CONTRALATERAL RADICULOPATHY: IS IT RARE AFTER UNILATERAL TLIF?

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ABSTRACT

Introduction: TLIF is a very common spinal procedure done for a variety of clinical indications commonly done for degenerative disc disease. In this procedure, discectomy is done, nerve root is decompressed, neural foramen is enlarged, disc height is restored and unstable segment is stabilized. In our center, we perform TLIF on regular basis. Contralateral radiculopathy in the normal limb is a worrisome complication of this procedure. In this study we will be focusing on the rate, possible explanation and course of contralateral radiculopathy after single sided TLIF.

Objective: To evaluate the rate of contralateral radiculopathy in patients undergoing unilateral transforaminal lumbar interbody fusion.

Materials & methods: All those patients who underwent unilateral TLIF for a variety of conditions at our center between 2012 and 2017 were included in the study. Thorough pre-op clinical and radiological examination was done including CT scan for selected patients. Post operatively, presence of contralateral radiculopathy and its severity was recorded. Patients were re-assured and conservative therapy initiated and followed. In case of improvement at 2 weeks, conservative treatment was continued. If the symptoms did not improve at 2 weeks, MRI and CT scan were performed. If there was any organic cause, it was addressed accordingly. In case no organic cause was found, nerve block was performed at 6 weeks. If no improvement occurred with nerve block, surgical intervention was done. All the data were recorded using SPSS 20.

Results: A total 134 patients were included in the study. Out of 134 patients 29 were male while 105 were female. Mean age of the patients undergoing single level unilateral TLIF was 44.6(SD10.8) years with minimum of 20 and maximum 74 years. Spondylolisthesis was the most common indication with 73(54.5%) patients while 43(32.1%) were with degenerative disc disease and 18(13.4%)were with recurrent disc herniation. total of 11 (8.2%) patients developed contralateral radiculopathy after single level unilateral TLIF. After 2 weeks, 3 patients showed satisfactory improvement and the remaining 8 patients were investigated. In 3 out of these 8 patients no obvious organic pathology was found so continued with conservative treatment. 3 (27.3%)patients were diagnosed with foraminal stenosis while 2 (18.2%) with screw malposition.

Conclusion: Contralateral radiculopathy is a common complication, which can be easily avoided by careful planning and technique.

Key words: TLIF, Radiculopathy, Spondylolisthesis.

INTRODUCTION

Lumbar interbody fusion is one of the most commonly performed spinal procedures in the world[9]. With advances in surgical techniques and spinal instrumentations, the number of spine surgeries is increasing day by day. Lumbar interbody fusion can be performed through different approaches: anterior, posterior and lateral. Each type has its own advantages and disadvantages. Surgeon training, surgeon preference and implants availability also play an important role[11]. Transforaminal lumbar interbody fusion (TLIF) is one of the common types of posterior lumbar lumbar interbody fusion[10].

TLIF is usually indicated in disc degeneration disease with segmental instability. Also an excellent choice in revision cases with or without instability and spondylolesthesis[1]. TLIF decompresses nerve impingement, remove herniated disc material, enlarge neuroformina, restore disc height and stabilize the unstable segment[2]. Usually more symptomatic side approach to the interbody space is used. TLIF is a proven method for the treatment of disc degeneration disease, instability, and spondylolisthesis[3]. The fusion rates reported in the literature are well above 90%, with satisfactory clinical outcome[4]. There are acceptable rate of complications, which includes new onset neurology, infection, screws malposition, pedical fracture and nonunion[5].

Most of the time TLIF is done in patients with degenerative disc disease, prolapse disc with single

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side radiculopathy, instability and spondylolisthesis.

TLIF provides an access to the disc space through far lateral approach, removing part of the facet joint while preserving the other facet joint[6].

In these cases we observed that few patients reported radicular pain in the normal limb after surgery. The literature search yielded a few reports on the same problem[7,8]. Few explanations were given for it apart from some obvious reasons like screw malpositioning. Some proposed that it was due to stretching of the normal side root. Some found the displacement of the superior articular facet into the already narrow foramen[8].

In our center we perform TLIF on regular basis. After initial observation of the contralateral normal side radiculopathy we focused on this problem. This is annoying for patients as their original symptoms go away and the normal limb becomes painful. Literature search on the issue is limited, so we decided to conduct a study on the said problem. In this study we will be focusing on the rate, possible explanation and course of contralateral radiculopathy after single sided TLIF.

OBJECTIVE

To evaluate the rate of contralateral radiculopathy in patients undergoing unilateral transforaminal lumbar interbody fusion.

