FUNCTIONAL OUTCOME OF TRANSFORAMINAL LUMBAR INTER BODY FUSION: AN EXPERIENCE AT A TERTIARY CARE CENTRE

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ABSTRACT

Objective: To assess functional outcome of transforaminal lumbar inter body fusion (TLIF) with specific reference to improvement in pain by visual analogue score (VAS) and Oswestry disability index (ODI).
Study Design: Quasi-experimental study.
Place and Duration of Study: The study was conducted at the Department of Spine Surgery of a tertiary care hospital in Rawalpindi from May 2004 to May 2013.
Material and Methods: Thirty nine patients who underwent TLIF and completed one year of follow up in our department during the study period were included in the study. Cases were evaluated clinically and radiologically preoperatively and assessed for pain with VAS and general well being with ODI. After TLIF they were reassessed at 1, 3, 6 months and 1 year for improvement in VAS and ODI. Patient satisfaction and work status after surgery was also recorded at 1 year of follow up.
Results: Out of 39 cases 19(48.7%) were operated for degenerated disc disease (DDD), 11(28.2%) for spinal stenosis and 7(17.9%) for spondylolisthesis and 2(5.2%) for trauma. A total of 28(71.79%) were males and 11(28.21%) were females. Common levels operated were 12 (30.8%) at L4-5, 11 (28.2%) at L5-S1, and 12(30.8%) at L4,5-S1, 2(5.1%) at L2-4 and 1(2.6%) each at L3-4 and L3-5. At 1 year of follow up median VAS score improved significantly from 7 to 2 and median ODI improved significantly from 76 to 34. Regarding patient satisfaction 26 (66.7%) patients were satisfied, 9 (23.1%) were partially satisfied and 4 (10.2%) were not satisfied with the surgical outcome.
Conclusion: TLIF is a safe and effective procedure for reducing chronic low back pain as a result of DDD, instability and spondylolisthesis.

Keywords: Functional outcome, ODI, TLIF, VAS.

INTRODUCTION

Degenerative disease of the lumbar spine is a serious problem that causes varying degrees of disability. Lower back pain, sciatica, paraesthesia, weakness and intermittent claudication are the main symptoms caused by degeneration[1]. There are different ways to treat degenerative spinal problems and fusion of affected level is one of them. The goal of fusion of the lumbar spine is to obtain a primary solid arthrodesis to alleviate pain. There are three categories of spinal fusion, posterolateral, anterior and circumferential[2]. Different circumferential fusion techniques have been described such as combined anterior–posterior fusion (APF), instrumented posterior lumbar interbody fusion (PLIF) and transforaminal lumbar interbody fusion (TLIF)[3]. Harms et al., first introduced the technique of TLIF in 1982[4]. Back pain is a common chronic disorder that represents a large burden for the health care system. Fusion of the painful spinal segment is one of the popular methods to treat degenerative spinal disorders. The use of instrumentation to stabilize the lumbar motion segments and thereby enhance the fusion rate has been proposed in a number of studies[8]. The surgeon's choice of the approach and mechanical or biological implant is dependent on the patient's specific pathology and anatomy, in addition to the experience and training of the surgeon in similar conditions[9]. Since then TLIF is an increasingly popular treatment for degenerative lumbar conditions, it's unilateral posterior alone approach enables anterior column stabilisation

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and 360º fusion, thus reducing the morbidity associated with posterior and anterior lumbar interbody fusion (PLIF and ALIF)[5]. We evaluated functional outcome of TLIF procedures carried out in our hospital with the help of Oswestry disability index (ODI)[6], visual analogue score (VAS)[6], patient satisfaction and work status after surgery. There is a broad spectrum of available treatment options for patients suffering from chronic low back pain in the setting of degenerative disorders of the lumbar spine, including both conservative and operative approaches[7].The purpose of the study was to analyze the functional outcome of patients of back pain who underwent spinal fusion by TLIF after one year of surgery.

MATERIAL AND METHODS

This quasi-experimental study was carried out in the department of spine surgery of a tertiary care hospital in Rawalpindi from May 2004 to May 2013. All cases operated by TLIF which completed one year follow up were included in the study whereas other cases operated by ALIF and PLIF as well as those which were lost to follow up were excluded from the study.

