Nonsurgically managed patients with degenerative spondylolisthesis: a 10- to 18-year follow-up study

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Object. Controversy exists concerning the indications for surgery and choice of surgical procedure for patients with degenerative spondylolisthesis. The goals of this study were to determine the clinical course of nonsurgically managed patients with degenerative spondylolisthesis as well as the indications for surgery.

Methods. A total of 145 nonsurgically managed patients with degenerative spondylolisthesis were examined annually for a minimum of 10 years follow-up evaluation. Radiographic changes, changes in clinical symptoms, and functional prognosis were surveyed.

Progressive spondylolisthesis was observed in 49 patients (34%). There was no correlation between changes in clinical symptoms and progression of spondylolisthesis. The intervertebral spaces of the slipped segments were decreased significantly in size during follow-up examination in patients in whom no progression was found. Low-back pain improved following a decrease in the total intervertebral space size. A total of 84 (76%) of 110 patients who had no neurological deficits at initial examination remained without neurological deficit after 10 years of follow up. Twenty-nine (83%) of the 35 patients who had neurological symptoms, such as intermittent claudication or vesicorectal disorder, at initial examination and refused surgery experienced neurological deterioration. The final prognosis for these patients was very poor.

Conclusions. Low-back pain was improved by restabilization. Conservative treatment is useful for patients who have low-back pain with or without pain in the lower extremities. Surgical intervention is indicated for patients with neurological symptoms including intermittent claudication or vesicorectal disorder, provided that a good functional outcome can be achieved.

KEY WORDS • degenerative spondylolisthesis • spinal instability • low-back pain • restabilization • spinal fusion

Degenerative spondylolisthesis of the lumbar vertebrae is frequently encountered in routine clinical practice. Many reports are available concerning the operative treatment of this condition. Decompressive laminectomy with spinal fusion is a common method for treating spinal instability associated with this condition. Decompressive laminectomy without fusion is another operative intervention for this condition. Whether spinal fusion should be performed in patients with degenerative spondylolisthesis is controversial. The radiological diagnosis of degenerative spondylolisthesis is controversial. The radiological diagnosis of degenerative spondylolisthesis is not difficult, and many clinicians believe that instability is an important factor in the pathophysiology of this condition. Patients with this condition often undergo surgery for low-back pain or neurological symptoms without first being offered conservative treatment for the aforementioned reasons. Few authors have documented the clinical course of nonsurgically managed patients with degenerative spondylolisthesis; the clinical course of such patients will yield information useful for determining indications for surgery and the choice of surgical procedures.

We previously reported on the natural course of degenerative spondylolisthesis; however, this study was not prospective, and follow-up periods averaged only 8 years. A longer-term prospective study was needed to determine the final outcome of nonsurgically treated patients with degenerative spondylolisthesis. A prospective study with more than 10 years of follow-up data was performed in nonsurgically managed patients to determine the progression of spondylolisthesis, changes in clinical symptoms, and patients’ final functional abilities.

Clinical Material and Methods

Study Design

This was a prospective study with minimum 10-year follow-up. The study was conducted between January 1981 and October 1989; the follow-up study was continued until October 1999. The slippage was measured by the compass method of Morgan and King. Lines were drawn along ra-
Nonsurgically treated degenerative spondylolisthesis

Changes in Clinical Symptoms

At initial examination 110 patients suffered from lumbar rheumatism, with or without pain in the lower extremities. Pain in the lower extremities was transitory, and it was considered to be pain originating in the nerve root. The average duration of low-back pain was 3.2 months (1.5–6.8 months), and the frequency of episodes decreased with time. Eighty-five (77%) of the 110 patients experienced improvement in their symptoms during follow-up. All 25 patients who experienced no change in symptoms were heavy laborers. Finally, 84 of the 110 patients who had no neurological deficits at initial examination remained free of neurological deficits after 10 years of follow-up. The remaining 26 patients had minor neurological deficits such as numbness, but these patients did not require surgery. Forty-eight (86%) of 56 patients who had pain in the lower extremities experienced improvement of pain with conservative treatment, but pain recurred in 37% of them. Twenty-nine (83%) of the 35 patients who had neurological symptoms such as those of intermittent claudication or vesicorectal disorder due to cauda equina syndrome at initial examination and refused
surgery experienced deterioration of these symptoms. Development of neurological deficits was not correlated with progression of slippage. The only symptom that changed with a decrease in intervertebral space size was low-back pain. Eighty-five (90%) of 94 patients in whom a decrease in intervertebral space size was demonstrated experienced improvement of low-back pain (Fig. 5).

