	Total
Mobility				
No problem	4	3	0	7
Moderate	6	2	1	9
Severe	2	1	0	3
Total	12	6	1	19
Self-care				
No problem	7	2	2	10
Moderate	4	1	0	5
Severe	1	2	0	3
Total	12	5	2	19
Usual activities				
No problem	5	3	0	8
Moderate	2	2	3	7
Severe	1	2	1	4
Total	8	7	4	19
Pain discomfort				
Normal	0	1	0	1
Moderate	5	3	1	9
Severe	3	4	2	9
Total	8	8	3	19
Anxiety/discomfort				
No problem	4	2	2	8
Moderate	3	2	2	7
Severe	1	2	1	4
Total	8	6	5	19

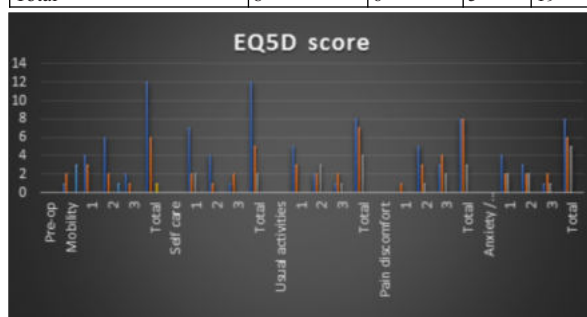


Figure: 2 Bar Chart Showing The Distribution Of The Differences Between The 6-month Post-operative EQ-5D Score

DISCUSSION

During the COVID 19 epidemic, we looked at patients' health-related quality of life before and after surgery for a herniated lumbar disc.

Most patients who have surgery for a herniated disc have a better health-related quality of life, according to our research. During Six months follow up after surgery, our patients improved their post-test means value of the visual analogue scale in the post-op group was 3.42.

The post mean value of EQ5D in the post-op group was 0.72.

To improve the delivery of treatment to COVID-19 patients, international and government directives have curtailed nonemergent surgery. This has a major influence on surgeons' capacity to address the demands of their patients. Despite being substantially impacted, surgeons follow national and international guidelines to avoid unnecessary surgery while treating urgent surgical difficulties. The present moratorium on elective surgery has prompted a lot of thought about when physicians will be able to restart these procedures safely. [9]

Socio-demographic And Comorbidities Distribution

In the present study, there were 19 patients in the trial, 58 per cent of whom were men and 42 per cent of whom were women. The patients in this study were mostly between the ages of 20 and 60. The mean age of the study population was 42±3.4 years, whereas the mean age of previous studies ranged from 30 to 50 years were identified in those studies [10] when surgery for recurrent disc herniation was considered. Our research sample, like prior studies, had a male majority, which may be attributed to more outdoor and hard jobs kinds among men (particularly in the Indian situation), resulting in disc degeneration and male domination of healthcare help-seeking.

This is far from the first study to demonstrate that comorbidities like smoking and depression have a major impact on lower back pain and lower limb pain. Lower back pain has been linked to psychological aspects such as coping, self-efficacy, fear-avoidance behaviours, catastrophizing, body mass index (BMI), and depression, as previously indicated. [8] To further understand this risk and the consequences of surgery, ongoing randomised clinical trials of pre-and post-operative smoking cessation are critical. Our preliminary data show that the underlying features of the two groups, such as smoking and lower back/leg discomfort, may differ.

In the present study, Two of the 19 patients between the ages of 20 and 30 (11%) and two of the 19 patients over 45 (11%) took part in the follow-up. ($P < 0.0001$). Even though $p > 0.005$ is implied by the sex distribution and leg pain duration, the f ratio [2 mean square values] = 0.678 and 0.34, respectively, which is close to 1. This means that the two variances will be equal regardless of the significance level employed in the test. Patients who could walk less than 1 km had 0.027 SEM (0.006) p-value 0.01 units worse scores than those who could walk more than 1 km.

Herdman et al., [11], using a Euroqol (EQ-5D) questionnaire, evaluated the pre-operative and one-year postoperative health-related quality of life (HRQOL) results in 263 patients who had had surgery for lumbar disc herniation. Between 2001 and 2002, data from the National Swedish Register for lumbar spinal surgery were used, as well as a comparison between their cohort and a Swedish EQ-5D population survey. He examined data on quality of life before and after surgery, as well as age, gender, smoking habits, pain, and walking ability. The patients ranged in age from 20 to 66 years old; 155 (59%) were men, and 69 (26%) smoked.

Correlation Between Different Baseline Parameters Of Preliminary Operation With EQ5D And VAS Results:

Those who had leg discomfort for more than six months before surgery scored 0.027 (0.006), with a 0.054-unit lower p-value than those who had pain for less than six months. Those who had been in pain for more than six months before surgery scored 0.068 (0.012) p-value 0.0023 units lower than those who had been in pain for less than six months. Finally, smokers scored 0.017 units lower than non-smokers (SEM 0.051, $p = 0.0001$). The mean scores were equal pre-operatively, but smokers had lower scores after 6 months than non-smokers, with EQ-5D values of 0.60. The mean EQ-5D score increased from 0.29 to 0.70, and their HRQOL improved. The post-operative score was unaffected by the pre-operative score. All five EQ-5D measures improved in the majority of patients, although not to the level reported by the age and gender-matched population sample (mean difference 0.17). Smoking, a short pre-operative walking distance, and a lengthy history of back discomfort were all predictors of poor results. The EQ-5D is a preference-based instrument that uses three answer levels to assess general health status across five domains of health: (1) mobility, (2) self-care, (3) normal activities, (4) pain/discomfort, and (5) anxiety/depression (no problems, some problems, extreme problems). Each health state correlates to a health index ranging from 0.109 to 1.0, with higher numbers indicating better overall health. [12]

Multivariate Analyses:

When it comes to multivariate analytics, The preoperative factors of walking distance, duration, and degree of leg discomfort might explain the bimodal distribution of preoperative EQ-5D scores. Patients who could walk less than 1 km had 0.027 SEM (0.006) p-value 0.01 units worse scores than those who could walk more than 1 km. Those who had leg discomfort for more than six months before surgery scored 0.027 (0.006), with a 0.054-unit lower p-value than those who had pain for less than six months. Those who had been in pain for more than six months before surgery scored 0.068 (0.012) p-value 0.0023 units lower than those who had been in pain for less than six months. Finally, smokers scored 0.017 units lower than non-smokers (SEM 0.051, $p = 0.0001$).

Before and after surgery, the EQ-5D dimension values for patients with a moderate or severe conditions were compared to those for the EQ5D survey. The majority of patients said they felt better, but not to the same extent as the general sample. Six months following surgery, the mean difference was 0.65 lower. In comparison to the reference population, the relative probability of having moderate or severe issues in the five dimensions was between 2.2 and 21.87 times greater before the procedure. [13]

CONCLUSION

The ongoing COVID-19 global pandemic is unprecedented in modern history. Spine surgeons have a crucial role to play as a provider, conservers of health care resources, and public health advocates. Smoking was the most important risk factor in those patients who did not improve or who experienced a reduced quality of life. As the result of our analyses, we propose a prognostic model for two outcomes, namely failure and worsening, one year after surgery for lumbar disc herniation. The model is built based on previously identified risk factors, and outcome criteria are identified based on the patient's rating of outcome compared to self-reported disability scores.

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