

Isthmic Spondylolisthesis: Adult Slip Progression

Isthmic Lumbosacral Spondylolisthesis in Adults

Adult Slip Progression

In contrast to the well-documented slip progression (increase in the extent of anterior vertebral slippage) that may occur in children and adolescence, late progression of isthmic [spondylolisthesis](#) in adults is rarely discussed or described in spine literature. In the last decade, adult onset slip progression was recognized and described in the medical literature as a distinct clinical entity causing severe incapacitating back and leg pain (1). Moreover, it was found that slip progression is not at all rare. It is always accompanied by disc degeneration at the slip level. As the disc loses its structural and functional integrity, the lumbosacral junction (L5-S1) becomes unstable and the slip progresses.

The following figures exemplify isthmic slip progression in adults (Fig. 5a, 5b, 5c). These serial lumbar spine radiographs (x-rays) demonstrate the progressive nature of the slip. The increased [spondylolisthesis](#) always coincides with disc degeneration at the slip level.

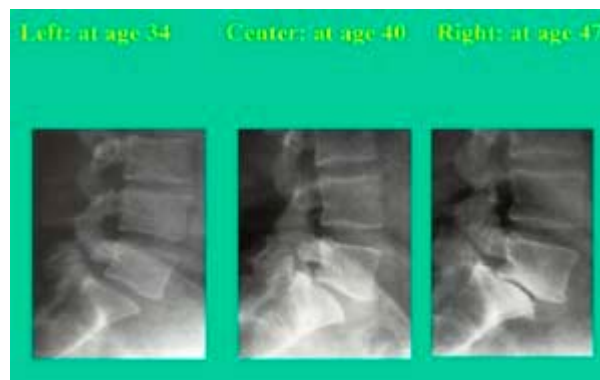


Figure 5a. Serial radiographs (x-rays) demonstrating progression of vertebral slippage in the lumbar spine at age 34, 40, and 47.



Figure 5b. Lateral x-rays indicating isthmic [spondylolisthesis](#).



Figure 5c. Additional lateral x-rays indicating isthmic spondylolisthesis.

Slip progression occurs in about 20% of adults with isthmic spondylolisthesis. Slip progression starts usually after the third decade of life and coincides with marked disc degeneration at the olisthetic (downward slipping) level. Slip progression is associated with clinical signs of mechanical instability and [spinal stenosis](#) manifested by incapacitating [low back pain](#) and significant [sciatica](#). The concurrent occurrence of disc degeneration at the slip level and adult slip progression explains how an asymptomatic developmental lesion, present for at least two or three decades, may become symptomatic.

Symptoms

Patient complaints include [low back pain](#) with/without buttock or thigh pain. Symptoms are "mechanical" in nature, meaning that the pain is aggravated by standing and walking and relieved by lying down. In addition, symptoms of spinal stenosis (narrowed spinal

canal and intervertebral foramina) are also common. Complaints such as tired legs, numbness and tingling after walking a certain distance are common. Symptoms are partially or completely relieved by leaning forward or sitting down for a couple of minutes (Fig. 6).



Figure 6. Lateral x-ray illustrating lumbar vertebral slippage and instrumentation to stabilize the lumbosacral segment (L5-S1).

How Adult Slip Progression is Diagnosed

Serial x-rays (radiographs) of the lumbar spine may be helpful to establish the diagnosis. Serial radiographs are x-rays taken over a period of several years. Simple standing x-rays of the lumbar spine may suffice in patients with a sole complaint of back pain. However, in cases with accompanying [sciatica](#) (leg pain), these may not suffice. Further, computed tomography (CT) and magnetic resonance imaging (MRI) are important diagnostic tools used to assess [spondylolisthesis](#) (Fig. 7). In addition, electromyography (nerve testing) may further help to evaluate symptoms but, it is not a mandatory diagnostic procedure in every case.



