CASE REPORT

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Case report: successful conservative treatment of a soccer player with multiple-level spondylolysis

Wouter Mistiaen, MD, Bruno Vanhecke, MD, Patrick Linden, MD, Luc Vanden Bossche, MD, PhD and Martine De Muynck, MD, PhD

Physical and Rehabilitation Medicine, University Hospital of Ghent, Belgium

INTRODUCTION

Spondylolysis is a bone defect of the pars interarticularis often seen in adolescent athletes, such as football offensive linemen throwing athletes, and gymnasts, who participate in activities that involve repetitive axial loads to a hyperextended lower back. There are two factors that play an important role in the pathogenesis of spondylolysis. A genetic factor plays a role, although the specific gene that causes spondylolysis is still unknown. Mechanical factors and the repetitive axial load of the lumbar spine also contribute to this condition.[1,2]

There may be a relation between repetitive trauma and spondylolysis. People who regularly participate in sports or who engage in heavy labor are more likely to have these bone defects.[1] Traumatic stress to the posterior arch can be aggravated by a combination of repetitive loading, lumbar spine rotation, and/or hyperextension.

Conservative treatment options include rest from the sport, bracing, nonsteroidal anti-inflammatory drugs, and physical therapy. Less conservative treatment options include surgery for refractory pain. Selhorst *et al.*[3] found that female gender, multilevel injury, and continued or recurring low back pain during treatment were significantly associated with a poor long-term outcome (1.5 to 5.6 yr). They concluded that a multilevel injury is much more likely to result in a poor prognosis than a single-level injury, even in patients with bilateral spondylolytic injuries.[3] We present an 18-year old patient who received conservative treatment for multilevel spondylolysis. The patient provided written informed consent for the use of data related to this case for publication purposes.

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Correspondence to Wouter Mistiaen, MD, Corneel Heymanslaan 10, Gent, Oost Vlaanderen, Belgium
Tel: +0032496643663; fax: +003293325286;
e-mail: wouter.mistiaen@gmail.com.

CASE REPORT

An 18-year-old adolescent professional soccer player gradually developed unprovoked lumbar pain after a 90-minute match. The back pain did not improve with oral analgesics, and it increased in intensity after the match. It was the second time he presented with occasional back pain that was aggravated by activity. Pain did not appear after walking or after training. He denied any radicular pain. There was no history of trauma. A few years earlier this patient had nonspecific lumbar pain complaints after a soccer match for which he consulted his general practitioner. No further examination was done at that time. A short period of rest and

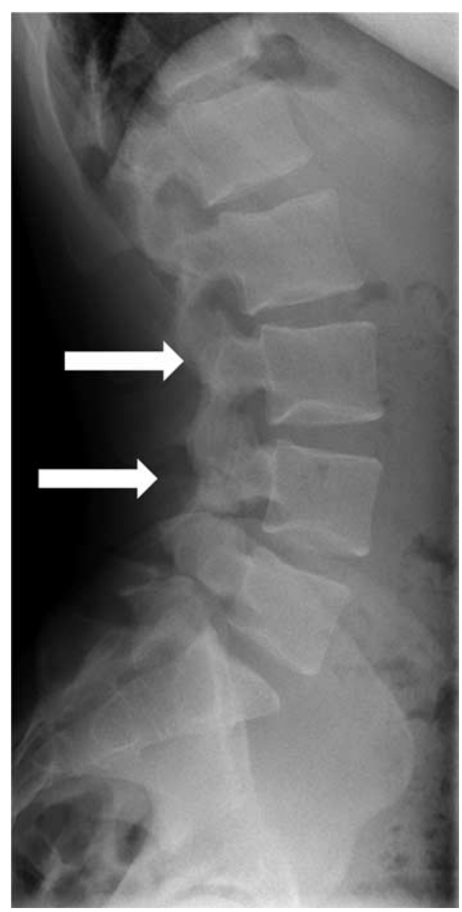

FIGURE 1. Lateral lumbar spine radiograph showing pars interarticularis defects at L4-L5. Arrows indicate fracture.

