

# Lateral Recess Stenosis as a Cause for Failed Back Surgery

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## Abstract

**Background:** Lateral recess stenosis constitutes forty percent of causes of failed-back surgery and present with radicular pain which increases with exercise, decreases on rest and have intermittent claudication character. The study aims to identify symptomatology and natural history of the disease pre and postoperatively. Identifying the exact nature of the pathology by CT scan. the determination which group of patients needs a preoperative CT scan of the lower lumbar vertebrae depending on clinical features for measuring the lateral recess.

**Patients:** A total of 24 patients with failed back surgery in whom other causes of failed back surgery were excluded other than lateral stenosis. Mosul teaching hospital neurosurgical department.

**Results:** Lateral stenosis causes pain of specific criteria in the age group over forty years, it occurs in multiple levels and increases in severity from up-down, the severity differs in both sides at the same level and is correlated to symptoms. The laminectomy may not decompress the lateral recess adequately.

**Conclusion:** CT scan of the lumbar vertebrae is indicated preoperatively for patients with disc prolapse and/or stenosis in the age group over forty and has certain criteria in their disease history.

**Keywords:** Lateral Recess Stenosis; Failed-Back Surgery; Radicular Pain; Laminectomy; Disc Prolapse

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## Introduction

Lateral recess stenosis is a stenosis of the lateral subarticular gutter leading to nerve root compression in the lumbar spine, and the narrowest part located at the rostral pedicle. It is bounded laterally by the pedicle, posteriorly by the superior articular facet, and anteriorly by the vertebral body [1]. CT scan can measure the lateral recess perfectly at axial sections taken at the rostral part of the pedicle by the line adjoining the most inferior portion of the superior articular facet to the superior vertebral body [2-5].

Normal lateral recess must be more than 3 mm, and if it is less than 3mm, revealed moderate stenosis and if it is less than 2 mm, represent severe lateral stenosis [1]. There are inherited predispositions and the affected people recorded to have vertebral canal of trifoliate shape [3]. An aggravating factor is the vertical orientation of the facet joint which compromises the lateral recesses [1]. Others are degenerative osteoarthritis in the joint, hypertrophy of the ligament, hypertrophied ligamentum flavum, downward disc prolapse, synovial cyst, and abnormally large root (conjoint root) [1]. The site of compressing vector lies dorsally which is different from the ventrally located disc which has a great influence on the clinical picture and treatment as the degree of compression increase with lordotic posture and the pain meanwhile kyphotic posture relief pressure which happen on sitting that differ from disc pain where it is not relief on sitting [4].

Lateral stenosis represents 40% of conditions of failed back surgery [1,5]. Which is defined as persistent pain after surgery for lumbar stenosis and/or disc disease [1]. The symptom is pain which is described as lancinating pain range from mild to severe radicular leg pain exaggerated by standing walking, relief by sitting, lying, assuming a kyphotic posture and it described as intermittent claudication [1,6]. Straight leg raising test usually negative and nerve deficit is absent because the affected person assumes a posture that relieves the pain so decrease the pressure on the nerve root [7]. CT Scan of the lumbar spine is the cornerstone in the diagnosis of lateral recess stenosis [8]. MRI may play a role in excluding other causes as disc disease and may show hypertrophied ligamentum flavum, which helps in planning surgical treatment [8].

Treatment of the lateral stenosis is surgical meanwhile operating on herniated disc or doing laminectomy for central stenosis the surgeon can decompress the lateral recess through undercutting technique or excision of medial extension of the facet joint and removing hypertrophied ligamentum flavum [9,10]. Surgical treatment of lateral stenosis gives excellent results and complete relief of neurogenic claudication occurs in 80% of patients [1,6].

This study was conducted to determine the symptom of lateral stenosis preoperatively concerning lumbar disc disease and/or stenosis and postoperatively and to define the pathology of the lateral stenosis



by CT scan about every single level, whether it is unilateral or bilateral, or multiple levels, to laminectomy and it is related to symptomatology. In addition, to identify the criteria in person who is decided to be subjected to operation in the lumbar spine for disc prolapse and/or stenosis.

