



**PATIENT REPORTED OUTCOMES AND ASSOCIATED FACTORS
FOLLOWING DECOMPRESSIVE LUMBAR SURGERY FOR
DEGENERATIVE LUMBAR DISEASE, AT AABET HOSPITAL, ADDIS
ABEBA, ETHIOPIA**

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Addis Ababa, Ethiopia

August, 2023

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Addis Ababa, Ethiopia

August, 2023

Research Project proposal submission form

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Abstract

Introduction: Degenerative spine disease (DSD) is a progressive deterioration of the structures of the spine not related to acute trauma. Changes in the intervertebral disc are a major factor in the initiation of degenerative disc disease. DSD is managed conservatively and surgically if there is indication. Decompressive lumbar surgery is among the standard of care for patients having indication for surgery, with the major goal of treatment to increase health-related quality of life by reducing pain and disability. Lumbar decompressive surgery is among the common neurosurgical procedure in Ethiopia and also at AaBET hospital, but there is no study done at AaBET hospital about the outcomes and associated factors of these patients. The purpose of this study is to determine the Patient reported Outcomes and associated factors following Decompressive lumbar surgery for degenerative lumbar disease, at AaBET hospital.

Objectives: The main objective of this study is to assess Patient reported Outcomes and associated factors following Decompressive lumbar surgery for degenerative lumbar disease.

Methods: Hospital based cross-sectional study design was used. All Patients, for whom Decompressive lumbar surgery for degenerative lumbar disease was done at AaBET hospital, from January 1, 2020 to March 30, 2022 G.C, was included in the study. A structured questionnaire was used to collect data from the patient's chart and following phone interview. Data processing and analysis was done using SPSS-26 software. Descriptive statistics using frequency, mean, median, range and standard deviation was done and Multivariate regression analyses was used to determine association and p-value of less than 0.05 was considered statistically significant finally results presented by tables.

Result: A total of 39 patients with mean age of 45.18 years were included in this study. Most of the patients were between the ages of 30-39 years. Male predominate 61.5% and all patients had low back pain at presentation. 76.9% of the respondents have satisfactory outcome and 23.1% of the respondents have poor patient reported outcome. Pre-operative working status and sphincter dysfunction were found to have statistically significant association with patient reported outcome based on the multivariable logistic regression.

Conclusion: This study demonstrated that satisfactory patient reported outcome following decompressive lumbar surgery for degenerative lumbar disease is comparable with other studies. Pre-operative working status and sphincter dysfunction were found to have statistically significant association with patient reported outcome. A prospective study with a sizable sample size is required to assess the impact of the finding in this study on decision-making in the future.

Keywords: Patient reported outcomes, Decompressive lumbar surgery and Degenerative lumbar disease

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Acronyms

AaBET-Addis Ababa Burn, Emergency, and Trauma Hospital

CBHI-Community Based Health Insurance

DSD- Degenerative Spine Disease

EQ-5D-EuroQol-5 Dimension score

ETB-Ethiopian Birr

G.C.-Gregorian Calendar

IRB-Institutional Review of Boards

LBP-Low Back Pain

NSRC-Neurosurgical Referral Clinic

MRI-Magnetic Resonance Images

PI-Principal Investigator

PRO-Patient Reported Outcome

SF-36 –Short Form 36

SLR-Straight Leg Raise test

SPHMMC-Saint paul’s Hospital Millennium Medical College

SPSS-26-Statistical Package for the Social Sciences

YLDs-Years Lived with Disability

Introduction

Background

Degenerative spine disease is a progressive deterioration of the structures of the spine not related to acute trauma(1). Changes in the intervertebral disc are a major factor in the initiation of degenerative disc disease which may lead to disc bulging, osteophytes, loss of disc space, and compression and irritation of the adjacent nerve root(1). Degenerative spine disease encompasses conditions such as disc degeneration, lumbar spinal stenosis and spondylolisthesis(2).

Disc degeneration is age-related remodeling process that begins in the second decade of life (3), Degeneration of at least one level is present in approximately 35% of individuals under 40 years and in almost all individuals over the age of 60 years(4). Risk factors causing lumbar disc degeneration disease and associated lumbosacral neural structure compression other than age includes socioeconomic status(5), torsional stress(6), smoking, obesity(7–9), heavy lifting, vibration(9), trauma, immobilization(8), psychosocial factors, gender, height, hereditary, genetic factors(5,6,9) and occupations like machine drivers, carpenters, and office workers(10–12). Genetic inheritance plays a significant role in the rate of degradation(13,14).

Clinical presentations associated with lumbar disc degeneration includes back pain, Radicular pain, muscular weakness, sensory defects, neurogenic claudication, bowel and bladder symptoms(2).

Worldwide 266 million individuals (3.63%) have Degenerative spine disease and Low back pain each year; the highest and lowest estimated incidences were found in Europe (5.7%) and Africa (2.4%)(2). Intervertebral degeneration and associated low back pain have a huge socioeconomic impact and place a burden on health services worldwide. People throughout the world spend more than 100 billion US dollars/year for the treatment of low back pain(16).

Saint Paul's hospital and millennium medical college (SPHMMC), Neurological Surgery Department annual reports of 2017 G.C. showed that out of 3630 neurosurgical referral clinic visit at Aabet hospital, in the period of July 2016 to June 2017, more than half of the patients

(54%) were spine pathology cases. The same report showed that out of 57 operated spine cases on the same year 38 cases (66.65%) were lumbar degenerative disease(17).

When it comes to treating degenerative lumbar disease, a period of conservative, nonsurgical treatment is recommended at first, unless the patient exhibits symptoms of cauda-equina syndrome, a progressive neurologic deficit, or profound motor weakness, or if their pain is so severe that it cannot be adequately controlled by pain medication (a relative indication), in which case urgent surgery is advised(1).

Surgical options for degenerative lumbar diseases include Open laminectomy/ Laminotomy with or without discectomy, micro-discectomy, foraminotomy, plus fusion(if indicated) based on the specific disease entity(1).

The major goal of treatment for those with degenerative spinal illnesses is to increase health-related quality of life by reducing pain and disability. In this sense, the best measurement of treatment quality should be the patient's opinion of the results using patient-reported outcome (PRO) instruments (health status reports taken directly from patients without interpretation by clinicians)(18). In recent decades, several questionnaires have been developed and validated for the clinical and functional evaluation of spinal treatment outcomes These instruments quantify the impact of a pathological process on aspects of quality of life and vary by how dimension specific they are. Patient-reported outcome data is collected at baseline (preoperatively) then serially collected post operatively, at 3 months, 12 months and 24 months etc. then the preoperative and postoperative PRO scores will be compared to quantify the outcomes(19). Since there is no trend of recording the PRO score prior to surgery and no validated tool for the PRO score in local languages, for this study PRO instrument which is based only on the patient's postoperative experience and satisfaction is used.

Statement of the problem

Degenerative spine disease is a common global problem. Degenerative lumbar disease and associated low back pain have a huge socioeconomic impact, place a burden on health services worldwide and also it has been the leading cause of Years lived with disabilities (YLDs). Spine pathology accounts for more than half of the Neurosurgical referral clinic visit per year at Aabet Hospital.

There are different neurosurgical armamentariums for treatment of degenerative lumbar diseases, both surgical and non-surgical. The major goal of treatment is to increase health-related quality of life by reducing pain and disability.

Laminectomy &/or discectomy was the second commonest neurosurgical procedure done next to burr hole in Ethiopia(20). Surgery done for Lumbar degenerative disease accounts for more than two-third of the spine surgery performed per year at Aabet hospital.(17)

Despite this limited evidence is available about the outcomes and associated factors after decompressive lumbar surgery for degenerative lumbar disease. This perceived gap has led to determine patient reported outcomes and associated factors following Decompressive lumbar surgery for degenerative lumbar disease, at Aabet hospital.

Significance of the study

The purpose of this study is to determine the Patient reported Outcomes and associated factors following Decompressive lumbar surgery for degenerative lumbar disease, at Addis Ababa Burn, Emergency, and Trauma Hospital (AaBET).

