https://doi.org/10.3329/bjns.v9i2.44883

Original Article

Functional outcome of Lumber Spinal Stenosis in Laminectomy, Laminotomy and Unilateral approach

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Conflict of interest: There is no conflict of interest relevant to this paper to disclose.

Funding Agency : was not funded by any institute or any group.
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Received: 03 Aug 2019
Accepted: 4 September 2019

Abstract:

Objective: *The objective of the study was to compare the surgical outcome between Bilateral Laminotomy, Laminectomy and Unilateral approach in Lumber Spinal Stenosis.*

Methods*: One hundred forty four (144) patients were going to underwent three prospective surgery such as Bilateral Laminotomy (48 patients), Laminectomy (48 patient) and Unilateral approach (48 patients). This study conducted between 2009 to 2014 at private medical hospitals in Dhaka. All the patients ages are e" 40. All the patients were observed prospectively. Clinical outcomes for back and leg pain were analyses using Oswestry Disability Index (ODI) questionnaires and Swiss score.*

Results: *Satisfactory decompression was accomplished in all patients. The complications were less in patients who had experienced Unilateral Laminotomy rather than Bilateral Laminotomy and Laminectomy. Mean age of patients were 52.16+/- 6.87 years with the range of 40-68 years. Among them 101 patients are male (70.11%) and 43 patients are female (29.99%). The rates of improvements are 79.17% in Laminectomy, 85.1% in Bilateral Laminotomy and 91.9% in Unilateral Laminotomy. From here unilateral Laminotomy have quite better results than others. Minimum follow up period was 2 years.*

Conclusion: *Unilateral Laminotomy has a satisfactory outcome in Lumber Spinal Stenosis surgery in comparison to rest of two approaches. Postoperative complications were minimum in respect to blood loss, hospital stay and revision surgery.*

Key words: *Laminectomy, Bilateral Laminotomy, Unilateral Laminotomy, Lumber Spinal Stenosis.*

Bang. J Neurosurgery 2020; 9(2):105-110

Introduction:

Lumbar Spinal Stenosis (LSS) is a restorative condition in which the spinal waterway limits and packs the nerves at the level of the lumbar vertebrae. It starts between fifth to sixth decades of life. Degenerative changes of the spine are seen in up to 95% of individuals by the age of 50. Spinal stenosis regularly happens in grown-ups more than 60 years of age. Back pain is the most widely recognized reason for spinal stenosis. Joint inflammation alludes to degeneration of any joint in the body. In the spine, joint inflammation can result as the circle declines and loses water content. In kids and youthful grown-ups, circles have high water content. As we get more seasoned, our circles start to dry out and debilitate. This issue causes settling, or crumple, of the circle spaces and loss of plate space stature.[1]

Traditionally, the careful treatment of obtained lumbar stenosis has been wide laminectomy, which permits decompression of the neural structures by unroofing

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the spinal trench. The achievement rate of the strategy, be that as it may, is just 64%. The incessant careful disappointments have been ascribed to neighborhood tissue injury and to postoperative spinal insecurity, which has prompted a sensational increment in lumbar combination medical procedure. Expanding learning of the pathoanatomy, combined with high-goals imaging, has permitted an exact limitation of nerve pressure, which as a rule happens at the level of the intervertebral space and the swelling yellow tendons. Different creators have proposed more custom fitted and less intrusive procedures in the treatment of obtained lumbar stenosis. Specifically, two-sided and one-sided laminotomy for two sided decompression have been depicted. The revealed results have been empowering, with progress rates as high as 90%, however a large portion of these clinical arrangement included little patient populaces, enrolled an inhomogeneous populace, were review, or did not have a control gathering.[2]

Objective

Our main objective to compare between Laminectomy (group 1), Bilateral Laminotomy (group 2) and Unileteral Laminotomy (group 3) and find out which approach showed best possible outcomes.

Methods:

This prospective observational study was conducted in private hospitals, Dhaka from 2009 to 2014. This is a multicenter study. Hundred and forty four patients were going to three different approaches for lumber spinal stenosis were included this study. The examination convention was endorsed by the institutional morals board of trustees. One hundred and forty four patients (meanagesare52.16+/-6.87 years) with lumbar spinal stenosis stubborn to sufficient moderate treatment were enlisted continuously amid a 60-month time frame. The accompanying incorporation criteria were utilized: 1) indications of neurogenic claudication or radiculopathy; 2) radiological/neuroimaging confirmation of degenerative lumbar stenosis; 3) Failure of conservative treatment at least for 8weeks.[3] Clinical outcomes for back and leg pain were analyses using Oswestry Disability Index (ODI) questionnaires and Swiss score.

