

Short Term Clinical Outcomes in Spine Surgeries. A Descriptive Cross Sectional Study in a Tertiary Care Hospital

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ABSTRACT

Objective: To find out the short-term post operative outcomes faced by patients undergoing various spine procedures.

Study Setting: Neurosurgery department Khyber Teaching Hospital Peshawar Khyber Pakhtunkhwa.

Study Duration: January 2022 to January 2023

Study Design: Cross-sectional study (descriptive).

Material and Methods: After taking approval from the hospitals ethical and research committee a single center review of the medical records of all patients who underwent common surgical procedures of the spine were collected and patients followed for short term post-operative outcomes. Data was analyzed by using the statistical software SPSS version 23.0 and the results were presented in the form of tables and charts.

Results: Out of 360 patients included in the study, 206 (57.2%) were males and 154 (42.8%) were females with a mean age of 41.3 ± 13.4 . The highest percentage of patients presented with a PIVD at L4-L5 (n=176, 48.9%). It turns out that aged patients had more VRS scores compared to young candidates after surgery (p-value= 0.05) and patients who underwent only decompressive laminectomies had noticeable reduction frequency of discitis (p-value= 0.40) and a remarkable improvement in the VRS score after surgery (p value=<0.01) as compared to other procedures.

Conclusion: Even though laminectomy, being the procedure of choice in so many cases, significantly treats neurogenic claudication, still unresolved back pain is the most common complaint made by patients in the post operative period. However, despite complications, patient satisfaction rates have improved over the period of time.

Keywords: Post-operative complications, laminectomy, discectomy, neurosurgery.

INTRODUCTION

One of the most common complaints by patients in the outdoor setting is lower back pain (LBP), as 80% of the population globally is prone to develop this problem at least once in their life¹. Among the most common causes for lower back pain is degeneration of the discs in the spine that lead to prolapsed intervertebral discs (PIVD) with almost 90% of disc herniations occurring at the level of L4-L5 or L5-S1 level^{2,3}. The intervertebral disc is composed of an inner nucleus pulposus and an outer annulus fibrosis and it is the structural weakness in the annulus fibrosis which allows the nucleus pulposus to protrude out or herniate hence leading to PIVD⁴. PIVD is most prevalent in the age group of late thirties or early fifties with a male to female ratio of 2:1⁵.

Patients usually present with radicular pain, decreased sensation at the lumbosacral nerve root distribution, lower limb weakness, neurogenic claudication, stiff flexion in the lower back and pain increasing with coughing and straining in the seated position. It is more common to have a herniated disc in the lumbar and cervical region due to mechanical stress in the flexible part of the spine as compared to the thoracic region^{6,7}. Most patients who present with LBP are managed conservatively with a wait and watch policy where symptoms tend to improve within six to eight weeks with appropriate patient education, physiotherapy, exercises and pain medications⁸⁻⁹. Patients who don't respond to medical therapy specifically those with neurological deficits are considered for surgical management¹⁰⁻¹¹, and the two most common procedures performed are laminectomies and discectomies either through open approach or minimally invasive approach¹².

Even though laminectomy is regarded as the most effective surgical procedure for multiple pathologies of the spinal cord, with a patient satisfaction rate of above 75%¹³, it has its own set of post operative complications such as the post laminectomy syndrome¹⁴, re-stenosis¹⁵, disability¹⁶, dural tear, nerve root injury and epidural fibrosis¹⁷. Almost similar adverse events are also noticed with fenestration and discectomies. Studies have illustrated some reasons for failure of herniated disc surgeries which include improper diagnosis, wrong patient selection followed by incomplete surgical procedures¹⁸⁻¹⁹. The following study conducted in a tertiary

care setting will shed further light on the frequency of various short-term outcomes in terms of complications and patient satisfaction noticed following spine surgeries and what could be done to prevent them in the future.

METHADODOLOGY AND STUDY DESIGN

This following cross sectional study was conducted in department of neurosurgery Khyber teaching hospital Peshawar from January 2022 to January 2023 comprising of 360 patients selected through non probability consecutive sampling.

The hospital's ethics and scientific committee gave its clearance before the study could be carried out. Through OPD, all patients who met the inclusion requirements were added to the trial and then admitted to the ward for additional evaluation. All participants in the study had their goals and advantages outlined to them, and if they agreed, formal informed consent was obtained. All patients underwent thorough clinical and historical evaluations before undergoing the requisite preoperative baseline tests.

We conducted a single center review of the medical records of all patients who underwent common surgical procedures such as laminectomy, laminectomy with discectomy and fenestration with discectomy. The data includes diagnosed patients with PIVD presenting to OPD with LBP who did not respond to conservative management. Patients who presented with LBP secondary to other causes such as trauma, weight gain, neuropathies, comorbid conditions such as diabetes mellites and autoimmune spine diseases along with other pathologies related to spinal disability were excluded from the study. Parameters of the study included surgical site infections (4th post operative day), bleeding from wound site (dressing), possibility of dural tear (leakage of spinal fluid), post operative pain (VRS score from 1-10), transient neurodeficit (loss of power in 24 hours by medical research council, score out of 5) patient satisfaction through 4-point questionnaire ranging from 4 points (very satisfied) to 1 point (very dissatisfied) at 3 months post-operative period.