## Methods

A case series was conducted on 24 patients referred to Neurosurgical Department, Mosul Teaching hospital as cases of failed back surgery during the period from June 2003 to December 2005. All those patients are referred to as cases of persistent pain after they have been subjected to spinal surgery for disc diseases and lumbar stenosis. The diagnosis doing by CT scan, measuring the lateral recesses, and correlating complaints to the CT scan finding. Full past medical and surgical history of patients and they are complain analyzed and recorded preoperatively. Then we document the indication behind the decision of operation and all the preoperative investigations taken into account on which surgeon decided operation. Type of operation, date of operation, and history of the postoperative complaint were taken, and concentrating on point goes with lateral stenosis. Then we investigate the patient accordingly by MRI, X-ray, and CT scan. We excluded those patients whose investigation prove that their complaint related to other causes and there were nine patients excluded from the study, three of them had disc space infection, two with recurrent disc herniation, one patient had secondary in the spine and three patients had no cause identified though all of them have normal lateral recess on CT scan.

All of our patients whose history and examination were suggestive of lateral stenosis were subjected to a CT scan of the last lumbar vertebrae at 3 mm section thickness with minimal angle. We use a bone window with magnification and software to measure the real size of the last 3 lumbar vertebrae lateral recesses bilaterally and the central canal. At the section passes through the rostral pedicle of each vertebra were the lateral recesses present.

## Results

The age and sex distributions showed in Figure 1 and Figure 2.

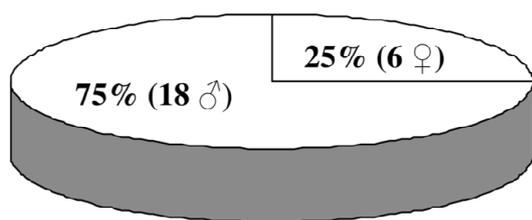


Figure 1: Age and sex distributions in the study.

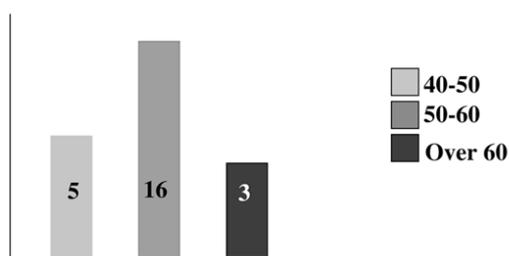


Figure 2: Age range from 40- over 60.

## Preoperation Analysis

Two patients (8%) had pain in one leg only, while 22 patients (92%) had bilateral leg pain with prominence to one side and 6 patients (25%) had backache with their leg pain.

The duration of pain in 21 patients was more than 3 years (87%) and in 3 patients 2-3 years (13%). In all patients the pain was precipitated by exercise and standing, relieved by sitting and lying down and all of them got paresthesia. Only 3 patients were aware that kyphotic posture makes pain relief All the patient's complaints are remitting relapsing (Tables 1 and 2).

Table 1: Relation to Laminectomy Level.

	L5	L4	L3
Normal	1	2	23
Moderate lateral stenosis	2	13	1
Severe lateral stenosis	21	9	-

Table 2: The relation of the laminectomy to the lateral stenosis.

	L5	L4	L3
Laminectomized	23	10	-
Laminectomized with non-decompressed lateral recesses Severe lateral stenosis	20	4	-
Laminectomized with good decompression	1	-	-
Laminectomized with lateral recesses (2-3) mm Moderate stenosis	2	6	-
Non Laminectomized with moderate to Severe lateral stenosis	1	12	-
Non Laminectomized with normal lateral recess	-	2	-
Fenestration	Severe lateral stenosis	Severe lateral stenosis	

## Preoperative Diagnosis

All patients (24) were subjected to MRI of the lumbar spine for the diagnosis of their pathology and the results were: 19 patients were found to have disc prolapse only, 18 of them one level L4-L5 or L5-S1, and one of them had two levels of disc prolapse. Four patients having spinal stenosis with disc prolapse in one level only and one patient had lumbar spinal stenosis only (Figure 3).

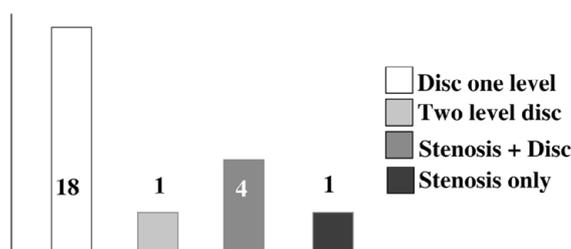


Figure 3: The indication for surgery.

## Relation of Pain to MRI Finding Revealed

Seven patients (27%) their pain and disc prolapse on MRI at the same side and 17 patients (73%) had disc prolapse were contralateral to the site of pain.

## Types of Operation

Twenty-three patients were subjected to laminectomy. 13 had one level laminectomy, 10 had a two-level laminectomy and one patient had been subjected to fenestration.



