

Pott Disease (Tuberculosis of the Spine)

A patient guide

In brief: Pott disease, also known as spinal tuberculosis, tuberculous spondylitis or tuberculosis of the spine, is a chronic infection of the vertebral column caused by the bacterium *Mycobacterium tuberculosis*. It is the commonest form of tuberculosis affecting the bones and joints, and it characteristically begins in the body of a vertebra before spreading to neighbouring vertebrae and the soft tissues around the spine. Because the infection slowly destroys bone, it can lead to collapse of the vertebrae, a sharp forward angulation of the spine known as a gibbus, the formation of so-called cold abscesses, and, in some people, pressure on the spinal cord that may cause weakness or paralysis. The infection is slow and indolent, often developing over many months, which means it is frequently advanced by the time it is recognised. The single most important idea is that Pott disease is first and foremost a treatable infection: the mainstay of treatment is a prolonged course of anti-tuberculous medication, with surgery reserved for particular problems such as severe deformity, instability or pressure on the nerves. It is a serious condition that is managed by a specialist multidisciplinary team. This page is general information about the condition and is not medical advice.

What Pott disease is

Pott disease is tuberculosis of the spine. It takes its name from Percivall Pott, the eighteenth-century English surgeon who described the deformity and paralysis that can accompany it. The underlying cause is infection of the vertebral column by *Mycobacterium tuberculosis*, the same organism that causes tuberculosis of the lungs. In most cases the bacteria reach the spine through the bloodstream, having seeded there from a primary site of infection elsewhere in the body, most often the lungs, sometimes long before the spinal disease becomes apparent.

Among the forms of tuberculosis that affect the skeleton, the spine is the most commonly involved site. Spinal tuberculosis accounts for roughly half of all cases of bone and joint tuberculosis and is described in the literature as a substantial proportion of extrapulmonary tuberculosis overall. It can occur at any age, and it remains an important diagnosis worldwide, particularly where tuberculosis is common, and in people whose immune systems are weakened, including those living with HIV.

The hallmark of the disease is its slow, smouldering course. Unlike a sudden bacterial infection that produces dramatic fever and acute pain, tuberculosis of the spine typically develops gradually over weeks to months, with persistent back pain as the leading symptom. This indolence is part of what makes it both insidious and, on occasion, difficult to recognise early.

How the infection behaves in the spine

The way tuberculosis damages the spine is distinctive and helps to explain its characteristic complications. After the bacteria settle in a vertebra, they multiply slowly and provoke a particular kind of chronic inflammation that gradually erodes bone. As the bone is destroyed, the affected vertebra loses height and structural strength.

A key feature of spinal tuberculosis is that it tends to attack the front, or anterior, portion of the vertebral body while relatively sparing the intervertebral disc, at least in the earlier stages. This pattern stands in contrast to the commoner pyogenic, or pus-forming, bacterial infections of the spine, which characteristically destroy the disc early. The reason for the difference is that the tuberculosis bacterium does not produce the proteolytic, or protein-digesting, enzymes that ordinary pus-forming bacteria use to break down the disc. The disc is also relatively poorly supplied with blood, which further protects it until the disease is well advanced. This relative disc preservation, combined with destruction of the front of adjacent vertebral bodies, is one of the features that points

towards tuberculosis on imaging.

Because the front of the vertebral column is preferentially destroyed while the back is relatively preserved, the spine tends to collapse forwards. This produces the angular, sharply pointed forward bend that gives Pott disease its recognisable deformity.

Where it occurs in the spine

Tuberculosis can affect any level of the spine, but it has a clear predilection for the lower thoracic and upper lumbar region, around the thoracolumbar junction. The thoracic and lumbar segments together account for the great majority of cases, with the area where these two regions meet being the single most frequently involved. The neck, or cervical spine, and the lowest part of the spine, the sacrum, are less commonly affected.

The disease usually involves more than one vertebra, and it often involves two or more adjacent vertebrae together, because it spreads from one vertebral body to the next. This contiguous, multi-level involvement is another characteristic feature.