This study will provide critical baseline information and fill the knowledge gap about patient reported outcomes; factors associated with satisfactory or Poor outcomes and post-operative complications following Decompressive lumbar surgery for degenerative lumbar disease in a resource limiting set up. This information will also be used to counsel patients about the center's experience about the outcome. This study also will provide additional information to the world regarding the outcome in resource-limited setups compared to other international publications.

The finding of this study may be used as a baseline data for future studies.

Literature Review

Patient reported Outcome

Different studies done at different place about patient reported outcomes of Decompressive lumbar surgery and also about the associated factors for the outcome showed different results.

According to a community-based study on patient-oriented outcomes from low back surgery conducted at the University of Washington, out of 236 study participants roughly two thirds of the study participants reported significant improvements in their quality of life (64%), significantly better functioning (65%), and a very positive perspective on their treatment outcome (68%)(21).

Another hospital based prospective study conducted in Russia by Sharama et al. by using VAS and ODI questionnaire at pre-operative and post-operative period revealed that out of 75 study participants 75% of the study population reported that their pain was rapidly improving in the post-operative stages. As a result, the majority of patients stopped taking painkillers, anxiolytics, or other preparations like sleeping pills during the post-operative period. Also, they stated that after surgery, one's quality of life has significantly improved(22).

Another retrospective case series studied by Sunderland et al. revealed that out of 2611 study participants 76% of patients who underwent primary decompression surgery experienced an overall clinically significant improvement, demonstrating that these patients have strong surgical response rates(23).

Another retrospective longitudinal analysis of postoperative recovery patterns in patients with lumbar radiculopathy who underwent discectomy surgery revealed that 18% and 55% of patients experienced excellent and good outcomes, respectively. The remaining 25% of patients, however, reported little change and continued to experience severe leg pain after 24 months. The identified outcome for back pain was similar to those of leg pain. Unlike the pain subgroups, those for disability indicated that 95.3% experienced an excellent-fair pattern of recovery(24).

Another study with a title Predictors of satisfaction after lumbar disc herniation surgery in elderly done at Sweden by Hareni et al. showed that one year after surgery, 71% of the patients were satisfied, 18% uncertain and 11% dissatisfied.(25)

Another multicenter register study done at Denmark by Paulsen et al showed that at 1-yr follow-up, 62.4% of patients were satisfied but 15.1% reported dissatisfaction. The satisfied patients showed significantly greater improvement in all outcome measures compared to the dissatisfied patient. The outcome scores for the dissatisfied patients were relatively unchanged or worse compared to baseline(26).

Associated factors

A community-based study on patient-oriented outcomes from low back surgery conducted at the University of Washington revealed that younger patients and those who underwent a fusion procedure were more likely to report an improvement in quality of life. Patients who smoked and were unemployed prior to their operation were significantly less likely to report better functioning. This study also showed that Previous low back surgery, workers' compensation insurance, and legal counsel before surgery are associated with worse functional and quality-of-life outcomes(21).

Another prospective observational study done at Stanford university on Clinical Outcomes After Lumbar Discectomy for Sciatica: The Effects of Fragment Type and Annular Competence showed that Intraoperative findings were more clearly associated with outcomes i.e. Patients in the Fragment-Fissure group, who had disc fragments and a small annular defect, had the best overall outcomes and the lowest rates of re-herniation (1%) and as well the lowest rate of reoperation (1%).Patients in the No Fragment-Contained group did poorly: 38% had recurrent or persistent sciatica, and the standard outcomes scores were less improved (27).

Results from a systematic review and narrative synthesis by Rushton et al showed that low level evidence that higher severity of pre-operative leg pain predicts outcome at 12 months and better post-operative leg pain at 2 and 7 years. There is very low level evidence that a lower pre-operative quality of life (measured by EQ-5D) predicts better quality of life at 2 years. Low level evidence Showed that preoperative leg pain duration is not associated to

outcome, while very low quality evidence indicates that preoperative ODI, back pain duration and intensity, ipsilateral straight leg raise test (SLR), and forward bend are not associated to the outcome(28).

According to a review of the article Sciatica Presentations and Predictors of Poor Outcomes Following Surgical Decompression of Herniated Lumbar Discs, higher anatomical levels of herniation (L1-2, L2-3), as well as socio-demographic factors (female gender, smoking, aging, low socioeconomic status, and low education level), were linked to less favorable surgical outcomes. Long-term outcomes do not appear to be significantly influenced by the size of the herniated disc or the length of the symptoms; nevertheless, early surgery (within a year) may lead to a quicker recovery after surgery, and patients who underwent discectomy for predominate leg pain had better outcomes. A few research suggested that unemployment and depression are correlated with sluggish postoperative recovery (29).

The Swedish study revealed that satisfied patients were younger than the general population, had shorter preoperative leg pain durations, higher SF-36 mental component summaries, and more leg than back pain. When unsatisfied patients were compared to others, they were older, had leg pain that persisted longer before surgery, and scored worse on the SF-36 questionnaire(25).

The Danish study revealed association between patient dissatisfaction and comorbidities, leg pain duration, and smoking status. Patients with a good baseline walking ability were less likely to express dissatisfaction than patients with a poor baseline walking ability(26).

Another multicenter study by Alexandra et al. revealed that improved functional results were related to higher postoperative satisfaction and stronger expectation fulfillment. Although they were linked to better functional results, higher prior expectations decreased postoperative satisfaction. Improved functional results were associated with higher postoperative satisfaction, and vice versa(30).

Objectives

General objective

To assess Patient reported Outcomes and associated factors following Decompressive lumbar surgery for degenerative lumbar disease, at AaBET hospital, Addis Ababa, Ethiopia, from January 1, 2020 to March 30, 2022 G.C

Specific objectives

To determine Patient reported Outcomes Following Decompressive lumbar surgery for degenerative lumbar disease, at AaBET hospital, Addis Ababa, Ethiopia, from January 1, 2020 to March 30, 2022 G.C

To determine factors associated with Patient reported Outcomes Following Decompressive lumbar surgery for degenerative lumbar disease, at AaBET hospital, Addis Ababa, Ethiopia, from January 1, 2020 to March 30, 2022 G.C

Methods and Materials

Study area and Period

The study was conducted from January 1, 2020 to March 30, 2022 G.C, at Addis Ababa Burn, Emergency & Trauma Hospital (AaBET Hospital), a government hospital and an affiliate of St. Paul's Hospital and Millennium Medical College (SPHMMC) found in Addis Ababa, Ethiopia. AaBET Hospital is one of the largest government-based trauma & emergency center in the country with 190 beds, providing a 24-hour service for patients from all over the country. It is also a teaching center with four major departments; Neurosurgery, Plastic and Reconstructive Surgery, Orthopedics & Traumatology and Emergency Medicine and Critical Care. The Neurosurgery department provides both emergency and elective Neurosurgical services.

Study design

Institution (Hospital) based, cross-sectional study was conducted among patients who had undergone Decompressive lumbar surgery for degenerative lumbar disease from January 1, 2020 to March 30, 2022 G.C at Aabet hospital, Addis Ababa, Ethiopia.

Population

Source population

All surgically treated Lumbar Spine patients at AaBET Hospital were the source population.

Study population

All patients for whom Decompressive lumbar surgery was done for degenerative lumbar disease from January 1, 2020 to March 30, 2022 G.C fulfilling the inclusion criteria

Sample size and sampling technique

Sample Size Determination

The sample size was calculated by single population formula. Considering, a 95% confidence interval and 5% margin of error.

n = desired sample size for a population

$Z_{\alpha/2}$ = Z-value for a 95% confidence level which is 1.96

P = 96% (percentage of satisfied patients after surgery for lumbar degenerative disease, from previous study)(31)

d = precision (d) = 5%

The sample size (n) is calculated according to the formula for infinite: $n = z^2 * p * (1 - p) / e^2$

Where: z = 1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal), e = margin of error.

z = 1.96, p = 0.96, e = 0.05

$n = (1.96)^2 * 0.96 * (1 - 0.96) / (0.05)^2$

n = 59

By adding a 10% nonresponse rate, the final sample size calculated for this study is 65.

Since the total number of patients for whom decompressive lumbar surgery was done during the study period is less than 65 (the calculated sample size), all patients for whom decompressive lumbar surgery was done for degenerative lumbar disease during the study period meeting the inclusion criteria were included in the study.

