

Low Back Pain Due to Degenerative Disease in Elderly Patients

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Abstract: Low back pain in elderly individuals arises from age-related changes in lumbar spine structures, and these changes are closely associated with the lifestyle of the patient. Low back pain is classified into organic pain associated with organic disorders in lumbar spine structures (spondylolisthesis, spinal stenosis, osteoporotic vertebral fracture, etc.) and functional pain associated with no lesions other than physiological age-related changes. While the former should be treated with appropriate intervention after accurate diagnosis, the latter requires therapeutic exercise and guidance for their lives.

Key words: Low back pain; Elderly patients; Exercise; Lumbar degenerative disease

Epidemiology of Low Back Pain in Elderly Patients

Reflecting the increasing size of the elderly population, we are faced with a constant increase in the prevalence of low back pain and neurological symptoms in the lower limbs among senior citizens. The development of low back pain is strongly associated with postural load conditions reflecting the lifestyle of the patient, in addition to the age-related changes in lumbar spine structures.

The authors studied the prevalence of low back pain among individuals aged 65 years or more in Kochi Prefecture, and the results are shown in Table 1. Of the 745 randomly selected

elderly individuals living in the urban area of Kochi City, 54% reported having low back pain (the percentage of those who had low back pain during the preceding month). On the other hand, the prevalence of low back pain exceeded 70% among the 703 elderly persons working in rural/mountainous areas. The prevalence was as low as 42% among those staying in a health institution for the elderly in the city. These results indicate that low back pain is closely associated with patient lifestyle.

Lumbar Disorders in Elderly Patients

The lumbar spine structures involved in the development of low back pain are interverte-

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Table 1 Prevalence of Low Back Pain in Elderly Individuals (aged ≥ 65)

		Subjects (persons)	Low back pain		
			(+) at the time of the study	(+) during the past month	None
Urban	Kochi City	745	13%	54%	46%
	Health institution for the elderly	45	13	42	57
Rural/mountainous	Rural (Tai)	302	43	72	14
	Rural (Hayama)	129	49	76	24
	Mountainous (Higashi Toyonaga)	272	50	77	20

(Quoted from Masaaki Ando, Hiroshi Yamamoto *et al.*, *Journal of the Western Japanese Research Society for Spine*, 1986; 12(1): 172–175.)

bral disk cartilages, intervertebral joints, tendons, and muscles. When the sensory receptors in these structures receive nociceptive stimuli, they trigger a pain reaction in the pain sensation system, including both at the peripheral and the central levels. Inappropriate posture, irregular movement of the lumbar vertebrae, and reduced or imbalanced muscle strength enhance the nociceptive stimuli. Motion restriction due to pain leads to the contracture of intervertebral joints and the atrophy of the other lumbar spine structures, resulting in a vicious circle of pain.

Among changes in lumbar spine structures, age-related degeneration of intervertebral disk cartilages and that of intervertebral joints are common causes of low back pain. Kirkaldy-Willis classified the development of low back pain into the following 3 stages:

(1) **Dysfunction:** Ruptures occur in the intervertebral cartilages, and early lesions such as minimal damage to the intervertebral joints and mechanical inflammation develop.

(2) **Instability:** The function of the intervertebral disks is disrupted, progression of the degenerative processes is seen in the intervertebral joints, instability develops in the motor functional unit, and clinical symptoms such as low back pain and lower limb neurological symptoms become severe.

(3) **Restabilization:** Motion is restricted due

to spur formation on the vertebral bodies and thickening and deformation of intervertebral joints. At this stage, the severity of low back pain decreases despite the reduced range of motion of the lumbar spine. However, morbidity may result from lumbar spinal canal stenosis.

1. Lumbar spinal canal stenosis

Lumbar spinal canal stenosis involves the age-related degeneration of the vertebral bodies, vertebral arches, and intervertebral disks, which comprises the spinal canal. This degeneration causes deformation or slipping of the vertebrae, resulting in the narrowing of the space containing the cauda equina and nerve roots, hence causing neurological symptoms of the lower limb and low back pain. A characteristic symptom of lumbar spinal canal stenosis is claudication, in which prolonged continuous walking and standing may cause excessive dynamic loading on the spinal canal, inducing symptoms of the lower limb. The factors inducing lumbar spinal canal stenosis are summarized in Table 2. While the primary factor is the age-related changes in the lumbar spine structures, attention should be paid to the postural factor, in which backward bending of the lumbar spine due to weakening of trunk muscles may cause narrowing of the spinal canal and accelerate deformation of the posterior structures.

Table 2 Factors Causing Lumbar Spinal Stenosis

1. Age-related changes in lumbar spine structures
2. Postural factors: weakening of trunk muscles (increased load on spinal canal)
3. Segmental instability starting in middle age: degenerative spondylolisthesis
4. Spondylytic spondylolisthesis, previous lumbar surgery, etc.

