Frequency of Complications of Transforaminal Lumbar Interbody Fusion (TLIF): A Single Center Experience.

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Authorship and contribution Declaration:
Each author of this article fulfilled ALL 4 Criteria of Authorship:
1. Conception and design or acquisition of data, or analysis & interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.
4. All authors agree to be responsible for all aspects of their research work.

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ABSTRACT

Objective: To determine the frequency of complications of Transforaminal Lumbar Interbody Fusion (TLIF) in tertiary care hospital.

Methods: This retrospective Cohort study was conducted in Department of Orthopedics and spine surgery Hayat Abad medical complex Peshawar. All patients who underwent Transforaminal Lumbar Interbody Fusion (TLIF) for various indications fulfilling the inclusion criteria and operated in time period extending from 2nd January 2012 and 3rd Jan 2020 were included in this study. A thorough evaluation of the patients records were done and frequency of post operative complications were noted.

Results: Based upon our inclusion criteria the medical records of 208 patients were examined. Male patients were 50(24%) and female 158 (76%).The mean age was 45±7(range 20 to 74 years).The overall complication rate was 33.6%(n=70).Dural tear was documented in 9(4.3%) patients, 16(7.6%) had postoperative ileus, wound infection in 14(6.7%), radiculopathy in 12(5.7%),motor weakness in 1(0.4%), 6 (2.8%) had pseudoarthrosis and 12(5.7%) patients had implants related complications. The re surgery rate was 6.2%(n=13)

Conclusion: Transforaminal Lumbar Interbody Fusion (TLIF) is a reliable surgical procedure to achieve fusion in a variety of clinical conditions. The complication rate is variable. Careful patient selection, preoperative planning and meticulous intra-operative execution can avoid these complications.

Keywords: Complication, fusion, lumbar, Transforaminal Lumbar Interbody Fusion, vertebra.

This article may be cited as: Satar A, Khan MZ, Ullah I, Kabir SK, Saeed M, Waqar M. Frequency of complications of Transforaminal Lumbar Interbody Fusion(TLIF):A Single Centre Experience.J Pak Orthop Assoc 2021;33(2):

INTRODUCTION

Spinal fusion is indicated for a wide range of spinal disorders like degenerative pathologies, trauma, infection and neoplasia.[1] The history of lumbar spinal fusion is about 70 years old.[1,2] Transforaminal lumbar interbody fusion (TLIF) is indicated to achieve spinal fusion in degenerative spinal disorders.[3] The aim of this technique is to achieve fusion of adjacent vertebrae through the disc space to immobilize the intervertebral joint and thus eliminating painful movements.[4] Since the ipsilateral foramen are exposed with minimal traction on thecal sac the approach can be particularly advantageous in cases of scarring and adhesions after previous surgery.[5] In literature successful fusion rate of above 90% and satisfactory clinical outcome has been reported with TLIF.[6] Fusion techniques traditionally utilize iliac crest autograft.[7] Though the clinical success of auto graft has been well documented but this is not without complications. The advances in surgical technology have improved our ability to correct spinal pathologies with less invasive techniques but the technical complexities of these procedures have also increased.[8]

Variable complications of TLIF have been reported in literature ranging from surgical site infection, dural tear, neurological injuries to pseudoarthrosis.[9,10]

Although reported to be relatively safer, TLIF is not without complications. We present a

retrospectively data of perioperative complications associated with TLIF. The objective of our study was to determine the frequency of complications of Transforaminal Lumbar Interbody Fusion (TLIF) in our center.

METHODS

We conducted this retrospective Cohort study in Department of orthopedics and spine surgery Hayat Abad medical complex Peshawar. Medical record of all adult patients of either gender who were operated for TLIF in the time interval between 2nd Jan 2012 to 3rd Jan 2020 were included. Those patients who underwent TLIF for infection or as a second stage adjunct to another procedure were excluded. Patients with incomplete medical record or follow up were also excluded. The study protocols were approved by the Ethical Committee of our hospital. A thorough evaluation of hospital records of these patients were done in terms of both intraoperative and postoperative complications.

All the data was compiled and entered into SPSS version 26 for analysis. Frequencies and percentages were calculated for qualitative data while mean and standard deviation for quantitative data. The data was presented in table where necessary.

RESULTS

The medical record of 208 patients were included in this study. Male patients were 50(24%) and female 158 (76%).The mean age was 45±7(range 20 to 74 years). Indications for TLIF surgery included spondylolisthesis in 109 (52.4%) cases, degenerative disc disease in 71 (34.1%) cases and recurrent disc herniation in 28 (13.5%) cases. The most common level of surgery was L4-L5 (45.7%, n=95) followed by L5-S1 (43.3%,n=90). The overall complication rate was 33.6%(n=70) as shown in table I.

