

Short Review

The history of and clinical findings in lumbar spinal stenosis: a brief review



Lumbar spinal stenosis is a condition that has gained recognition only relatively recently as being a common cause of back pain. It is easily confused with other disorders which may present with similar symptoms such as vascular claudication, herniated disk, and peripheral neuropathy. The purpose of this paper is to examine some recent publications in this field and to pool the information in an attempt to provide clinicians with clear indicators relating to the history and the physical examination of the patient. It is hoped that this will then enable the clinician to make a diagnosis of lumbar spinal stenosis with some degree of confidence. In particular, this paper is aimed at the clinician who is seeing the patient for the first time and who, therefore, has limited access to diagnostic facilities such as CT/MRI scans, etc.

*The Institute of Rehabilitation, 215,
Anlaby Road, Hull HU3 2PG,
U.K.*

Key Words: Lumbar spinal stenosis; history; clinical findings; clinical diagnosis

Introduction

Lumbar spinal stenosis (LSS) is recognized as a common cause of back and leg pain in elderly patients and causes significant functional disability.¹ It is a condition that has only gained recognition relatively recently and therefore there is a lack of clear information available to help clinicians formulate a confident diagnosis.^{1,2}

The purpose of this paper is to examine some recent publications in this field and to pool the information in an attempt to provide clinicians with clear indicators relating to the history and the physical examination of the patient. It is hoped that this will then enable the clinician to make a diagnosis of lumbar spinal stenosis with some degree of confidence.

There have been very few good quality studies conducted to establish the diagnostic value of the history and physical findings,¹ and in the absence

of such studies this paper draws information from several reports of case series and other findings related to the subject of lumbar spinal stenosis.

This paper is particularly aimed at the clinician who is seeing the patient for the first time and who, therefore, does not have immediate access to diagnostic tests (e.g. X-rays, computed tomography (CT) scans, physical tests requiring equipment, etc.) which would perhaps help to confirm the diagnosis. Therefore we have in mind the GP and the physiotherapist, as these are often the first clinicians encountered by this group of patients.

Definition and classification

Lumbar spinal stenosis has been defined as: 'any type of narrowing of the spinal canal, nerve root canals, or intervertebral foramina'.³ This immediately opens up the possibility of the condition being the

result of many quite different pathologies which include inflammatory and mechanical problems as well as conditions like space-occupying lesions.⁴ The condition has been categorized into several distinct types:

- (a) acquired stenosis
 - (1) degenerative stenosis
 - (a) Central canal
 - (b) Lateral recess, root tunnels
 - (c) Degenerative spondylolythetic
 - (d) Mixed (a combination of (a) and/or (b), (c) above)
 - (2) iatrogenic (e.g. post-surgical)
 - (3) post-traumatic
 - (4) miscellaneous (e.g. inflammatory disease, etc.) (See Onel *et al.*² and Nixon⁵)
- (b) congenital stenosis
- (c) developmental stenosis

Technically speaking, a prolapsed disk or a space-occupying malignant growth could be included under the general term 'stenosis', because they contribute to the narrowing of the spinal canal and/or neural canal, etc. However, these are clearly separate diseases in their own right and clinically present quite different pictures.^{2,6} They can therefore be excluded from the categorization shown above.

History

It is worth noting that the diagnosis of LSS may rest more on the information gained from a detailed history than from the physical findings.⁷ In practice, the most commonly seen type of stenosis is the degenerative type.^{5,8} Initially it was thought that the general condition of 'lumbar spinal stenosis' was more common in men.⁸ However, the reported frequency of occurrence in the two sexes has produced conflicting results.^{1,5,8} This may arise from the fact that as the condition has become more accepted and recognizable, more females have been reported presenting with the required findings for a diagnosis to be made. Also, a proportion of those cases presenting as 'degenerative' stenosis actually result from the formation of a spondylolythesis in the lumbar spine. As the condition of 'degenerative spondylolythesis' is much more common in females than males, this would also account for the view that LSS is generally more prevalent in the female.^{1,5,8}

Age of onset

The reported age of onset has produced data which is not perfectly consistent; however, it points to some

general findings, namely that the time at which patients present usually occurs in the following sequence:

