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Original Research Paper

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CLINICAL & FUNCTIONAL OUTCOME OF TLIF IN LOW-GRADE SPONDYLOLISTHESIS

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ABSTRACT

Introduction: Spondylolisthesis is a common cause of spinal instability and is defined as the translation of one vertebra relative to another. Various studies have been performed on different ethnic groups. However, data on the Indian population is sparse. This study aims to bring forth local data on a series of patients undergoing TLIF at a tertiary care centre, its clinical & functional outcome, and observe any complications. **Methodology:** This prospective observational study was conducted after approval from the Institutional Ethics Committee. 35 individuals having single-level low-grade isthmic and degenerative spondylolisthesis in the age group 18 to 60 years were included in the study. **Results:** In our study, the mean age was 44.0286 ±2.922 years. The mean OT time was 2.2 ±0.122 hours. The mean blood loss was 300 ±8.427 ML. The mean pre-op VAS was 7.2286 ±0.312. The mean post-op VAS was 1.5429 ±0.325. Improvement in VAS was statistically significant (P<0.0001). The mean pre-op ODI was 49.3143 ±1.654. The mean post-op ODI was 19.9429 ±1.153. Improvement in ODI was statistically significant (P<.0001). 91% of study subjects had a satisfactory outcome. **Discussion:** Our experience with the TLIF procedure confirms the findings of prior studies in that it produces good clinical outcomes. It provides circumferential fusion via a posterior approach and, thus, avoids the need for a separate anterior surgery. **Conclusion:** Based on the available evidence, TLIF appears to be a more efficacious and safe technique with reduced tissue trauma, quicker postoperative recovery, and better long-term functional outcomes for the treatment of low-grade spondylolisthesis.

KEYWORDS : VAS, ODI, TLIF, Low-Grade, Spondylolisthesis

INTRODUCTION

Low back pain is the most common cause of work-related disability and one of the most common contributors to missed time at work. This back pain can be aggravated by activity, which then leads to avoidance of activity and eventually disability. There is a 50–70% chance of a person having low back pain during his or her lifetime.

The loss of the spine's ability to maintain the connections between the vertebrae necessary to prevent injury to the spinal cord or irritation of the nerve roots, as well as the emergence of deformity or discomfort, is known as lumbar spinal instability. When a difference of 4mm in translation or 10 degrees in sagittal rotation from the next level is found, instability is deemed to exist.

Spondylolisthesis is a common cause of spinal instability and is defined as the translation of one vertebra relative to another. It was first reported in 1782 by a Belgian obstetrician Herbinaux[1]. He described a bony prominence anterior to the sacrum that obstructed the vagina in a small number of patients. Killian[2] coined the term "spondylolisthesis" in 1854 to describe this condition.

The word "spondylolisthesis" is derived from the Greek words "spondylos" (vertebra) and "olisthanein" (to slip). Spondylolysis refers to an acquired defect in pars interarticularis whereas spondyloptosis refers to an extreme degree of spondylolisthesis where the upper vertebral body appears to be not in contact and is placed anterior to the lower vertebral body.

The erector spinae muscles, which are posteriorly located and create an anteriorly directed vector when they contract, along with the force of gravity acting on the upper body mass through the lordotic lumbar spine and lumbosacral junction, are the two biomechanical forces responsible for this translation.

Failure of anatomic components that typically resist this anteriorly oriented strain is required for spondylolisthesis to take place. The facets, pedicles, posterior bony arch, and annulus fibrosus are some of these structures.

For the treatment of spondylolisthesis, several approaches have been described with varying degrees of effectiveness. We chose the TLIF approach with connecting rods, pedicle screws and a titanium cage filled with autologous bone graft and we assessed the results for clinical and functional outcomes.

Various studies have been performed on different ethnic groups. However, data on the Indian population is sparse. This study aims to bring forth local data on a series of patients undergoing TLIF at a tertiary care centre, its clinical & functional outcome, and observe any complications.

METHODOLOGY

This prospective observational study was conducted after approval from the Institutional Ethics Committee.

