

Management Protocol of Patients with Lumbar Spinal Stenosis, using the Qualitative Grading as a Tool

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ABSTRACT

Objectives: Several parameters exist for assessment of lumbar spinal stenosis (LSS) but these parameters lack clinical correlation. To formulate a protocol for management of these group of patients using the qualitative grading as a tool.

Materials and methods: A prospective study was undertaken using the qualitative grading on magnetic resonance imaging (MRI) to assess the clinical outcome of LSS at a single level. Irrespective of the grade every patient underwent a minimum 3 months period of conservative management after which depending on the Oswestry Disability Index (ODI) and Visual Analog Scale (VAS) for pain he was grouped into success or failure and the failed patients were advised for decompression surgery at the involved level. These patients were then further assessed after a period of 3 months after surgery. A decrease in ODI by 10 points and a 20 points decrease in VAS was considered as a success.

Results: Out of the 90 patients, there were 61 failures in conservative group, out of these 57 were operated of which only nine did not match the success criteria, while the other four either refused surgery or were lost to follow-up. In grades A1 to 3, only two patients failed conservative trial while from A4 to D, there was a gradual decline in success of conservative trial.

Conclusion: Qualitative grading is a useful tool in LSS and correlates with the clinical outcome and to decision making of these patients.

Keywords: Lumbar spinal stenosis, Magnetic resonance imaging, Neurogenic claudication, Spine decompression.

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INTRODUCTION

The term spinal stenosis refers to an anatomic diagnosis that increases with age and can occur in asymptomatic

individuals.^{1,2} Lumbar spinal surgery (LSS) is an important and understudied research field and as the populations of developed nations get older and want to remain active, research in this field is likely to become prioritized since LSS is a disease of the old individual.³ Several parameters have been proposed in defining spinal stenosis, such as measurement of spinal canal or dural sac cross-sectional surface area (DSCA). However, these parameters lack clinical correlation. Another newer diagnostic tool devised is the qualitative grading system based on morphological appearance of the dural sac on magnetic resonance imaging (MRI). We formulated a protocol for management of these patients using this morphological grading and assessed the outcome of these patients.

MATERIALS AND METHODS

We did a prospective study on 90 consecutive patients having signs and symptoms suggestive of LSS with predominantly single dermatomal involvement. Patients having previous spinal surgery, spinal stenosis at more than two levels, patients with segmental instability, osteoporotic fracture in lumbar spine, severe scoliosis, idiopathic or degenerative, malignant disease, cauda equina syndrome, polyneuropathy, ASA > 3, severe paresis (less than grade 4) were excluded from the study as they may influence the outcome. All the patients were analyzed functionally on the basis of the Oswestry Disability Index (ODI) and the Visual Analog Scale (VAS) for pain. On admission into the study, all patients had a minimum ODI > 25 and a VAS > 50. All the patients underwent MRI with 1.5 T Siemens system and 3 mm cuts at each lumbar level including T1- and T2-weighted sagittal and axial cuts. The T2 axial images included a cut at the level of intervertebral disk. This cut was used to classify the patient into the a qualitative grading system based on the morphologic appearance of the dural sac, taking into account the cerebrospinal fluid (CSF)/rootlet content.⁴ The patients were classified into their respective groups from A1-4, B, C, D by an independent senior spine surgeon not involved in the study (Fig. 1).

All the patients then underwent a trial of conservative management for a period of 3 months which included analgesics, physical therapy, interferential therapy, epidural steroids after which they were assessed in

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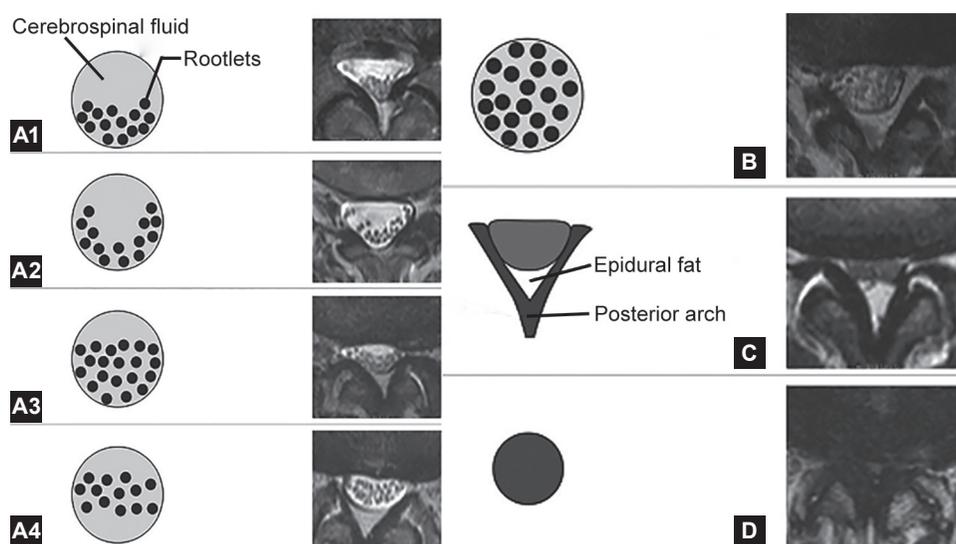