Inclusion criteria's

Age $\geq$ 18 years

Patients with degenerative lumbar disease diagnosed by the neurosurgery team for whom decompressive lumbar surgery was done with a posterior midline/paramedian approach for degenerative pathology from January 1, 2020 to March 30, 2022 G.C

Exclusion criteria's

Patients who underwent additional procedure on the top of laminectomy and discectomy like fusion, facet injections.

Lost chart

Patients not available for a phone interview

Patients who did not give consent during the phone interview

Data collection and measurement

Variables

Dependent Variable

Patient reported Outcomes Following decompressive lumbar surgery

Independent Variables

Age

Sex

Smoking status

Pre-operative working status

Community based health insurance

Pre-operative symptoms

Preoperative symptom duration

Comorbidities (Diabetes mellitues, hypertension, asthma)

Psychiatric illness

Specific lumbar degenerative disease diagnosis

Surgical procedure done

Intra operative accident

Post-operative complication

Data Collection Procedure

Instruments and Measurements

A structured questionnaire was used to collect data from the patient's chart and following phone interview. Questionnaire was adapted from works of literature (21,32) and modifications were made to them with regard to local context. It consists of two parts. Part one of the questionnaire assesses socio-demographic characteristics, clinical presentation, surgery-related conditions, and post-op complications of study participants. Part two contains Patient reported Outcomes questions which is translated to Amharic and Oromiffa for ease of communication with patients during the phone interview.

Data collection methods

Patients, for whom decompressive lumbar surgery was done for degenerative lumbar disease, were identified from operation logbook of the study hospital. Patient chart retrieved from chart archives using medical record number. Socio-demographic characteristics, clinical presentation, surgery-related conditions, and post-op complications of study participants was taken from history, physical examination, operation, and post-operative follow-up note by Neurosurgery residents and seniors. Using cell phone contact address on the chart patient was interviewed for patient reported outcome part of the questionnaire.

Data collector

Data was collected by trained data collectors (medical interns) using the pretested and structured questionnaires.

Data processing and analysis

The data was cleaned, entered in to and processed using SPSS version 26(a statistical package for the social sciences) software. Descriptive summary measures including, mean, median, relative frequency and standard deviation was used to analysis the specific objectives. Chi-square test was used to analyze the presence or absence of association of variables. Odds ratios and confidence interval was also calculated to determine the strength of association of selected variable.

Ethical consideration

A formal letter of ethical clearance was taken from Saint Paul Hospital Millennium Medical College, institutional review board (IRB). All the respondents were clearly informed about the purpose of the study and verbal informed consent was taken from the patient during the phone interview.

Quality control measures

To assure the quality of data, properly designed data collection instruments was employed. Questionnaire was Pre-tested on ten subjects from study population. The collected data reviewed and checked for completeness and relevance by the principal investigator each day. Data quality was also assured during data entry through checking randomly 10% of the data by the principal investigator, and data cleaning was also done after entry.

Dissemination plan

The results of the study will be submitted to Saint Paul's Hospital and Millennium Medical College, Neurosurgery department. Furthermore the finding may be published and disseminated through different journals and scientific publications

Operational definition

Satisfactory outcome – patient who scored Cumulative patient reported outcome point ≥ 3 .

Poor outcome-Patient who answered unfavorable answer for the first four patient reported outcome questions or patient who scored cumulative patient reported outcome point < 3 .

Decompressive lumbar surgery-Complete anatomical decompression of all symptomatically involved neural elements with diagnostic correlation by Laminectomy/laminotomy with or without discectomy or foraminotomy or by minimally invasive spine surgery.

Degenerative lumbar disease: Age-related wear and tear on spinal disc causing symptoms.

Discectomy -Removal of all or part of the disc that is compressing the thecal sac and/or the root

Foraminotomy- Partial removal of the articular process

Laminectomy -Complete removal of the lamina including spinous process.

Laminotomy-Partial removal of the lamina

Sphincter dysfunction: Patient having any one or more of the symptoms urinary retention, urinary or fecal incontinence in isolation or in combination.

Results

Decompressive lumbar surgery was done for forty five patients during the study period. Forty two charts were retrieved, resulting in 93.3% chart retrieval rate. Three Patients were excluded by exclusion criteria. Finally, thirty nine patients were included in this study.

Socio-demographic characteristics of the study participants

The mean (SD) and Median (IQR) age of the respondents was 45.18 years (13.28), 45 (35-55) years respectively. The minimum and maximum age of the respondents was 23 and 75 years respectively. Most of the patients (28.3%) were between 30-39 years of age. Majority of the patients were male and have educational status below high school. Over half of the patients were private employee. In regards to their working status, 30 (76.9%) of the patients were working before the surgery. Pain was the predominant reason (77.7%) for not working in patients who were not working preoperatively. Only 1 (2.6%) of the patients uses CBHI and similarly 1 (2.6%) of the patients are smokers. Most patients do not have any other comorbidity. Comorbidities were identified in 7(17.9%) of the patients and all of them has hypertension, one of the patient also has diabetes mellitus. None of the patients have any psychiatric illness or previous back surgery (Table 1).

Table 1: Socio-demographic characteristics of the study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Ten-years age group		
20-29 years	4	10.3
30-39 years	11	28.2
40-49 years	8	20.5
50-59 years	9	23.1
60 years and above	7	17.9
Patient's sex		
Male	24	61.5
Female	15	38.5

Highest educational status		
Below high school	16	41.0
High school	10	25.6
College and above	13	33.3
Occupation		
Private employee	23	59.0
Government employee	10	25.6
Farmer	6	15.4
Working status		
Working	30	76.9
Not working	9	23.1
Reason for not working (n=9)		
Weakness	3	33.3
Pain	7	77.7
CBHI user		
No	38	97.4
Yes	1	2.6
Smoker		
No	38	97.4
Yes	1	2.6
Have any comorbidities		
No	32	82.1
Yes	7	17.9
Comorbidities (n=7)		
Hypertension	7	100.0
Diabetes mellitus	1	14.3
Have any psychiatric illness		
No	39	100.0
Previous back surgery		
No	39	100.0

Clinical presentations of the study population

While all of the patients have back pain, neurogenic claudication, radicular lower extremity pain and lower extremity weakness were found in 21 (53.8%), 38 (97.4%), 22 (56.4%) of the patients respectively. Physical and social functioning was restricted in 16(41.0%) and 15(38.5%) of the patients respectively. 7(17.9%) of the patients have sphincter dysfunction. While most of the patients ambulate independently, 9(23.1%) and 3(7.7%) of them ambulate with assistance and are wheelchair bound respectively (Table 2).

The median (IQR) duration of back pain was 24 (7-84)months, neurogenic claudication is 12 (9.5-30)months, lower extremity pain 12 (6-39)months, lower extremity weakness 3 (1.5-6)months, restricted physical activity 4.0 (1.0-8.0)months, social functioning 2.0(0.3, 4.0)months and sphincter dysfunction 0.7 (0.3-3.0)months (Table 3).

The mean (SD) duration of back pain, neurogenic claudication, radicular pain, lower extremity weakness, restricted physical activity, restricted social functioning and sphincter dysfunction was 49.8±60.5, 30.3±39.4, 35.9±49.7, 5.0±5.99, 4.9±4.2, 3.2±4.1 and 1.6±1.6 months respectively (Table 3).

Table 2: Symptoms of the study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Have back pain		
Yes	39	100.0
Have neurogenic claudication		
No	18	46.2
Yes	21	53.8
Radicular lower extremity pain		
No	1	2.6
Yes	38	97.4
Lower extremity weakness		
No	22	56.4

Yes	17	43.6
Physical activity		
Unrestricted	23	59.0
Restricted	16	41.0
Social functioning		
Unrestricted	24	61.5
Restricted	15	38.5
Sphincter dysfunction		
No	32	82.1
Yes	7	17.9
Ambulation status		
Independent ambulation	27	69.2
Ambulation with assistance	9	23.1
Wheelchair bound	3	7.7

Table 3: Duration of symptoms of study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Duration	Back pain	Neurogenic claudication	Radicular lower pain	Lower extremity weakness	Restricted physical activity	Restricted social dysfunction	Sphincter dysfunction
1 months and less	2	-	2	4	5	3	4
1-3 months	1	-	3	5	3	2	2
3-6 months	5	4	5	5	5	1	1
6-12 months	9	10	11	2	4	1	-
12-24 months	4	2	4	1	-	-	-
24-60 months	7	2	7	-	-	-	-
More than 60 months	11	3	6	-	-	-	-

Clinical Signs of the study population

Less than half of the patients (43.6%) have any degree of motor weakness. Sensory deficit was identified in 11 (28.2%) of the patients. Depressed and absent deep tendon reflex was identified in 16 (41.0%) and 2(5.1%) of the patients respectively. 35(89.7%) of the patients have positive straight leg raising tests (Table 4).

