

## FUNCTIONAL OUTCOME OF LUMBO-SACRAL SPONDYLOLISTHESIS-POSTERIOR STABILISATION WITH MOSS-MIAMI INSTRUMENTATION AND SPINAL FUSION

H. B. Shivakumar<sup>1</sup>, T. S. Channappa<sup>2</sup>, Amit Singh<sup>3</sup>

<sup>1</sup>Professor, Department of Orthopaedics, Kempegowda Institute of Medical Sciences, Bangalore.

<sup>2</sup>Professor, Department of Orthopaedics, Kempegowda Institute of Medical Sciences, Bangalore.

<sup>3</sup>Senior Registrar, Department of Orthopedics, Apollo First MED Hospital, Chennai.

**ABSTRACT:** Spondylolisthesis is derived from the Greek words—spondyl (Vertebra) and olisthesis (To slip). The prevalence of spondylolisthesis in general population is approximately 5% and is about equal in men and women. Spondylolysis is a descriptive term referring to a defect in the pars interarticularis. Few studies have investigated the long term effect of posterior lumbar interbody fusion on functional outcome.

**OBJECTIVES:** Objectives of the study are to evaluate the safety, efficacy and functional outcome of surgical management of spondylolisthesis with Moss-Miami instrumentation and posterior spinal fusion.

**METHODOLOGY:** From November 2012 to April 2014, a total of 20 patients, operated with Moss-Miami instrumentation and posterior spinal fusion were followed up and evaluated based on ODI score.

**RESULTS:** There were 20 patients with spondylolisthesis at L4-L5 and L5-S1, who were managed with Moss-Miami instrumentation and posterior spinal fusion; 70% of patients had spondylolisthesis at L5-S1. Most of the patients were in 3<sup>rd</sup> and 4<sup>th</sup> decade of life with a female predominance of 18 cases (90%). In this study 55% of patients had Grade I listhesis and 45% had Grade II listhesis. Bony fusion was achieved for all the patients. In this study 12(60%) patients had excellent, 5(25%) had good, 2(10%) fair and 1(5%) had poor results based on ODI scoring.

**CONCLUSION:** Surgical fixation of spondylolisthesis using Moss-Miami instrumentation and posterior lumbar interbody graft is still a safe, promising and appealing technique especially in low-grade listhesis.

**KEYWORDS:** Spondylolistheis, Moss-Miami Instrumentation, Functional Outcome.

**HOW TO CITE THIS ARTICLE:** H. B. Shivakumar, T. S. Channappa, Amit Singh. "Functional Outcome of Lumbo-Sacral Spondylolisthesis-Posterior Stabilisation with Moss-Miami Instrumentation and Spinal Fusion." Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 93, November 19; Page: 15819-15822, DOI: 10.14260/jemds/2015/2291.

**INTRODUCTION:** Spondylolisthesis is derived from the Greek words – spondyl (vertebra) and olisthesis (to slip). The prevalence of spondylolisthesis in general population is approximately 5% and is about equal in men and women.<sup>1</sup> This most commonly describes the forward slippage of a cephalad vertebra on a caudal vertebra, whereas spondylolysis is a descriptive term referring to a defect in the pars interarticularis. The defect may be unilateral or bilateral and it may be associated with spondylolisthesis.<sup>2</sup> The purpose of this study was to evaluate the safety, efficacy and functional outcome of surgical management of spondylolisthesis with Moss-Miami instrumentation and posterior lumbar interbody fusion.

**MATERIALS AND METHODS:** This clinical study was conducted in the Department of Orthopaedics, Kempegowda Institute of Medical Sciences and Research Centre, Bangalore between November 2012 to April 2014. During this period, 20 patients satisfying the inclusion criteria were selected on the basis of purposive random sampling. This included 18 females and 2 males, between the age group of 20 to 69 years.

