

Microscopic Decompression for Patients With Grade 1 Degenerative Spondylolisthesis- Outcome And Comparison of Results With Patients Without Spondylolisthesis.



Medical Science

KEYWORDS : Spondylolisthesis, Decompression, lumbar canal stenosis

Dr. Janardhana Aithala
P

Kasturba Medical College, Mangalore, Manipal university.

ABSTRACT

While fusion is recommended for degenerative spondylolisthesis in select indications, microscopic decompression in low grade spondylolisthesis is being increasingly considered for pain relief as well as early mobilization. This study aims to find out the results of microscopic decompression in grade 1 spondylolisthesis and compare the results of microscopic decompression between patients with spondylolisthesis and lumbar canal stenosis without spondylolisthesis groups. Between 2007 and 2013, 108 patients with lumbar canal stenosis without spondylolisthesis and 16 patients with grade 1 degenerative spondylolisthesis underwent microscopic decompression at our center. Patients in spondylolisthesis group had good pain relief in short term, although the VAS scores were slightly higher at 6 months compared to patients with Lumbar canal stenosis (Mean VAS score 4.75 and 2.75 respectively). At 2 years, both VAS and ODI scores were comparable between the two groups (Mean ODI scores 16 and 13.6 respectively; mean VAS scores 2.43 and 1.97 respectively). We conclude that, decompression alone in grade 1 spondylolisthesis is safe, gives good results although pain relief may take a longer time compared to patients without spondylolisthesis.

Introduction: Lumbar canal stenosis associated with degenerative spondylolisthesis is a challenging problem. Various treatment modalities including Conservative treatment⁽¹⁾ decompression alone⁽²⁾, fusion without instrumentation and with instrumentation are recommended^(3,4,5,6). In patients with dynamic instability fusion along with decompression has given better results^(7,8), however comparable clinical benefits with instrumentation is not well established⁽⁹⁾.

In higher grades of degenerative listhesis with dynamic instability, fusion is a preferred treatment^(7,8), same cannot be told about grade 1 degenerative listhesis. Fusion surgeries are associated with high cost⁽¹⁰⁾, increased morbidity as most of these patients are elderly patients with difficulty in mobilizing these patients early⁽¹¹⁾. Such patients with minimal translation usually suffer from claudication pain and relief of symptoms can be achieved with decompression alone⁽¹²⁾. Fusion surgery also carries the risk of adjacent segment degeneration with recurrence of symptoms⁽¹³⁾. With the advent of minimally invasive microscopic decompression procedures iatrogenic instability associated with decompression is also reduced and patients can have good relief of leg symptoms^(14,15,16), although backache may persist. So our hypothesis was microscopic decompression even in grade 1 listhesis can help the patient by reducing leg pain and improving their disability while avoiding the complications of major fusion surgery. Thus our aim of study was to analyse the improvement of pain and function in patients with grade 1 spondylolisthesis following microscopic decompression. We also would like to compare these results with that of patients who underwent decompression and did not have spondylolisthesis.

Materials and Methods:

This study was done at the associated hospitals of Manipal University from June 2007 to Dec 2013 and data were collected retrospectively from a prospectively maintained data source. An informed consent was taken before inclusion. Patients were divided into two groups, one group (Group A) of patients who had claudication pain and lumbar canal stenosis associated with grade 1 degenerative listhesis (as measured in a standing lateral x-ray, showing less than 25% of slip), while second group (Group B) included all other patients without spondylolisthesis and underwent decompression. For Group A, inclusion criteria included all patients who had Grade 1 degenerative spondylolisthesis, with less than 25% slip, who had predominant leg symptoms, and flexion and extension radiographs showing no dynamic instability. For Group B, inclusion criteria included, patients who have leg symptoms, radiographs did not show spondylolisthesis and who underwent decompression alone. Patients who had

higher grades of spondylolisthesis, patients who have two levels of spondylolisthesis were excluded from the study.

All patients underwent clinical evaluation and MRI, to assess for the need for surgery and planning of surgery. Following assessment, all the patients underwent microscopic decompression by a single surgeon. In bilateral cases we did bilateral decompression through unilateral approach. Surgical technique depended on the compressive structures causing neural compression, mid-line structures were not disturbed, and medial 1/3rd facetectomy was done to properly decompress lateral recess.

Patients were evaluated preoperatively for pain with VAS and for disability with Oswestry disability index. Perioperatively, data regarding, surgical duration, bleeding and intraoperative complications recorded. Postoperatively patients were evaluated for pain with VAS, Oswestry disability index for disability at 6 months (short term) and at 2 years (long term). Radiological examination was done at 2 years to check for progression of slip.

Statistical analysis was done using SPSS 16 including comparison of results between two groups in terms of improvement in VAS and ODI as well as progression of slip in patients with listhesis.

Results:

During the study period we treated 16 patients with grade 1 spondylolisthesis with microscopic decompression. In the same period there were 108 patients without spondylolisthesis. Base line data and preoperative VAS and ODI scores are given in Table 1.