Inclusion Criteria

1. All individuals having single-level low-grade (Meyerding Grade I & II) isthmic and degenerative spondylolisthesis with radicular symptoms &/or backache corresponding with radiological findings in the age group 18 to 60 years (both inclusive) with ineffective conservative treatment for not less than 6 weeks

Exclusion Criteria

1. Pregnant females with positive UPT (urine pregnancy test)
2. Patients on chronic medications (>6 months) like tranquillizers, opioids & antidepressants
3. Patients having employee compensation at working place
4. Patients having facetal tenderness at levels other than the level of spondylolisthesis
5. Multiple levels &/or high-grade (Meyerding Grade III & IV) spondylolisthesis
6. Previous spinal surgery
7. Preoperative coronal imbalance or degenerative scoliosis
8. Clinical evidence of diabetic neuropathy or vascular claudication of limb

9. Dysplastic, traumatic, and pathologic spondylolisthesis

CLINICAL FEATURES

Symptoms of lumbar spondylolisthesis include:

- Generalized low backache with intermittent shooting pain from the buttocks to the posterior thigh and/or lower leg
- Stiffening of back & tightening of hamstrings with a resulting change in posture & gait
- Waddle may be seen in more advanced cases due to compensatory pelvic rotation due to decreased lumbar spine rotation
- Change in gait is often a noticeable atrophy in gluteal muscles due to lack of use
- Leaning-forward of semi-kyphotic posture may be seen due to compensatory changes

The back pain is poorly localised with worsening on standing. It is believed to arise from pseudoarthrosis, ligamentous or facet joint strain or degeneration in the disc or facet joint. In L5-S1 isthmic spondylolisthesis, the compression is on the exiting root (L5) that is stretched over the L5-S1 disc by forward displacement. The root compression is at the foraminal level due to the loss of height of the L5 subpedicular body resulting in stretching of the root by the undersurface of the L5 pedicle.

Degenerative spondylolisthesis is most common at the L4-L5 level and causes compression of the traversing root (L5). The compression is not so much due to forward displacement but due to lateral canal narrowing caused by spondylosis deformans. The symptoms do not improve on forward bending, unlike pure lumbar canal stenosis. Peripheral (leg) pulses are palpated to rule out associated vascular claudication. Neurogenic claudication is triggered by standing or walking but not by cycling. Vascular claudication is triggered by walking or cycling but not by standing.

PLAN OF ACTION

Oswestry Disability Index (ODI) and Visual Analog scale (VAS) for leg and back pain were used for preoperative and postoperative evaluation of functional and clinical outcomes. The patients were called for follow-up at 6 weeks, 3 months, 6 months and 1 year and were functionally and clinically evaluated. The improvement rate of ODI and VAS demonstrated the degree of postoperative normalization.

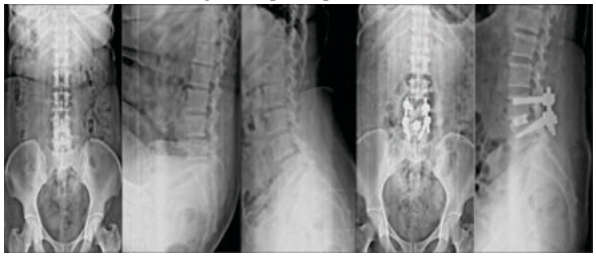

Figure 1: Preoperative & Postoperative Radiographs

RESULTS

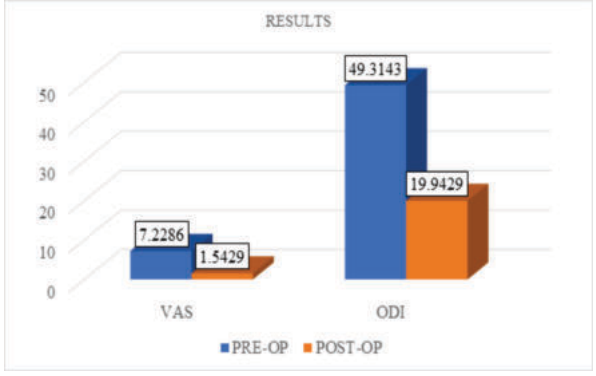

Figure 2: Results

In our study, the mean age was 44.0286 ±2.922 years. The mean OT time was 2.2 ±0.122 hours. The mean blood loss was 300 ±8.427 ML. The mean pre-op VAS was 7.2286 ±0.312. The mean post-op VAS was 1.5429 ±0.325. Improvement in VAS was statistically significant (P<0.0001). The mean pre-op ODI was 49.3143 ±1.654. The mean post-op ODI was 19.9429 ±1.153. Improvement in ODI was statistically significant (P<.0001). 91% of study subjects had a satisfactory outcome.