Table 4: Clinical signs of the study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Have motor weakness		
No	22	56.4
Yes	17	43.6
Have sensory deficit		
No	28	71.8
Yes	11	28.2
Deep tendon reflexes		
Normal	21	53.8
Depressed	16	41.0
Absent	2	5.1
Straight let raising test		
Negative	4	10.3
Positive	35	89.7

Pre-operative diagnosis of the study population

41% (16) of the study participants was diagnosed to have lumbar disc herniation only, whereas 28.2% (11) of the study participants have lumbar disc herniation with spinal canal stenosis and neural foraminal stenosis. The remaining 12.8%(5), 7.7%(3), 7.7%(3) and 2.5%(1) patients was diagnosed with Lumbar disc herination & lumbar spinal canal stenosis, Lumbar disc herination and Foraminal stenosis, spinal canal and foraminal stenosis and lumbar spinal canal stenosis respectively.

Lumbar disc herniation at any level was found in 34 (87.2%) of the patients. Most of them have lumbar disc herniation at L4/L5 level. L4/L5 lumbar disc herniation was found in 28(82.4%) of the cases. The central type of lumbar disc herniation was the most common type of herniation in each of the lumbar disc levels. It was found in 5 (71.4%), 20 (71.4%) and 8 (57.1%) of L3/L4, L4/L5 and L5/S1 level lumbar disc herniation. Para-median type of herniation was the second most common type of herniation in all of the lumbar disc levels.

Lumbar canal stenosis and foraminal stenosis was identified in 21 (51.3%) and 14 (43.6%) of the cases respectively. In 18 (85.7%) of patients with lumbar canal stenosis, the stenosis occurred at L4/L5 level. Similarly, the foraminal stenosis was most common at L4/L5 level and it occurred in 16 (88.9%) of the patients with foraminal stenosis. Tandem disc herniation was identified in 2 (5.1%) of patients only (Table 5).

Table 5: Diagnosis of the study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Diagnosis		
Lumbar disc herniation only	16	41
Lumbar disc herniation with spinal canal and neural foraminal stenosis	11	28.2
Lumbar disc herniation with spinal canal stenosis	5	12.8
Lumbar disc herniation with neural foraminal stenosis	3	7.7
Spinal canal stenosis and neural foraminal stenosis	3	7.7

Lumbar spinal canal stenosis	1	2.5
Have lumbar disc herniation		
No	5	12.8
Yes	34	87.2
Levels of lumbar disc herniation (n=34)		
L3/L4	7	20.6
L4/L5	28	82.4
L5/S1	14	41.2
Number of levels with disc herniation		
One level herniation	25	
Two level herniation	9	
Three level herniation	2	
L3-L4 lumbar disc herniation type (n=7)		
Central	5	71.4
Para-median	2	28.6
L4-L5 lumbar disc herniation type		
Central	20	71.4
Para-median	8	28.6
L5-S1 lumbar disc herniation type		
Central	8	57.1
Para-median	6	41.9
Lumbar canal stenosis		
No	18	48.7
Yes	21	51.3
Level of lumbar canal stenosis (n=21)		
L3/L4	6	28.6
L4/L5	18	85.7
L5/S1	9	42.9
Lumbar canal stenosis		
One level	11	
Two levels	8	

Three levels	2	
Foraminal stenosis		
No	22	56.4
Yes	17	43.6
Levels of foraminal stenosis (n=17)		
L3/L4	4	22.2
L4/L5	16	88.9
L5/S1	6	33.3
Number of levels foraminal stenosis		
One level	11	
Two levels	6	
Three levels	1	
Tandem disc herniation		
No	37	94.9
Yes	2	5.1

Surgery related conditions of the study Population

Laminectomy and discectomy was the commonest procedure done in this study, accounting for 41% (16), followed by laminectomy, discectomy and foraminotomy which accounts for 25.6% (10). Laminectomy and foraminotomy, MIS and Laminectomy alone was done for 17.9% (7), 12.8% (5) and 2.5% (1) patients respectively.

Regarding levels of the procedure, Laminectomy and discectomy was done at L4/L5 for 22 (78.6%) patients. Microdiscectomy was done at L4/L5 and L5/S1 level in most of the cases. Foraminotomy was done at L4/L5 level in 15 cases (Table 6).

Table 6: Surgical procedures done for study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Procedures		
Laminectomy and discectomy	16	41
Laminectomy Discectomy and foraminotomy	10	25.6
Laminectomy and foraminotomy	7	17.9
Laminectomy only	1	2.5
MIS discectomy	5	12.8
Number of levels of laminectomy		
One level	5	
Two levels	19	
Three levels	10	
Laminectomy &Discectomy		
No	13	33.3
Yes	26	66.7
Level of discectomy		
L3L4	4	14.3
L4L5	22	78.6
L5S1	10	35.7
Number of levels of discectomy		
One level	20	
Two levels	8	
Level of MIS discectomy		
L3L4	1	20.0
L4L5	2	40.0
L5S1	2	40.0
Foraminotomy		
No	22	56.4
Yes	17	43.6
Levels of foraminotomy		

L3L4	3	18.8
L4L5	15	93.8
L5S1	4	25.0
Number of foraminotomy		
One level	10	
Two levels	6	
Had intraoperative accident		
No	33	84.6
Yes	6	15.4
Intraoperative accidents		
Unintended durotomy	6	100.00

Post-operative complications of the study population

Post-operative complication was found in 1 (2.6%) of the patients and it was found to be CSF leak. The mean (SD) duration of post-operative hospital stay was 3.49 ± 2.7 days with minimum and maximum post-operative hospital stay was 1 day and 17 days respectively. The post-operative duration of hospital stay was less than 48 hours in 17 (43.6%) of the patients (Table 7).

Table 7: Post-Surgical complications of the study participants at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Any post op complications		
No	38	97.4
Yes	1	2.6
Post-op complication (n=1)		
CSF leak	1	100.0
Post-operative duration of hospital stays		
Up to 2 days	17	43.6
3-5 days	16	41
6 days or above	6	15.4

Patient reported outcomes

The mean (SD) time between time of interview and index surgery is 25.2 ± 7.9 months. The shortest time gap between index surgery and interview time is thirteen months the longest being 36 months.

Only 2 (5.1%) of the patients had subsequent lumbar spine surgery at the same level. 92.3% of the patients were satisfied with their back surgery and 89.7% of the patients would select the same spine surgery again in the future given the same disc herniation and familiarity with operative experiences. Only 1 (2.6%) of the patients report the back or leg symptoms worse than before the back surgery. 21 (79.5%) of the patients have either complete or almost complete degree of clinical recovery after operation. 16 (36.7%) of the patients resumed customary occupation from the index operation within 6 months. Time to resume normal activity of daily livings and time to discontinue prescription analgesics was less than 6 months in 22 (56.4%) and 15 (64.1%) of the cases respectively.

In the first step patient-based outcome assessment 32 (82.1%) of the patients reported favorable outcome; of these, 18 (46.2%), 9 (23.1%) and 3(7.7%) have excellent, good and fair patient reported outcome on second step assessment respectively. In the second step of patient based outcome assessment 30(76.9%) of the respondents have satisfactory outcome. 7(17.9%) of respondents from first step had unfavorable outcome and additional 2(5.1%) of respondents from second step: totally 9(23.1%) of the respondents have poor patient reported outcome (Table 8).