Figure 7. MRI, lateral view of lumbosacral level indicating isthmic [spondylolisthesis](#)

Management of Symptomatic Isthmic [Spondylolisthesis](#) in Adults

Historically pain medications, anti-inflammatory drugs, and physiotherapy were prescribed for symptomatic [spondylolisthesis](#) in adult patients. However, a recent clinical study (a prospective randomized trial) pointed out that such a therapeutic approach was ineffective in controlling pain and incapacitation. Further, this study indicated that surgery only brought symptomatic relief in the majority of patients. (2,3)

Surgical Management

Three main types of surgical approaches may be applicable. Common to all three approaches is the use of internal fixation (screws, rods or plates) and the apposition of local bone graft to enhance a solid bony fusion. The bone graft can be obtained from local bone such as the resected lamina and spinous process and sometimes from the iliac bone (pelvis).

The three surgical procedures are as follows:

1. Posterior decompression with pedicle screw fixation and posterolateral fusion. This operative plan is reserved for patients with mild to moderate slips with marked disc space narrowing (Fig. 8).



Figure 8. Left: Preoperative lateral x-ray illustrating isthmic [spondylolisthesis](#). Middle/Right: Post-operative lateral and posterior x-rays showing the pedicle screw fixation (instrumentation) to stabilize the lumbar spine.

2. Posterior decompression and pedicle screw fixation with the addition of lumbar interbody fusion ([PLIF](#) or [TLIF](#)). This operative strategy is reserved for slips with a relatively preserved disc space and in cases where slip reduction is performed (Fig. 9, 10).

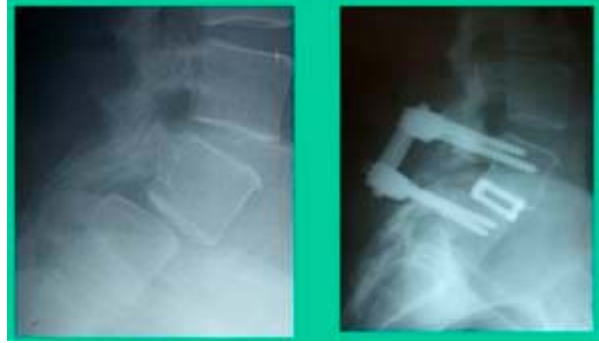


Figure 9. Left: Pre-operative x-ray indicating spondylolisthesis.
Right: Post-operative x-ray, cage and pedicle screw fixation.

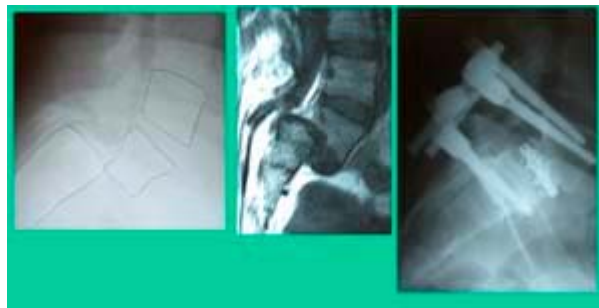


Figure 10. Left/Middle: Lateral x-ray and MRI indicating grade 4 spondylolisthesis.
Right: Post-operative x-ray showing implant and screw fixation following complete slip reduction.

3. Decompression and fixation with sacral transdiscal screw fixation ending in the L5 body. This operative plan is performed in patients with advanced slip accompanied by advanced disc space narrowing.

Management after Surgery

The use of modern spinal instrumentation eliminates the need for post-operative bracing. Soon after surgery, the patient can get on his feet and walk, as tolerated. Performance of isometric exercises to strengthen the abdominal and paraspinal muscles is recommended. It takes about 3-6 months for a solid bony fusion to mature. Swimming and other non-strenuous sports activities can be performed usually 3-6 months after surgery. Serial post-operative x rays will determine the progress toward a solid bony fusion.

Conclusion

While the outcome of surgery in patients with [degenerative disc disease](#) may sometimes be unpredictable and relies among other factors on socioeconomic cofounders, the outcome of surgery in adult isthmic spondylolisthesis is much more predictable and favorable. The combination of mechanical instability and local [spinal stenosis](#) make this kind of surgery rewarding.