All patients experienced an institutionalized neurological and clinical appraisal to assess strolling separation, and agony was estimated independently for the low back and the legs torments. All patients underwent surgery after induction of general endotracheal anesthesia while in the prone position. Surgery was performed in a standardized manner. We used C- arm to identify the level of stenosis pre operatively. All three techniques used in the groups had been routinely performed at our institution in the 1 year preceding the study.

Laminectomy (Group 1): The spinous process and the laminae of the involved segment(s) as well as the medial aspects of the facet joints were resected (facet-sparing laminectomy).Care is formed to preserve the aspect joints, removing solely the osteophytes medially. Patients mobilised the morning once surgery.Analgesia controlled by patients was not routine but was prescribed for patients who needed it.[5] Bilateral Laminotomy (Group 2): The bone from the inferior aspect of the cranial lamina and, to a minimal degree, from the superior aspect of the subjacent lamina was resected, and subsequent flavectomy was performed to expose the spinal canal. The medial aspect of the facet joint was resected to decompress the lateral recess. The spinous process, the supra- and interspinous ligaments, and a substantial portion of the lamina were preserved.

Unilateral Laminotomy (Group 3): Following an ipsilateral laminotomy as depicted before, the spinous procedure was undermined with a fast burr. By calculating the minute view following ipsilateral decompression, the contralateral ligamentumflavum were resected for contralateral decompression. [4]

Results:

Mean age of the patients were 52.16 +/- 6.87 years in between 40-69 years. Highest 42.3% patients were between 50-59 age group and rest of 39.08%, 18.59% are chronologically 40-49 and 60-69 age group (Table 1). Distribution of age based on surgery is shown in Table 2.

Table-I

General distribution of patients according to age (n=144)

Age (years)	Frequency	Percentage (%)
40-49	56	39.08%
50-59	61	42.53%
60-69	27	18.59%
Total	144	100.0%
Mean +/- SD	52.16 +/- 6.87 years	

Table-II

Distribution of age based on surgery

Age (years)	Frequency			Percentage (%)		
	G-1	G-2	G-3	G-1	G-2	G-3
40-49	16	21	19	35	45	40.3
50-59	21	19	21	42.6	38.5	43.5
60-69	11	8	8	22.4	16.5	16.1
total	48	48	48	100%	100%	100%
Total	144					

Table-III

Shows that males (70.11%) were predominantly than females.

Table-III

Distribution of tables according to gender (n=144)

Gender	Frequency	Percentage
Male	101	70.11%
Female	43	29.99%
Total	144	100.0%

Total 36 male and 12 female patients were under goes Laminectomy (G-1) surgery. Respectively 32 male and 16 (66.67% male and 33.33% female) female patients were going through Bilateral Laminotomy (G-2). Rest of 33 male and 15 female patients were going through Unilateral Laminotomy (G-3) surgery. Compare to Laminectomy surgery and Bilateral Lamiotomy 68.75% male and 31.25% female patients were more reliable in Unilateral Laminotomy surgery (Table 4).

Patients who were undergoing into Unilateral Laminotomy, their follow up rate is quite good then rest of other surgery (Table 5).

Laminectomy vs. Bilateral Laminotomy demonstrated no significant difference in the reduction of CSF leak and discitis. From above statistics, it can easily measurable that Unilateral Laminotomy serving quite good surgical outcome than Bilateral Laminotomy and Laminectomy (Table 6).

From above demonstrated table it easily understandable that, patients who were underwent through

Unilateral Laminotomy (G-3) *they* had less blood loss and less hospital stay comparatively Laminectomy (G-1) and Bilateral Laminotomy (G-2) (Table 7).

Table-IV

Distribution of gender based on surgery

Gender	Frequency			Percentage (%)		
	G-1	G-2	G-3	G-1	G-2	G-3
Male	36	32	33	75%	66.67%	68.75%
emale	12	16	15	25%	33.33%	31.25%
Total	48	8	8			
	144					

Table-V

Distribution of patients according to follow up

Follow up (years)	Frequency			Percentage (%)		
	G-1 (n=48)	G-2 (n=48)	G-3 (n=48)	G-1	G-2	G-3
d” 5.0	25	27	25	52.6	55.6	53.2
e” 5.0	23	21	23	47.4	44.4	46.8
Total	48	48	48	100	100	100

The average pre-operative ODI score for all patients was 45.55%, reducing to 25.74% at 6 weeks and was 29.87% after 1 year, (Table 6) .These reductions in disability are statistically significant at a 5% level, with the final ODI scores indicative of mild disability. The degree of disability was found to be independent of gender. Although a greater improvement in ODI was seen for patients at 1 year for Laminectomy vs. Bilateral Laminotomy and Unilateral laminotomy was (19.1% vs. 20.2 % and 21.19), such differences were not found to be statistically significant. Similarly, Laminectomy vs. Bilateral laminotomy and Unilateral laminotomy demonstrated no significant difference in the reduction of ODI scores at 6 weeks.