Table 8: Patient reported outcomes following decompressive lumbar surgery for degenerative lumbar diseases at Aabet hospitas from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Frequency	Percentage
Had subsequent lumbar spine surgery at same level		
No	37	94.9
Yes	2	5.1
Satisfied with the outcome of back surgery		
No	3	7.7
Yes	36	92.3

Would select same spine surgery in the future		
No	4	10.3
Yes	35	89.7
Back or leg symptoms worse than before surgery		
No	38	97.4
Yes	1	2.6
Patient reported outcome on first step assessment		
Unfavorable outcome	7	17.9
Favorable outcome	32	82.1
Self-assessed degree of clinical recovery		
No improvement	3	7.7
Partial improvement	5	12.8
Almost complete	18	46.2
Complete	13	33.3
Time to resume occupation		
After 12 months	10	25.6
7-12 months	3	7.7
3-6 months	12	30.8
Within 2 months	14	35.9
Time to resume normal activities of daily living		
After 12 months	11	28.2
7-12 months	6	15.4
3-6 months	11	28.2
Within 2 months	11	28.2
Time to discontinue prescription analgesic		
After 12 months	11	28.2
7-12 months	3	7.7
3-6 months	13	33.3
Within 2 months	12	30.8
Patient reported outcome		
Poor	9	23.1

Fair	3	7.7
Good	9	23.1
Excellent	18	46.2

Factors associated with patient reported outcome

On bivariate logistic regression, pre-operative working status, sphincter dysfunction and laminectomy and discectomy at L3/L4 level were found to have statistically significant association with patient reported outcome. Patients who were not working preoperatively were 0.089 times less likely to have satisfactory patient reported outcome than patients who were working (COR: 0.089, 95% CI: 0.015, 0.525, p-value: 0.008). Patients with sphincter dysfunction are 0.1 times less likely to have satisfactory patient reported outcome than patients without sphincter dysfunction (COR: 0.107, 95% CI: 0.017, 0.666, p-value: 0.017). Patients with laminectomy and discectomy at L3/L4 levels were 0.056 times less likely to have satisfactory patient reported outcome than patients who do not have laminectomy and discectomy at L3/L4 (COR: 0.056, 95% CI: 0.005, 0.646, p-value: 0.021).

Degree of patient reported outcome is not found to have a statistically significant association with patient's age, sex, educational status, occupation, CBHI use, smoking history and having comorbidities. Except sphincter dysfunction, all other patient's symptoms and signs and duration of symptoms were not found to have statistically significant association with patient reported outcome. The type of lesion, the number of levels involved and the lumbar spinal cord level affected were not found to have statistically significant association with patient reported outcome. The type of surgery, the level of spinal cord, intraoperative accident, post-operative duration of hospital stay and post-operative complication were not found to have statistically significant association with patient reported outcome.

On multivariable logistic regression, variables with p-value less than 0.2 on bivariable logistic regression were included. The variables in multivariable logistic regression includes: working status, occupation, sphincter dysfunction, social functioning, sensory deficit, straight leg raise

test, number of levels of foraminal stenosis, L3 laminectomy, L3/L4 discectomy and laminectomy, L3/L4 foraminectomy and duration of neurogenic claudication.

Based on the multivariable logistic regression, working status and sphincter dysfunction were found to have statistically significant association with patient reported outcome. Patients who are not working were 0.133 times less likely to have satisfactory patient reported outcome than patients who are working (AOR: 0.133, 95% CI: 0.020, 0.888, p-value: 0.037). Patients with sphincter dysfunction were 0.128 times less likely to have satisfactory patient reported outcome than patients without sphincter dysfunction (AOR: 0.128, 95% CI: 0.019, 0.843, p-value: 0.033) (Table 9).

Table 9: Factors associated with patient reported outcomes at Aabet hospital from January 1, 2020 to March 30, 2022 G.C (N = 39)

Variables	Recovery		COR (95% CI)	p-value	AOR (95% CI)	p-value
	Good	Poor				
Working status						
Working	27 (90.0%)	3 (10.0%)	1.00		1.00	
Not working	4 (44.4%)	5 (55.6%)	0.089 (0.015,0.525)	.008	0.133 (0.020,0.888)	.037
Sphincter dysfunction						
No	28 (87.5%)	4 (12.5%)	1.00		1.00	
Yes	3 (42.9%)	4 (57.1%)	0.107 (0.017,0.666)	.017	0.128 (0.019,0.843)	.033
Laminectomy and discectomy at L3/L4						
No	30 (85.7%)	5 (14.3%)	1.00		1.00	
Yes	1 (25.0%)	3 (75.0%)	0.056 (0.005,0.646)	.021	0.100 (0.004,2.504)	.161

Discussions

This two years retrospective study illustrates patient reported outcomes and associated factors following decompressive lumbar surgery for degenerative lumbar spine disease. The study participants were 39 patients.

In this study the mean age of the respondents was 45.18 ± 13.28 years, which is consistent with study done by F. Gebeyehu Shiferaw et al (31), which shows the mean age of the study participants was 44.4 ± 11.9 years, but the respondents in this study were younger than report by Maki et al (62.8 ± 12.7 years)(33), Sunderland et al (mean ~ 58 years)(23). This can be explained by the longer average life expectancy rate in western countries.

61.5% of the participants of this study were male; it's comparable to the study done by Sunderland et al in which case 59.6 % of the study participants were male(23). This result is different from the study done by F. Gebeyehu Shiferaw et al, in which 83% of the participants were male(31).

In this study 41% of the respondents have educational status below high school and Over half (59%) of the patients were private employee. This result is different from the report by F. Gebeyehu Shiferaw et al in which case half of the respondents had completed college education and Over one-third the respondents were farmers.(31)

In this study 23.1% of the patients were not working before the surgery, of which 77.7% of the respondents were not working due to pain. In contrast to the report by Taylor et al 73% of the respondents were not working of which 43,5% due to back problem and 56.5% due to other reason(21).

In this study 17.9% of the respondents have hypertension as a comorbid illness and 2.6% of the respondents were smokers and, none of the patients in this study has any psychiatric illness or previous back surgery. This is comparable with the study done by F. Gebeyehu Shiferaw et al in which case 20.6% of the respondents had comorbidities, 3.7 % of the respondents were smokers and 1.9% of the participants were previously operated for

degenerative spine disease(31).This result is different from the report by Sunderland et al, in which case 62% of the respondents were not smokers.(23)

All of the participants in this study have low back pain, 97.4% had radicular lower extremity pain, and 53.8% of the respondents had neurogenic claudication during presentation, in contrast to the study by F. Gebeyehu Shiferaw et al. in which case the predominant presenting symptom was radiculopathy (62.6%)(31).

In this study 56.4%, 41% and 38.5% of the respondents had lower extremity weakness, physical restriction and restricted social functioning respectively, which is lower than the study done by Taylor et al in which 77% , 82% and 80% of the respondents had leg weakness, physical restriction and restricted social functioning respectively(21).

In this study 7(17.9%) of the patients had sphincter dysfunction at presentation, which is higher than reports in which patients with this constitutes only 1-3% of the respondents(34–37).

In this study 69.2% of the patients were ambulating independently before the surgery which is comparable with the study by F. Gebeyehu Shiferaw et al 74.8% came to the hospital walking unsupported(31).

In this study all the respondents had back pain preoperatively; the mean (SD) duration of back pain was 49.8 ± 60.5 months and 56.4% of the respondents had back pain for greater than twelve months preoperatively. 53.8% of the respondents had neurogenic claudication preoperatively with the mean duration of 30.3 ± 39.4 months. In this study 63.8% of the respondents were symptomatic for more than twelve months preoperatively, which is comparable with the study done by F. Gebeyehu Shiferaw et al in which case 69.2% of the respondents were symptomatic for more than twelve months preoperatively(31).

In this study 43.6% of patients had any degree of motor weakness preoperatively, which is comparable with the reports of Taylor et al in which case 58% of the participants had motor deficit(21). In this study 28.2 % of the respondents had sensory deficit and 89.7% of the patients had positive straight leg raising tests preoperatively, which is different from the

reports of Teylor et al, in which there the respondents had 58% dermatomal deficit and 57% of the respondents had positive SLR(21).