Table No. 1 showing base line data and preoperative VAS and ODI scores between two groups.

	Non Listhesis group (N-108)	Listhesis group (N-16)	P value
Age (Mean)	49	60.8	0.003
Number of levels decompressed	1.38	1.81	0.03
Neurological deficits	35%	56%	0.12
Preoperative VAS (Mean)	8.68	8.87	0.387
Preoperative ODI (Mean)	39.45	45.3	0.284

Table No. 2 shows the difference between two groups in intraoperative characteristics.

	Non L1sthesi	Listhesis	
Blood loss(Mean)	464ML	483 ML	0.44
Surgical duration(Mean)	106 min.	174 min.	0.02
Dural tears	23.4%	37.5%	0.254

Patients were evaluated with VAS at 6months and 2 years and ODI at 2 years, Table No. 3 shows the comparison between two groups.

Table No. 3 showing results between two groups.

	Non listhesis group	Listhesis group	P value
Short term VAS(Mean)	2.25	4.75	0
Final VAS(Mean)	1.97	2.43	0.13
Final ODI(Mean)	13.26	16	0.177

In view of significant difference in the age group between two groups, we decided to evaluate the results of spondylolisthesis group with non listhesis group including those patients who are aged above 55 years.

Table No. 4 Comparison between two groups after age matching.

	Non listhesis group aged above 55 years (N-56)	Listhesis group(N-16)	P value
Mean age	61.33	60.8	0.94
Mean VAS short term	2.53	4.75	0
Mean VAS at 2years	2.26	2.43	0.37
Mean ODI at 2 years	17.89	16	0.90

In patients with Spondylolisthesis, radiographs were available for 13 patients, Mean preoperative slip was 17.44% and at final follow up it was 19.21% which was not significant (P 0.51)(Fig. 1)

Fig. 1 showing preoperative and follow up radiographs of a patient with grade 1 Degenerative spondylolisthesis.



Discussion: Managing a patient with lumbar canal stenosis/radiculopathy due to degenerative disc disease is a challenge when associated with degenerative spondylolisthesis. Our study analyses results of microscopic decompression alone in patient with grade 1 spondylolisthesis. Our hypothesis was that these patients will get predictable relief from their radicular symptoms thus improving their quality of life, while, avoiding risks and complications associated with major fusion surgery. There

are many reports which says that fusion surgery cannot give satisfactory results, while can be associated with major problems (11,13). Shen Y et al (11), opine that fusion surgery is associated with complications especially in elderly when they have other comorbid complications. Zencica P et al also opine that fusion can lead to adjacent segment degeneration, thus results of fusion can be short lived. Also, cost is a major factor (12) especially in Indian patients coming from rural background. In an elderly patient early relief of pain and early mobilization are the goals and microscopic decompression helps to achieve these objectives.

Our results clearly support this, patients with spondylolisthesis have comparable pain relief and disability to that of non listhesis group. While long term results at the end of 2 years, show no significant difference between two groups, there is a significant difference between two groups in the short term pain relief. Patients with degenerative spondylolisthesis will take a longer time to recover from pain, but at the end of 2 years we did not see any difference in pain or function between two groups. Since our group without listhesis was younger, we did age matching and made a comparison, still our results were similar. Better short term pain relief in non listhesis group may be due to better stability, while patients with listhesis may have some instability symptoms which may improve over time. This we feel because, there may be some worsening of instability symptoms due to muscle damage, and pain which may improve over a period of time with good physical exercises. Even in listhesis group the pain was mainly because of backache and not due to leg symptoms and all the patients had good relief of radicular symptoms.

Our study was supported by Kunihiro Sasai et al (15), whose results are comparable at 2 years. They also found that there was no progression of instability. NASS guidelines(12) released in 2014 also supports the role of minimally invasive decompression in low grades of spondylolisthesis.

Another important observation from our study was, patients in spondylolisthesis group had longer operative hours and more intraoperative bleeding. However we do not feel this is significant as patients in spondylolisthesis group underwent comparatively decompression of more levels (1.81 vs 1.38 P 0.02). This also would have contributed to slightly higher VAS and ODI scores in this group although they were statistically not significant. 6 patients(37.5%) in Group A underwent 2 or more levels of decompression. In contrast in Group B there were 21 patients (19%) with 2 or more levels of decompression. This also should explain the reasons for higher incidence of dural tears in Group A.

Following the work of Herkowitz (7) et al, there is a trend towards fusion in patients with degenerative spondylolisthesis, but it may not be a good idea to generalize these observations. Nass guidelines(12) provide a strong recommendation for decompression alone in low grades of spondylolisthesis and this has been substantiated by many authors. Rosen DS et al(16) found good results with decompression alone in patients over 75 years, while Podichetty VK et al (17), have shown that micro decompressions can be done safely with minimal complications. Our study also supports these views.