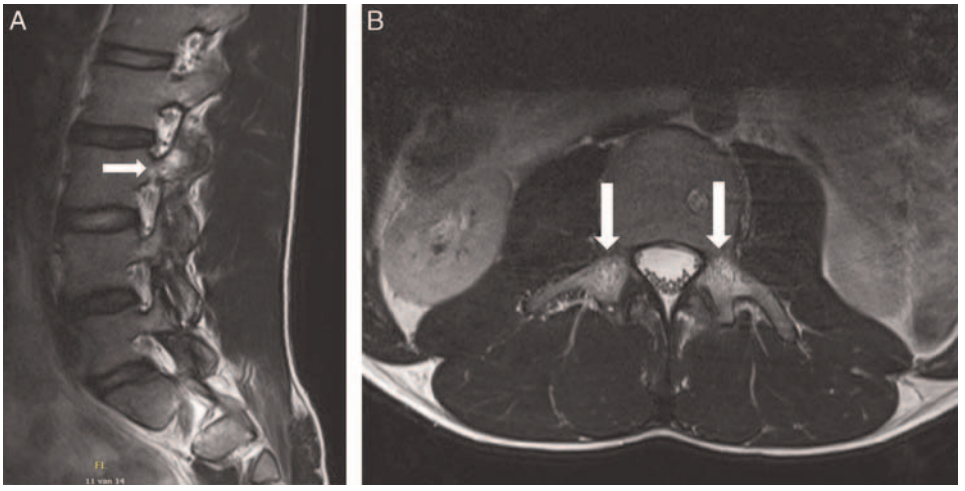

FIGURE 2. T2-weighted sagittal MRI sequence showing edema surrounding L3 pars fracture (A, sagittal view and B, an axial view), which is tracking along the adjacent soft tissues and chronic L4-L5 pars defect with fluid in the adjacent facet joint but with no surrounding edema. Arrows indicate focus on the spot of the vertebrae where the fracture is located.

physical therapy made the pain disappear. Continuation of lumbopelvic core stabilization training (LPST) provided beneficial effects.

During physical examination the patient showed very good muscle strength in the lower limbs. Sensitivity and reflexes in the lower limbs were symmetrical and normal. There was no Babinski sign. He had midline tenderness along the upper lumbar spine and pain with lumbar spine extension. Lumbar rotation to the right side was also painful. Range of motion of the lumbar spine was decreased in end-range flexion and extension.

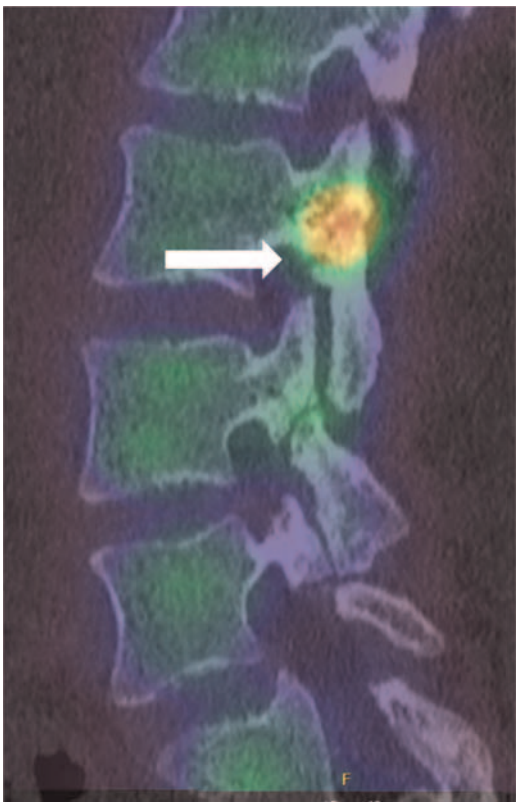

FIGURE 3. Sagittal single photon emission CT reconstruction showing more acute L3 pars interarticularis fracture with irregular hazy edges and chronic L4-L5 pars interarticularis defect. Arrow indicates edema.

