



STUDY OF RESULTS OF TRANSFORAMINAL LUMBAR INTERBODY FUSION (TLIF) IN SPONDYLOLISTHESIS IN CIVIL HOSPITAL AHMEDABAD, GUJARAT, INDIA

Orthopaedics

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ABSTRACT

Introduction: Spondylolisthesis is a descriptive term derived from the Greek word spondylo (spine) and olisthesis (slip). spondylolisthesis is anterior translation of the cephalad vertebra relative to the adjacent caudal segment. For spondylolisthesis to occur there must be a failure of anatomic structures that normally resist this anteriorly directed force. These structures include the facets, annulus fibrosus, posterior bony arch, and pedicles. Radiological investigations are done for diagnosis and planning of treatment. Treatment includes conservative management and surgical management using different techniques. **Aim And Objective:** 1) To Estimate the clinical outcome of patients who underwent Transforaminal lumbar interbody fusion (TLIF) in terms of symptoms and signs. **Materials And Methods:** This is a Prospective Study, Sample size of 25 in which 18 were female and 7 males. After Institutional Ethics Committee approval, Study was conducted from September 2019 to December 2021 at a tertiary care Hospital. Consecutive patients with spondylolisthesis and planned for TLIF. Informed written consent was taken from all the patients. **Observation And Results:** Total 25 patients were included in the study out of that 7(28)% men and 18(72%) women. Majority of the study patients 16(64%) were belong to above 45 years age group. Preoperative minimum VAS scoring of back pain was 6 while the maximum was 8, with a mean of 6.8. The mean VAS scoring at 6 months follow up was 1.08 with a minimum of 0 while a maximum of 3, which is statistically significant. In our study slip grade was reduced by 1 in 19 patients and by grade 2 in 5 patient and there was no improvement of grade in 1 patient. Out of 25 study patients, 1(4%) patient had superficial wound infection and only 1(4%) patient had complication of screw loosening. **Conclusion:** In our study 18(72%) patients were female while 7(28%) patients were male, with mean age of 47 years. showing that degenerative spondylolisthesis is common in females as compared to male, in age group more than 40 years. level of spondylolisthesis is L4-L5 while L5-S1 in 10(40%), indicating that L4-L5 is the more commonly involved as compared to L5-S1 due to sagittal inclination of the lower vertebra and relative stability of L5-S1 between the stout iliolumbar ligaments in the sacral ala and the L5 transverse process. Transforaminal lumbar interbody fusion is a safe and effective option to achieve circumferential fusion without sever complications. TLIF has been established as one of the most successful surgery for reducing pain and enhancing physical function in spondylolisthesis.

KEYWORDS

Spondylolisthesis, Transforaminal lumbar interbody fusion, Polyetheretherketone, Pedicle screw.

INTRODUCTION

Spondylolisthesis is a descriptive term derived from the Greek word spondylo (spine) and olisthesis (slip). The common feature of the various types of spondylolisthesis is anterior translation of the cephalad vertebra relative to the adjacent caudal segment. The biomechanical force causing this translation is the anteriorly directed vector created by the contraction of the posteriorly located erector spinae muscles, coupled with the force of gravity acting on the upper body mass through the lordotic lumbar spine and lumbosacral junction, which explains why this deformity is not seen in children before they are ambulatory. For spondylolisthesis to occur there must be a failure of anatomic structures that normally resist this anteriorly directed force. These structures include the facets, annulus fibrosus, posterior bony arch, and pedicles.

Lumbar segmental instability is defined as an abnormal response of the lumbar motion segment to physiological loads and characterized by its movement beyond the physiological limits. It is a common cause for low backache and radiculopathy in middle aged individuals.

Symptoms of spondylolisthesis include axial pain, neurogenic claudication, radiculopathy, and cauda equina syndrome. Radiological investigations are done for diagnosis and planning of treatment. Treatment includes conservative management and surgical management using different techniques like Posterolateral fusion with or without fixation, Transforaminal lumbar interbody fusion (TLIF), Posterior lumbar interbody fusion (PLIF) and Anterior lumbar interbody fusion (ALIF).²⁻³

AIM AND OBJECTIVE

1) To Estimate the clinical outcome of patients who underwent

Transforaminal lumbar interbody fusion (TLIF) in terms of symptoms and signs.

MATERIALS AND METHOD

Prospective Observational Study. After Institutional Ethics Committee approval, Study was conducted from September 2019 to December 2021 at a tertiary care Hospital. Consecutive patients with spondylolisthesis and planned for TLIF were included in the study as per inclusion and exclusion criteria. Informed written consent was taken from all the patients.