Data was analyzed by using the statistical software SPSS version 23.0. Quantitative variables were calculated as Means \pm Standard deviation and qualitative variables were

calculated as frequencies and percentages. Measures of association were analyzed by using chi-square test followed by regression analysis. A p-value of < 0.05 was considered significant and the results were presented in the form of tables and charts.

RESULTS

Out of 360 patients included in the study, 206 (57.2%) were males and 154 (42.8%) were females with a mean age of 41.3 ± 13.4. Prolapsed intervertebral disc was observed at various levels of the spinal cord, the highest percentage of patients presented with a PIVD at L4-L5 (n=176, 48.9%) followed by L5-S1(n=118, 32.8%) and L3-L4(n=38, 10.6%) shown in table 1. Laminectomies were done for 192 patients (53.3%) thenceforth fenestration and discectomy for 126 patients (35%) and laminectomy with discectomy for 42 patients (11.7%). The list of post operative outcomes included: -

- Surgical site infections at 7th post operative follow up: noticed in 52 patients (14.4%)
- Post operative bleeding (surgical dressing) treated conservatively: in 11 patients (3%).
- Post dural tear leakage of spinal fluid: in 22 patients (6%)
- Post operative pain according to visual analogue scale: score=3(n=142 patients, 39.4%) score=4 (n=120, 33.3%) score=5 (n=60, 16.7%) and the rest of the details given in table 2.
- Transient neurodeficit loss, power assessment by medical research council MRC scale: grade 5(n=185, 51.4%) grade=4(n=156, 43.3%) grade 3(n=17, 4.7%) grade 2(n=2, 0.6%).
- Patient satisfaction rate: very satisfied (n= 76, 21.1%), satisfied (n= 220, 61.1%) dissatisfied (n=50, 13.9%) very dissatisfied (n=14, 3.9%)

Pearson chi square test was applied to test the correlation between age, gender, level of PIVD and type of surgery with all of the post operative events. It turns out that aged patients had more VRS scores compared to young candidates after surgery (p-value= 0.05) however no statistical relationship was seen between age and other post-operative variables. Similarly, gender and level of PIVD had no significant correlation with any of the short-term outcomes. Patients who underwent laminectomies had noticeable reduction in the rate of surgical site infections (p-value= 0.40) and a remarkable improvement in the VRS score after surgery (p value=<0.01) as compared to other procedures. The rest of the parameters did not show any noteworthy association with any of the events in the post operative period. Details of correlation are shown in table 6.

Table 1: Levels of PIVDs observed in patients.

PIVD level	Frequency	Percent	Valid Percent
PIVD C3-C4	3	0.8	.8
PIVD C4-C5	1	0.3	.3
PIVD C5-C6	22	6.1	6.1
PIVD L2-L3	2	0.6	.6
PIVD L3-L4	38	10.6	10.6
PIVD L4-L5	176	48.9	48.9
PIVD L5-S1	118	32.8	32.8
Total	360	100.0	100.0

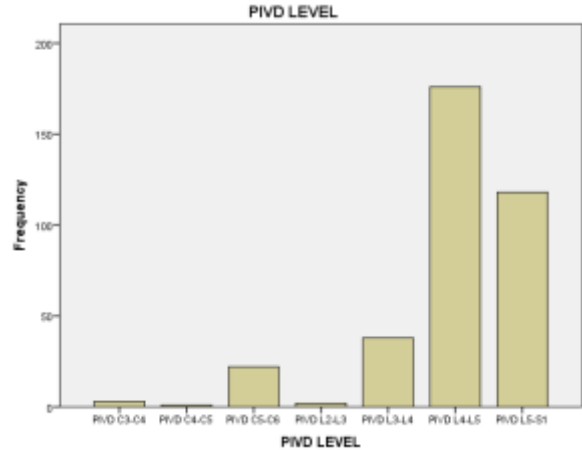


Table 2: Pain scores according to VRS scale.

VRS scale	Frequency	Percent	Valid Percent
2	6	1.7	1.7
3	142	39.4	39.4
4	120	33.3	33.3
5	60	16.7	16.7
6	21	5.8	5.8
7	8	2.2	2.2
8	3	0.8	.8
Total	360	100.0	100.0

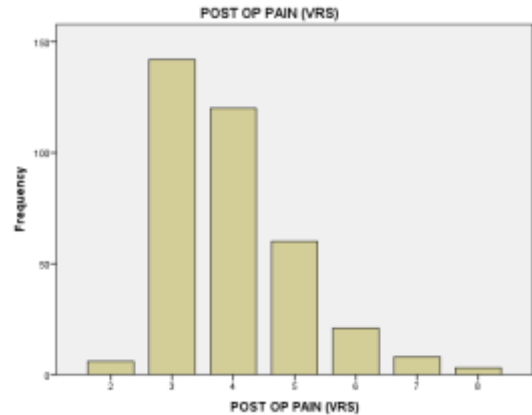


Table 3: Crosstabulation type of surgery with post operative pain VRS scale.