Degenerative: 50-80 years
 Degenerative spondylolythesis: 40-50 years
 Congenital/developmental stenosis: adolescence-early thirties
 (See Katz *et al.*¹ Nixon⁵ and Herkowitz.⁸)

Pain

The patient usually experiences a progressive increase in pain over many years.^{1,8} During this time the distribution of the pain changes to involve the buttocks and/or thighs and/or legs.⁵ This is characterized by its general nature in that it tends to have a non-dermatomal distribution but rather has a 'stocking' type distribution.^{1,8}

The patient usually tolerates the progressive increase in pain for a long time, possibly years, but tends to seek help when the pain starts to radiate into the legs, particularly when it is related to walking. Perhaps the classical indicator for stenosis is the presence of so-called neurogenic claudication.¹ This is characterized by the development of pain in one or both legs on walking. The pain tends to start centrally and move towards the extremities as the patient continues to walk. Eventually they may have to stop walking and can often be found then adopting a flexed position, i.e. sitting in flexion or even squatting down 'tying their shoelaces'.⁵ In some cases the symptoms can be brought on simply by prolonged standing. Sometimes the patient adopts a typical type of gait when walking (the 'Simian' gait) which results from their need to adopt a flexed position.^{1,5,9} This type of claudication can be distinguished from vascular claudication in that the peripheral arterial pulses are usually absent in the vascular type,² the walking distance also tends to be variable in LSS,^{10,11} and in LSS the pain tends to radiate from the back towards the extremities, whereas in vascular claudication it tends to originate in the periphery (calf area) and radiate towards the back.⁹ Also there is less of a tendency for vascular claudication to be precipitated by standing alone.² The relief obtained by flexion of the lumbar spine is in sharp contrast to that experienced by patients suffering from a prolapsed disk, who usually experience a significant worsening of their pain on lumbar flexion. This factor thus helps to distinguish stenosis from this condition.² Although the patient may be very limited in their

walking capabilities, they may report the ability to cycle many miles without difficulty.^{1,5}

The quality of the pain experienced by the patient during the years of slow deterioration is also typical in that it usually resembles that which is seen in osteoarthritis, i.e. an ache accompanied by stiffness, which may be related to changes in the weather.⁶ Having said this, it has to be noted that as the condition worsens, the pain experienced by the patient varies considerably and can be severe. This is particularly related to the position of the lumbar spine⁷ and activity, especially walking. Generally speaking, more leg pain is experienced as the lumbar spine moves into extension and this may be a significant factor in the diagnosis. The patient may also report that they have difficulty in finding a comfortable position when lying down – unless they bend their knees.⁹

Many patients present with a combination of low back pain and leg pain. In reality they often suffer from a combination of pathologies which includes lumbar stenosis, and chronic disk degeneration. Any leg pain therefore needs to be carefully scrutinized to determine to what extent it may be related to disk problems or other pathology.¹ The key findings are that the leg pain is related to ambulation, is relieved by flexion, is diffuse in nature – following no dermatomal pattern – and generally starts centrally and gradually progresses towards the extremities.^{1,5}

Neurological symptoms

Sensory deficit may be present and the patient may report numbness and paraesthesia. They may also have noticed some subjective weakness and occasional loss of balance.^{1,9} The most commonly affected nerve root is L5,⁸ so any neurological deficits will usually be associated with this level.

Occasionally bladder and/or bowel disturbance may be reported, but as these, together with weakness and balance problems, are fairly common in elderly people, care needs to be taken to ensure that other pathology unrelated to the spine is not present.¹ Similarly, the diffuse nature of the pain or discomfort experienced by the patient may be easily confused with other pathologies, e.g. various neuropathies which, again, are not uncommon in the elderly. These neuropathic conditions are characterized by a 'burning' discomfort below the knee which has a 'stocking' distribution and is not related to activity.⁸

Physical examination

Range of movement of lumbar spine

Generally there is some clear limitation in extension of the lumbar spine.^{4,8} It must be noted that flexion may also be limited, but this is usually related to degenerative processes within the lumbar spine and does not usually produce pain.¹ If lumbar extension is sustained (for 30 s or more) this may reproduce the patient's leg pain, and this is possibly one of the most important physical signs present in LSS.¹