### Postoperative Pain Analysis

The nature of the complained in the postoperative period at presentation: In 20 patients the pain was lancinating in two patients was burning and in another two was aching the pain is diffuse not localized to a specific dermatomal area in the leg and recurred post operatively in all of our patients within less than one year period. Three patients (12%) had their pain got worsen, meanwhile, 21 patients (88%) experienced no improvement. 22 patients (92%) got bilateral leg pain worse in one leg, two of them (8%) had only one leg pain and 8 of them (33%) got both backaches with leg pain. All of the patients got parasthesia. All of our patients' pain worsens on exercise, standing, and relief by sitting and lying down. Only three (12%) of them were aware that kyphotic posture relief pain.

### On Examination

In all patients the SLRT was negative. Neither deformities of the back, muscle atrophy nor neurological deficit were detected.

### CT- Result

CT scan conducted as the main investigation to diagnose the lateral recess stenosis and lateral recess measured in the CT software for the last 3 lumbar vertebrae. In the third lumbar vertebra only one patient was found to have lateral recess less than 3 mm but more than 2mm bilaterally and in 23 patients it was more than 3mm. In the fourth lumbar vertebra, 2 patients were found to have lateral recess more than 3 mm, 13 patients between 2-3 mm, and 9 patients found to have a lateral recess of less than 2mm in the range of (1-1.9 mm). In the fifth lumbar vertebra, 21 patients had lateral recess less than 2 mm in the range of 0.6-1.9 mm, 2 patients lateral recess 2-3 mm, and in one patient lateral recess more than 3 mm.

### Relation to Laminectomy Level

Twenty-three patients subjected to laminectomy. One patient had fenestration. Of those 23 only 10 have two levels of laminectomy L4-L5 13 only L5 laminectomy. So, we got 10 Laminectomized L4 and 23 Laminectomized L5. In the fifth lumbar vertebra, two out of 23 Laminectomized L5 have lateral recesses measurement (2-3) mm and adjacent Laminectomized L4 also. One patient out of 23 have lateral recesses of more than 3 mm and was subjected to good decompression and there was adjacent L4 with severe lateral stenosis. Twenty out of 23 Laminectomized L5 having lateral stenosis less than 2 mm on both sides. In the fourth lumbar vertebra, 10 were Laminectomized. six patients got lateral recesses (2-3) mm Four patient lateral recess less than 2 mm. Two nonlaminectomized L4 patients having lateral recess more than 3 mm have adjacent laminectomized L5 with severe lateral stenosis less than 2 mm (Figure 4).

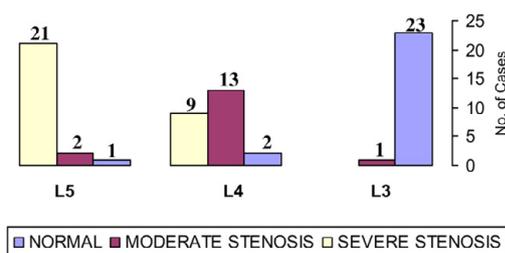


Figure 4: Distribution of finding in the last three lumbar vertebrae.

**Appendix:** The main clinical and pathological differences between disc and lateral stenosis.

Criteria	Disc	Lateral Stenosis
	Ventral	Dorsal
<b>Site of compression</b>		
<b>Pain</b>		
Exercise	+	+
Standing	+	+
Sitting	+	-
<b>Kyphotic posture</b>	-	+
<b>Neurological deficit</b>	±	-
<b>Lasegue sign or straight leg raising test (SLRT)</b>	+	-

### Discussion

The study shows that 25% of patients are females versus 75% males contrary to the other study which show equal incidence for both sexes [11]. Probably due to the small sample in our series. Five patients 21% were 40-50 years meanwhile the majority were 16 patients 66% their age between 50-60 year and 3 patients 13% over 60 years which is older than the age group shown in another study [11].

The study shows that the pre-operative pain was not typical for disc pain for which most of the patients underwent an operation and if we consider that 30% of the normal population having abnormal MRI findings (disc prolapse) [12]. We will know that these patients have already lateral stenosis with their main complaint. On the other hand, if we consider the duration of pain in the preoperative period in 21 patient (87%) more than 3 years and in 3 patients (12%) for 2-3 years. With no precipitating factor for pain rather a pain increase with the progression of the day, exercise and relieved by stooping exercise. Even by sitting it means lateral stenosis present in the preoperative period and considering the recurrence of pain in the postoperative period in all of our patients is occur within less than one year, which is not enough period for degenerative changes to cause Lateral stenosis. Though both pathologies i.e., disc prolapse and lateral stenosis may occur together and disc prolapse especially if protruded disc descends downward, it may decompensate the stenosed lateral recess [12] and may aggravate the symptoms.