All patients were operated under general anaesthesia. Patients were positioned prone on the operation table with pillows placed under chest and pelvis to keep abdomen free of pressure. The hip and knee joints were kept partially flexed. The anesthetist took care to avoid pressure on the eyes and other susceptible pressure points of the body. A vertical incision was made over the segment to be fused after identifying the level with C-arm. The skin, muscles, and soft tissues were gently retracted to expose the lateral aspect of the spinous process, the lamina and the facet joints. The pedicle screws were placed in standard fashion using anatomical marks as guidelines and confirmed under image intensifier. A unilateral laminotomy and partial facetectomy were performed on the side consistent with the patient's symptoms or anatomical abnormalities. A bilateral laminotomy was reserved for clinically significant bilateral neural element compression. Complete facetectomy was performed where required.

After adequate decompression, the disc

Table-I: Pre & post comparison of median VAS & ODI (n=39).

Variables	Median	IQ Range	*p*–value
Preoperative (VAS)	7	6 – 8	< 0.001
Postoperative(VAS)	2	1 – 6	
Preoperative (ODI)	76	66 – 78	< 0.001
Postoperative(ODI)	34	16 – 58	

Table-II: Comparison of mean VAS and ODI with other studies.

Study	Year	MeanVAS pre op	Mean VAS at[12] months	Median ODI Pre-op	Median ODI at[12] months
Current	2014	7	2	76	34
Perez-Cruet et al[12]	2014	7.0	4.2	43	29.7
Lars Hackenberg(Degenerativ et al[13]	2005	7.6	4.5	41.6	37.5
Lars Hackenberg(Spondylolisthesis)[13]	2005	8.3	3.2	58.4	20.3
Nattawat witoon[15]	2014	8.7	3.92 (24 months)	-	-
Seng-yew poh[5]	2011	7.2	2.4 (24 months)	-	-

All patients underwent clinical evaluation for low back pain followed by radio-graphic assessment and MRI examinations preoperatively. Functional and pain status was then evaluated with ODI[6] and VAS[6]. Discograms were carried out in doubtful cases to confirm discogenic origin of pain.

space was gradually distracted by using the pedicle screws or an intralaminar spreading device. The dura was retracted with a small retractor. The disc was then removed and end plates denuded of cartilage with curettes. Graft

was then placed in the anterior portion of disc space. Interbody cage of appropriate size was then placed after filling it with graft. We used a single trapezoid cage in one disc space in most of the cases. However, in a few cases two cages were also used. LumcageR was used for interbody fusion and PolyNicesR was used for pedicle screw fixation.

Once the graft and cage were placed within the interbody space, pedicle screws were attached to lordotic rod and carefully compressed to restore lumbar lordosis. Care was taken to restore disc height. The contra lateral facet joint was decorticated and bone graft was placed over them for a posterolateral fusion, thus completing the 360^0 fusion. A standard closure in layers was performed. Non suction drains were placed in all the cases. Pre operative and post operative images are shown in fig.

All patients were mobilized out of bed on first post operative day. They were discharged when pain was within tolerable limits with oral anaelgesics. Stitches were removed after two weeks and they were followed in out patient department at 1, 3, 6 and 12 monthly intervals. Assessment of function was done at the end of 1 year with the help of ODI, VAS, patient satisfaction and work status. Patient satisfaction was graded as satisfied, partially satisfied and not satisfied. Work status was graded as not affected, slightly affected, seriously affected, part time job, change of job and loss of job. The assessment criteria for patient satisfaction and work status were devised by the authors for this study.

Data were analyzed with statistical package for social sciences (SPSS version 17). Descriptive statistics were used to describe the results. Pre and post operative VAS and ODI were compared by Wilcoxon Signed Rank test and a *p*-value of less than 0.05 was considered significant. End note X6 was used for compilation and citation of references.