Fig. 1: Morphological grading based on MRI axial T2 images

terms of the ODI and VAS scores. The VAS is a scale for overall pain intensity. The VAS is well-evaluated and measures pain with consistency.⁵ A VAS scale measuring from 0 (no pain) to 100 (pain as bad as it could be or the worst imaginable pain) was used. A 18 to 19 point difference in VAS and a 10 points difference in ODI is found to be clinically significant.⁶ On the basis of this, they were again divided into successful and failure groups, with a decrease in ODI scores of 10 and VAS by 20 points judged as successful. All the patients in the failure group were advised to undergo surgery in the form of decompression at the involved level by standard open laminectomy (Flow Chart 1).

Conventional decompression of the lumbar spinal canal consists of exposure of the posterior spine, then subsequently performing a laminectomy. In this process, the spinous process and the lamina are removed where after the exposed ligamenta flava and medial parts of the facet joints are removed with a chisel or a Kerrison rongeur. The goal of the procedure is to decompress the central canal as well as the lateral recesses by ‘undercutting’, i.e. by resecting the ligamentum flavum and bone

from the anterior and medial parts of the facets, with special care to retain facet joint integrity. Similar to the previous assessment, these patients were also assessed after 3 months of surgery and further classified as success or failure based on the same criteria.

RESULTS

Out of the 90 patients, 42 were males and 48 females with a mean age of 54 years (37–79). The assessment of these patients showed that there was no significant correlation between the grade of the patient and his functional assessment scores (Table 1). This again proves the generally accepted finding that the tolerance of each individual to the stenosis is different. Out of the 90 patients, 29 (32.2%) were managed successfully with conservative treatment while of the remaining 61, 57 underwent surgery with four patients opting against surgical management. Out of the operative group, 48 patients (84.2%) were managed successfully (Graph 1).

Also we found that out of the 17 patients with grades A1-2 there were only two failures with a success rate of conservative management being 88.2%. While on the other end with grades C, D all patients failed conservative management while after surgery the success rate

Flow Chart 1: Protocol followed during our study

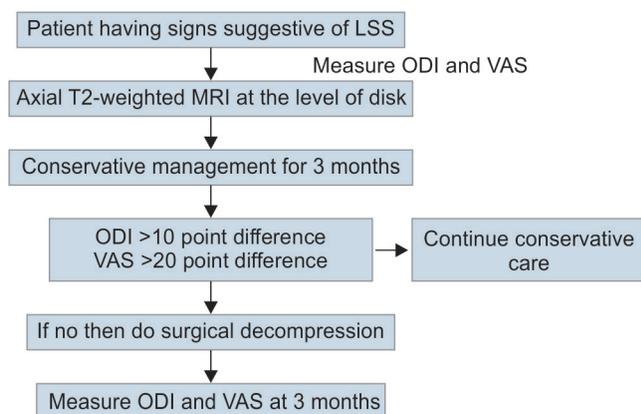
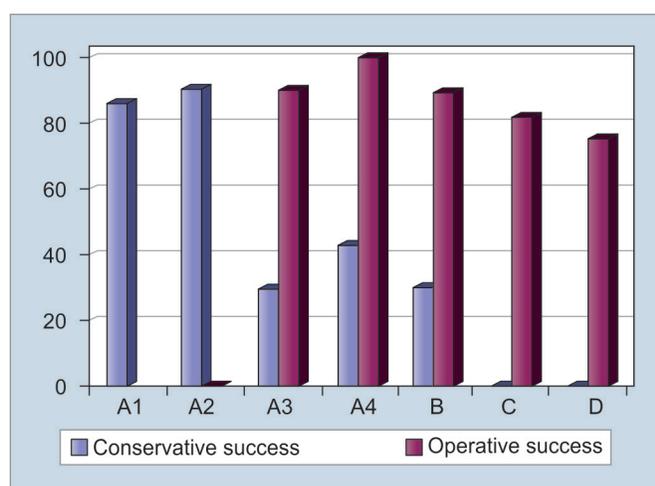


Table 1: Functional assessment of patients included in various grades at admission into the study

Morphological grade	Mean ODI on admission	Mean VAS on admission
A1	28	52
A2	32	56
A3	30	65
A4	36	64
B	32	71
C	41	68
D	39	81



Graph 1: Percentage of patients enrolled in both groups and attaining our set criteria of success

was 80%. In the intermediate groups A4 and B showed only a 33% success rate with conservative care and a 90% success with surgical care more in line with the overall outcome of this study (Tables 1 and 2).

