# To determine the efficacy of unilateral approach for Bilateral Decompression in Lumbar Spinal Stenosis

Sohail Amir[1] , Maimoona Qadir[2], Ibrahim Farooq Pasha[3], Muhammad Asad Qureshi[3]

## ABSTRACT

**BACKGROUND:** Lumbar spinal stenosis is a common condition in elderly patients and can be defined as any narrowing of the spinal canal, lateral recess or intervertebral foramen.

**OBJECTIVES:** The objective of this study is to determine the effectiveness of unilateral approach for bilateral decompression in Lumbar spinal stenosis.

**MATERIAL & METHODS:** It was a Descriptive case series study conducted in the admitted patients of Lumbar spinal stenosis in the Department of Neurosurgery, Combined Military Hospital, Rawalpindi in one year. Total of 86 patients were enrolled in the study. Bilateral decompression through a unilateral approach was performed. All the patients were followed up till 24 hours post operatively for the determination of effectiveness in terms of improvement in at least one grade of pain on visual analogue scale from baseline.

**RESULTS:** In this study, 86 patients with Lumbar spinal stenosis were observed. Male to female ratio was 1.61:1. The study included age ranged from 40 to 78years. Average age was 59.29 years ± 11.41. 8 major complication occur in all patients, 3 patients had unintended dural rent, 3 patient had wound dehiscence, and 2 patient develop discitis, which was manage conservatively. Efficacy of unilateral approach for bilateral decompression in Lumbar spinal stenosis was found in 79(80.2%).

**CONCLUSION:** Unilateral approach for bilateral decompression is the better option for the patients presenting with Lumbar spinal stenosis.

***Key Words:*** *Bilateral decompression, Lumbar spinal stenosis, Unilateral approach, Efficacy.*

This article may be cited as: Amir S, Qadir M, Pasha FI, Qureshi AM. To determine the efficacy of unilateral approach for bilateral decompression in lumber spinal stenosis. JSMC 2017;7(2):102-106

## INTRODUCTION:

Pain radiating to lower extremities is a frequent complaint, especially in elderly people, and lumbar spinal stenosis is one of the underlying conditions. Lumbar spinal stenosis is defined as "buttock or lower extremity pain, which may occur with or without low back pain, associated with diminished space available for the neural and vascular elements in the lumbar spine"[1]. LSS due to degenerative changes start in the fifth and sixth decades of life. It is characterized by ligamentum flavum hypertrophy, bulging of the intervertebral disc, and facet joint thickening with arthropathy, eventually leading to compression of the neural elements[2].Patients complain of neurogenic claudication (pain in the buttocks and lower extremities with or without low back pain provoked by walking or extended standing and relieved by rest and bending forward) that is compatible with a narrowing of the lumbar spinal canal[3].

Because of the elderly age of the patients, LSS is usually treated conservatively with medication, epidural steroid injections, lifestyle modification, and physiotherapy. Surgery is considered in those cases in which conservative treatment has failed to relieve pain and to improve function and typically consists of wide laminectomy[4]. The surgical aim of treatment for symptomatic lumbar canal stenosis is relief of symptoms by adequate neural decompression while preserving much of the anatomy and the biomechanical function of the lumbar spine[5].Conventional laminectomy is frequently associated with surgical failures, generally related to postoperative iatrogenic spinal instability[4].

Other operative options that are less invasive, such as the bilateral laminotomy and, in particular, the unilateral laminotomy for bilateral decompression (ULBD), have been introduced during the past years[2].Bilateral decompression of lumbar spinal stenosis via a unilateral approach involves shorter operating times and less blood loss, less muscle dissection, fewer and less severe complications, and better mobility in the immediate postoperative period than open decompressive techniques[6].The unilateral approach preserves the facet joints and neural arch of the contralateral side, limits postoperative destabilization and protects the nervous structure against posterior scarring [5, 7].The success rate of unilateral approach in cases of bilateral

*1. Naseer Teaching Hospital , Peshawar*
*2. Khyber Teaching Hospital Peshawar.*
*3. Combined Military hospital, Rawalpindi*

*Correspondence: Dr. Sohail Amir*
*House No.80, Street No 6, Sector H-3, Phase 2,*
*Hayatabad, Peshawar. Pakistan.*
*Cell: 03325723653, 03219181303*
*Email : dr.sohailamir@gmail.com*

*Received: January 21, 2017 Accepted: October 27, 2017*

decompression mentioned by different studies is 68%[4], and 85%[5,7], 87%[4], 88%[4], 94%[5,7].