### Inclusion Criteria:

- Patients of age group >20 yrs - <70 yrs.
- Presenting with low back pain and neurological claudication.
- Diagnosed clinically and confirmed radiologically.
- Non-traumatic spondylolisthesis.

### Exclusion Criteria:

- Grade I spondylolisthesis with no neurological deficit and no functional disability.
- Spondyloptosis.
- Patients with any other spinal pathology.
- Patients with any associated neurological involvement due to any other diseases.
- Patients who have had earlier surgeries on their spine.
- Patients who do not consent to the study.
- Patients unfit for surgery due to comorbid medical conditions.

The data was collected from patients attending OPD, during their inpatient stay at the hospital and also during their follow-up. All patients included in the study were assessed clinically with a structured questionnaire, namely the Oswestry disability index.<sup>3</sup> detailed physical examination was done and the defect was confirmed radiologically. These patients were then classified by Wiltse, Newman, and Macnabs.<sup>4,5,6</sup> classification and the percentage of slip was graded by the Myerding.<sup>7</sup> method. All the patients included in the study were treated surgically i.e. decompression, reduction, stabilization and posterior spinal fusion done with

Financial or Other, Competing Interest: None.

Submission 22-10-2015, Peer Review 23-10-2015,

Acceptance 09-11-2015, Published 17-11-2015.

Corresponding Author:

Dr. Amit Singh,

Plot No.6 Gandhi Street, Jak Nagar,

Thirumallaivoli-600062,

Chennai.

E-mail: dramitsingh88@gmail.com

DOI:10.14260/jemds/2015/2291.

Moss-Miami instrumentation and bone grafting. Spinal fusion was performed by posterior lumbar interbody fusion technique using bone graft.

Post-operative radiographs were taken for all the cases for evaluation. On the 2<sup>nd</sup> post-operative day, drain removal was done and patients were mobilized with a lumbosacral belt. Patient was then discharged with the lumbosacral belt which was gradually withdrawn after 6 months. These patients were followed up at 6 weeks, 12 weeks and 24 weeks. At each visit, clinical and radiological evaluation was done with special emphasis on the neurological status, pain, flexion-extension movements at spine and posterior spinal fusion. Functional outcome was assessed on the basis of the Oswestry disability index.

**RESULTS:** The youngest patient in our study was 24 years old and oldest was 60 years of age; 35% of patients were in age group 30–39, 30% between age group 40–49, 15% between age group 60–69 and 10% between age group 20–29 and 50–59. There was a significant female predominance with 90% of the patients being females and 10% males. Majority of the them (90%) were housewives and 10% were farmers; 70% of our patients had spondylolisthesis at L5–S1 level and rest 30% at L4–L5.

Also among all of our patients 55% of them had Grade I listhesis and 45% had Grade II listhesis. No patients were found to have Grade III or Grade IV listhesis. In this study, 19 of the patients had severe disability on pre-operative assessment (ODI score between 40–60%) and only 1 patient had moderate disability (ODI score between 20–40%). Pre-operatively one patient had motor deficit, while 19 patients were free of any motor deficit.

At 6 months' follow-up, this patient continued to have same amount of motor deficit without any new neurological deficit. Also 4 patients had pre-operative sensory deficit and 16 were free of any sensory deficit. All 4 patients recovered from sensory deficit over a follow-up period of 24 weeks. Average blood loss in all our patients was around 423 ml. We achieved bony fusion for all the patients with PLIF. Based on the ODI scoring, the outcome of the surgery was graded as excellent (65%), good (30%) and poor (5%).

