

Original article

Evaluation of surgical management of degenerative spondylolisthesis: A study from Metropolitan Hospital, Thrissur, Kerala

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Abstract

Introduction: Lumbar degenerative spondylolisthesis with resultant stenosis is a common condition typically seen at L4-L5, in females more commonly than males, and in individuals older than 50 years of age. The slippage is generally due to degenerative changes in the zygapophyseal joints between the 2 vertebrae with accompanying degeneration of the disc at that level. **Objectives:** To evaluate the clinical outcome of surgically treated patients and also to evaluate the radiological outcome of surgically treated patients. **Methodology:** The study was conducted in Metropolitan Hospital, Thrissur, Kerala between August 2006 and January 2008 including 16 patients who were treated surgically for degenerative Spondylolisthesis. **Results:** The age distribution pattern in our study shows that 75% of the patients are less than 55 Years. The average age of patients is 51 years with standard deviation of 10.41. The male to female ratio of patients undergoing surgical treatment for degenerative spondylolisthesis in our study is 1:3. The radiological outcome of fused, partially fused and not fused categories were found in the ratio of 1:2:1. 8 patients have post-operative ODI between 11-20 of which 4 are in fused and 4 in partially fused category. Out of 3 patients with post-operative ODI ≤ 10 , 2 are partially fused and 1 is not fused. **Conclusion:** Good clinical results can be obtained by augmenting the decompression and fusion procedure with instrumentation.

Key words: *surgical management, degenerative spondylolisthesis*

Introduction

Degenerative spondylolisthesis is defined as forward slippage of a vertebra with respect to the underlying vertebra, without rupture of the posterior arc¹, distinguishing it from lytic spondylolisthesis. It thus usually induces lumbar canal stenosis, even though the slippage is always moderate.²

It was in 1782, Herbineux G, a Belgian obstetrician described the condition but it was Kilian in 1854 who coined the term Spondylolisthesis (derived from Greek- spondylos meaning vertebra and olisthesis meaning to slip or slide down a slippery path). Neugebauer in 1882 gave detailed description of this condition. Since then, there have been many descriptions describing etiology, pathology, radiological assessment and different types of operative and

non-operative treatment. Introduction of spinal instrumentation and newer technologies of imaging have made surgical treatment of spondylolisthesis safer, associated with less complications and improved outcome.³

The usual levels are L4–L5, in 73% of cases, or L3–L4, in 18% of cases. It is a common pathology with prevalence estimated, by Jacobsen, at 2.7% in males and 8.1% in females.³ Paradoxically, despite this high frequency, there is no strong consensus on treatment, regarding medical options, surgical options or choice between medical and surgical attitudes.⁴

The purpose of this study on 'Evaluation of Surgical Management of degenerative spondylolisthesis' is to evaluate the results of surgically treated patients in this institution.

Objectives

- To evaluate the clinical outcome of surgically treated patients
- To evaluate the radiological outcome of surgically treated patients

Materials and methods

The study was conducted in Metropolitan Hospital, Thrissur, Kerala between August 2006 and January 2008. All patients who were treated surgically for degenerative Spondylolisthesis were included in the study. The diagnosis was suspected clinically and confirmed by radiological examination.

A detailed case history was taken about gender, age, medical co-morbidities, gynaecological history, history of trauma and history of any previous surgery. A careful clinical examination was done with special focus on looking for trunk furrows and range of movements and feeling for a step and its movement with flexion and extension of lumbar spine. A Complete Neurological examination was done for all patients. Distal pulsations were examined in all patients. All female patients underwent gynaecological examination by gynecologist.

Roentgenographic assessment

All patients underwent radiographic examination with standardized anteroposterior views and standing lateral views in flexion and extension.

The spondylolisthesis was defined as a slippage of more than 3mm. The amount of anterior listhesis was measured as the distance between two posterior perpendicular lines by a transverse line on the upper end plate of the lower vertebra on a lateral film. Then, this was graded according to Meyerdings grading system. Grade I spondylolisthesis is displacement of 25% or less, grade II between 25% to 50%, grade III between 50% to 75% and grade IV more than 75%.