The following Table 7 shows preoperative and post operative swiss score of Laminectomy vs. Bilateral laminotomy and Unilateral laminotomy.

Swiss.PF = Physical Function Scale of the Swiss Spinal Stenosis Questionnaire Swiss.SS = Symptom Severity Scale of the Swiss Spinal Stenosis Questionnaire

The result is expressed as a percentage of the maximum possible score. The score increases with worsening disability.

Table-VI

Distribution of patients according to complications

Complications	Frequency			Percentage		
	G-1 (n=48)	Gm-2 (n=48)	G-3 (n=48)	G-1	G-2	G-3
No Complication	36	37	42	75%	77.08%	87.5%
Complication	12	11	6	25%	23%	12.5%
CSF Leak	1	2	1	2.08%	4.16%	2.08
Discitis	1	1	1	2.08%	2.08%	2.08%
No Improvement	10	8	4	20.83%	16.67%	8.33%

Table-VII

Blood loss, hospital stay and revision surgery in three groups

Groups	Blood loss	Hospital stay	Revision surgery
G -1	100-350 ML	3-5 DAY	2 patient
G-2	100-250 ML	2-5 DAY	1 patient
G-3	50-120 ML	1-2 DAY	1 patient

Table-VIII

Oswestry Disability Index percentage scores preoperatively, at 6 weeks and 1 year

Cohort	n	Pre-op (%)	6 weeks	1-year	“6 weeks		“1 year	
			Post-op (%)	Post-op (%)	(95% CI) (%)	P value	(95% CI) (%)	P value
All	144	45.55	25.74	29.87	19.8	<0.0001	15.7	<0.0001
Male	101	43.25	24.8	26.37	18.5	<0.0001	16.9	<0.0001
Female	43	47.45	26.52	32.78	20.9	<0.0001	14.7	<0.0001
G1	48	47.18	24.21	28.06	23.0	<0.0001	19.1	<0.0001
G2	48	43.22	19.21	23.02	24.0	<0.0001	20.2	<0.0001
G3	48	43.20	18.21	22.01	24.9	<0.0001	21.19	<0.0001

“, change in score by.

Table-IX

Preoperative and Post operative Swiss Score

Scale	Preoperative			Post operative		
	Gl	G2	G3	Gl	G2	G3
Swiss.PF	2.51	2.5	2.49	1.51	1.5	1.49
Swiss.SS	2.31	2.3	2.2	1.31	1.3	1.2

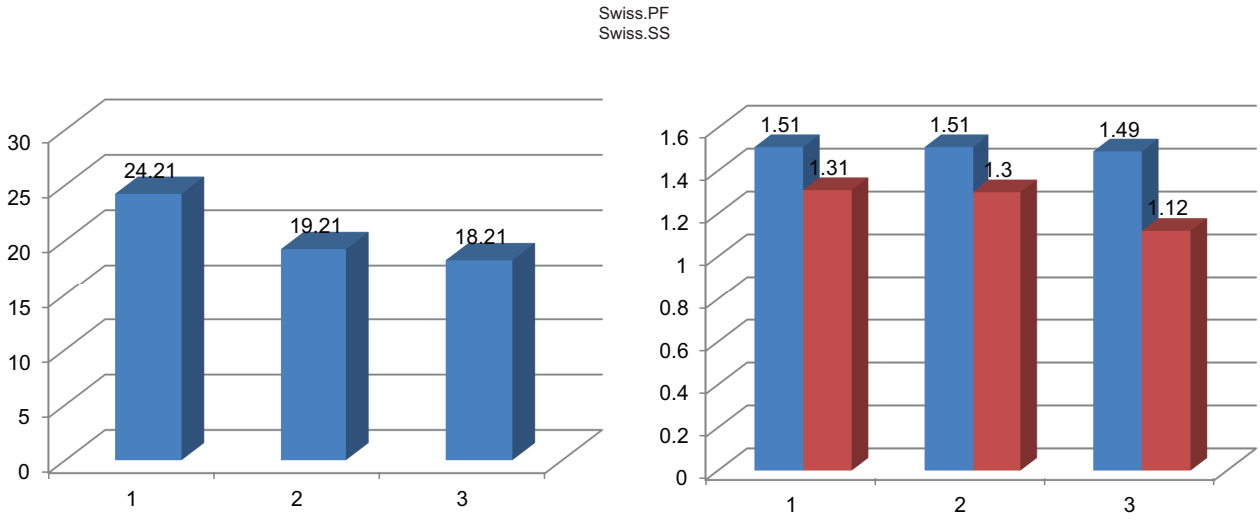

Fig1A and 1B: Postoperative outcome of Laminectomy, Bilateral Laminotomy and Unilateral Approach in Lumber Spinal Stenosis using ODI and Swiss Score

