Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2014; 2(5C):1657-1659 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com **DOI:** 10.36347/sjams.2014.v02i05.033

Research Article

When Motion Segment is No More a Motion Segment

Prabodh Kumar Dakey
I/C Professor of Orthopaedics, Rangaraya Medical College, Kakinada-533003, Andhra Pradesh, India

***Corresponding author**
Prabodh Kumar Dakey
Email: savitriputra@yahoo.co.in

Abstract: The motion segment plays a major role in the biomechanics of spine. Lumbar spine, especially lower lumbar spine, which is mobile and weight bearing, undergoes series of changes as age advances. This segment transforms into a motionless segment due to degenerative spondylosis and lead to a clinical entity called lumbar canal stenosis, which can produce, low back pain and neurological claudication. In such patients internal decompression of stenosed lumbar canal by laminectomy and foraminotomy by excising the medial part of superior facet of inferior vertebra can be a useful surgical option. We report a case series of 98 elderly patients, suffering from severe lumbar canal stenosis secondary to degenerative spondylosis with various neurological complications managed at our institute between October 2010 and May 2013, using the above mentioned surgical option. At two years follow up all patients showed good functional recovery, symptomatic relief and none presented with any spinal instability..
Keywords: Degenerative spondylosis, Foraminotomy, Laminectomy, Motion segment.

INTRODUCTION

The motion segment consists of two adjacent vertebrae and the connecting ligamentous tissues i.e all the structures that move between two vertebra include, inter vertebral disc, inter vertebral foramen, facets, inter laminar space, ligamentumflavum, inter spinous, and supra spinous ligaments. In older age groups, due to degenerative spondylosis, this motion segment undergoes so many changes and loses its original nature and becomes a segment without motion.

Degenerative lumbar spinal stenosis is seen primarily in patients older than 60, with an average age of 73 at presentation [1]. Males are predominantly affected, with reported male-to-female ratios ranging from 3:1 to 12:1 [2]. Although the exact prevalence of degenerative spinal stenosis is unknown, advancements in diagnostic imaging have increased recognition of this lumbar canal stenosis [3].

According to Junghans a change in the intervertebral disc produces changes in the whole motion segment which leads to initially a phage of instability followed later by a stage of fixed deformity. In this stage of fixed deformity, inter spinous space, inter laminar space, inter vertebral space, size of inter vertebral foramen are reduced. Due to thickening of ligamentumflavum, hypertrophy of facet joints and bony proliferation over facet joints, tropism (coronal orientation of facet joints) formation of osteophytes, protrusion of discs, lumbar spinal canal further becomes narrow like a tight bony tube, tightly holding caudaequina and nerve roots. At this stage motion segment is no more a motion segment

Aims and Objective

This study evaluates the safety and outcome of internal decompression of stenosed lumbar canal after laminectomy, by removing thickened fibrosed ligamentum flavum, bony proliferation over hypertrophied facet joints, and foraminotomy by excising the medial part of superior facet of inferior vertebra, and osteophytes growing towards intervertebral foramen.

MATERIALS AND METHODS

We operated on 98 elderly patients, suffering from severe lumbar canal stenosis due to degenerative spondylosis, with radiculopathy, neurological claudication, and some patients with neurological deficit. Surgeries were performed over the time period from 2010 october to 2013 may. Seventy two patients were male and 26 were female. The mean age of patients was about 62 years (range 56 to 74 years). Out of 72 male patients, ligamentum flavum is thickened bilaterally in 70 patients and it is more thickened unilaterally in two patients and all female patients have bilateral uniform thickening of ligamentum flavum**.**

MR Imaging of most of the lumbar spines revealed hypertrophy of facet joints, thickened ligamentum flavum, degenerated IV discs, canal stenosis with foraminal stenosis. Majority of the patients had

maximum stenosis between L4 – L5 facet joints with waist like narrowing of the dural tube, indentation of dural tube being secondary to disc prolapsed

CT scan axial cut can reveal unilateral or bilateral facet hypertrophy and narrowing of lateral recess.

Operative technique

After exposing the lower lumbar spine in routine fashion, L4 lamina is commonly removed completely and then about 3mm of inferior margin of L3 lamina and spinous process and about 2mm of superior margin of L5 lamina and spinous process are excised. Medial portion of superior facet and all the proliferated new bone from the hypertrophied facet joints is excised; which is the main culprit causing compression of the nerve root in the lateral recess is excised. Inferomedial margin of the pedicle at times need to be excised. Thickened ligamentum flavum is excised. Osteophytes, from the posterior margins of vertebral bodies also excised. Excision of disc is not a routine unless there is significant prolapse causing compression of nerve root. With this, complete internal decompression can be achieved without any spinal instability, as the motion segment is no more a motion segment at this stage of fixed deformity. At this stage lower lumbar spine is like a fixed bony tube, there is no need to stabilize the lumbar spine with instrumentation and inter body fusion after this procedure.