#### COMPLICATIONS

COMPLICATIONS	NUMBER OF PATIENTS	PERCENTAGE %
DURAL TEAR	0	0
NEUROLOGICAL DEFICIT OF NEW ONSET	1 (TRANSIENT FOOT DROP)	5
IMPLANT FAILURE	0	0
SCREW MISPLACEMENT	1	5
REOPERATION	0	0
DEEP INFECTION	0	0
NO COMPLICATION	18	90
<b>TOTAL</b>	<b>20</b>	<b>100</b>

**DISCUSSION:** Isthmic spondylolisthesis is present in about 5% to 6% of the population. It starts as spondylolysis in childhood and is mostly asymptomatic in children and adolescent, becoming symptomatic in the third to fifth decades of life. The key to transformation of a dormant lesion to a symptomatic one lies in the integrity of intervertebral disc. As long as the disc maintains its structural and functional integrity, the spondylolisthesis level will be stable and will not generate painful stimuli, whereas degeneration

of disc may lead to pain with or without adult slip progression.<sup>8</sup> In our study average age of patients presenting with spondylolisthesis was 42.7 years.

Per Ekman et al.<sup>9</sup> in their study found that the average age was 40 years. S. Madan et al.<sup>10</sup> reported similar finding in their study. Majority of our patients were females which were also noticed in the study by Per Ekman et al.<sup>9</sup> In our study 70% of patients had spondylolisthesis at L5–S1 and rest 30% at L4–L5, while Robert W. Molinari et al.<sup>11</sup> found that 80% of the patients had L5–S1 spondylolisthesis. Yizhar Floman et al.<sup>12</sup> in their study found that 75% patient had L5–S1 spondylolisthesis. We had 55% of patients with Grade I listhesis and 45% had Grade II listhesis.

No patients were found to have Grade III or Grade IV listhesis. Similar findings were reported by Mostafa Fathy et al.<sup>13</sup> (56% patients with Grade I and 44% with Grade II listhesis). In our study mean pre-op ODI score was 40.15 and mean post-op ODI score was 17.1. Hosam A.M. Habib et al.<sup>14</sup> in their study found that mean pre-operative ODI score was 36.9 and mean post-operative ODI score was 16.2. We achieved bony fusion for all the patients with PLIF. Yizhar Floman et al.<sup>12</sup> in their study achieved 97% fusion rate, while Hosam A.M. Habib et al.<sup>14</sup> reported 96% fusion in their study.

#### Final Outcome:

AUTHORS	EXCELLENT %	GOOD %	FAIR %	POOR %
S Madan et al. <sup>10</sup>	60.8	8.6	17.3	13
M.W.Hu et al. <sup>15</sup>	52.8	30.6	16.7	0
Present study	65	30	0	5

S Madan et al. used ODI score for clinical assessment.

- Scores less than 20 were excellent.
- Scores 20 to 40 were better.
- Scores 40 to 60 were considered the same.
- Scores higher than 60 were considered worse.

#### CONCLUSION

##### We Conclude:

- Low back ache is one of the common conditions that are seen in Orthopaedic practice. Of the various causes for this condition, spondylolisthesis is a very prominent cause.
- Reduction of listhesis of grade I and II is not necessary for better relief. But if the listhesis is reduced, the tension of the roots does disappear, and also the transverse processes come into same level to put the intertransverse graft.
- In situ fusion can be attempted in Grade I and II listhesis, whereas reduction and fusion in the reduced position should be attempted in cases of severe spondylolisthesis.
- Surgical fixation of spondylolisthesis using pedicular screw rod system and posterior lumbar interbody graft is still a safe, promising and appealing technique, especially in low-grade listhesis.
- In the earlier stages of this condition, the patient can be managed by non-operative methods like rest, traction, lumbosacral corset, NSAID's, physiotherapy and exercises.
- When these methods do not bear the expected results and when the other indications for the surgery as mentioned earlier are met, then the option of surgery must be given to the patient.

**The goals of surgical management should be the following:**

- Reduction of back and leg pain.
- To prevent further slip when reduction is not possible especially for Grade I and II.
- Stabilization of unstable segment.
- Restoration of normal spine mechanisms, posture and gait.
- Reversal of neurological deficits.