RESULTS

A total of 39 cases which completed follow up after surgery were included in study. Mean age was 44.59 years with a range of 50 years (22 to 72 years). In gender distribution 28(71.8%) were males and 11(28.2%) were females. Regarding disease distribution 19 (48.7%) cases were operated for degenerated disc disease (DDD), 11(28.2%) for spinal stenosis and DDD and 7(17.9%) for spondylolisthesis and 2 (5.1%) were operated for trauma. As far as levels of surgery are concerned, 1 (2.6%) was operated at L3-4, 12 (30.8%) were operated at L4-5 level, 11 (28.2%) at L5-S1, 2 (5.1%) at L2-4, 1 (2.6%) at L3-5 and 12 (30.8%) were operated at L4,5-S1. Regarding satisfaction with surgery 26 (66.7%) patients were satisfied, 9 (23.1%) were partially satisfied and 4 (10.2%) were not satisfied with the surgical outcome. Seventeen (43.6%) patients had no effect on job status, 14 (35.9%) patients had partial and 6 (15.4%) had severely affected job status after surgery. One (2.6%) patient had to change his job and one (2.6%) lost his job. Median pre operative VAS score was 7 which significantly improved to 2 after surgery ($p<0.001$). Median preoperative ODI was 76 which improved to 34 after surgery with significant improvement ($p<0.001$) (table-I).

DISCUSSION

There are several types of lumbar fusion and among them the most commonly used are the following: PLF, PLIF, ALIF, circumferential

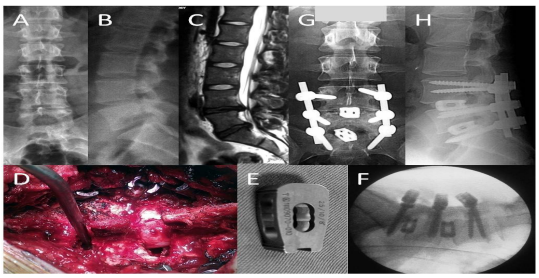

Figure: Transforaminal interbody fusion in a 43 years old male for DDD. A and B: AP and lateral radiographs of lumbosacral spine showing reduced L5-S1 disc space. C: MRI scan showing disc degeneration at L4-5 and L5-S1. D: Intraoperative picture showing decompression at L4-5 and sites of cage insertion at two levels. L5-S1 insertion site pointed by suction nozzle. Pedicle screw fixation is partially visible. E: Lumbcage. F, G and H: Intra and post operative radiographs showing cages and pedicle screws in place. Disc height has been restored.

3600 fusion (front and back) and more recently, the TLIF[10]. The use of bone graft packed in a titanium mesh which was inserted via a transforaminal route into the disc space was introduced by Harms and Rolinger in 1982. They named this technique as "transforaminal lumbar interbody fusion"[11]. The TLIF has been shown to

be a valuable alternative to the traditional PLIF. Advantages of the TLIF over PLIF are fewer complications, elimination of epidural scarring, less intraoperative bleeding and avoidance of dura and nerve roots[3]. TLIF is now a popular procedure for spinal fusion in the lumbar region. In our study we used laminar spreader to distract two motion segments and the placement of the distractor and screws did not interfere with the dissection and in fact, this system allowed for easy visualization of the nerve roots, thecal sac, and disc space. We also found that even with laminectomy and decompression in TLIF we were able to place the cages without compression on dura and nerve roots as compared to PLIF which is usually the procedure used for fusion when decompression is required for stenosis. The purpose of placing cages is to restore disc height and lumbar lordosis to keep the ligaments in appropriate tension. It also serves as a carrier for bone graft and provides stability for fusion.

The median VAS was 2 and median ODI was 34 at 1 year. Perez-Cruet et al[12] calculated mean post operative VAS as 4.2 and ODI as 29.7 in their study. Hackenberg[13] also showed similar VAS and ODI at 1 year interval. Table-II shows comparison with other studies. Perez-Cruet et al[12] found out that L4-5 is the commonest level operated upon followed by L5-S1. In their series they operated upon 152(50%) L4-5 and 88(28.9%) L5-S1 levels (n=304). We also found out that L4-5 is the commonest level operated upon. Antonio et al[14] in their series reported that 71% patients undergoing TLIF rated the results as good to excellent. In our study 66% patients were satisfied with the results of surgery. We found out that we have comparable results with other studies (table-II).

CONCLUSION

We have found TLIF an effective procedure in reducing back pain and improving patient disability scores in cases of low back pain because of DDD, instability and spondylolisthesis.

We recommend further studies to find out relation of these parameters with fusion rates and post operative alignment of spine.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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