The current study is designed to determine the effectiveness of unilateral approach for bilateral decompression of lumbar spinal stenosis. This study will generate local statistics about effectiveness of unilateral approach in our local population as the literature available showed controversial and differences in the effectiveness. The results of this study will be projected to other neurosurgeons and based upon results of this study we can make suggestions for necessary modifications in the routine management of patients with lumbar spinal stenosis.

**MATERIAL AND METHODS:**

The descriptive case series study was conducted after approval from hospital research and ethical committee over 86 patients in Combined Millitary Hospital, Rawalpindi from June 2014 To Jully 2015. All the patient with symptoms of radiculopathy or neurogenic claudication, radiological/ neuroimaging evidence of LSS involving the central canal and/or foraminal stenosis, failure of conservative treatment with medication and physiotherapy for a minimum of three months were included in the study. All the patients having History of Previous back surgery, lumbar spinal stenosis due to spinal malignancy, presence of instability and spondylolisthesis or combined disc herniation were excluded as they act as confounder.

After written informed consent all patients were subjected to detailed history followed by complete physical and neurological examinations and routine set of investigations were performed. Following endotracheal intubation the patient was turned prone;midline incision made and extended over limited to underlying region of stenosis as documented on MRI. Unilateral laminotomy was performed with partial resection of the inferior aspect of the cranial hemilamina and the superior aspect of caudal hemilamina by using microscopes or operative loupes. After performing ipsilateral decompression , the base of spinous process was undercut. After that , bilateral flavectomy was performed, and the lateral recess and neural foramina were decompress contralaterally. Both the ipsilateral and conrralateral nerve roots were well visualizes after the bilateral decompression. When decompression was confirmed with direct inspection under surgical microscope/operative loupes, the operation was considered completed. All the patient were mobilized on first postoperative day. All the patients were followed up till 24 hours post operatively for the determination of effectiveness in terms of improvement in at least one grade of pain on visual analogue scale from baseline. Visual analogue scale is a horizontal line ,100mm in length anchored by word descriptors from no pain to very severe pain at each end. The patient marks on the line the point they feel represent their perception of their current state pre and post operatively. The VAS score is determined by measuring in millimeters from the left hand end to the point that the patient mark. Data collection include variables such as age, gender, duration of symptoms, number and nature of complication and clinical outcome on VAS. The data were entered, stored and analyzed in SPSS version 10.

**RESULTS:**

In this study, 86 patients with Lumbar spinal stenosis were observed, in which 33(38.4%) were female and 53(61.6%) were male patients. Male to female ratio was 1.61:1.

Patients age was divided in four groups: A(<50yrs), B(50-60yrs), C (60-70yrs), and D (>70yrs) out of which most presented in age of 51-60 years which were 31(36%) while 20(23.3%) patients were in the age range of less than or equal to 50 years, 19(22.1%) were of age range of 61-70 years and 16(18.6%) patients have age more than 70 years. The study included age ranged from 40 to 78years. Average age was 59.29 years $\pm$ 11.41. Age wise distribution of efficacy shows that the efficacy was high in lower ages and decrease as the age increase. Statistically significant results with p=0.002 shows that age have a strong role in efficacy. Similarly, gender also has significant with p=0. 000. table 1

Symptoms wise distribution of efficacy shows that the majority of the efficacy was seen in patients having less than or equal to 20 weeks duration of symptoms but it was insignificant with p= 0.181. Fig 1.

When efficacy was stratified over baseline pain it shows it was high in patients having moderate baseline pain which is highly significant with p=0.000.