In our study post operative ileus was documented in 16 (7.6%) patients. All of them were treated conservatively with the help of surgical colleagues. Wound discharge was noted in 14 (6.7 %) patients out of which 8(3.8%) patients were successfully treated with antibiotics and dressings. The remaining 6(2.8%) patients underwent re-opening surgery and infective debris was noted in 3(1.4%), sub muscular hematoma in 2(0.9%) and sub facial seroma in 1(0.4%) collection.

The post operative medical record revealed that per operative dural tear was noted in 9(4.3%) patients. All of them were repaired intraoperatively followed by placement of fibrin glue. None of these patients had dural leak from the wound post operatively or at follow up.

Implants related complications were noted in 12(5.7%) patients. Screw malpositioning was documented in 9 patients (4.3%). Screw readjustment was done for 3(1.4%) symptomatic patients and radicular pain was subsided after readjustment. Cage subsidence in 1(0.4%) symptomatic patient was successfully retrieved with resurgery and symptoms were resolved. Implant breakage or pullout was not documented in our study.

In our series 13 (6.25%) patients had new onset neurology. Neurology was defined as radiculopathy in dermatomal pattern and motor weakness of grade 1 or more. Contralateral side radiculopathy was noted in 12(5.7%) patients which was resolved with conservative treatment in 10(4.8%) patients at 12th week. Decompression surgery in 2(0.9%) patients resolved the symptoms. One patient in our series had motor weakness post operatively which improved completely at 12th week.

Pseudoarthrosis was documented in 6 (2.9%) patients. One patient with moderate to severe symptoms had re-do surgery with screws re-adjustment and bone graft. The other 5(2.4%) patients had mild symptoms and were treated conservatively.

There were no cases of pulmonary embolism or DVT formation in our series.

Table I. Frequency of TLIF complications.

Complications		Frequency	Percent
Postoperative ileus		16	7.6%
Post operative infection		14	6.7%
Dural tears		9	4.3%
New onset neurology	Radiculopathy	12	5.7%
	Motor weakness	1	0.4%
Implants related complications	Screw malpositioning	9	4.3%
	Cage subsidence	3	1.4%
Pseudoarthrosis		6	2.8%
Re surgery		13	6.2%

DISCUSSION

In our study 14(6.7%) patients had post-operative infection. Tormenti *et al* reported 3.8% infection rate in their series of 531 patients.[11] Rihn *et al* reported 4.2% infection rate in their series of 119 patients.[7] The relatively higher rate of infection in our series could be because of our low threshold for slight oozing or discolored wound edges as infection. However outcome of our cases with post op infection were satisfactory as all were successfully treated.

We had 9(4.3%) cases of dural tear during surgery. Potter[12] in their series of 100 TLIF procedures reported 6 (6%) cases of dural tears. In another series by Hee HT[13] 5(4.5%) cases of dural tears during TLIF surgery were reported. Hence our reported dural rate is comparable with other studies in literature.[7,14-16]. We repaired all our dural tears intraoperatively followed by putting fibrin glue. None of these patients had dural leak post operatively in the follow up.

The screw malpositioning resulting in symptomatic radicular pain was reported in 9(4.3%) patients in our study. Tormenti MJ *et al*[11] reported 11(2.1%) cases with symptomatic screw malpositioning and all were revised. We did revision in only 3(1.4%) cases.

Intervertebral cage migration is a serious complication of TLIF procedure. We had noted 3(1.4%) cases of cage migration. Re-do surgery was done in one symptomatic patient and displaced cage was successfully retrieved. Aoki[17] reported 3 cases of posterior migration of cage.

One of our patient developed motor weakness on the contralateral side after TLIF in revision PID case. To our understanding it was due to traction on the root because of large cage. Large cages in access of 10 mm height should be carefully used especially in revision cases.

The rate of successful fusion in our series was 97.1% and pseudoarthrosis in 2.1% cases. Brantigan and colleagues[18] reported fusion rate of 90% in their 221 patients with TLIF.Kuslich19 reported 85.3% fusion at 1 year and 90.6 % fusion at 2 years follow up. Other studies[20,21] have also reported fusion rates above 90%.

Our study had few limitations. This study was retrospective in design and the possibility of missing complications existed. Post operative CT scan was not used routinely unless patient was symptomatic. The effects of comorbidities on post operative complications could not be analyzed. We recommend further studies to verify our results.

CONCLUSION

Transforaminal Lumbar Interbody Fusion (TLIF) is a reliable surgical procedure to achieve fusion in a variety of clinical conditions. The complication rate is variable. Careful patient selection, preoperative planning and meticulous intra-operative execution can avoid these complications.