The study has few limitations too, this is a retrospective study, and we have also not studied long term results of more than 4 years. However, Weinstein et al (3) in the SPORT trial have shown that results may be stable at 2 and 4 years. Another limitation of this study, groups differ in number of patients and age. We have tried to limit the influence of age by age matched analysis and found that results do not differ.

Conclusions:

Minimally invasive decompression surgery in grade 1 Spondylolisthesis is a good option for pain relief and functional im-

provement, can be done safely with minimal risks but patient may take little bit longer to recover from pain.

References

1. SHUNJI MATSUNAGA, M.D., KOSEI IJIRI, M.D., AND KYOJI HAYASHI, M.D. Nonsurgically managed patients with degenerative spondylolisthesis: a 10- to 18-year follow-up study, *J Neurosurg (Spine 2)* 93:194–198, 2000
2. Joaquim AF1, Milano JB, Ghizoni E, Patel AA. Is There a Role for Decompression Alone for Treating Symptomatic Degenerative Lumbar Spondylolisthesis?: A Systematic Review. *J Spinal Disord Tech.* 2015 Dec 24. [Epub ahead of print]
3. Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical compared with nonoperative treatment for lumbar degenerative spondylolisthesis. Four-year results in the Spine Patient Outcomes Research Trial (SPORT) randomized and observational cohorts. *J Bone Joint Surg Am* 2009;91:1295-304.
4. O'Rourke MR, Grobler LJ. L4-L5 degenerative spondylolisthesis: indications and technique for operative management. *The Iowa Orthopaedic Journal.* 1998;18:76-86.
5. Bridwell KH, Sedgewick TA, O'Brien MF, Lenke LG, Baldus C. The role of fusion and instrumentation in the treatment of degenerative spondylolisthesis with spinal stenosis. *J Spinal Disord.* 1993;6:461-72.
6. Martin CR, Gruszczynski AT, Braunschur HA, et al. The surgical management of degenerative lumbar spondylolisthesis: a systematic review. *Spine* 2007;32:1791-8.
7. Herkowitz HN, Kurz LT. Degenerative lumbar spondylolisthesis with spinal stenosis. A prospective study comparing decompression with decompression and intertransverse process arthrodesis. *J Bone Joint Surg Am.* 1991;73:802-8.
8. Rampersaud YR, Fisher C, Yee A, et al. Health-related quality of life following decompression compared to decompression and fusion for degenerative lumbar spondylolisthesis: a Canadian multicentre study. *Canadian Journal of Surgery.* 2014;57(4):E126-E133. doi:10.1503/cjs.032213.
9. Ye YP1, Chen D, Xu H. The comparison of instrumented and non-instrumented fusion in the treatment of lumbar spondylolisthesis: a meta-analysis. *Eur Spine J.* 2014 Sep;23(9):1918-26. doi: 10.1007/s00586-014-3453-1. Epub 2014 Jul 14.
10. Kim S, Mortaz Hedjri S, Coyte PC, Rampersaud YR. Cost-utility of lumbar decompression with or without fusion for patients with symptomatic degenerative lumbar spondylolisthesis. *Spine J.* 2012;12(1):44-54
11. Shen Y, Silverstein JC, Roth S. In-hospital complications and mortality after elective spinal fusion surgery in the united states: a study of the nationwide inpatient sample from 2001 to 2005. *J Neurosurg Anesthesiol.* 2009 Jan;21(1):21-30. doi: 10.1097/ANA.0b013e31818b47e9
12. Paul Matz, MD et al. Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis | NASS Clinical Guidelines, 2014 revisited. <https://www.spine.org/.../Spondylolisthesis>, downloaded on 28-03-2016
13. Zencica P, Chaloupka R, Hladiková J, Krbec M. Adjacent segment degeneration after lumbosacral fusion in spondylolisthesis: a retrospective radiological and clinical analysis. *Acta Chir Orthop Traumatol Cech.* 2010 Apr;77(2):124-30.
14. Palmer S, Davison L. Minimally invasive surgical treatment of lumbar spinal stenosis: Two-year follow-up in 54 patients. *Surgical Neurology International.* 2012;3:41. doi:10.4103/2152-7806.94294.
15. Microsurgical bilateral decompression via a unilateral approach for lumbar spinal canal stenosis including degenerative spondylolisthesis Kunihiro Sasai, Masayuki Umeda, Tohku Maruyama, Ei Wakabayashi, Hirokazu Iida, *Journal of Neurosurgery: Spine*, December 2008 / Vol. 9 / No. 6 : Pages 554-559
16. Rosen DS, O'Toole JE, Eichholz KM, Hrubes M, Huo D, Sandhu FA, Fessler RG. Minimally invasive lumbar spinal decompression in the elderly: outcomes of 50 patients aged 75 years and older. *Neurosurgery.* 2007 Mar;60(3):503-9;
17. Podichetty VK, Spears J, Isaacs RE, Booher J, Biscup RS. Complications associated with minimally invasive decompression for lumbar spinal stenosis. *J Spinal Disord Tech.* 2006 May;19(3):161-6.