Inclusion Criteria

1. Age 25-70 years
2. Radicular symptoms and/or back pain consistent with the radiologic findings
3. Radiological evidence of Spondylolisthesis

Exclusion Criteria

1. Patient with severe Sensory motor neurological deficit.
2. Patient Age <25.
3. Patients with multiple level spine Pathology.
4. Associated with Vascular claudication.

A prospective database of operated patients was maintained. Patient demographics, presenting symptoms and affected spinal level were noted. All Patients of the case series undergoes clinical and radiological assessment, clinical history, local physical examination, as well as neurological examination, to confirm the diagnosis and for surgical plan.

Surgical Technique

All patients were operated under general anaesthesia. Preoperative

antibiotics were given 30 min before the incision. The patient was placed prone on a Jackson table and all bony parts carefully padded. The surgical site was then prepped and draped in the usual sterile fashion. The correct level was identified using a spinal needle with the help of a C-arm image. An incision was made in the skin over the intended surgical levels and dissection was carried down through the subcutaneous tissue down to the level of the deep fascia. Posterior elements were exposed in a standard subperiosteal fashion. Dissection was carried out from the spinous process, bilateral laminae, bilateral facet joints and transverse processes. The facet capsules were kept intact during the exposure. Self-retaining retractors were placed. An intra-operative radiograph was taken to confirm the appropriate spinal level. Pedicle screws were placed bilaterally. The TLIF procedure was performed from the side of radicular symptoms. The inferior facet of the cephalad vertebra was excised using a 10 mm osteotome. The interlaminar space was distracted using a laminar spreader. Then the superior facet of the caudad vertebra was removed up to a point where the superior and medial border of the caudad pedicle was palpable. The disc was visualized without retraction of the thecal sac. A box annulotomy was performed. The disc space and the end plates were prepared by using curettes and shavers. A sizer trial was used to determine the appropriate height of the banana cage to be used and was found to be stable. Autograft harvested from the local site was then inserted in the cage. The disc space was adequately packed with this autograft bone. The cage was then inserted in the disc space. C-arm imaged confirmed proper placement of the cage. Central canal decompression and subarticular decompression on the side opposite the TLIF was achieved. The foramen was confirmed to be decompressed using a Murphy probe and, in the end, the decompression of the exiting and traversing nerve roots was confirmed bilaterally. normal saline wash was used. The cortical surfaces of remaining posterior elements (transverse processes) were gently decorticated with a high-speed burr. Following this, an appropriate size rod was captured in the screws bilaterally. Gentle compression across the screws was applied bilaterally to achieve lordosis. Cage was checked and found to be stable. The foraminal decompression was again confirmed following this manoeuvre. Closer done in layers. The patient was placed supine on a regular bed.

CLINICAL AND RADIOLOGICAL ASSESSMENT

Thorough history of patients complaints of back pain and associated radiating pain is done with regarding to duration, location, aggravating factors, relieving factors interference with daily activities. History related to neurological involvement like is elicited. Local Examination is done to look for any tenderness, step off, muscle spasm with loss of lumbar lordosis. Special test related to nerve compression like straight leg rise, Femoral nerve stress test, string test are done. X ray antero-posterior, lateral view, lateral flexion extension View and standing lateral view done for all patients. On x ray we find that level of Spondylolisthesis, type and grade of slip, measurement of lordosis, any associated scoliosis and pelvic parameters MRI is done to see for disc protrusion, disc degeneration, compression of neural elements, canal stenosis.



PRE-OP

POST-OP

46 years old male patient radiographs of lumbosacral spine antero-posterior and latera views demonstrating spondylolisthesis with dynamic instability at L⁵-S¹ level. post operative radiographs showing L⁵-S¹ single level open TLIF was done, global and segmental lumbar lordosis improved significantly.

All the selected patients who are planned for Transforaminal lumbar interbody fusion (TLIF) surgery are further investigated for surgical fitness. Consent is obtained for anesthesia and spine surgery, antibiotics is given at 10 pm night before surgery and 6am in the morning of surgery to all patients.

All Patients were discharged after 5 days, first dressing was done at post op day two, stitch removal done at the end of 12 days, first follow up done at the end of 1st month. Thorough clinical examination is done and x ray of lumbar spine antero-posterior and lateral view is obtained to check for implant position, and stability of implant. Examination is done to check for any complain and neurology. VAS and ODI score were obtained and noted. Patients were encouraged to walk without any support and avoid weight lifting. Then further follow up is done at 3 and 6 months.