Conflict of Interest: None
Grants/Funding: None

REFERENCES

1. Mobbs RJ, Phan K, Malham G, Seex K, Rao PJ. Lumbar interbody fusion: techniques, indications and comparison of interbody fusion options including PLIF, TLIF, MI-TLIF, OLIF/ATP, LLIF and ALIF. J Spine Surg 2015;1(1):222-230.
2. Cole CD, McCall TD, Schmidt MH, Dailey AT. Comparison of low back fusion techniques: Transforaminal lumbar interbody fusion (TLIF) or posterior lumbar interbody fusion (PLIF) approaches. Curr Rev Musculoskelet Med 2009;2(2):118-126.
3. Chrastil J, Patel AA. Complications associated with posterior and transforaminal lumbar interbody fusion. J Am Acad Orthop Surg 2012 ;20(5):283-291.
4. Goz V, Weinreb JH, Schwab F, Lafage V, Errico TJ. Comparison of complications, costs, and length of stay of three different lumbar interbody fusion techniques: an analysis of the Nationwide Inpatient Sample database. Spine J 2014 ;14(9):2019-227.
5. Rosenberg WS, Mummaneni PV. Transforaminal lumbar interbody fusion: technique, complications, and early results. Neurosurgery 2001;48(3):569-575.
6. Satar A, Khan MZ, Ali M, Raza MM, Saeed M, Waqar M, *et al*. Contralateral radiculopathy: Is it rare after TLIF? KJMS 2019;12(1):58-61.
7. Rihn JA, Patel R, Makda J, Hong J, Anderson DG, Vaccaro AR, *et al*. Complications associated with single-level transforaminal lumbar interbody fusion. Spine J 2009;9(8):623-629.
8. Burneikiene S, Nelson EL, Mason A, Rajpal S, Serxner B, Villavicencio AT. Complications in patients undergoing combined transforaminal lumbar interbody fusion and posterior instrumentation with deformity correction for degenerative scoliosis and spinal stenosis. Surg Neurol Int 2012;3:25-30.

9. Liu J, Deng H, Long X, Chen X, Xu R, Liu Z. A comparative study of perioperative complications between transforaminal versus posterior lumbar interbody fusion in degenerative lumbar spondylolisthesis. Eur Spine J 2016 ;25(5):1575-1580.
10. Takahashi T, Hanakita J, Minami M, Kitahama Y, Kuraishi K, Watanabe M, et al.Clinical outcomes and adverse events following transforaminal interbody fusion for lumbar degenerative spondylolisthesis in elderly patients. Neurol Med Chir (Tokyo) 2011;51(12):829-835.
11. Tormenti MJ, Maserati MB, Bonfield CM, Gerszten PC, Moossy JJ, Kanter AS, *et al.* Perioperative surgical complications of transforaminal lumbar interbody fusion: A single-center experience. J Neurosurg Spine 2012;16(1):44-50.
12. Potter BK, Freedman BA, Verwiebe EG, Hall JM, Polly Jr DW, Kuklo TR. Transforaminal lumbar interbody fusion: clinical and radiographic results and complications in 100 consecutive patients. J Spinal Disord Tech 2005;18(4):337-346.
13. Hee HT, Castro Jr FP, Majd ME, Holt RT, Myers L. Anterior/posterior lumbar fusion versus transforaminal lumbar interbody fusion: analysis of complications and predictive factors. J Spinal Disord 2001;14(6):533-540.
14. Wang J, Zhou Y, Zhang ZF, Li CQ, Zheng WJ, Liu J. Comparison of one-level minimally invasive and open transforaminal lumbar interbody fusion in degenerative and isthmic spondylolisthesis grades 1 and 2. Eur Spine J 2010;19(10):1780-1784.
15. Lowe TG, Tahernia AD, O'Brien MF, Smith DA. Unilateral transforaminal posterior lumbar interbody fusion (TLIF): indications, technique, and 2-year results. J Spinal Disord Tech 2002;15(1):31-38.
16. Whitecloud III TS, Roesch WW, Ricciardi JE. Transforaminal interbody fusion versus anterior–posterior interbody fusion of the lumbar spine: a financial analysis. J Spinal Disord 2001;14(2):100-103.
17. Aoki Y, Yamagata M, Nakajima F, Ikeda Y, Takahashi K. Posterior migration of fusion cages in degenerative lumbar disease treated with transforaminal lumbar interbody fusion: A report of three patients. Spine 2009 ;34(1):54-58.
18. Brantigan JW, Steffee AD, Lewis ML, Quinn LM, Persenaire JM. Lumbar interbody fusion using the Brantigan I/F cage for posterior lumbar interbody fusion and the variable pedicle screw placement system: two-year results from a Food and Drug Administration investigational device exemption clinical trial. Spine 2000 ;25(11):1437-1446.
19. Kuslich SD, Ulstrom CL, Griffith SL, Ahern JW, Dowdle JD. The Bagby and Kuslich method of lumbar interbody fusion: history, techniques, and 2-year follow-up results of a United States prospective, multicenter trial. Spine 1998;23(11):1267-1278.
20. Freeman BJ, Licina P, Mehdian SH. Posterior lumbar interbody fusion combined with instrumented postero-lateral fusion: 5-year results in 60 patients. Eur Spine J 2000;9(1):42-46.
21. Schofferman J, Slosar P, Reynolds J, Goldthwaite N, Koestler M. A prospective randomized comparison of 270 fusions to 360 fusions (circumferential fusions). Spine 2001;26(10):207-212.