



Progression of spondylolysis to isthmic spondylolisthesis in an adult without accompanying disc degeneration : a case report

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Progression of spondylolysis to spondylolisthesis in adults is very rare. It is always accompanied by disc degeneration at the slip level, or at a lower level. The intervertebral disc is indeed the main structure that opposes the anteriorly directed shear forces. Of course, the disc degeneration might also be a consequence, rather than a cause of the slip. The authors describe an unusual case of progression of spondylolysis to spondylolisthesis in an adult, without any disc degeneration. They are not aware of a similar case in the literature. In 1999, an aircraft engineer with known asymptomatic spondylolysis was involved in a low impact motorcycle accident, after which a Grade I spondylolisthesis L4 was diagnosed. There was no predisposing disc space narrowing at any vertebral level. There may have been a certain degree of microscopic disc degeneration L4L5, a possibility which was confirmed by the development of a disc hernia L4L5, seven years after trauma. This case illustrates the potential for progression of spondylolysis to spondylolisthesis in an adult, without radiographical signs of disc degeneration at any level. The minimal trauma might have played a role. The authors recommend that patients with known spondylolysis who sustain acute exacerbation of their back pain should have standing radiographs.

Keywords : spondylolysis ; spondylolisthesis ; progression ; disc degeneration ; adult ; minor trauma.

INTRODUCTION

The pars interarticularis is an area of force concentration and is subject to failure with repetitive

stress. Spondylolysis is a unilateral or bilateral defect in the pars interarticularis (13). Such a defect diminishes the stabilizing capacity of the posterior elements in the spinal motion segment and may lead to isthmic spondylolisthesis (3).

The progression of spondylolysis to spondylolisthesis in children and adolescents is well documented. Similar progression in adults is reported infrequently. However, small series and sporadic cases are described in the literature (1-3,5-7,9,12).

CASE REPORT

In November 1993, a 32-year-old man, who was working as an aircraft engineer, clinically asymptomatic, attended the annual medical assessment of his department, where radiographs (standing anteroposterior and lateral views of the lumbar

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Fig. 1a. — Lateral radiograph demonstrating spondylolysis L4 without evidence of spondylolisthesis.



Fig. 1b. — Anteroposterior radiograph demonstrating a bilateral defect of pars interarticularis L4.

spine) revealed bilateral spondylolysis L4, without spondylolisthesis (fig 1a and 1b). Six years later and while the patient continued being asymptomatic, he was involved in a low impact motorcycle accident which caused the initiation of moderate low back pain without neurological symptoms. Radiological examination showed a Grade I spondylolisthesis L4 (fig 2), possibly related to the trauma. Conservative treatment with non-steroidal anti-inflammatory drugs relieved the symptoms temporarily. In the course of the ensuing seven years the back pain deteriorated significantly, and in the last two years of this period a left L5 radiculopathy added to the clinical picture. An MRI scan showed a large hernia of the L4L5 disk, and spontaneous reduction of the olisthesis (fig 3). The patient was successfully treated with discectomy and L4L5 fusion.

DISCUSSION

Epidemiological studies have shown that spondylolysis and isthmic spondylolisthesis are most frequently acquired in childhood. In a prospective study of 500 children by Fredrickson *et al* (4) no one was noted to progress from spondylolysis to spondylolisthesis after the age of 16 years, but they were not followed into late adulthood. In a review of 173 children and teenagers with spondylolysis or spondylolisthesis, Turner and Bianco (11) observed no progression in grade during their study prior to operation, but their study did not extend beyond 19 years.

In adults spondylolisthesis is normally accompanied by disc degeneration at the slip level. Östermann *et al* (8) studied 27 cases of spondylolisthesis in adults, by means of discography and MRI,



Fig. 2. — Lateral radiograph demonstrating a grade I spondylolisthesis without disk narrowing at any level.



Fig. 3. — MRI-scan demonstrating spontaneous reduction of spondylolisthesis, with normal disc space.

and found disc abnormalities at all olisthetic levels. This is logical, as the intervertebral disc is the main structure that opposes the anteriorly directed shear forces (3). Of course, disc narrowing could also have been a consequence of the spondylolisthesis.

Floman (3) showed in a retrospective study of 18 adult patients that slip progression started after the third decade of life and coincided with marked disc degeneration at the olisthetic level. Postacchini (9) described 7 cases of spondylolysis progressing to spondylolisthesis during adulthood; he noted a decrease in the height of the underlying disc in all cases.

Stone and Tribus (10) presented an unusual case: a 39-year-old woman with known spondylolysis sustained an acute olisthesis L4 after minimal trauma, with a normal disc L4L5 but with severe disc degeneration L5S1. The authors felt that the severe disc degeneration L5S1 may have contributed to further slip of L4 by concentrating the stress on the L4L5 level.

The presented case is even more unusual. There was no disc space narrowing at any vertebral level. So, a radiographically established disc degeneration below the pars defect could not be the proposed mechanism for olisthesis in this case. The minor trauma might have played a role. In the authors' knowledge, there is no other report in the literature about progression of spondylolysis to spondylolisthesis in an adult without concomitant disc disease at the slip level or below.

Unfortunately, it was impossible to establish when the pars defect originated. On the other hand, it was questionable if the ultimate disc degeneration, seven years after trauma, existed *before* the olisthesis, at a microscopical level, or was the *result* of the spondylolisthesis. Nevertheless, this case recognizes the potential for progression of spondylolysis to spondylolisthesis in an adult, without accompanying clinical and radiographical disc degeneration. The authors agree with Stone and Tribus (10) that patients with known spondylolysis,

who sustain acute exacerbation of their back pain, should have repeat standing radiographs.

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