Efficacy of unilateral approach for bilateral decompression in Lumbar spinal stenosis was found in 79(80.2%) while 17(19.8) patients show no efficacy

**TABLE NO: 1. AGE AND GENDER WISE DISTRIBUTION OF EFFICACY**

| | | EFFICACY | | | |
|---|---|---|---|---|---|
| | | Yes | | No | |
| | | Number | % | Number | % |
| Age (in years) | ≤ 50.00 | 20 | 100.0 | 0 | .0 |
| | 51.00 - 60.00 | 24 | 77.4 | 7 | 22.6 |
| | 61.00 - 70.00 | 17 | 89.5 | 2 | 10.5 |
| | ≥71.00 | 8 | 50.0 | 8 | 50.0 |
| Gender | Male | 52 | 98.1 | 1 | 1.9 |
| | Female | 17 | 51.5 | 16 | 48.5 |

**Fig : 1: DURATION OF SYMPTOMS WISE DISTRIBUTION OF EFFICACY**

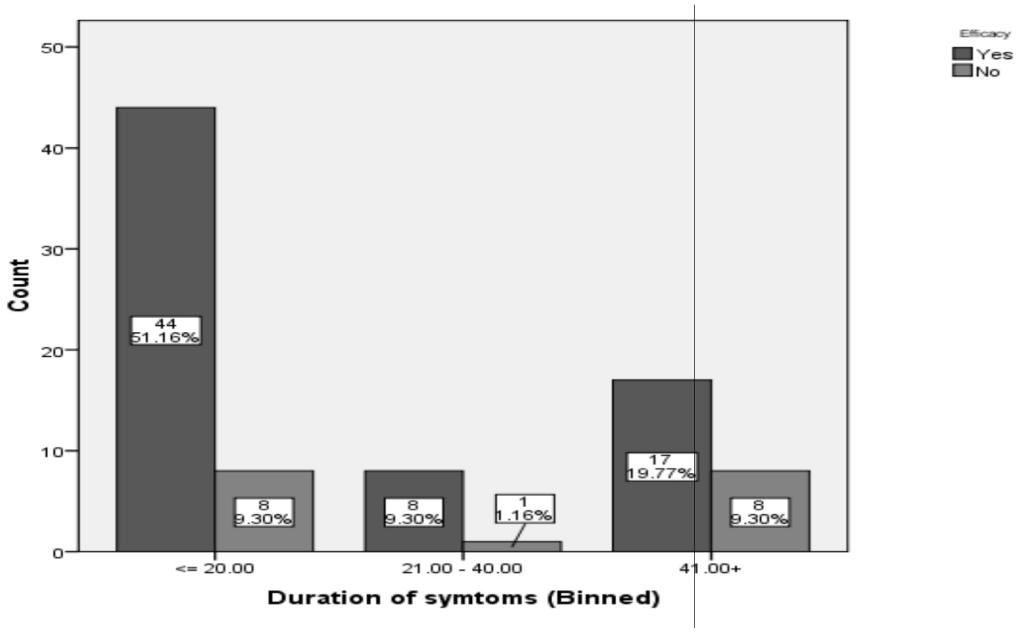
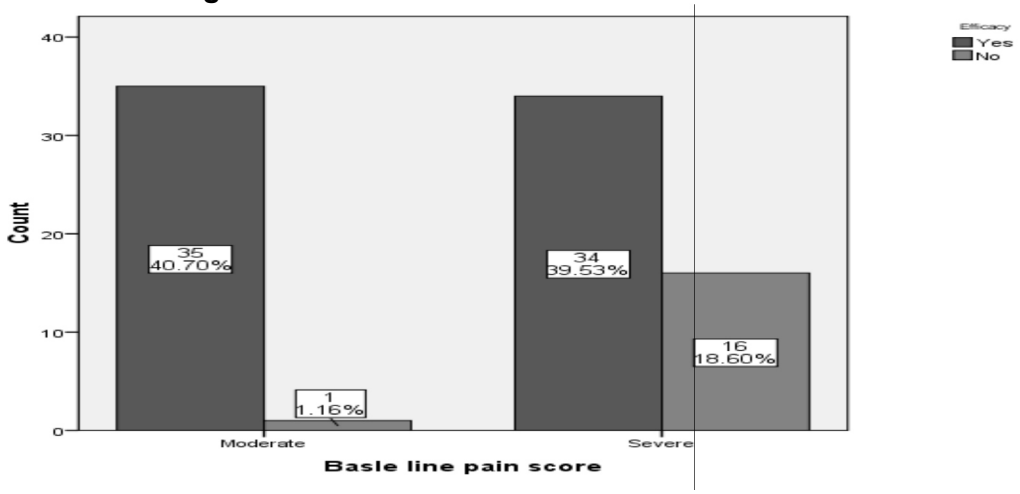