Treatment/Surgery * Post OP Pain (VRS) Crosstabulation		Post OP Pain (VRS)							Total
		2	3	4	5	6	7	8	
Treatment/Surgery	Fenestration +discectomy	3	51	34	28	6	4	0	126
	laminectomy	3	83	71	23	10	2	0	192
	laminectomy + discectomy	0	8	15	9	5	2	3	42
Total		6	142	120	60	21	8	3	360

Table 4: Crosstabulation type of surgery with transient neurodeficit loss.

Treatment/Surgery		Transient Neurodeficit (Loss of Power in 24 Hrs by Mrc Grading Score Out of 5)				Total
		2	3	4	5	
Treatment/Surgery	Fenestration +discectomy	0	5	57	64	126
	laminectomy	2	10	77	103	192
	laminectomy + discectomy	0	2	22	18	42
Total		2	17	156	185	360

Table 5: Crosstabulation type of surgery with patient satisfaction.

		Patient Satisfaction (4-Point Questionnaire)				Total
		1	2	3	4	
Treatment/Surgery	Fenestration +discectomy	4	22	78	22	126
	laminectomy	10	23	119	40	192
	laminectomy + discectomy	0	5	23	14	42
Total		14	50	220	76	360

Table 6: Correlation between variables and post operative outcomes in terms of p-values.

	SSI	Bleeding	Post op pain	Leakage of spinal fluid	Transient neurodeficit loss	Patient satisfaction
Age	0.790	0.745	0.05	0.808	0.707	0.329
Gender	0.198	0.259	0.537	0.287	0.293	0.732
PIVD level	0.305	0.992	0.997	0.994	0.246	0.594
Type of surgery	0.040	0.740	<0.01	0.08	0.656	0.202

DISCUSSION

Surgery for decompression of the spinal nerves due to degenerative disease process is one of the commonest procedures performed in the domain of spine surgery however, the post operative short-term efficacy and safety of the procedure is still under research. The present study aims to appraise the post operative (within hospital stay) sequelae of the common spine procedures that are performed in a tertiary care setting for prolapsed intervertebral discs to treat low back pain.

The present study demonstrates noticeable improvement in pain following laminectomies and fenestration with discectomy in almost 70% of the patients and a 55% patient satisfaction rate observed with the same procedures (table 3 and 5). The results are consistent with the findings of El Tabl MA et al²⁰ and his coworkers who reported more than 50% betterment in pain and 58.7% satisfaction proportion among patients who underwent laminectomies. Similarly, in a cohort study involving 500 patients conducted by Bydon M et al²¹ and his colleagues, out of 57.40% of patients presenting initially with back pain, only 25.40% had this symptom postoperatively (P < 0.001). Liao et al²² and his team, analyzed 181 patients in a retrospective design who had posterior decompression for degenerative lumbar disease and noticed 86% patients exhibiting excellent results.

Spinal decompression, even though beneficial and effective in treating low back pain is associated with significant blood loss as discussed by MacNalty A²³ in his paper, post laminectomy syndrome, paraspinal muscle devascularization secondary to nerve injury²⁴ and the risk of re-stenosis warranting re-exploration. Garcia JB et al. reported a prevalence of 60% for post laminectomy syndrome and a muscle weakness of 61%²⁵. Dural tears was the most frequent complication seen by Williams MG et al. in their study²⁶. Surgical site infections are reported to occur in about 0.7 to 12% of cases, Ogihara S et al²⁷, and it has an incidence of only 3% in a paper quoted by Chaudhary SB et al²⁸ and his fellow researchers. The present study illustrates an incidence of 14.4% as far as surgical site infections is concerned, post operative bleeding seen in 6.9% cases, dural tear leading to CSF leakage in 9.2% cases and iatrogenic injury leading to muscle weakness in almost 5% of the cases. So, the statistics are showing wide variation which can be most probably attributed to hospital resources and facilities.

This study has highlighted some of the after effects of spine surgeries conducted in a tertiary care setting carried out over a period of 12 months and the need for measures to be adapted to prevent their occurrence in the future. Some of the limitations of the study include patient selection bias (since only one institute was used), a simple cross sectional study design, limited sample size and a short term follow up.

CONCLUSION

This descriptive study demonstrated functional outcomes following common spine procedures performed for prolapsed intervertebral disc causing low back pain. It turns out that laminectomy is still the most common procedure performed with the highest success rate in managing this symptom however it has its fare share of adverse

events after surgery as well. Despite all the data available, there is a lack of high-quality evidence for long term events that occur following spine surgeries. We propose that this matter be taken into consideration by the hospital authorities and steps be taken to further reduce the morbidity observed following spine procedures.

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