Lateral plain radiographs of the lumbar spine showed an L4-L5 bilateral pars interarticularis defect (Figure 1). An MRI of the lumbosacral spine showed normal results of the spinal cord and lumbar discs and no foraminal narrowing. There was edema on the T2 sequences within both pedicles of L3 as well as in the adjacent soft tissues that was consistent with acute bilateral pars interarticularis fractures at L3. No edema was noted at pars interarticularis defects at L4-L5, which suggested bilateral chronic nonunion of the pars interarticularis (Figure 2).

A single photon emission CT (SPECT) scan showed increased uptake at L3 pars bilaterally, with the right side greater than the left. L4 pars showed minimal increased uptake, and L5 pars showed no increased uptake (Figure 3).

There was marginal sclerosis at the L5 and minor sclerosis in L4, but not in the L3 pars, which suggested that the L3 fracture was acute, while the L4 and lesser L5 fracture were chronic.

The physiotherapy regimen for this patient included restriction of activity, especially taking care to avoid overhead or lumbar extension movements. Lumbopelvic stabilization training was also restricted for 12 wk. Nonsteroidal anti-inflammatory drugs were prescribed for 10 days.

At the 3-month follow-up evaluation, the patient reported no back pain. CT images of the L3 pars interarticularis fracture showed incomplete bony union. Since the patient was pain free in daily activities as well as on lumbar flexion and extension during the physical examination, therapeutic exercise, including low-impact aerobic conditioning exercises, consisting of abdominal strengthening, pelvic tilts, and hamstring stretching, was restarted. At the 5-month follow-up evaluation, the soccer player returned to sport. At 10-month follow-up he reported no pain while playing.

DISCUSSION

Similar to that of single-level spondylolysis, the cause of multiple-level lumbar spondylolysis is thought to be fatigue

TABLE 1. Treatment timeline

Day 0	Presentation of symptoms and diagnosis
Day 0-90	Rest from activity
Day 90-150	Physical therapy regimen
Day 150	Return to sport pain-free

fractures.[2,4] Only a few reports of multiple-level lumbar spondylolysis have been published.[4] While Wong[5] and Dunn *et al*.[6] described patients with two-level spondylolysis who were treated successfully with conservative methods, this is the first case report of a patient with three-level bilateral spondylolysis who was treated successfully in a conservative way.

Lumbosacral radiographs have limited effectiveness in the diagnosis of spondylolysis. For the early diagnosis of active spondylolysis, bone scintigraphy is a more sensitive tool. Increased uptake can occur for 1 yr after the fracture.[7]

Multiple-level lumbar spondylolysis occurs mainly at L3–5[1,6] and can be treated with conservative management or surgery. In a metaanalysis of 15 studies assessing long-term clinical outcomes, Klein *et al*.[8] found a pooled success rate of 83.9% with conservative care. Bracing does not seem to influence this outcome.[8] Selhorst *et al*.[3] found that patients with multiple vertebral levels injured were approximately 11 times more likely to have a poor long-term outcome. Athletes with an early or progressive stage of spondylolysis should be advised to rest for 3 mo because of the strong potential for healing and with the aim of achieving bony union, especially in unilateral fractures.[9] Nonunion does not seem to compromise the overall outcome in the short term and does not mean that the segment is unstable.[7] Fibrous healing can occur and may lead to a good clinical result.[7]

CONCLUSION

There is a greater healing rate in acute lesions with signs of active healing or minimal separation when compared to chronic lesions with separation or pseudarthrosis. Therefore, physicians can treat acute lesions in a more conservative way.

Limitation to this case report was the short duration of follow up, which was 10 mo. To compare outcomes of operative versus nonoperative treatment, additional long-term data are needed (Table 1).

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