Palpation of the lower back

This usually does not produce severe pain, although it does occur occasionally.^{3,8}

Neurological findings

A restriction in straight leg raise may be present, but this does not usually cause pain unless the patient is suffering from a concomitant disk lesion.^{1,8} Some motor weakness may also be apparent. As the L5 nerve root is the most frequently affected, any weakness present will be detected in the extensor hallucis longus and/or tibialis anterior.^{1,8} Sensory changes may be noted, especially in the L4-L5 dermatomes.⁸ This can be detected by lack of pin-prick sensation over the affected areas. The inability to detect sensations of vibration over the medial foot is also a feature of LSS, and is considered by Katz to be perhaps the most important neurological test in diagnosing LSS.¹ A more diffuse sensory loss that is not related to walking is suggestive of peripheral neuropathy.⁸

The ankle and/or knee jerks may be absent or diminished (the ankle more commonly than the knee) but this finding, together with many other neurological signs, needs to be interpreted with care, as such discrepancies are common in elderly people.⁸

In a very small number of cases there may be evidence of cauda equina involvement, which may be demonstrated by loss of control of the sphincters.³ Urgent referral would then be indicated, if alternative causes for the loss of control were eliminated. Again, in older people other co-existing pathologies need to be considered.

Physical observations

There may be some evidence of muscle atrophy, but this will probably relate to long-standing neural

Table 1. Main findings from the history.

History
1. Patient complains of neurogenic claudication, i.e. pain radiating into the buttocks/legs from the back on walking.
2. Long history of progressive low back pain which eventually radiates into the legs.
3. Complains of pain on standing upright and/or walking.
4. No history of trauma.
5. Pain relieved by inactivity and/or flexion of the lumbar spine.
6. Inability to find a comfortable position except with legs flexed.
7. Age ≥ 50 years
8. Non-dermatomal distribution of pain on walking. It tends to have a 'stocking-like' distribution.
9. Patient may report episodes of loss of balance and/or falls.

compression.⁸ The patient's gait may also alert the clinician to suspecting LSS. Characteristically they adopt a rather stooped, flexed posture (the Simeon posture) when walking; they may also have a tendency to adopt a wide-based gait.¹² If the patient relates a history of falls, it is worth carrying out a modified Romberg test to assess their balance (the patient is asked to stand with feet together, eyes closed for 10 s. The test is regarded as positive if the patient has to perform any compensatory movements in this time).¹² Katz considers this a very specific physical finding, together with a wide-based gait on walking, in cases of LSS.

These findings, together with the loss of vibration sense over the medial foot, would seem to suggest degeneration of the larger diameter afferent nerve fibres which are responsible for proprioception and which are therefore involved in balance responses.¹

Effects of exercise

Asking the patient to carry out some exercise after examination, e.g. walking upstairs, may result in the diminution or loss of reflexes in the lower limb when retested.⁸ Also, the patient's pain may be reproduced by asking them to perform sustained lumbar extension and holding in this position for more than 30 s.¹²

Commonly the patient reports pain on ambulation and that this pain worsens as the walking continues. This is an important finding to assist diagnosis of the condition.⁴

Table 2. Main findings from the physical examination.

Physical findings
1. Range of movement in lumbar spine: <ul style="list-style-type: none"> • Extension is usually significantly reduced and, if maintained for >30 s, may provoke the leg pain. • Flexion may be limited but does not provoke the leg pain.
2. Standing upright for a long time may provoke the pain.
3. Walking provokes the pain which radiates from the low back into the buttock and/or legs.
4. May have some weakness in L5 (tibialis anterior and/or extensor hallucis longus).
5. Pain relieved by forward flexion of the lumbar spine.
6. Patient may adopt the 'Simeon' posture on walking.
7. May have a positive modified Romberg test.
8. May have loss of vibration sensation over the medial foot.

Table 3. Difference between LSS and herniated disk.