Fig 1 shows that postoperative outcome of Unilateral Approach in Lumber Spinal Stenosis using ODI and Swiss Score is lowest compare with other approaches. Therefore it is clear that in this study post operative outcome of Unilateral approach is satisfactory than other two approaches.

Discussion:

Although effective, Laminectomy decompression is associated with significant blood loss, postoperative wound pain, prolonged hospital stay, extensive soft tissue dissection, devascularization of paraspinal muscles and the risk of iatrogenic segmental spinal instability requiring instrumental fusion or stabilization.[6 -8] As a result, various less invasive adaptations were described in order to preserve the back and soft tissue stripping elements of the spine and thus reduce the risk of iatrogenic segmental instability while maintaining favorable results. These adaptations include techniques such as spinal laminoplastic splitting.[9] Preserving Laminotomy of the spinal process, hemilaminectomy, laminotomy and microsurgical and endoscopic laminotomy.[10,11] In addition, the approach of whether the operation is direct, lateral, unilateral(' cross- over') or slalomic has been examined to try and reduce the adverse effects of the operation.[12 -14] A significant increase in operational and general complications was observed in comparison with Laminotomy with instrumented fusion.[10,11] Our study has shown more complications in Laminectomy than Laminotomy in accordance with the Spine Tango Report.

In our investigation, average patient's age was 52.160 ± 6.87 years among the range of 40-68 years. Maximum 40.80% patients were in both 50-59 and 40-49 year range (Table-1). In our study, males (70.11%) are predominant than female (29.99%). Among 144 patients 33male and 15 female patients were underwent through Unilateral Laminotomy. Which were comparatively higher than Bilateral Laminotomy. In Laminectomy 75% male (36 male) and 25% female (12 female) patients was undergo through this treatment. On the other hand, 66.67% male and 33.33% female patients were underwent through Bilateral Laminotomy. (Table-2). Average follow up years in Unilateral Laminotomy was 4.15 ± 2.08 years. Almost 53.2% patients were under follow up more than d" 5 years and 46.8% patients were following up less than under e" 5 years. Besides in Laminectomy 52.6% patients was in more than d" 5.0 years follow up and 47.4% patients were under e" 5.0 years follow up. Parallel level in Bilateral Laminotomy 55.6% patients were under more than 5 years under observation and 44.4% patients was in less than 5 years observation (Table-5).

In this follow up, we find some complication in all three surgeries. Several complication and improvement stats help us to compare between all three surgeries. In our study among 48 patients in Laminectomy surgery 36 patient had no complication and rest of the 10 patients had complication. Two of patients had CSF Leak and discitis and rest of 8 patients were no improvement. Besides, Bilateral Laminotomy among

48 patients 37 patients have no complication but rest of 11 patients have showed some complication. Maximum two patients were facing CSF Leak complication and 1 patient suffers in discitis problem. But rests of seven patients have no improvement. On the other hand, Unilateral Laminotomy in between 48 patients 42 patients did not have any complication. Only 2 patients suffer in CSF leak and discitis complication and 4 patients did not have any improvement (Table-6). On this study we also observe that those patients who were treated by Unilateral Laminotomy they had quite low blood loss (50-120 ML) and they had stay less time at hospital (1-2 day).

Conclusion:

Unilateral Laminotomy shows comparatively better outcomes rather than Laminectomy and Bilateral Laminotomy. Unilateral Laminotomy has been 91.9% improvement rate whereas Laminectomy and Bilateral laminotomy shows 79.17% and 85.1% improvement rate respectively. Therefore Unilateral Laminotomy has been shown quite better and acceptable performance than other two surgery method. Postoperative complications were minimum in respect to blood loss, hospital stay and revision surgery.

Informed Consent

Informed consent was obtained from all guardians of the patients.

Conflict Of Interest

No potential conflict of interest relevant to this article was reported.

Ethical Consideration

Ethical clearance for the study was taken from the Private Hospital, Dhaka. Patients relatives was informed in details about the study, its merits and demerits explained to them in easy and understandable language and then informed consent was taken.

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