**Fig : 2. EFFICACY ON THE BASIS OF PAIN SCORE**



**DISCUSSION:**

Several surgical techniques for lumbar spine decompression have been described over last few decades. The surgical aim of treatment for symptomatic lumbar canal stenosis is relief of symptoms by adequate neural decompression while preserving much of the anatomy and the biomechanical function of the lumbar spine. Traditional treatment of spinal stenosis has involved wide laminectomy and undercutting of the medial facet with for aminotomy. The frequent surgical failures have been attributed to local tissue trauma[8] and to postoperative spinal instability[9-11], which has led to a dramatic increase in lumbar fusion surgery[12]. Turner's meta-analysis of 74 published studies of surgery for lumbar spinal stenosis produced good to excellent results ranging from 26 to 100% (mean 64%)[13].

Although controversy still lies in the management of lumbar spinal stenosis, surgical decompression has been proven to be the safe and effective treatment option for patients suffering from the disabling symptoms of spinal stenosis [14-15]. However, due to age-related co-existing diseases, healthcare providers as well as patients and their family members are often concerned about surgery in the elderly group [16]. In this respect, applications of less invasive techniques are thought to be very important in the treatment of geriatric spinal stenosis.

Mayer et al[17] demonstrated a decrease in paraspinal muscle strength with concomitant atrophy on postoperative computed tomography scans. See and Kraft[18] echoed these concerns in their observation of chronic denervation and electromyographic abnormalities of the paraspinal muscles 4 years after open surgery. Sihvonen et al[19] noted similar computed tomography and electromyographic abnormalities and correlated these with the postoperative failed back syndrome. The described technique of micro-decompression limits ipsilateral retraction to the level of the medial facet border. Contralaterally, no elevation or retraction of the paraspinal musculature is undertaken, thereby minimizing the risk of iatrogenic muscular trauma and therefore prove to be an important tool in decreasing the risk of these undesirable sequelae.

Our intra and postoperative rate of complications was comparable to other surgical procedures[20,21], and refutes the initial fear that dural sac and nerve roots were injured by using this unilateral approach. A single inadvertent dural tear occurred in the beginning of the series and was caused by too early resection of the ligamentum flavum before and adequate undermining of the spinous process had been achieved. The mean follow-up after 18 months demonstrated that all initial symptoms caused by direct compression or entrapment of neural structures such as paresis, sensory disturbances or neurogenic claudication were treated successfully.

The authors who performed unilateral laminotomy for bilateral decompression, demonstrated good results in 87% (26 of 30 patients)[22] at 9 months; 82% (18 of 22)[23] at 1 year; 88% (22 of 25)[24], and 70% (in 28 of 40)[25] at 18 months; and 68% (in 15 of 22)[24] at 4 years in their studies. In fact, only a few patients really required additional lumbar instrumentation after surgical decompression.

Papavero L,Theil M, of 165 patients underwent microsurgical bialateral decompression using unilateral approach. All patients were divided in to 3 age groups: A(<65yrs) ,B(65-70 yrs),C (>75yrs). This study concluded that efficacy was high in low age group i-e group A, and decreases as the age increases, which correlate well with our study. In the same study the clinical outcome was measured through visual analogue scale, analgesic consumption, neurogenic claudication outcome score, and walking distance x, pain decreases in 85.9% of patient on visual analogue scale which is slightly high as compare to our study.[27]

This study will provide efficacy of unilateral approach for bilateral decompression of lumbar spinal stenosis in our local population, as the literature available shows controversies and differences in effectiveness. The limitation of our study is short follow up and subsequently high complication rate as compare to international studies.

**CONCLUSION:**

Minimally invasive bilateral decompression of lumbar spinal stenosis from a unitateral approach can be successfully accomplished with reasonable operative time and acceptable morbidity. Unilateral approach for bilateral decompression has the advantages of avoiding postoperative spinal instability by preserving the

contralateral facet joint and neural arch and substantial widening of the spinal canal. In addition, unilateral approach for lumbar spinal stenosis is a less invasive technique and leads to favorable results in elderly patients with co-morbid conditions.

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