MATERIALS & METHODS

This prospective case series was conducted at the department of orthopedics and spine surgery Hayatabad medical complex from 2012 to 2018. All the patients fulfilling the inclusion criteria were included in this study. Inclusion criteria was patients undergoing unilateral TLIF for variety of the conditions and were assessed for contralateral radiculopathy.

Patients with bilateral symptoms, postoperative discitis and intraoperative pedical fracture were excluded from the study. Informed consent for surgery was taken from all patients.

All patients underwent detail radiological examination with standers anterioposterior and lateral X-rays and MRI. Flexion & extension lateral radiographs were done in patients with suspected occult instability. CT scan with 3D reconstruction was done in patients with suspected pars defect. Particular attention was paid to the foraminal stenosis on the non-symptomatic side specifically the hypertrophy of the superior articular facet. In case of any stenosis it was addressed during the surgery. In case of spondylolisthesis, any slip greater then 25% the nonsymtomatic foramina were decompressed routinely.

Postoperatively the presence of contralateral side radiculopathy was recorded. If contralateral radiculopathy was present, its severity was recorded. Patients were reassured and started on pregabalin. If there was improvement in the intensity at two weeks, the conservative treatment was continued until resolution of symptoms. Patients who were informed preoperatively about the said complication did extremely well in contrast to those who were not. If there were no signs of improvement in two weeks, 3D CT scan and MRI were performed. In case of foraminal stenosis and screw malposition or herniated disc material, intervention was done. In case of no organic cause, nerve root block was performed at 6 weeks. If no improvement with conservative treatment, surgical intervention was done.

All the data were recorded using SPSS 20. Frequencies were calculated for categorical variables and mean with standard deviations for numerical variables.

RESULTS

A total of 176 patients were reviewed for this study in which 134 patients fulfilled the criteria and were included in the study. Out of 134 patients 29 were male while 105 were female (table 1).

Mean age of the patients undergoing single level unilateral TLIF was 44.6(SD10.8) years with minimum of 20 and maximum 74 years.

The most common diagnosis of patients undergoing unilateral TLIF was spondylolisthesis. Out of 134 patients, 73(54.5%) patients were with spondylolisthesis, while 43(32.1%)were with degenerative disc disease and 18(13.4%)were with recurrent disc herniation (table 2). The most common level was L4-L5 followed by L5-S1. L4-L5 level TLIF was done in 64(47.8%) while L5S1 was done in 62(46.3%) patients. L3-L4 level was the least instrumented and only 8(6%) patients had involvement of this level (table 3).

The severity of spondylolisthesis slip was graded according to the well-known Meyerding classification[12]. According to this classification, slip of one vertebra over the other less then 25% is grade I, 25 to 50% is grade II, 50 to 75% is grade III while 75 to 100% is graded as grade IV (table 4). This grading is important as spondylolisthesis being the most common cause in our series, we routinely decompressed the contralateral foramen if slip was grade II and above, even in the absence of symptoms on that side.

In our series a total of 11 (8.2%) patients developed contralateral radiculopathy after single level unilateral TLIF. After 2 weeks, 3 patients showed satisfactory improvement and were continued on conservative treatment without any further investigation. These patients were symptom free at 6 weeks. 8 patients showed some improvement but not satisfactory so investigations were done. Out of these 8 patients, in three patients there was no abnormality so conservative treatment was continued. These three patients had nerve root block at 6 weeks for their residual symptoms and were symptoms free at three months. Three patients had residual foraminal stenosis and had nerve root block at 6 weeks but they had some discomfort even at three months.

Table 1: Patients' Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	29	21.6	21.6	21.6
2		105	78.4	78.4	100.0
Total		134	100.0	100.0	

Table 2: Diagnosis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Degenerative Disc Disease	43	32.1	32.1	32.1
Recurrent Pid		18	13.4	13.4	45.5
Spondylolisthesis		73	54.5	54.5	100.0
Total		134	100.0	100.0	

Table 3: Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	L3-L4	8	6.0	6.0	6.0
L4-L5		64	47.8	47.8	53.7
L5-S1		62	46.3	46.3	100.0
Total		134	100.0	100.0	

Table 4: Grade of Spondylolisthesis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	22	16.4	30.6	30.6
2		33	24.6	45.8	76.4
3		15	11.2	20.8	97.2
4		2	1.5	2.8	100.0
Total		72	53.7	100.0	
5		62	46.3		
Missing Total		134	100.0		

Table 5: Diagnosis * Contralateral Radiculopathy

Diagnosis	Contralateral Radiculopathy				Total
	Absent	Present no cause	Present due to foraminal stenosis	Present screw malposition	
Degenerative disc disease	39	1	2	1	43
Recurrent pid	17	1	0	0	18
Spondylolisth Esis	67	4	1	1	73
Total	123	6	3	2	134

Table 6: Contralateral Radiculopathy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	absent	123	91.8	91.8	91.8
present no cause		6	4.5	4.5	96.3
present due to foraminal stenosis		3	2.2	2.2	98.5
present screw malposition		2	1.5	1.5	100.0
Total		134	100.0	100.0	

However, these patients were not willing for any further intervention and decided to continue conservative measures. Two patients had screw malposition, which was readjusted in one patient, and the other improved on conservative treatment (table 5).