2. Osteoporotic fracture

Reduced bone mass in elderly individuals may result in the development of osteoporosis and an increased risk of non-traumatic osteoporotic fracture of the spine. The pain from osteoporotic fracture arises abruptly and is severe. The fracture usually heals, and the pain decreases within 2 or 3 months. If pain continues for more than 2 or 3 months, pseudoarthrosis of the vertebral body is suspected. This possibility should be studied by examining whether or not there is a difference in the anterior height of the injured vertebral body between standing lateral and supine lateral plain radiographs.

Figure 1 shows lumbar spine disorders and their symptoms in elderly patients. The symptoms reported by elderly patients include (i) low back pain, (ii) kyphotic and scoliotic spine deformity, and (iii) neurological symptoms of lower limb accompanying spinal stenosis. These 3 categories of clinical symptom arise from the above forms of the disease.

Diagnostic Tips

The diagnosis of lumbar disorders in elderly patients should be based on careful history taking and physical findings. It is particularly important to confirm what kind of activities of daily living induce and eliminate the clinical symptoms. It is necessary to examine the deformity of the lumbar spine, the range of motion, the presence of neurological symptoms of the lower limb in response to postural loading, and physical findings such as neurological findings in the lower limbs.

MRI is an effective method of imaging diag-

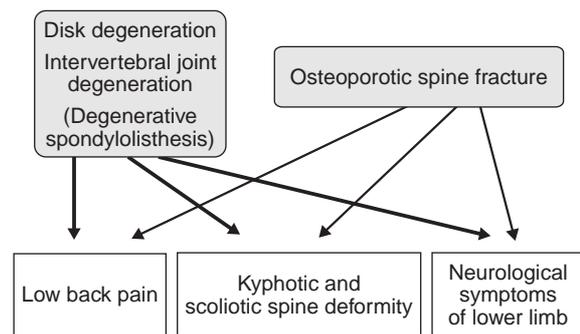


Fig. 1 Lumbar spine disorders in elderly patients

nosis, and can provide definitive evidence of disk herniation, spinal stenosis, and osteoporotic spine fracture. In the case of osteoporotic spine fracture, a low intensity area on a T1 enhanced image indicates a new fracture.

Table 3 lists the important points to be considered in diagnosing low back pain in elderly patients. While imaging diagnosis in elderly patients may provide objective evidence, it has the drawback of frequent false-positive findings. Therefore, even if abnormalities are detected on MRI images, it should not necessarily be concluded that the clinical findings are attributable to these abnormalities. A key in selecting the treatment method can also be obtained from careful history taking, symptomatic analysis of pain, examination of motion-induced symptoms observed while walking side-by-side with the patient, detailed analysis of neurological findings, and functional diagnosis such as nerve block and electrophysiological examination. In all cases, it is important to obtain and evaluate detailed information on the nature of the pain in the lower back and lower limbs, as well as information on how

Table 3 Important Points in Diagnosing Low Back Pain in Elderly Patients

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- MRI and other imaging methods tend to show false-positive findings.
 - Physicians should not necessarily conclude that clinical symptom is attributable to abnormal findings on the images.
 - Careful history taking and physical findings are important.
 - Functional diagnosis sometimes provides evidence.
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Table 4 Treatment of Lumbar Spine Disorders in Elderly Patients

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1. Conservative therapies (first choice)
 - Medication: NSAIDs, muscle relaxants (e.g., eperisone hydrochloride)
 - Local block therapy
 - Physical therapy: Physiotherapy (heat, light, brace, etc.), therapeutic exercise
 2. Surgical therapies (second choice)
 - Decompression
 - Spine fusion
 - Decompression and fusion
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the pain is related to the activities of daily living, to decide the method for treatment that will improve the patient's quality of life.

Treatment

1. Basics of treatment of lumbar spine disorder in elderly patients

The first choice of treatment for elderly patients with lumbar spine disorder is conservative therapy. As shown in Table 4, the first-line conservative therapy is medication (oral, transdermal, suppository, or intravenous). Oral medication for low back pain basically involves the use of nonsteroidal anti-inflammatory drugs (NSAIDs). Because NSAIDs tend to develop hepatic, renal, and gastrointestinal complications in elderly patients, it is necessary to consider the possible adverse effects of the prolonged NSAID use. Prostaglandins are used for lumbar spinal canal stenosis with claudication. Depending on the symptoms and diagnosis, local intervertebral joint block, nerve root block, and extradural block can also be used. Local block techniques, however, are not effective unless the needle is placed accurately,

and a risk of complication accompanies these techniques.

Bed rest and corsets are prescribed to stabilize the lumbar region. Care should be taken, however, because prolonged bed rest and prolonged corset use weakens the trunk muscles of the patients with degenerative disease in the lumbar region. Patients with lumbar degenerative spondylolisthesis and those with lumbar degenerative scoliosis may be prescribed braces for use during work and for protection against postural loading.

A condition that requires utmost caution is osteoporotic compression fracture of the vertebral body. Fracture should be suspected when the patient complains of severe pain and when strong pain is felt on moving from a lying position to a sitting position or vice versa. These cases should be diagnosed appropriately and treated by resting the affected part.