Postoperative protocol

First three weeks bed rest followed by ambulation with support of lumbar corset. After six weeks back strengthening exercises and physiotherapy. General condition must be improved and osteoporosis has to be treated.

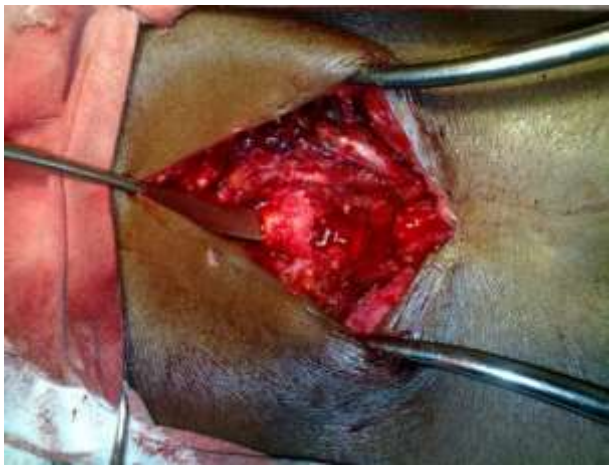

Fig. 1: Thickened, fibrosed ligamentumflavum

Fig. 2: Excised thickened ligamentum flavum

Fig. 3: Decompressed caudaequina

RESULTS

At three years follow up all patients showed good functional outcome and desired symptomatic relief, with no neurological claudication, without any spinal instability.

DISCUSSION

Lumbar spinal stenosis may be localized to a single segment of the spine or may span multiple segments. Each motion segment of the spine consists of two adjacent vertebrae and the intervening intervertebral disc, facet joints, and supporting ligaments. Degeneration of this joint complex commonly begins as disc desiccation. Mechanical failure of the disc then alters motion segment kinematics with subsequent facet joint osteoarthritis and hypertrophy. Segmental instability increases, the pedicles and laminae thickened [4] and the supporting ligamentous structures undergo hypertrophy. All these changes transform what was previous a motion segment of the spine into a fixed motionless segment (stage of fixed deformity). It has become evident that maintenance of sagittal alignment of the spine has important clinical implications when treating and preventing adjacent segment degeneration and flat back syndrome [5]. When the spine is in fixed deformity stage, where motion segment is no more a motion segment, laminectomy and foraminotomy is ideal and complete internal decompression is possible without any spinal instability.

Table-1: Result of study

No. of patients	Duration of follow up	No. of patients having low back ache	No. of patients having claudication pain	Results	Infection	Dural Leak	Time to return work
56	Three years	56	56	30 Excellent 26 Good	Nil	Nil	Most of them are non-working people, but they are able to perform their routine work after three months.
24	Two years	24	24	18 Excellent 6 Good	Nil	One	
12	One and half years	12	12	Good	Nil	Two	
6	One year two months	6	6	Excellent	Nil	Nil	

We selected the patients for internal decompression of stenosed lumbar canal with both low back ache and claudication pain. Time to return to work depends on patient's general condition and in most of the patients we observed complete relief of symptoms by three weeks.

CONCLUSION

When motion segment is no more a motion segment, in fixed deformity stage of spine, complete internal decompression by laminectomy and for aminotomy will rarely lead to spinal instability and stabilization by instrumentation and inter body fusion is not required as the spine is already stabilized by nature.

REFERENCES

1. Spivak JM; Degenerative lumbar spinal stenosis. J Bone Joint Surg Am., 1998; 80(7): 1053-1066.
2. Arnoldi CC, Brodsky AE, Cauchoix J, Crock HV, Dommisse GF, Edgar MA *et al*.; Lumbar spinal stenosis and nerve root entrapment syndromes: Definition and classification. Clin Orthop., 1976; 115: 4-5.
3. Jones RA, Thomson JL; The narrow lumbar canal: a clinical and radiological review. J Bone Joint Surg Br., 1968; 50(3): 595-605.
4. Rauschning W; Pathoanatomy of lumbar disc degeneration and stenosis. Acta Orthop Scand Suppl., 1993; 251: 3-12.
5. Kawakami M, Tamaki T, Ando M, Yamada H, Hashizume H, Yoshida M; Lumbar sagittal balance influences the clinical outcome after decompression and posterolateral spinal fusion for degenerative lumbar spondylolisthesis. Spine, 2002; 27(1): 59-64.