In this study 41% of the study participants were diagnosed to have lumbar disc herniation only, whereas 28.2% of the study participants have lumbar disc herniation with spinal canal and neural foraminal stenosis. Its comparable with reports done by Sunderland et al, disc herniation central stenosis and lateral stenosis accounting for 26%, 26% and 29 % respectively(23) and it's also comparable with reports done by Taylor et al in which case 50% and 27% of the participants were diagnosed with HLD and spinal canal stenosis respectively(21).

In this study Lumbar disc herniation at any level was found in 87.2% of the patients, L4/L5 level lumbar disc herniation being the commonest level and central disc herniation is the commonest location of disc herniation in all lumbar levels, which is comparable to the study done by Sunderland et al(23), L4/5 level is the most affected level. This result is different from the study done by Yeung et al in which case L5/S1 is the commonest level and Paramedian disc herniation is the commonest location(32).

Laminectomy and discectomy was the commonest procedure done in this study, accounting for 41%, followed by laminectomy, discectomy and foraminotomy which accounts for 25.6%. This result is comparable with the reports done by Sunderland et al, in which laminectomy and discectomy was the commonest mode of decompression done accounting for 38%(23).

In this study the MIS discectomy rate is 12.8% which is lower than the study done by K. W. Ongeti et al, in which 30.8% of the procedure was MIS discectomy. Regarding the level of MIS discectomy done 40% was done at L4/L5 level and 36.9% was done at L5/S1 level which is the same with the study by K. W. Ongeti et al (38).

In this study Post-operative complication was found in 1 (2.6%) of the patients and it was found to be CSF leak. The complication rate is lower than the study by K. W. Ongeti et al and F. Gebeyehu Shiferaw et al, in which case 8% and 14% of the study participants develop post-operative complications respectively(31,38)

In this study the mean (SD) duration of post-operative hospital stay was 3.49 ± 2.75 days with minimum and maximum post-operative hospital stay was 1 day and 17 days respectively. Its comparable with the study done by F. Gebeyehu Shiferaw et al, in which the mean hospital stay was 4 days ($SD \pm 1.6$). (31)

In this study 2 (5.1%) of the patients had subsequent lumbar spine surgery at the same level, which is comparable with the study done by K. W. Ongeti et al, in which the reoperation rate was 1.2% of surgically treated patients (38).

In this study 92.3% of the patients were satisfied with their back surgery and 89.7% of the respondents would select the same spine surgery again in the future given the same disc herniation and familiarity with operative experiences. This result is comparable to the results of study done by Hermantin et al and F. Gebeyehu Shiferaw et al, in which from those patients operated for lumbar degenerative disease 93% and 96.6% were satisfied respectively (31,39). This result is better than the study done at Sewden by Hareni et al which showed that one year after surgery, 71% of the patients were satisfied (25), and the study done at Denmark by Paulsen et al which showed that at 1-yr follow-up, 62.4% of patients were satisfied (26).

In this study 1 (2.6%) of the patients report the back or leg symptoms worse than before the back surgery, which is comparable with the study done by K. W. Ongeti et al, in which the post-operative deterioration rate was 2.3 % of surgically treated patients (38).

21 (79.5%) of the patients have either complete or almost complete degree of clinical recovery after the operation. 16 (36.7%) of the patients resumed customary occupation from the index operation within 6 months. Time to resume normal activity of daily livings and time to discontinue prescription analgesics was less than 6 months in 22 (56.4%) and 15 (64.1%) of the cases respectively, This result is comparable with study done by JG Lunsford et al which showed The return to duty rate following elective lumbar decompressive spine surgery is 63% (40).

In this study 76.9% of the respondents have satisfactory patient reported outcome of which 46.2% excellent, 23.1% good and 7.7% fair patient reported outcome and 23.1% of the

respondents have poor patient reported outcome. This result is comparable with the reports by Taylor et al in which case 42%, 13%, 13% and 6% of the respondents have Excellent, good, fair and poor overall self-reported outcome(21).

This study showed that preoperative working status of the patient found to have statistically significant association with patient reported outcome. Patients who were not working were 0.133 times less likely to have satisfactory patient reported outcome than patients who are working (AOR: 0.133, 95% CI: 0.020, 0.888, p-value: 0.037). Similarly, the study done by Taylor et al and Katz JN et al showed that patients who were not working before their operation were significantly likely to report lower patient satisfaction(21,41).

This study showed that patients with sphincter dysfunction in the preoperative period were 0.128 times less likely to have satisfactory patient reported outcome than patients without sphincter dysfunction (AOR: 0.128, 95% CI: 0.019, 0.843, p-value: 0.033), which is in line with study done by JG Kennedy et al which showed that Bladder and anal sphincter dysfunction were predictors of a poor outcome(42).

In this study patient reported outcome is not found to have a statistically significant association with patient's age, sex, educational status, occupation, CBHI use, smoking history, having comorbidities, the preoperative diagnosis, the number of levels involved and the affected lumbar spine level, type of surgery, intraoperative accident, post-operative duration of hospital stay and post-operative complication.

Limitations

The retrospective nature of this study may affect the quality of data collected.

Small sample size

There is no a standardized documentation using validated patient reported outcome measurement tools.

Conclusions

This study demonstrated that satisfactory patient reported outcome following decompressive lumbar surgery for degenerative lumbar disease is comparable with other studies. Pre-operative working status and sphincter dysfunction were found to have statistically significant association with patient reported outcome whereas, patient's age, sex, educational status, occupation, CBHI use, smoking history, having comorbidities, the preoperative diagnosis, the number of levels involved and the affected lumbar spine level, type of surgery, intraoperative accident, post-operative duration of hospital stay and post-operative complication were not found to have statistically significant association with patient reported outcome. A prospective study with a sizable sample size is required to assess the impact of the finding in this study on decision-making in the future.

Recommendations

- To start documenting Patient reported outcome tools during preoperative and postoperative follow-up patient evaluation.
- Early intervention before patients develops significant neurologic deficit preoperatively.
- Future large scale prospective studies to be done on this area.

References

1. Mark S. Greenberg. Handbook of neurosurgery. 9th edition.
2. Ravindra et al. Degenerative Lumbar Spine Disease: Estimating Global Incidence and Worldwide Volume. *Glob Spine J.* 2018;Vol. 8(8) 784-794.
3. Siemionow K. et al. The effects of age, sex, ethnicity, and spinal level on the rate of intervertebral disc degeneration: a review of 1712 intervertebral discs. *Spine Phila Pa* 1976. 2011;36(17):1333–1339.
4. Savage RA, Whitehouse GH, Roberts N. The relationship between the magnetic resonance imaging appearance of the lumbar spine and low back pain, age and occupation in males. *Eur Spine J.* 6(2):106–114.
5. J. N. Katz. Lumbar disc disorders and low-back pain: socioeconomic factors and consequences. *J Bone Jt Surg Am.* 2006;88, Supplement 2.
6. I. M. Virtanen, J. Karppinen, S. Taimela et al. Occupational and genetic risk factors associated with intervertebral disc disease. *Spine.* 2007;32, no. 10.
7. M. Kanayama, D. Togawa, C. Takahashi et al. Cross-sectional magnetic resonance imaging study of lumbar disc degeneration in 200 healthy individuals. *J Neurosurg Spine.* 2009;11, no. 4.
8. M. Liuke, S. Solovieva, A. Lamminen et al. Disc degeneration of the lumbar spine in relation to overweight. *Int J Obes.* 2005;29, no. 8.
9. N. G. Baldwin. Lumbar disc disease: the natural history. *Neurosurg Focus.* 2002;13, no. 2.
10. M. C. Battié, T. Videman, L. E. Gibbons et al. Determinants of lumbar disc Degeneration,. *Spine.* 20, no. 24.
11. K. Luoma, T. Vehmas, H. Riihimäki et al. Disc height and signal intensity of the nucleus pulposus on magnetic resonance imaging as indicators of lumbar disc degeneration. *Spine.* 2001;Vol. 26, no. 6.
12. M. C. Battié, T. Videman, L. E. Gibbons et al. Occupational driving and lumbar disc degeneration: a casecontrol study. *The Lancet.* 2002;Vol. 360, no. 9343.
13. M. C. Battié, T. Videman, E. Levälahti et al. Genetic and environmental effects on disc degeneration by phenotype and spinal level. *Spine.* 2008;33, no. 25.