**BIBLIOGRAPHY:**

1. Stewart TD: The Age Incidence of Neural Arch Defects in Alaskan Natives, Considered from the standpoint of etiology *IBJS* 1953;35 A: 397-400.
2. Weinstein, Stuart L.; Buckwalter, Joseph A. *The Thoracolumbar Spine Turek's Orthopaedics: Principles and Their Application*, 6th Edition;501.
3. Fairbank JCT, Couper J, Davies JB, O'Brian JP. The Oswestry low back pain disability questionnaire. *Physiotherapy*. 1980;66:271-3.
4. Arme K. Pederson and Rolf Hagen; Spondylosis and Spondylolisthesis treatment by internal fixation and bone grafting of the defect; *JBJS* 1988; 70A, 16-24.
5. Martin, Swins. Degenerative spondylolisthesis: *Clin Orthop* 1976;117: 112-15.
6. David Boxall, David S. Bradford, Robert B. Winter, John H.; Management of Severe Spondylolisthesis in Children and Adolescents. *JBJS* 1979;61A:No4:479-485.
7. Edeinken; Spondylolisthesis in children and adolescents. *JBJS* 1981;63B: No-1,67-70.
8. Yizhar Floman, Michael A. Millgram; Instrumented Slip Reduction and Fusion for Painful Unstable Isthmic Spondylolisthesis in Adults; *J Spinal Disord Tech* 2008;21:477-483.
9. Per Ekman, Hans Moller et al.; Posterior Lumbar Interbody Fusion Versus Posterolateral Fusion in Adult Isthmic Spondylolisthesis; *SPINE* Volume 32, Number 20, pp 2178-2183; 2007.
10. Madan S. Boeree NR: Outcome Of Posterior Lumbar Interbody Fusion versus Posterolateral Fusion For Spondylolytic Spodylolistheis. *Volume 27, Number 14, pp 1536-1542.*
11. Molinari RW, Sloboda JF, Arrington EC, et al., Low-grade isthmic spondylolisthesis treated with instrumented posterior lumbar interbody fusion in US servicemen. *J Spinal Disord Tech* 2005;18(suppl 1):S24-9.
12. Yizhar Floman, Michael A. Millgram; Instrumented Slip Reduction and Fusion for Painful Unstable Isthmic Spondylolisthesis in Adults; *J Spinal Disord Tech* 2008;21:477-483.
13. Mostafa Fathy et al. Outcome Of Instrumented Lumbar Fusion for Low-Grade Spondylolisthesis; *Evaluation of Interbody Fusion with or without cages. Asian J Neurosurg.* 2010 Jan-Jun; 5(1): 41-47.
14. Hosam A.M. Habib et al. Posterolateral fusion versus posterior interbody fusion in adult lumbar isthmic spondylolisthesis. *Menoufia Med J* 27:191-196.
15. M.W. Hu et al. Posterior Lumbar Interbody Fusion Using Spinous Process and Lamina. *J Bone Joint Surg Br*2012;94-B:373-7.

**Case 5:**

**Pre Op X – Ray and MRI:**



*Lateral view*



*Antero-Posterior view*

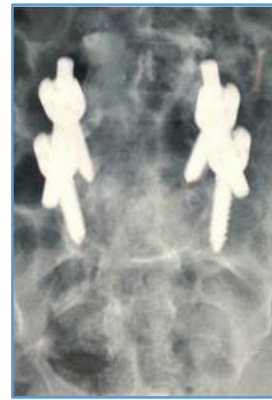


*Sagittal section*

24 Weeks Follow Up



*Lateral view*



*Antero-Posterior view*

- No further progression of slip.
- Absence of halo around implant.
- Presence of B/L continuous trabecular bone.

Pre Op Clinical Photos



*Rt leg SLRT - 50°*



*Lt leg SLRT - 90°*



*Forward Flexion*

Post op Clinical Photos at 24 Weeks Follow Up



*Lt leg SLRT - 90°*



*Rt leg SLRT - 90°*



*Forward Flexion*