The pattern of involvement within and around the vertebra is conventionally described as falling into several types. The **paradiscal** type, the commonest, begins in the part of the vertebral body next to the disc and the cartilage endplate, and from there involves the disc and the neighbouring vertebra. The **central** type begins in the middle of the vertebral body and can lead to collapse of a single vertebra into a flattened disc of bone, sometimes called vertebra plana. The **anterior** type runs beneath the long ligament that lies along the front of the spine, spreading up and down the surface of several vertebrae and producing scalloping of their front edges. The **posterior**, or appendiceal, type involves the bony arch and the structures at the back of the vertebra. Recognising these patterns helps in understanding how a given case has developed and what complications might follow.

Cold abscess and gibbus deformity

Two of the most characteristic features of Pott disease are the cold abscess and the gibbus.

A **cold abscess** is a collection of infected material, including pus, dead tissue and caseous debris, that forms around the diseased vertebrae. It is called "cold" because, unlike an ordinary abscess, it lacks the classic signs of acute inflammation such as redness, marked warmth and severe tenderness. It tends to accumulate quietly. These abscesses can be substantial, and they may track along tissue planes well away from the spine, following muscles and ligaments, so that a swelling may appear at a distance from the actual site of bony disease, for example in the groin, the flank or the wall of the chest. A cold abscess can therefore be the first noticeable sign of the underlying spinal infection.

A **gibbus** is the sharp, angular forward bend of the spine that results from collapse of the front of one or more vertebrae. Because the destruction is concentrated at the front, the spine folds forward at a point, producing a localised, pointed prominence rather than the smooth, rounded curve seen in many other causes of spinal curvature. The degree of angulation depends on how many vertebrae are involved and how much bone has been lost. A small angulation involving one vertebra is sometimes described as a knuckle, two vertebrae as a gibbus, and more extensive involvement as a rounded kyphosis. This deformity is a defining clinical sign of the disease and, once established, tends to persist.

Pott's paraplegia: pressure on the spinal cord

The most feared complication of spinal tuberculosis is pressure on the spinal cord, which can cause weakness or paralysis of the legs. This is known as Pott's paraplegia. It arises because the disease and its consequences encroach on the spinal canal where the cord runs.

The pressure on the cord may come from several sources: the abscess and inflammatory tissue, fragments of dead bone and disc, or the deformity itself as the collapsing spine narrows the canal. It is conventional to distinguish

between paralysis that appears while the disease is still active, sometimes called early-onset paraplegia, and paralysis that appears years later as a consequence of an established deformity or reactivation, sometimes called late-onset paraplegia. Early-onset paraplegia, caused by abscess and active inflammation pressing on the cord, often responds well to treatment of the infection. Late-onset paraplegia, arising from long-standing mechanical deformity and scarring, tends to be more difficult to reverse.

The severity of neurological involvement is graded using systems that describe the progression from minor signs through to complete paralysis. Grading systems such as the modified Tuli classification describe stages ranging from subtle changes that the affected person may barely notice, through increasing weakness, to a complete loss of movement and sensation. Broader scales used across spinal injury, such as the Frankel and ASIA systems, are also applied. These gradings help the treating team to monitor whether the neurological state is stable, improving or deteriorating, which is important in deciding how to proceed.

How it is investigated

The investigation of suspected Pott disease combines imaging to show the extent of the disease with tissue sampling to confirm the diagnosis.

Magnetic resonance imaging (MRI) is the most informative imaging test. It is highly sensitive at detecting the disease early, before bones have visibly collapsed, and it shows the marrow changes in the vertebrae, the destruction of bone, the abscesses around the spine and the all-important state of the spinal cord and nerves. The pattern seen on MRI, with anterior vertebral destruction, relative disc preservation, abscesses spreading beneath the front ligament and involvement of several adjacent vertebrae, helps to distinguish tuberculosis from pyogenic infection and from tumours, although these distinctions are not always clear-cut.