RESULTS

In our study, the mean age was 47. Majority of the study patients 16(64%) were belong to 46-65 years age group followed by 9(36%) were belong to 25-45 years age group. In our study we included 7(28%) men and 18(72%) women with Male: female ratio approx. 1:3. In our study 23(92%) patients were of grade I and II (low grade), with 16 (64%) of grade I and 7(28%) of grade II. While 2(8%) were of grade III and IV (high grade) with 1 patient each of grade III and VI.

Results shows 15(60%) patients with L4-L5 level involvement and 10(40%) with L5-S1 level. Results shows 92% (23) patients were associated with decreased disc space, and 36% (9) patients were associated with loss of lumbar lordosis. Preoperative minimum VAS scoring of back pain was 6 while the maximum was 8, with a mean of 6.8. The mean VAS scoring at 6 months follow up was 1.08 with a minimum of 0 while a maximum of 3, which is statistically significant. Pre operative VAS scoring of leg pain was 4.84(mean) and post operative at 6 months was 0.76(mean). Preoperative minimum ODI scoring was 28 while the maximum was 60, with a mean of 43. The mean ODI scoring at 6 months follow up was 7.52, with a minimum of 0 while a maximum of 16. which is statistically significant.

In our study slip grade was reduced by 1 in 19 patients and by grade 2 in 5 patient and there was no improvement of grade in 1 patient.

DISCUSSION

Instability of lumbar spine from degenerative etiology is a common problem involving mainly the lower lumbar motion segments in middle aged individuals. This instability arises from the degeneration of articular facets and discs leading to abnormal motion under the physiological loads of activities of daily living. The resultant spondylolisthesis manifests clinically with low backache with or without radiculopathy which is mostly activity related. Spinal fusion has become the gold standard in symptomatic spondylolisthesis patients who have failed conservative treatment. Adequate neural decompression, stabilization and fusion restore segmental stability and produces satisfactory outcome in these patients.⁴ Solid Spinal fusion reduces the pain due to instability at that lumbar spine motion segment. In our study 18 patient were female while were male out of 25 patients. In degenerative spondylolisthesis, the female gender is shown to be predominant stated by Sanderson PL et al.⁵ And our study supports this finding.

Common level for involvement for spondylolisthesis in our study is L4-L5 in 15 (60%) patients followed by L5-S1 in rest 10(40%) patients. Which is similar to findings of study done by Jacobsen S.⁶ The majority of spondylolisthesis observed in MrOS study was Meyerding grade I. Majority of patients in our study i.e., 92% (23) were of low-grade spondylolisthesis while only 8% (2) patients were of high-grade spondylolisthesis.

Our results are similar to recent studies done by Potter BK et al. and Rosenberg MS et al in terms of surgical data and hospital stay.^{4,7} Total complication rate of 8% is reported in our study which was very low. There were no intra-operative complication including durotomies which is common in PLIF. This is reflected in similar studies.³ In recent

MRC study a peri operative complication rate of up to 36% and Transient neuritis due to excessive nerve root retraction has been reported to be as high as 7%;⁸ however, this has not been our experience.

Like Pan J achieved an average reduction from 24% (grade II) to 10% (grade I). According to them it was spontaneous and was due to circumferential release.⁹ In our study, the mean pre operative slip was 32.9% (grade II) and post operatively was 5% (grade I), with an average reduction of 25%. We think that even with one sided release and disc removal easy reduction can be obtained without increasing the complication rate. The distraction of disc space serves to increase cross sectional area of neural foramen and has been assumed to be of clinical value in relieving neural compression.⁹ In our study slip grade is reduced by 1 grade in 19 patients (76%), in 5 patients (20%) slip grade is reduced by 2 grades and no improvement in grade in 1 patient.

Poh et al. in their results found VAS score for back and leg pain improved significantly and improved by > 4 points in 59% and 62% respectively in 6 months follow-up. Poor radiological outcome correlated significantly with higher VAS scores in single level fusion.⁴ In our study, VAS score for back pain (mean difference 5.72) and leg pain (4.08) has improved significantly after surgery. The ODI score improved by a mean of 35.84 from preoperative status.

CONCLUSION

The Transforaminal Lumbar Interbody Fusion is an effective option to achieve circumferential fusion without severe complications like neuropraxia and epidural fibrosis which are common with PLIF surgery. TLIF increases global and segmental LL and provides a satisfactory outcome in symptomatic low-grade degenerative spondylolisthesis. TLIF has been established as one of the most successful surgery for reducing pain and enhancing physical function in spondylolisthesis. Clinical scoring (VAS and Oswestry disability index) proved that our patients improved post operatively significantly when looking at pain and overall state of health.

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