In this study, we have found that 17 of our patients (73%) MRI finding not coherent with their Pain side, and only 7 patients (27%) their pain at the same site of the prolapsed disc which means that the offending pathology was different.

The majority of our patient's pain was lancinating in nature (20 patients) 83% which is similar to another study [11,13], while it was burning in two and aching in two.

The type of pain in 22 of them was bilateral leg pain worse in one side, this reflects the radicular nature of pain in lateral recess stenosis and the pathological finding of bilateral that stenosis which is more in one side than the other.

The pain does not follow a specific dermatomal pattern is rather a diffuse leg pain probably due to multiple root compression contrary to another study [11,14-16].

Backache was found in eight patients (34%) in association with leg pain and its part of the clinical picture [17].

Paraesthesia has been found in all of our patients and reflects pressure on the nerve root [12].

The majority of our patients 21(88%) have not found any improvement in the pain after the operation (laminectomy) reflect that



the operation did not correct the pathology (lateral stenosis).

Their pain in the preoperative period increases with the passage of a day, exercise, and improved after a period of rest or sitting down as mentioned in the other studies [18].

Three of our patients 12% were aware that kyphotic posture makes significant relief of pain contrary to results of other studies [17].

No one of our patients got deformities, neurological deficits which are considered with the nature of lateral stenosis [17,19-21]. All of our patients were found to have SLRT negative.

The lateral stenosis occurred in multiple levels in different severity and increase as we go down from L3 to L5 probably reflects that the increase in the mobility at L5 cause increase stress and degenerative changes.

If we consider those patients having good decompression at laminectomized L5 whose lateral recess was more than 3 mm and have adjacent non laminectomized L4 levels with severe lateral stenosis, we have to know that the patient didn't get benefit from the operation because it did not decompress the lateral stenosis of L4. A similar thing for two patients who got normal lateral recess more than 3 mm at L4 underwent Laminectomy for L5 and the operation did not satisfactorily decompress lateral stenosis at L5.

Correlation of left side to right side there were differences in the size of the lateral recess between both sides. Though both sides are severely stenosed which explains the lateralization of pain.

In the fourth lumbar vertebra, there was Nine patient with severe lateral stenosis all of them have differences from left side to the right side lateral recess.

Range from 0.2-0.6 mm and eight patients have right-side leg pain mainly and have right-sided lateral recess less than left side lateral recess and the patient who have Lt Side pain have Lt Side lateral recess smaller than right- side by 0.4 mm.

In the fifth lumbar vertebra twenty-one patients with severe lateral stenosis, 6 have left side pain prominence and 15 have right side pain prominence.

Those left side pain got bilateral stenosis and left side smaller than right side by 0.2-0.4 mm range. Those who got right side pain prominence has a lateral recess in right side narrowest than left side by 0.3-0.6 mm range and both sides are significant stenosed.

All of those patients' C.T scans show inequality in the stenosis on both sides and the prominent stenosis on one side in both levels (L4, L5) and is correlated clinically to the pain prominence toward one side. Two patients have only one-sided pain they have to severe lateral stenosis at L5 level with normal L4 lateral recesses and pain at the side of more severe stenosis. Laminectomy may or may not decompress the lateral recess though it decompresses central stenosis as no one of our patients got significant central stenosis.

## Conclusion

Symptoms of lateral stenosis is bilateral leg pain prominent on one side with no specific dermatomal pattern with or without backache paresthesia always present, pain increase with the day and exercise (intermittent claudication) developed slowly over a long time and of remitting relapsing course assuming kyphotic posture is not important diagnostic criteria. CT scan of the lumbar vertebrae is diagnostic

and correlated clinically to side and severity of pain. Lateral stenosis occurs at multiple levels. The severity increases from up down and differs from side to side in a single level. It is not necessarily that lateral stenosis occurs with central stenosis rather occurs alone and even at the laminectomized vertebrae also. CT scan may be done for that patient over forty presented with radicular leg pain with or without backache developed over a long time of remitting relapsing course of intermittent claudication nature to measure the lateral recess if they are going to be subjected to surgery for lumbar stenosis and or disc to diagnose and decompress the stenosed lateral recess.

## Recommendation

CT scan may be done to those patients submitted to lumbar surgery for lumbar disc prolapse and/or spinal stenosis to measure lateral recesses in the age group over 40 years, those have poorly localized radicular leg pain, of intermittent claudication character especially if the pain developed slowly over a long time of remitting relapsing in nature with paresthesia and SLRT may be negative.

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