14. A. Buckwalter. Aging and degeneration of the human intervertebral disc. Spine. Vol. 20, no. 11.
15. Hoy D, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014;73.
16. A. Bakhsh. Long-term outcome of lumbar disc surgery: an experience from Pakistan. J Neurosurg Spine. 2010;12, no. 6, pp. 666–670.
17. Annual Report of Neurological Surgery Department 2017, July 2016-June 2017.
18. Greenhalgh J. The applications of PROs in clinical practice: what are they, do they work, and why? Qual Life Res. 2009;18(1).
19. Alisson R. Teles et al. Why and how should we measure outcomes in spine surgery? Review Article. J Taibah Univ Med Sci. 2016;11(20, 91–97.
20. M. Abebe, T. Munie, G. Lende et al. Pattern of Neurosurgical Procedures in Ethiopia: Experience from Two Major Neurosurgical Centres in Addis Ababa. East Cent Afr J Surg.
21. Taylor et al. Patient-Oriented Outcomes From Low Back Surgery, A Community-Based Study. Spine. 2000 Volume • Number 19; Volume 25 • Number 19.
22. Sharma et al. A Comprehensive Study of Outcome after Lumbar Discectomy for Lumbar Degenerative Spine Disease at 6 Months Post-Operative Period. Open Neurosurg J. 2013;6.
23. Sunderland et al. Patient-Reported Outcomes Following Lumbar Decompression Surgery: A Review of 2699 Cases. Glob Spine J. 2021;Vol. 11(2) 172-179.
24. Shuajin W., Jeffery J.H., Edward A. et al. Postoperative recovery patterns following discectomy surgery in patients with lumbar radiculopathy. Sci Rep. 2022;12:11146.
25. Hareni et al. Predictors of satisfaction after lumbar disc herniation surgery in elderly. BMC Musculoskelet Disord. 2019;20:594.
26. Paulsen et al. Prognostic Factors for Satisfaction After Decompression Surgery for Lumbar Spinal Stenosis. Neurosurgery. 2017;0:1–7.
27. By Eugene J., Carragee, Michael Y.H. et al. Clinical Outcomes After Lumbar Discectomy for Sciatica: The Effects of Fragment Type and Anular Competence. J BONE Jt Surg. 2003 Jan;VOLUME 85-A · NUMBER 1.

28. Rushton et al. Physical prognostic factors predicting outcome following lumbar discectomy surgery: systematic review and narrative synthesis. *BMC Musculoskelet Disord.* 2018;19:326.
29. Aljawadi A, Sethi G, Islam A. et al. Sciatica Presentations and Predictors of Poor Outcomes Following Surgical Decompression of Herniated Lumbar Discs: A Review Article. *Cureus.* 2020 Nov;12(11).
30. Alexandra S. , Alexander C.,William A. et al. Relationship Between Preoperative Expectations, Satisfaction, and Functional Outcomes in Patients Undergoing Lumbar and Cervical Spine Surgery:A Multicenter Study. *SPINE.* 2012;37:2.
31. Fisiha Gebeyehu, Mersha Abebe, Azarias Kassahun. Patient satisfaction three months after elective spine surgery for degenerative spine disease, Addis Ababa, Ethiopia: A one-year prospective study. *Interdiscip Neurosurg Adv Tech Case Manag.* 2023;31.
32. Yeung et al. Posterolateral Endoscopic Excision for Lumbar Disc Herniation Surgical Technique, Outcome, and Complications in 307 Consecutive Cases. *Spine.* 2002;27.
33. M. Macki, M.A. Alvi, P. Kerezoudis et al. Investigators, Predictors of patient dissatisfaction at 1 and 2 years after lumbar surgery,. *J Neurosurg Spine.* 2019 Nov 22;1–10.
34. Shapiro S. Cauda equina syndrome secondary to lumbar disc herniation. *Neurosurgery.*
35. Robinson RG. Massive prolapse of lumbar disc. *Br J Surg.*
36. Shephard RH. Diagnosis and prognosis of cauda equina syndrome produced by protrusion of lumbar disc. *.BMJ.*
37. Chaudhary A, Taylor J. Cauda equina syndrome in lumbar disc disease.
38. K. W. Ongeti. Treatment and outcome of herniated lumbar intervertebral disk in a referral hospital in Kenya. *East Afr Orthop J.*
39. Hermantin et al. A prospective, randomized study comparing the results of open discectomy with those of video-assisted arthroscopic microdiscectomy. *J Bone Jt Surg.* 1999;81:958–65.
40. Lunsford JG, Lawson BK, Johnson AE,. Return to Duty Rates in Active Duty Service Members After Elective Surgery of the Lumbar Spine. *Mil Med.* 2016 Jun;. doi: 10.7205/MILMED. 2016;181(6):572-6.

41. Katz JN, Lipson SJ, Brick GW, Grobler LJ et al. Clinical correlates of patient satisfaction after laminectomy for degenerative lumbar spinal stenosis. *Spine*.
42. J. G. Kennedy, K. E. Soffe,, A. McGrath et al. Predictors of outcome in cauda equina syndrome. *Eur Spine J*.

ANNEX-I: ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of the student: Temesgen Wolde (Year V neurosurgery resident)

Date. _____ **Signature** _____

APPROVAL OF THE ADVISORS

	Name	Signature	Date
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

ANNEX-II: VERBAL INFORMED CONSENT

My name is Dr.Temesgen Wolde, I'm a final year Neurosurgery resident at St.Paul's Hospital millennium medical college. I am calling because I am conducting a research on the title PATIENT REPORTED OUTCOMES AND ASSOCIATED FACTORS FOLLOWING LUMBAR LAMINECTOMY AND DISCECTOMY FOR DEGENERATIVE LUMBAR DISEASE, AT AABET HOSPITAL, ADDIS ABEBA, ETHIOPIA and would like to ask you a few questions. It will only take a few minutes to complete the questions, and the data you submit will only be used for this study.

All information disclosed during the conversation will be kept in a secure location.

Participation in this study is voluntary and you may refuse to participate or stop the interview at any time.

Would it be okay to begin with my questions? Yes/No_____

ANNEX-III: QUESTIONNAIRE

Part-I:-Socio-demographic Data, Clinical presentation and surgery related conditions of the study participants

Serial No	Questions	Findings
1.	Age	_____
2.	Sex	A. Male B. Female
3.	Educational status	A. Under high school B. High school C. College and above D. Other(Specify)
4.	Occupation	A. Farmer B. Government employee C. Private sector D. Other (Specify.....)
5.	Working status	A. Working B. Not working(Reason_____)
6.	Do You have Community based Health Insurance?	A. Yes B. No
7.	Do you Smoking Cigarette?	A. Yes B. No
8.	Comorbidities.	A. Yes (Specify_____) B. No
9	Do you have any history of Psychiatric illness?	A. Yes (Specify_____) B. No
10.	Do you have any history of Previous back surgery?	A. Yes (Specify_____) B. No
Clinical presentation		
Symptoms		

1.	Do you have Back pain?	A. Yes(specify duration____) B. No
2.	Do you have neurogenic Claudication?	A. Yes(specify duration____) B. No
3.	Do you have Radicular lower extremity pain?	A. Yes (specify duration____) B. No
4.	Do you have Lower extremity weakness?	A. Yes (specify duration____) B. No
5.	How is your Physical activity?	A. Restricted(Specify duration____) B. Not restricted
6.	How is your social functioning?	A. Restricted(Specify duration____) B. Not restricted
7.	Do you have any Sphincter dysfunction?	A. Yes (specify duration____) B. No
8	How is your ambulation?	1. Independent 2. With assistance 3. Wheelchair bound
Clinical signs		
1.	Motor weakness	A. Yes B. No
2.	Sensory deficit	A. Yes B. No
3.	Deep tendon reflexes	1. Absent 2. Depressed 3. Normal 4. Exaggerated 5. Clonus
4.	Straight-leg raise test	1. Positive 2. Negative
Diagnosis		

