

Isthmic Spondylolisthesis

A patient guide

In brief: Isthmic spondylolisthesis is a forward slip of one vertebra on the one below that happens because of a small defect (a stress fracture) in a bony bridge called the pars interarticularis. It is the type of spondylolisthesis most often linked to a defect acquired in youth, and it most commonly affects the lowest level of the spine, where L5 sits on the sacrum.

What isthmic spondylolisthesis is, and how it differs from the other types

Spondylolisthesis is the general term for one vertebra sitting slightly forward of the one beneath it. There are several distinct types, and isthmic spondylolisthesis has one defining feature that sets it apart: a defect in the **pars interarticularis**, the narrow bridge of bone that connects the upper and lower joints of a vertebra. This defect is called spondylolysis, and it is usually a fatigue (stress) fracture that develops during childhood or adolescence.

This is the key distinction from the other forms. In **degenerative** spondylolisthesis the pars is intact and the slip comes from wear of the discs and facet joints in later life. In **congenital (dysplastic)** spondylolisthesis the slip arises from a bony abnormality present from birth. Because in isthmic disease the back part of the vertebra is separated from the body by the pars defect, the vertebral body can drift forward while the bony arch behind it stays put. This tends to open out the central spinal canal rather than narrow it, which is why nerve irritation in isthmic slips is usually felt at the exit tunnel (the foramen) for the L5 nerve, rather than as the central narrowing seen in degenerative slips.

In the established classification of Wiltse, Newman and Macnab, isthmic disease is Type II, with three sub-patterns: a fatigue fracture of the pars (the commonest), an elongated but intact pars, and a rare acute fracture.

Why it happens

The pars interarticularis is the most heavily loaded part of the bony arch when the lower back is repeatedly arched backwards and twisted. Repetitive loading of this kind is thought to produce a stress fracture in a susceptible person. There is a recognised hereditary tendency, and an association with spina bifida occulta (a minor, usually harmless gap in the bony arch).

Activities that involve repeated hyperextension and rotation of the lower back are associated with a higher rate of pars defects. Reported examples in the literature include gymnastics, cricket fast bowling, diving, weightlifting and throwing sports. A defect on one side alone does not allow the vertebra to slip; a slip generally requires the bridge to be affected on both sides.

How common it is

In the general population, a pars defect is present in roughly six in every hundred people. The long-running study by Fredrickson and colleagues, which followed 500 children into adulthood, found a defect in about 4.4 per cent at age six, rising to around six per cent by adulthood. Many of these defects never cause symptoms and are discovered by chance. The level involved is most often L5, then L4.

The natural course

The same long-term studies provide reassuring information about how isthmic disease tends to behave over a lifetime. Defects on one side alone essentially did not slip. Where a slip did develop, it usually occurred early, and progression slowed with each passing decade of adult life. The degree of slip seen on an x-ray correlated poorly with how much back pain a person had, and adults in the cohort had quality-of-life scores similar to the general population.

It is important to read these findings in context: they describe unselected community populations, in whom the defect is often an incidental finding. They do not describe the outlook for someone who has come to a clinic specifically because a symptomatic slip is causing trouble.

Symptoms that are commonly described

The pattern most often reported is mechanical lower back pain, frequently brought on by activity and by arching backwards. Where the slip narrows the exit tunnel for the L5 nerve, leg symptoms in an L5 distribution can occur, such as pain spreading into the buttock and leg. Tightness of the hamstrings and a change in posture or gait are classically described, particularly with larger slips. In young athletes, an aching extension-related back pain is a frequently identified pattern.

How it is assessed

Assessment is descriptive here, not a set of instructions. A standing side-on x-ray shows the degree of any slip, which is commonly described using the Meyerding grade (grade I is up to a quarter, grade II up to a half, and so on). Oblique x-rays can show the pars defect as a break in the outline often likened to a collar on a "Scottie dog". CT shows the bony detail of the defect particularly well, including whether it is on one or both sides and whether it appears fresh or long-standing. MRI shows the discs, the nerve tunnels and any active bone reaction, and helps assess the L5 nerve. Surgeons also assess the shape of the pelvis (the pelvic incidence), because a higher value is associated with this condition.

How it is managed in the literature

The information below describes the evidence base and is not advice for any individual.

For incidental or mild cases, the natural-history data above underpin a watchful, non-surgical approach, and many lesions never require treatment. For symptomatic adolescents with an active pars stress lesion, the literature describes activity modification, physiotherapy and sometimes bracing, with bony healing more likely when the lesion is caught early.

Where a young person has a symptomatic defect that does not settle, a direct repair of the pars (preserving movement) has been described, with reported healing rates broadly in the range of two-thirds to over nine in ten in selected cases.

For a symptomatic low-grade adult slip that has not responded to non-surgical care, the strongest comparative evidence comes from Scandinavian randomised trials, in which fusion surgery gave better pain and function than a structured exercise programme, with the early advantage narrowing over the longer term. Adding an interbody support (a cage placed in the disc space) tends to raise the proportion of solid fusions but provides only a small and uncertain additional clinical benefit over a simpler fusion. In higher-grade slips, whether and how far to reduce (realign) the slip is genuinely debated, because realignment carries a higher risk of stretching the L5 nerve.

Outlook

For incidental and community-detected isthmic lesions, the outlook over a lifetime is generally favourable, and the slip rarely progresses after adolescence. For symptomatic adolescents, most do well, with bony healing more likely in early lesions. For a symptomatic low-grade adult slip that has not settled with non-surgical care, fusion offers durable benefit in the trials, with the choice of technique making a smaller difference than the decision to operate at all.

Common questions

What does "isthmic" mean?

It refers to the isthmus, an old name for the pars interarticularis, the slender bridge of bone where the defect occurs. The term simply signals that the slip is caused by a pars defect rather than by wear or a congenital abnormality.

How is isthmic spondylolisthesis different from the degenerative type?

The defining difference is the pars defect. In isthmic disease a small fracture in this bony bridge allows the slip, the lowest level (L5 on the sacrum) is most often affected, and onset relates to a defect acquired in youth. In degenerative disease the bony bridge is intact, the slip comes from disc and joint wear later in life, and the L4 level is most often involved.

Is the pars defect the same as the slip?

No. The pars defect (spondylolysis) is the crack in the bony bridge. The slip (spondylolisthesis) is the forward movement of the vertebra that the defect can allow. A defect can be present for years without any slip.

What causes the pars defect?

It is generally understood to be a fatigue or stress fracture from repeated backward-arching and twisting loads on the lower back, often beginning in childhood or adolescence, in someone with a hereditary predisposition.

Does playing sport cause it?

Certain sports that repeatedly load the lower back into extension and rotation are associated with a higher rate of pars defects, including gymnastics, fast bowling in cricket, diving and weightlifting. The association is statistical; many people with a defect were never high-level athletes, and many athletes never develop one.

How common is it?

A pars defect is found in roughly six per cent of people, and many never know they have one because it causes no symptoms.

At which level of the spine does it usually occur?

Most commonly at L5, the lowest lumbar vertebra, where it sits on the sacrum, and next most commonly at L4.

Will the slip get worse over time?

The long-term studies suggest that slips usually occur early and that progression slows with each decade of adult life. A defect on one side alone essentially does not slip. Whether an individual slip changes depends on many factors, which is why it is described and monitored rather than assumed.

The full set of questions and answers, with references, is available on the condition page.