For analysis of these results, the Chi-square test was used which showed that in patients with A4-D groups the operative care was more successful ($p < 0.05$), while in patients with A1-2 conservative care had a significant better outcome ($p < 0.05$). In the A3 group, there was no significance between the outcomes of the two management protocols.

DISCUSSION

Symptoms attributable to LSS were described already in the achondroplastic Greek God Hephaestus who as a result of a trauma to a narrow spinal canal developed a limp with radiating symptoms. Because of his pain and limp Hephaestus was mocked by the Olympians.⁷ Ever since Verbiest in 1949 coined the term LSS there has been extensive study on this subject, however, still a controversy regarding the management of these patients.⁸ Degenerative LSS as defined by the North American Society of Spine as 'a clinical syndrome of buttock or lower extremity pain, which may occur with or without back pain, associated with diminished space available for the neural and perivascular elements in the lumbar

spine'.⁹ However, this definition does not comply to the fact that not all patients having stenosis are symptomatic and the tolerance of each individual to this stenosis is different.

This has led to a large number of radiological criteria and classification systems in order to define and to determine the degree of stenosis. The prevailing being measurements of spinal canal or DSCA in either computed tomography (CT) or axial MRI sequences taken at disk level. In an effort to counter the above limitations, other parameters have been developed, such as the stenosis ratio (SR).¹⁰ These above-mentioned quantitative parameters require accurate measurement using tools not always available in everyday clinical practice.

Another parameter introduced includes a qualitative grading system based on the morphologic appearance of the dural sac as seen on T2-weighted axial images of the lumbar spine, taking into account the CSF/rootlet content.

The advantage of this grading over the others is that it grades stenosis in terms of the neural tissue impingement and can more closely correlate with clinical symptoms. A recent study has shown a good inter- and intraobserver agreement between measurements of dural sac area and morphological grading.¹¹

The aim of our study was to formulate a protocol for treatment of patients with LSS using this morphological grading. We found that there was a paucity of prospective clinical trials in order to manage these patients. The clinical symptoms of LSS are most often neurogenic claudication (pseudoclaudication), radicular leg pain as well as back and buttock pain. Balance problems and numbness of the legs is also frequent. The clinical presentation is highly variable but the occurrence of neurogenic claudication is considered to be a reliable clinical construct.¹² A recent systematic review comparing surgery to conservative treatment in LSS suggested that for patients with radicular pain caused by LSS, in whom a trial of 3 to 6 months of conservative treatment had failed, surgery did not improve walking ability but improved pain, function, and health-related quality of life (HRQoL) to a higher degree than continuing conservative treatment.¹³

Table 2: Distribution of the patients in their respective groups and the success and failure in accordance to our criteria

Qualitative grade	No. of patients	Conservative		Operative		
		Success	Failure	No. of patients	Success	Failure
A1	7	6	1	—	—	—
A2	10	9	1	—	—	—
A3	10	3	7	5	4	1
A4	7	3	4	4	4	0
B	26	8	18	18	16	2
C	22	0	22	22	18	4
D	8	0	8	8	6	2

At present, there is no significant evidence that favors conservative treatment over surgery in spinal stenosis.¹⁴ In our study, the diagnosis was made a separate senior spine surgeon not involved in the study. We tried to decrease the selection bias in by including patients having predominantly only a single dermatomal involvement and the patients were divided into their respective groups based on the grading at this involved level. The diagnosis of LSS was largely based on history and clinical examination and the patients were then placed into there respective groups after an MRI scan. The grading was tested for its prognostic significance and not as a diagnostic tool for LSS. A lot of literature is available supporting both conservative care and early surgical treatment for LSS. However, there is no concensus on what basis to delineate the use of these two management methods. Also most studies base there criteria of decision making on a functional questionnaires. We tried to make a protocol that incorporated both the functional subjective questionnaires and the quantitative objective finding of morphological grading based on MRI. We used the ODI and the VAS for pain as the functional criteria for assessment of our patients. A decrease in 10 points in the ODI and a 20 points decrease in the VAS was considered as a success.

CONCLUSION

We were able to draw following conclusions from our study, qualitative grading can be used in the management protocol of patients with LSS. Patients with a morphological grade of A1, 2 have a excellent outcome with conservative management. While patients with grades C and D have very poor response with all forms of conservative care and should be explained of surgery. Surgical decompression in this group of patients improve their functional and clinical parameters. Patients with grades A3-4 and B should have trial of conservative care for 3 months on failing of which surgery should be explained. Oswestry disability index difference of more than 10 points and a VAS scale difference of more than 20 points can be used to functionally assess the outcomes of conservative care and operative management in these patients. Also patients have different ability to sustain the stenosis and this did not correlate with the radiological severity, hence the diagnosis of these patients should be largely based on the history and physical examination

than solely on radiological diagnosis. The protocol can be used as a standard of care in the management of these patients, though we lack a long-term data in this regards to make our assertion more authentic.

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