In this radiographic examination, lowest rib seen was considered to be D12 vertebra. The instability was defined as increase or decrease in the translation of upper vertebra over lower vertebra in standing lateral views in flexion and extension.

All patients included in this study underwent a course of non-operative management for a minimum of three months. Non-operative treatment included a short period of bed rest (2-3 days), physiotherapy by local short-wave diathermy for 5 days, non-steroidal anti-inflammatory drugs with muscle relaxants, lower back exercises and lumbosacral orthosis.

Magnetic resonance imaging (MRI) was obtained in patients with radiculopathy. MRI was done to assess the condition of disc at the affected level as well as the adjacent levels. It was not possible to obtain MRI in all patients because of financial restraint as patients were of lower economic strata.

Complications

All complications we came across in the study whether Intra- operative, immediate post-operative and delayed post-operative were noted and are described later in the section of discussion.

Clinical evaluation was done pre-operatively and three months and one year post-operatively by Oswestry Disability Index (ODI)⁵ format of which is attached in continuation of protocol. Oswestry Disability Index was used as it is widely accepted method for clinical evaluation.

Radiological Evaluation was done at the latest follow up. Assessment of radiologic fusion was based on plain radiographs. More than 5° of angular motion or >2mm of sagittal motion on flexion and extension radiographs or 2mm of lucency over 50% of the bone adjacent to the implant was considered as 'not fused'. Radiographic results were rated as fused, partially fused and not fused.

Statistical analysis:

Statistical 2 way and 3-way tables were prepared for comparison and primary analysis. Also, various statistical test like Student's t test, Chi square test and Kolmogorov test were used to identify the sample. Characteristics and the tests are applied at 5% level of significance and 95% confidence intervals are made on variables under study.

Results

Table 1: Demographic information

Age	Male		Female	
	No	%	No	%
≤45	1	6.3	5	31.3
46-55	1	6.3	5	31.3
56-65	1	6.3	1	6.3
≥66	1	6.3	1	6.3
	Male		Female	
Mean	55.25		49.58	
SD	10.62		10.4	

The study consists of 16 cases of surgically treated patients of degenerative spondylolisthesis. The cases were operated and followed periodically in Metropolitan Hospital, Thrissur, Kerala between August 2006 to January 2008.

The age distribution pattern in our study shows that 75% of the patients are less than 55 Years. The average age of patients is 51 years with standard deviation of 10.41. Thus, it can be generalized that the patients undergoing surgical treatment for degenerative spondylolisthesis are around 50 years of age.

The male to female ratio of patients undergoing surgical treatment for degenerative spondylolisthesis in our study is 1:3. A female patient was three times more likely to have surgical treatment for degenerative spondylolisthesis as compared to a male patient.

Table 2: Distribution according to symptoms

Symptoms	No. of patients	Percent
Radicular pain	6	37.5
Neurologic claudication	9	56.25
Non-radiating low back ache	1	6.25

In our study, 9 out of 16 patients required surgical treatment predominantly for neurological claudication, 6 for radicular pain and 1 patient predominantly for low back ache. 56% of patient had neurological claudication where as 6% of patients had predominant low backache.

Table 3: Age versus level of degenerative spondylolisthesis

Age	L4-L5	L5-S1	L3-L4&L5-S1
≤45	4	2	0
46-55	5	1	0
56-65	1	0	1
≥66	2	0	0

75% of patients in this study had degenerative spondylolisthesis at L4-L5 level and it is also observed that they presented with symptoms at an early age that is <55years. It is also noted that 2 cases of L4 over L5 degenerative spondylolisthesis were more than 66years old. L5 over S1 was seen among patients<55years of age. The lone case of two-level degenerative spondylolisthesis undergoing surgical treatment in our study was between 56-65 years and had degenerative spondylolisthesis at L3- L4 and L5-S1.