2 (6%) patients had superficial wound infection which was managed with serial dressings and oral antibiotics. Both patients recovered and required no further intervention.

Figure 3: Superficial Wound Infection

DISCUSSION

The majority of people will encounter low backache during their lifetime, with the bulk of these occurrences resolving without sequelae in a few weeks. For the minority of people with severe, intractable pain, lumbar fusion may be recommended, especially when associated with leg pain or deformity. Multiple surgical approaches have been described for spondylolisthesis[3]. The principal goals are to achieve interbody fusion, decompression of normal structures, and sturdy vertebrae.

Middle-aged people frequently experience lumbar spine instability due to degenerative causes, which mostly affect the lower lumbar region motion segments. This instability results from the articular disc and facet degeneration, which causes aberrant motion under the physiological stresses of everyday activity. The clinical symptoms of the resulting spondylolisthesis include low back pain with radiculopathy, which is typically activity-related.

In individuals with symptomatic spondylolisthesis who have not responded to conservative therapy, spinal fusion has emerged as the gold standard. In these individuals, adequate neural decompression, stabilisation, and fusion restore segmental stability and lead to a positive result. The discomfort brought on by instability at that lumbar spine motion segment is lessened by solid spinal fusion.

With better fusion rates, interbody fusion with cages has transformed the surgical care of these patients. Brantigan's invention of inter-somatic carbon cages in 1990 produced 92% successful and repeatable results. With a decrease in slippage, fewer non-unions, and fewer implant failures, interbody fusion outperformed posterolateral fusion in terms of results. The height of the disc and intervertebral foramen is restored by interbody cages. This increase in the radiological outcome somewhat restores the sagittal balance, which will eventually lead to better clinical outcomes.

Currently, posterior pedicular screw fixation supplemented with interbody fusion remains the surgical treatment of choice for low-grade spondylolisthesis. There are various approaches for interbody fusion including anterior (ALIF), posterior (PLIF), lateral (LLIF), oblique (OLIF), and transforaminal lumbar interbody fusion (TLIF). The TLIF technique was developed by Harms & Jeszenszky[4] who published results in 1998 about 191 patients operated between 1993 and 1996. TLIF is now widely used because it

has several advantages including minimal traction on dura & nerve roots, decreased risk of postoperative radiculitis, easy availability of instruments, the familiarity of surgeons with the approach, shorter duration & low morbidity compared with other fusion methods. Also, TLIF requires a unilateral approach and opposite lamina and facet joint can be preserved which provides an added surface for fusion.

The spinal canal and neural foramen are both decompressed through TLIF. Through an entirely posterior approach, it reconstructs the anterior column and restores the sagittal balance. TLIF maintains the posterior soft tissues covering the dural sac. From a biomechanical perspective, the interbody construct offers anterior support, while the posterior soft tissues, pedicle screws, and rods create a posterior tension band.

In our study, transpedicular instrumentation with an interbody cage was performed for low-grade spondylolisthesis. Our experience with the TLIF procedure confirms the findings of prior studies in that it produces good clinical outcomes. It provides circumferential fusion via a posterior approach and, thus, avoids the need for a separate anterior surgery that would entail additional. In addition, TLIF avoids the need for dural retraction present when performing a PLIF, which may increase the potential for complications such as neurapraxic injury and dural laceration.

CONCLUSION

Based on the available evidence, TLIF appears to be a more efficacious and safe technique with reduced tissue trauma, quicker postoperative recovery, and better long-term functional outcomes for the treatment of low-grade spondylolisthesis.

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