2. Surgical treatment and its indications

Surgical treatment is often indicated for lumbar spinal canal stenosis in elderly patients with lumbar disorders. For patients who develop claudication when moving over a distance of

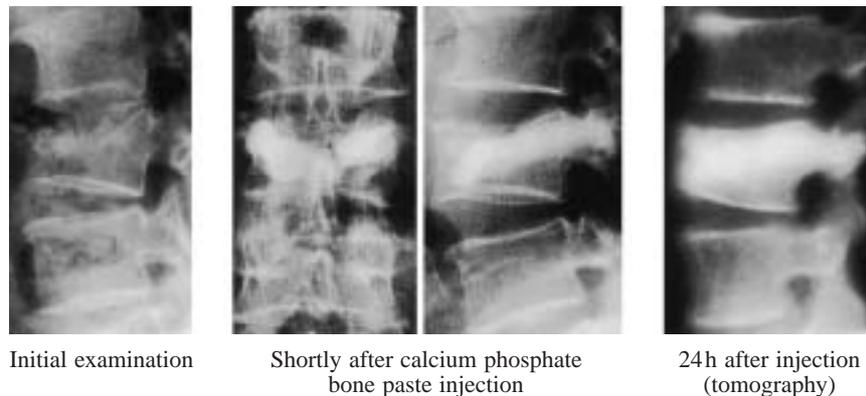


Fig. 2 Osteoporotic compression fracture of the lumbar vertebral body (L3, male, aged 76)
The extent of wedge deformation is 64% (left), 85% (middle), and 79% (right).

(Quoted from Hiroshi Yamamoto *et al.*, *Journal of the Japanese Clinical Orthopaedic Association*, 1999; 34(4): 435–442.)

less than 200m, show progression of symptoms, and do not respond to prostaglandin therapy within about a month and a half, surgical treatment based on the results of re-evaluation should be considered. If surgery is performed too late, recovery may be poor due to progression of irreversible changes. Close cooperation between primary care physicians and specialists is required in this respect.

When decompression is performed for lumbar spinal canal stenosis, it is important to avoid unnecessarily extensive decompression, because elderly patients tend to show false-positive results. It is necessary to determine responsible spinal levels as closely as possible through the accurate analysis of neurological findings and the possible use of nerve blocks, in addition to imaging diagnosis.

Spine fusion is sometimes performed on patients with spondylolisthesis when the lesions are dynamic, and the treatment is combined with instrumentation in elderly patients who retain sufficient bone mass and activity. However, many patients with lumbar spine slippage do not require spine fusion if the lesions do not involve considerable dynamic factors. Treatment for these patients should be planned carefully to avoid excessive surgical intervention.

The author uses transpediculate injection of

calcium phosphate bone paste (Fig. 2), even in fresh cases of osteoporotic spine fracture, if there is a significant risk of progressive collapse or there is evidence of spinal pseudoarthrosis and persistent pain when making positional changes.

3. Therapeutic exercise for functional low back pain

Cases of chronic low back pain are considered to be functional if there are no neurological symptoms in the lower limbs, and if imaging diagnosis does not reveal evident organic abnormalities other than intervertebral joint deformation and disk degeneration that are proportional to the patient's age. In addition to slight kyphosis and a reduced range of motion, these patients often show weakness of the trunk muscles including the back and abdominal muscles. In such patients, prolonged exertion and an active lifestyle may cause low back pain. The author and his colleagues conducted trunk muscle training in elderly patients with functional low back pain, and confirmed that low back pain improves as the trunk muscles strengthen, particularly the back muscles (Fig. 3). Therapeutic exercise should be prescribed based on specialist evaluation of the pain reduction achieved by medication.

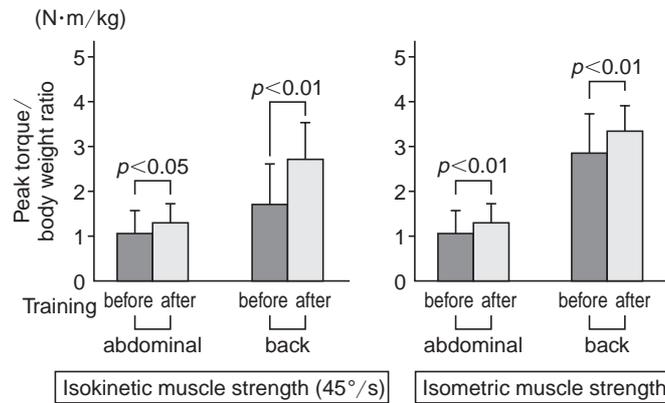


Fig. 3 Trunk muscle strength in middle-aged patients with chronic low back pain before and after training
 The subjects were patients with low back pain without evidence of organic disorder in the lumbar spine.

(Quoted from Norihiko Handa, Hiroshi Yamamoto *et al.*, *Exercise Therapy and Physiotherapy*, 1997; 8(1): 63–69.)

While low back pain is related to the functional deterioration of lumbar spine structures, paying attention to posture and continuing physical exercise in daily living can improve the

health of the lumbar region. I hope to help citizens lead active, fruitful lives through practicing appropriate exercise since all citizens may benefit from this practice, irrespective of age.