Final Functional Abilities in Daily Living

The 46 patients who participated in the follow-up study for more than 10 years until the end of their lives included 31 patients who underwent conservative treatment and were without neurological deficits at initial examination and 15 patients who refused surgery despite the presence of neurological deficits. Twenty-eight of these 31 patients could walk without assistance; however, none of the 15 patients who refused surgery could walk without help. Eleven of these 15 patients required a wheelchair in daily living.

Discussion

Degenerative spondylolisthesis develops as a result of a process of degeneration of the lumbar spine. It is characterized in most patients by hypertrophied arthritis of the facet joint, resulting in segmental instability predominantly in the sagittal plane. Disc degeneration is associated with degenerative spondylolisthesis to a varying degree. Decrease in intervertebral space size, the osteophytic formation and ossification of spinal ligaments, and degeneration of the facet joint were proposed by Kirkaldy-Willis and Farfan as radiographic findings of restabilization. In our study, the patients in whom the intervertebral space size had already decreased exhibited no subsequent pro-

Fig. 2. Radiographs obtained in a 61-year-old woman with progressive slippage of the L-4 vertebra. Left: Initial x-ray film showing slippage to be 12%, with the L4–5 intervertebral space maintained. Right: Follow-up x-ray film obtained after 7.5 years showing that the slippage has increased to 24%.

Fig. 3. Radiographs obtained in a 66-year-old woman without progressive slippage of L-3 vertebra. Left: Initial x-ray film showing slippage to be 14%, with the L3–4 and L4–5 intervertebral spaces narrowed. Right: Follow-up x-ray film obtained after 13.6 years showing that slippage has increased to 15%.
progression of slippage. This suggests that restabilization occurred over the natural course of degenerative spondylolisthesis. The decrease in the range of motion of the slipped segment in our study supports the development of restabilization.

Whether spinal fusion should be performed for the treatment of degenerative spondylolisthesis is controversial. Some authors believe that good results can be obtained by decompression alone, but others have a different opinion. The usefulness of fusion for treatment of this condition should be evaluated based on excellent results of fusion. Whether fusion is required, based on the observations in this study of the natural course of this condition, has not been determined. Low-back pain, the major symptom experienced by patients with degenerative spondylolisthesis, improved after restabilization. Moreover, spinal instability, a major pathophysiological mechanism associated with this condition, disappeared without surgical fusion as a result of restabilization. Spinal fusion procedures for instability associated with this condition should not be performed in patients who have low-back pain alone (except for those who engage in heavy labor). If spinal restabilization has already occurred during the natural course of this condition, spinal fusion procedures are not required except when destabilization by decompressive laminectomy has occurred. Fusion in patients with spondylolisthesis is often related to the iatrogenic destabilization, which is caused by decompressive surgery. Less invasive surgery for decompression should be attempted. If restabilization does not occur, the decision to perform spinal fusion should be based on the patient’s age and daily life activities. Sanderson and Wood recommended decompressive surgery alone for elderly patients. The mechanism of development of clinical symptoms in degenerative spondylolisthesis is very complicated, and intervertebral disc degeneration, facet joint degeneration, spinal instability, compression of nerve tissues by herniated intervertebral disc, and other factors are intricately involved. Particularly in the case of spinal instability, no clear conclusion has been reached concerning what extent of instability is clinically important. A better critical definition of instability is required to determine the indication for spinal fusion.

Our clinic specializes in spine surgery, and most patients come to us to undergo surgery. It is likely that most patients with degenerative spondylolisthesis do not present to medical attention if they have low-back pain only or minor symptoms. Therefore, the percentage of all patients with this condition who undergo surgery may be low. In the present study, many patients who had no neurological deficits at initial examination remained free of neurological deficits after 10 years follow-up study. These findings suggest that conservative treatment is useful for patients who have low-back pain with or without pain in the lower extremities. Most of patients who had neurological symptoms at the initial examination and refused surgery suffered deterioration of these symptoms. The final prognosis for these patients was very poor. Surgical intervention is required for these patients at the onset of symptoms or sign.

Conclusions

This long-term prospective study on the clinical course of nonsurgically managed patients with degenerative spondylolisthesis provided information useful for determination of surgical indications. Conservative treatment is useful for patients who have low-back pain with or without pain in the lower extremities, given the occurrence of restabilization. Surgical intervention to protect against the development of severe functional disabilities is required for patients who have neurological symptoms or signs.

References


Manuscript received January 17, 2000.

Accepted in final form June 26, 2000.

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