1,	Herniated Lumbar disc (level.....)	1. Central 2. Paramedian 3. Foraminal 4. Extraforaminal
2.	Lumbar canal stenosis with facet and LF hypertrophy	Specify level
3.	Disc herniation with facet and LF hypertrophy	Specify level
4.	Other	1. Yes (Specify_____) 2. No
5.	Tandem cervical disc herniation	1. Yes 2. No
Surgery-related conditions		
Operation done		
1.	Laminectomy	Level_____
2.	Laminectomy and discectomy	Level_____
3.	Foraminotomy	Level_____
4.	MIS Discectomy	Level_____
5.	Other	1. Yes(Specify_____) 2. No
6.	Any Intra operative accident?	1. Yes(Specify_____) 2. No
Post-operative condition		
1,	Post op duration of Hospital stay	_____

2.	Post op complication	1. Yes 2. No
2a.	Infectious complication	1. Chest Infection 2. Urinary tract infection 3. Thrombophlebitis 4. Superficial Surgical site infection 5. Deep surgical site Infection 6. Other(Specify_____)
2b.	Non infectious	1. DVT 2. PTE 3. CSF leak 4. Anemia 5. Other (specify)

Part-II: The patient-based outcome questionnaire

1.	Since your spine surgery, have you had subsequent lumbar spine surgery at the same level?	1. Yes 2. No
2.	Are you satisfied with the outcome of your back surgery?	1. Yes 2. No
3.	Would you select the same spine surgery again in the future, given the same disc herniation and your personal familiarity with the operative experience?	1. .Yes 2. No
4.	How is your back or leg symptoms currently, if any, worse than before your back surgery?	1. Yes 2. No
If the patient answered favorably to the above four questions, their responses from the second four questions were further evaluated and assigned a point value of 0 to 3.(The cumulative point rating was 9–12 points for Excellent, 5– 8 points for Good, and 3– 4 points for Fair)		
5.	The patient self-assessed the degree of clinical recovery after the operation	0. No improvement 1. Partial 2. Almost complete 3. Complete
6.	Time to resume customary occupation from the index	0. After 12 months 1. 7-12 months

	operation	2. 3-6 months 3. Within 2 months
7.	Time to resume normal activities of daily living including recreational sports from the index operation	0. After 12 months 1. 7-12 months 2. 3-6 months 3. Within 2 months
8.	Time to discontinuation of prescription analgesics and anti-inflammatory medications from the index operation	0. After 12 months 1. 7-12 months 2. 3-6 months 3. Within 2 months

PART II-በታካሚ ላይ የተመሰረተ የውጤት መጠይቅ

1. የመጀመሪያ የጀርባ አጥንት ቀዶ ጥገና ከተደረገልዎ በኋላ ብተመሳሳይ ቦታ ላይ በድጋሚ የጀርባ አጥንት ቀዶ ጥገና አደርገው ነበር?

ሀ. አዎ

ለ. አይ

2. በዲስክ (የጀርባ) ቀዶ ጥገናዎ ውጤት ረከተዋል?

ሀ. አዎ

ለ. አይ

3. አሁን ካሳልፉት ከጀርባ ቀዶህክምና ጋር የተያያዘ ልምድ ተነስተው ተመሳሳይ የዲስክ ወይንም የጀርባ ህመም ለወደፊቱ ቢያጋጥሞ ተመሳሳይ የአከርካሪ ቀዶ ጥገና እንደገና ለማረግ ይመርጣሉ?

ሀ. አዎ

ለ. አይ

4. የአሁኑ የሚሰማዎት ጀርባዎ ወይም የእግርዎ ምልክቶች (ህመም ካሎት) ከጀርባዎ ቀዶ ጥገና በፊት ከነበሩት የባሉ ናቸው?

ሀ. አዎ

ለ. አይ

በሽተኛው ለእነዚህ አራት ጥያቄዎች ጥሩ ምላሽ ከሰጠ፣ ለቀጣይ አራት ጥያቄዎች የሰጡት ምላሽ የበለጠ ተገምግሞ ከ0 እስከ 3 ነጥብ ተሰጥቷል። (የድምር ነጥብ ደረጃው 9–12 ነጥብ= Excellent፣ 5– 8 ነጥብ= good ፣ እና 3– 4 ነጥብ= Fair)

5. ከቀዶ ጥገናው በኋላ በታካሚው እይታ በምን ያህል ደረጃ አገግሞዋል ?

ሀ. ሙሉ በሙሉ

ለ. ሙሉ በሙሉ ሊባል በሚችል ሁኔታ።

ሐ. ከፊል

መ. ምንም መሻሻል የለም።

6. ከቀዶ ጥገናው በኋላ ወደ ቀድሞ ስዎራ በምን ያህል ጊዜ ተመለሱ።

ሀ. በ2 ወራት ውስጥ

ለ. 3-6 ወራት

ሐ. 7-12 ወራት

መ. ከ 12 ወራት በኋላ

7. ከቀዶ ጥገናው በኋላ ወደ ተለምዷዊ የቀድሞ የዕለት ተዕለት መደበኛ እንቅስቃሴዎች (የመዝናኛ ስፖርቶችን ጨምሮ) በምን ያህል ጊዜ ተመለሱ።

ሀ. በ2 ወራት ውስጥ

ለ. 3-6 ወራት

ሐ. 7-12 ወራት

መ. ከ 12 ወራት በኋላ

8. ከቀዶ ጥገናው በኋላ በሐኪም የታዘዙ የሕመም ማስታገሻ መድሃኒቶች እና ፀረ-ብግነት መድኃኒቶችን መቼ አቆሙ ?

ሀ. በ2 ወራት ውስጥ

ለ. 3-6 ወራት

ሐ. 7-12 ወራት

መ. ከ 12 ወራት በኋላ

PART II-DEEBBI YAALAMTOOTTA IRRATTI HUNDA'E

1. Eerga Yaaliin baqaqsanii yaaluu lafee dug-ddaa siif hojjeetamee booda sii'a lammaffafi bakka duraatti baqaqsanii yaaluun lafee dug-dda siif hojjetameera?
 - A. Eeye
 - B. Lakki
2. Bu'aa Yaalii baqaqsanii yaaluu lafee dug-ddaa isa jalqabatti gammadee jirta?
 - A. Eeye
 - B. Lakki
3. Dhibeen wolfakkataa osoo siqunamee Yaalii baqaqsanii yaaluu lafee dug-ddaa wolfakkataa gochuuf fedha qabda beekumssa kan duraani irraa argateen?
 - A. Eeye
 - B. Lakki
4. Dhukkubiin dugdaa fi miilla Yaalii baqaqsani yaaluu lafee dug-ddaa booda akkam? Yoo jiraate kan duraa irra caala?

- A. Eeye
- B. Lakki

Deebiin dhukkubsataa gaafii afuur armaan oliif quubsa yoo ta'e gaafii armaan gadii afuur gaafachuun tokko tokkon isaaniif qabxii (0 hanga 3) keenuun madaalama(ida'amnni isaanii 9-12 Excellent,5-8 good,3-4 fair)

5. Dhukkubsataan Yaalii baqaqsani yaaluu lafee dug-ddaa booda gaafa of madaalu fooya'eera?
 - A. Guutummati fooya'eera
 - B. Guutumma guututti jechuun hanga danda'ammu.
 - C. Walakka
 - D. Fooyainssa hinqabu
6. Yaalii baqaqsanii yaaluu lafee dug-dda booda yeroo hammam booda gara hojji isaani durritti deebi'ani?
 - A. Ji'a 2 keessatti
 - B. Ji'a 3- 6 keessatti
 - C. Ji'a 6 -12 tti
 - D. Ji'a 12 booda.
7. Yaalii baqaqsanii yaaluun booda yeroo hammam booda gara hojji isaani guyya guyyatti deebi'an(sochii qaama kan akka ispoortii dabalate)
 - A. Ji'a 2 keessatti
 - B. Ji'a 3- 6 keessatti
 - C. Ji'a 6 -12 tti
 - D. Ji'a 12 booda.
8. Yaalii baqaqsanii yaaluun booda yeroo hammam booda qorichoota dhukkubbiif ajajjamaan kan dhaaban?
 - A. Ji'a 2 keessatti
 - B. Ji'a 3- 6 keessatti
 - C. Ji'a 6 -12 tti
 - D. Ji'a 12 booda.