Table 4: Level of fusion versus Radiological outcome

Level	Fused	Partially fused	Not fused
L4-L5	5	4	3
L5-S1	0	3	0
L3-L4&L5-S1	0	1	0

The radiological outcome of fused, partially fused and not fused categories were found in the ratio of 1:2:1. Chi square=0.4999 and P=0.7788(>0.05). It is notable that at L4-L5 level this ratio is 1:1:1.13 out of 16 patients had radiological instability, the radiological outcome was fused in 4, partially fused in 7 and not fused in 2. Of the 3 patients with radiologically stable degenerative spondylolisthesis, radiological outcome was fused in 1, partially fused in 1 and not fused in 1. No patient with radiologically stable degenerative spondylolisthesis pre-operatively became unstable post-operatively.

Table 5: Outcome- Clinical versus Radiological

ODI	Fused	Partially fused	Not fused
≤10	0	2	1
11-20	4	4	0
21-30	1	2	1
≥31	0	0	1

The radiological outcome of fused, partially fused and not fused category is in the ratio of 1:2:1. Chi square=0.4999 with P=0.7788 (>0.05). Among patients belonging to fused category, 80% have post-operative ODI 11-20. Among those belonging to partially fused category, 50% have post-operative ODI 11-20, 25% each have ≤10 or 21-30. In not fused category, 1 patient has post-operative ODI ≤10 and other 2 have ≥ 21.

8 patients have post-operative ODI between 11-20 of which 4 are in fused and 4 in partially fused category. No case in this group belonged to not fused category. Another 4 patients with post-operative ODI 21-30, 1 each had fused and not fused as radiological outcome where as other 2 had partial fusion. Out of 3 patients with post-operative ODI ≤10, 2 are partially fused and 1 is not fused.

Discussion

The majority of patients with degenerative spondylolisthesis respond to non-operative management. But few patients may require surgical treatment for relief of symptoms and to improve their quality of life.

Herkowitz and Kurz et al⁶ reported that patients who had concomitant arthrodesis had significantly better clinical outcome than those in non-fusion group.

Bridwell et al⁷ reported better fusion rate and improved clinical outcome, if posterior instrumentation was added to decompression and fusion procedure. Similar results were reported by Isao Kimura et al⁸ and Fischgrund et al⁹

In our study of 16 patients, male to female ratio of patients undergoing surgical treatment for degenerative spondylolisthesis was 1:3 which is comparable with ratio of 1.1:3 as reported by Herkowitz and Kurz et al⁶

The mean age at the time of surgery in our study was 51 years (37-72) where as in studies of Herkowitz and Kurz et al⁶ and Isao Kimura et al⁸ were around 63.5 years and 52.7 years respectively.

In our study, 75% of degenerative spondylolisthesis was at L4 over L5 where as it is 85% as reported by Tetsuhiro Iguchi et al¹⁰ and 83% as reported by NJ Rosenberg et al¹¹. We observed that degenerative spondylolisthesis at L3 over L4 was less in our study.

In this study, we encountered 4 complications in 3 (18%) patients. Isao Kimura et al⁸ reported 28 complications in 15 (53%) patients.

Isao Kimura et al⁸ reported 82.1% excellent or good, 10.7% fair and 7.1% poor results in instrumented fusion group. Bridwell et al⁷ reported 83% patients with improved functional status.

Bridwell et al⁷ reported a fusion rate of 87% in instrumented patients whereas Isao Kimura et al⁸ reported a fusion rate of 82.8% and 92.8% in uninstrumented and instrumented group respectively. In our study, fusion is seen in 5 (31%) patients. This low rate of fusion may be due to short follow up (mean 8.5 months, range 3-16 months) of our study. Radiological outcome is likely to change over a period of time and only longer follow up will determine the final degree of fusion.

Our study has good clinical and radiological outcome in 93% and 31% respectively.

Herkowitz and Kurz et al⁶ reported excellent or good clinical outcome in all (9) of their patient who has pseudoarthrosis. Kornblum et al¹² reported excellent or good clinical outcome deteriorated to 56% in long term follow up.

Conclusion

The following are the conclusions drawn from this study:

- Majority of patients with degenerative spondylolisthesis can be treated non-operatively.
- Surgical treatment in a properly selected patient gives good result.
- Good clinical results can be obtained by augmenting the decompression and fusion procedure with instrumentation.
- Intra-operative complications can be reduced by careful use of surgical technique and dissection method.

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