

Adult Spondylolisthesis

A patient guide

In brief: Spondylolisthesis describes the forward slip of one vertebra upon the one beneath it. In adults the picture differs in an important way from the condition seen in children and adolescents. Once the skeleton has matured the underlying cause is, for the most part, fixed, and the growth-related progression that concerns paediatric practice is no longer the dominant issue. Adult presentations are largely accounted for by two distinct processes. The first is adult isthmic spondylolisthesis, in which a defect in a small bridge of bone called the pars interarticularis, usually acquired during youth, becomes symptomatic only later in adult life and most often involves the lowest lumbar level. The second is degenerative spondylolisthesis, a slip that develops in later life with the pars intact, typically at the level above and associated with narrowing of the spinal canal. This page provides a general orientation to the adult condition and sits alongside dedicated pages on the degenerative and isthmic forms. It is descriptive information about the condition and the published literature, not medical advice, and it does not recommend any test or treatment for any individual.

What changes once the skeleton is mature

In a growing child or adolescent the chief worry is that a slip may increase as the spine develops. The skeletally mature adult is in a different situation. The bony anatomy that produced the slip, whether a long-standing pars defect or the cumulative effect of age-related change, is broadly settled. Because of this the questions that arise in adults tend to concern symptoms and function rather than the threat of rapid structural progression. The published natural history work, discussed below, supports this distinction. It also explains why the adult condition is best understood by separating its two principal causes rather than treating it as a single entity.

The two dominant adult forms

Adult isthmic spondylolisthesis arises from a pars interarticularis defect. The defect itself is usually thought to begin in childhood or adolescence, often without symptoms at the time, and the slip it permits may only declare itself decades later as mechanical back pain or as nerve-related leg symptoms from narrowing of the exit canal where the nerve root leaves the spine. It most commonly affects the L5 on S1 level.

Degenerative spondylolisthesis is a different process. Here the neural arch and pars remain intact, and the slip results from age-related change in the discs and the small facet joints, with the restraining ligaments becoming less effective. It characteristically occurs at L4 on L5, is reported more often in women, and tends to present in later decades. Because the slip occurs with the bony ring intact, it frequently narrows the central canal and gives rise to neurogenic claudication, a pattern of leg discomfort brought on by standing and walking.

Adult isthmic and degenerative at a glance

The contrast between the two adult forms can be summarised in the following way. This is a descriptive comparison of typical patterns reported in the literature, not a diagnostic tool.

| Feature | Adult isthmic | Degenerative |

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| Neural arch | Pars interarticularis defect present | Pars and arch intact |

| Origin | Pars defect acquired in youth, symptomatic later | Acquired late in life from age-related change |

| Typical level | L5 on S1 | L4 on L5 |

- | Sex and age | Either sex, often symptomatic in mid-adult life | Female predominance, later decades |
- | Dominant symptom mechanism | Mechanical back pain and foraminal (exit canal) nerve compression | Neurogenic claudication from central canal narrowing |
- | Typical slip grade | Usually low grade, sometimes higher | Usually low grade, rarely beyond grade II |

How adult cases are classified

Two long-standing systems help describe spondylolisthesis. The aetiological framework set out by Wiltse, Newman and Macnab groups cases by cause: type I dysplastic, arising from a congenital abnormality of the upper sacrum or arch; type II isthmic, related to the pars; type III degenerative, the late-life slip with an intact arch; type IV traumatic, following injury to bony elements other than the pars; and type V pathological, where disease such as bone weakening underlies the slip. Most adult presentations fall into the isthmic and degenerative categories.

The Meyerding system grades the degree of slip by how far the upper vertebra has moved across the one below, divided into bands of roughly twenty-five per cent. Grade I describes a slip up to a quarter, grade II up to a half, grade III up to three quarters, grade IV beyond that, and grade V, sometimes termed spondyloptosis, where the vertebra has slipped completely off. The great majority of adult cases, of either form, are low grade.

Why the shape of the pelvis is considered

Spinal surgeons describe a set of measurements known as spinopelvic parameters, of which pelvic incidence is the most discussed. Pelvic incidence is a fixed anatomical measure of pelvic shape, and the literature has explored its relationship with the development and behaviour of spondylolisthesis, particularly at the lumbosacral junction. Classifications that incorporate these parameters, such as that proposed by Mac-Thiong and Labelle, attempt to relate the bony geometry of the pelvis to the way a slip sits and balances. This is included here to explain why such measurements appear on imaging reports, and it is offered as background rather than as guidance.

How common it is in adults

Spondylolisthesis is common in the general adult population, and much of it is found incidentally. Population studies give a sense of scale. The Copenhagen work reported by Jacobsen and the Framingham study reported by Kalichman both documented degenerative spondylolisthesis as a frequent finding on imaging of older adults, with prevalence rising with age and a notable female predominance. Systematic reviews of the wider epidemiology, such as that by Wang and colleagues, describe broadly comparable figures across populations while noting variation with the methods used. The recurring theme across these studies is that a radiographic slip is often present without being the source of a person's symptoms.