In summary, out of 11 patients, 6 (54.5%) patients had no obvious reason, 3(27.3%) with foraminal stenosis while 2(18.2%) with screw malposition. The 6 patients in whom no obvious cause was identified, 4 out of these 6 patients were with spondylolisthesis (table 6). Residual foraminal stenosis was mainly observed in patients with degenerative disc disease.

DISCUSSION

Contralateral radiculopathy in normal asymptomatic limb after unilateral TLIF is a worrisome complication both for the patients and surgeon. The reported rate varies. One of the early reported by Hunt T et al was 2.5%[7]. If the new onset neurology is defined as any dysfunction of the nervous system after surgery and the reported rates are usually under 1% then even 2.5 % is considered as high[13]. This is specifically annoying in our local setup where spine surgery is usually avoided at any cost due to fear of neurological injury. They perceive any such symptoms in the previously normal limb as impending paralysis.

The key to avoid such complication is detailed preoperative examination of the patient and proper selection of the patient. It is imperative to carefully examine the MRI scan for any pre existing stenosis on the nonsymtomatic side. Preexisting foraminal stenosis of the normal side is usually reported as the major cause of contralateral radiculopathy after unilateral TLIF[7,8].

Christian M specifically mentioned this in the comment to the paper by Hunt T et al[14].We consider it mandatory to evaluate the nonsymtomatic neuroforamen for any preexisting stenosis or hypertrophy of the superior articular facet. If the anterioposterior diameter of neuroforamen is less then 3 mm on the sagittal plane during surgery, prophylactic decompression should be considered[15].

One of the major indications for unilateral single level TLIF is spondylolisthesis. In our series of 134 patients who underwent unilateral TLIF, 73(54.5%) patients were with spondylolisthesis. Spondylolisthesis reduction is a known risk factor for nerve root injury especially high-grade spondylolisthesis[16]. High-grade slip is defined as slip more the 50% or Meyerding grade III and above. It may occur due to entrapment of the root or stretching apart from direct injury to the root. In our experience it is better to decompress the contralateral non-symptomatic foramen in grade II and above slip. It reduces the risk of contralateral radiculopathy and at the same time it improves reduction of the slip.

In our 134 Patients we had 11 patients with contralateral radiculopathy, which constitute about 8.2%. Jang KM et al reported contralateral radiculopathy in 5.9% of the patients undergoing unilateral TLIF[17]. They reported foraminal stenosis as the main cause of contralateral radiculopathy. Out of 32 patients with contralateral radiculopathy, 22(68.8%) developed it due to foraminal stenosis. In our series out of 11 patients with contralateral radiculopathy, 3(27.3%) were with foraminal stenosis. The rare occurrence of foraminal stenosis as a cause of contralateral radiculopathy in our series is partly due to our routine decompression of non-symptomatic side if there are any signs of preexisting neuroforominal stenosis. In our series, 6(54.5%) patients were with no obvious reason for the contralateral radiculopathy while they reported it only in two (6.3%)patients. Out of these 6 patients, four were with spondylolisthesis. These were mainly patients with grade II and above spondylolisthesis in whom routine decompression was performed. We believe that it is due to manipulation, nerve stretching, post-op edema and inflammation, which lead to radiculopathy. In these patients it is self-limiting and resolve with conservative treatment. Yang Y et al, similar to our study, reported contralateral radiculopathy in 11 (8.5%) out of 130 patients undergoing unilateral TLIF[18]. But in contrast to our study, foraminal stenosis was the main cause of contralateral radiculopathy in their patients.

It is obvious that contralateral radiculopathy after single level unilateral TLIF is quite common occurrence. This must be kept in mind by surgeon and should be communicated to the patients undergoing unilateral TLIF. In majority of the cases, it is self-limiting and resolve with time if preexisting foraminal stenosis on the nonsymtomatic side is excluded preoperatively. Detailed imaging of the nonsymtomatic side is mandatory and every center can devise their protocol accordingly.

CONCLUSION

Contralateral radiculopathy is a common complication, which can be easily avoided by careful planning and technique.

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