Lumbar spinal stenosis	Herniated disk
Pain relieved by lumbar flexion	Pain made worse by lumbar flexion
Non-dermatomal pain pattern	Dermatomal pain pattern
SLR does not usually provoke pain	SLR provokes the pain
Dull diffuse pain	Acute pain

General comments

On the whole the physical findings are relatively modest compared with disk herniation.^{3,8} It is also worth noting that the history and the physical findings may not correlate with the amount of pain experienced by the patient or their loss of function.¹

Summary

Tables 1 and 2 summarize the main findings under the headings of 'History' and 'Physical finding':

Factors which may help in the differential diagnosis of LSS

Tables 3–5 summarize the main differences between LSS and some commonly occurring conditions with which it may be easily confused.

Table 4. Differences between LSS and vascular claudication.

Lumbar spinal stenosis	Vascular claudication
Peripheral pulses tend to be normal	Peripheral pulses tend to be absent
Pain radiates from the centre (low back area) into the buttocks and/or legs on ambulation	Pain tends to start peripherally, below the knees and move up the legs on ambulation
Pain may be provoked on standing	Pain relieved by standing still after walking

Table 5. Differences between LSS and peripheral neuropathy.

Lumbar spinal stenosis	Peripheral neuropathy
Pain is ache + stiffness and located centrally (low back, buttocks)	Burning pain located below the knees
Pain related to ambulation and/or position of the lumbar spine (especially extension)	Pain not affected by ambulation
Pain may be provoked on standing	Pain relieved by standing still after walking

Conclusion

The most significant and reliable factors pointing to the presence of LSS can be summed up as follows:

History

1. Neurogenic claudication, relieved by inactivity or flexion of lumbar spine.
2. Leg pain on extension of lumbar spine, i.e. on prolonged standing.
3. Non-dermatomal distribution of pain on activity which radiates from the centre (low back area) into the buttocks/legs.
4. Age \geq 50 years.
5. May report problems with balance, i.e. falls.

Physical findings

1. Positive modified Rhomberg test.
2. Loss of vibration sensation over medial foot.
3. Extension of lumbar spine for >30 s provokes the leg pain.
4. Lumbar spine extension significantly limited.
5. May have neurological deficit associated with L5 root, either sensory or motor.

References

- 1 Katz JN, Dalgas M, Stucki G & Lipson SJ. Diagnosis of lumbar spinal stenosis. *Rheum Dis Clin North Am* 1994; 20: 471-83
- 2 Deyo RA, Rainville J & Kent DL. What can the history and physical examination tell us about low back pain? *JAMA* 1992; 268: 760-5
- 3 Amundsen T, Weber H, Lilleas F, Nordal HJ, Abdelnoor M & Magnaes B. Lumbar spinal stenosis. Clinical and radiologic features. *Spine* 1995; 20: 1178-86
- 4 Onel D, Sari H & Donmez C. Lumbar spinal stenosis: clinical/radiological therapeutic evaluation in 145 patients. Conservative treatment or surgical intervention? *Spine* 1993; 18: 291-8
- 5 Nixon JE, ed. *Spinal Stenosis, 1st ed.* London: Edward Arnold, 1991
- 6 Jackson DA, Llewelyn-Phillips H & Klaber-Moffett JA. Categorization of back pain patients using an evidence based approach. *Musculoskeletal Management* 1996; 2: 39-46
- 7 Berthelot JM, Bertrand Vasseur A, Rodet D, Maugars Y & Prost A. Lumbar spinal stenosis: a review. *Revue Du Rhumatisme Rev Rhum Engl Ed* 1997; 64: 315-25
- 8 Herkowitz HN. Spinal stenosis: clinical evaluation. *Instr Course Lect* 1992; 41: 183-5
- 9 Lazaro Lt & Quinet RJ. Low back pain: how to make the diagnosis in the older patient. *Geriatrics* 1994; 49: 48-53
- 10 Enebo B, Doxey T, Dunlap J, Elston W, Takahashi B & Tang T. Lumbar central and lateral recess stenosis: diagnosis, management, and hypothetical case presentation. *JNMS* 1997; 5: 26-34
- 11 Lipson S. Clinical diagnosis of spinal stenosis. *Semin Spine Surg* 1989; 1: 143-4
- 12 Katz JN, Dalgas M & Stucki G *et al.* Degenerative lumbar spinal stenosis. Diagnostic value of the history and physical examination. *Arthritis Rheum* 1995; 38: 1236-41