Natural history in the skeletally mature

The behaviour of an adult slip over time has been studied directly. Matsunaga and colleagues followed people with degenerative spondylolisthesis managed without surgery over many years and reported that roughly a third showed further slip on x-ray, while emphasising that radiographic progression correlated poorly with how patients actually fared. In other words the films and the symptoms did not move in step. For the isthmic form the long natural history work of Fredrickson and Beutler, following individuals from childhood across some forty-five years, indicated that once skeletal maturity is reached further slip is uncommon and that many people with a pars defect remain comparable to the general population. Taken together this literature supports the view that, in adults, structural progression is neither rapid nor closely tied to the experience of symptoms.

How it can present

The spectrum of presentation is wide. Some adults have no symptoms at all and the slip is noticed on imaging performed for another reason. When symptoms do occur the literature describes several patterns. Mechanical back pain, worse with activity and load and eased by rest, is common and is often emphasised in the isthmic form. Neurogenic claudication, in which standing and walking bring on discomfort, heaviness or pins and needles in the legs that settle on sitting or bending forward, is characteristic of degenerative slips that narrow the central canal. Radiculopathy, the pattern of pain or altered sensation following a single nerve root, may arise where a root is compressed, classically at the exit canal in isthmic cases. Across these patterns the published work documents an effect on work capacity and quality of life that varies considerably between individuals.

How it is imaged, described in general terms

Imaging principles are well established in the literature and are described here for understanding rather than as direction for any person. A standing lateral x-ray is generally preferred for assessing a slip, because the upright posture loads the spine and may reveal movement that lying down conceals. Flexion and extension views are used to look for dynamic movement between the vertebrae. Magnetic resonance imaging is the usual means of examining the nerves and the soft tissues and of showing canal and exit-canal narrowing. Computed tomography depicts bone in fine detail and is the modality that best demonstrates a pars defect, which can be subtle on other studies.

General principles of management as reported

The literature describes, rather than prescribes, a broad approach. For most adults without a progressive neurological deficit, non-operative measures are reported as the usual first-line approach, and many people are managed satisfactorily in this way. Surgery is described as a consideration where symptoms remain troublesome despite such measures. Two areas of genuine debate run through the surgical literature and are mentioned here only at the level of orientation. In degenerative spondylolisthesis the question of whether to add fusion to decompression, or to decompress alone, has been examined in trials including the SLIP study reported by Ghogawala and the Swedish trial reported by Forsth, which reached differing conclusions, and in the SPORT comparison of surgical and non-surgical care reported by Weinstein. In adult isthmic spondylolisthesis the comparison of fusion with continued conservative care has been studied in randomised work such as that of Ekman and Moller. These references are noted so that readers encountering them elsewhere can place them in context. The dedicated degenerative and isthmic pages discuss them in more depth. None of this constitutes advice for any individual.

Outlook, work and quality of life

The published evidence suggests that the outlook for adults with spondylolisthesis is generally favourable in the sense that catastrophic progression is uncommon once the skeleton is mature. At the same time the studies are consistent in showing that the radiographic course and the clinical course correlate only imperfectly. A slip may increase a little on film without much change in symptoms, and symptoms may improve or worsen without a matching change on imaging. Reported effects on the ability to work and on quality of life vary widely from person to person. Because of this variability the literature does not support stating an individual prognosis precisely, and the descriptions here should be read as general patterns observed across groups of people.

Common questions

What is spondylolisthesis?

It is the forward slip of one vertebra over the one immediately below it. The term combines the Greek words for vertebra and for slipping. The slip is usually described by the level at which it occurs and by how far the upper vertebra has moved.

What does "adult" spondylolisthesis mean, and how does it differ from the childhood condition?

Adult spondylolisthesis refers to the condition in a person whose skeleton has finished growing. The chief difference is that in childhood and adolescence the main concern is a slip increasing as the spine grows, whereas in the mature adult the underlying anatomy is broadly fixed and the focus shifts to symptoms and function rather than the threat of rapid progression.

What are the two main types in adults?

The two dominant forms are adult isthmic spondylolisthesis, caused by a defect in a small bridge of bone called the pars interarticularis, and degenerative spondylolisthesis, an age-related slip in which that bone remains intact. Most adult cases fall into one of these two groups.

What is the pars interarticularis?

It is a slender bridge of bone that connects parts of the bony ring at the back of each vertebra. A break or gap in this bridge, known as a pars defect, is the basis of the isthmic form of spondylolisthesis.

In plain terms, what is the difference between isthmic and degenerative spondylolisthesis?

In the isthmic form there is a defect in the pars bone, the slip usually involves the lowest lumbar level, and it often began as a defect in youth that only causes trouble later. In the degenerative form the bone is intact, the slip results from wear in the discs and joints, it usually involves the level just above, and it is more common in women and in later life.

Which spinal levels are usually involved?

The isthmic form most commonly affects the L5 on S1 level, the junction with the sacrum. The degenerative form characteristically affects L4 on L5, the level just above it.

Will the slip get worse now that I am an adult?

The natural history literature indicates that rapid progression is uncommon once the skeleton is mature. For degenerative slips one long-term study reported that about a third progressed somewhat on x-ray over many years, but that this radiographic change tracked poorly with symptoms. For the isthmic form, long follow-up suggests that further slip after maturity is unusual. This describes group findings and cannot predict any single person's course.

Does the size or grade of the slip matter?

The degree of slip is graded by the Meyerding system in bands of about twenty-five per cent, from grade I to grade V. Most adult cases are low grade. The literature is clear that the size of the slip on imaging does not, on its own, determine how a person feels, since the radiographic and clinical pictures correlate imperfectly.

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