Computed tomography (CT) shows bony destruction in fine detail and is often used to guide a needle to the right place for sampling. **Plain X-rays** can show established changes such as loss of vertebral height, narrowing of the disc space and deformity, but they are relatively insensitive in the early stages.

Tissue diagnosis is regarded as the cornerstone of confirming Pott disease, because it both proves that tuberculosis is the cause and allows the bacteria to be tested for resistance to medication. A sample of the diseased bone or abscess is usually obtained, frequently by a needle biopsy guided by CT, sometimes at the time of surgery. The sample is examined in several complementary ways. Modern molecular tests, in particular the Xpert MTB/RIF assay and its more sensitive successor Xpert MTB/RIF Ultra, can rapidly detect the genetic material of the tuberculosis bacterium and at the same time identify resistance to rifampicin, one of the key drugs. Culture, in which the bacteria are grown in the laboratory, remains an important reference test and allows fuller testing of drug sensitivity, although it is slow and may take weeks. Histology, the examination of the tissue under a microscope, can show the characteristic pattern of tuberculous inflammation. Together these tests, alongside the imaging, build the case for the diagnosis and guide treatment.

What the evidence shows about treatment

The descriptions in this section summarise what the published literature reports about the treatment of spinal tuberculosis in general. They are not advice for any individual, and decisions in practice are made by the treating multidisciplinary team for each person.

Anti-tuberculous medication is the mainstay of treatment. Spinal tuberculosis is fundamentally a treatable infection, and the foundation of management is a prolonged course of combination antibiotics directed against the tuberculosis bacterium. Treatment typically uses several drugs together, beginning with an intensive phase and continuing with a maintenance phase. The total duration is longer than for many other infections, commonly in the order of many months, with the exact length depending on the case; the literature describes regimens ranging from around six months to substantially longer, and there is not universal agreement on the single ideal duration. A central principle is that the medication must be taken faithfully for the whole prescribed period, because

incomplete treatment is a major driver of relapse and of drug resistance.

A landmark body of evidence comes from the controlled trials conducted by the Medical Research Council Working Party on Tuberculosis of the Spine, carried out over many years across several countries. These trials established that effective combination chemotherapy is the foundation of cure, that good results can be achieved with medication alone in many people, and that shorter modern drug regimens can be as effective as the much longer ones used historically. They also informed the long-running debate about the role of surgery.

The "middle-path" regimen is an influential and widely cited approach, described by Tuli, that occupies a middle ground between treating everyone with surgery and treating everyone with medication alone. Under this approach the great majority of people are treated primarily with anti-tuberculous medication, supported by rest, monitoring and rehabilitation, while surgery is reserved for a defined minority who have specific problems. This pragmatic, selective philosophy has been associated in the literature with good compliance and favourable outcomes, and it underlies much of modern practice.

Surgery is reserved for particular indications. Most people with spinal tuberculosis do not require an operation. Surgery is considered, according to the literature, in defined circumstances: a significant or worsening neurological deficit, particularly weakness that does not improve or that deteriorates despite medication; a large abscess or a mechanically unstable spine; a severe or progressive deformity; disease that fails to respond to drug treatment; and recurrent disease. When surgery is undertaken, its aims are to remove infected and dead tissue, to relieve pressure on the spinal cord and nerves, to restore stability and alignment, and to support the spine while it heals, often with bone grafts and metalwork. Both approaches from the front of the spine and from the back, and combinations of the two, are described, and reported series document good rates of bony healing, improvement in neurology and correction of deformity when surgery is appropriately selected. Surgery, however, is always combined with the full course of anti-tuberculous medication; it does not replace it.

In summary, the evidence points clearly towards prolonged anti-tuberculous chemotherapy as the indispensable mainstay, the middle-path philosophy of treating most people medically while selecting carefully for surgery, and an operation reserved for deformity, instability, abscess and significant or progressive neurological involvement, all within individualised, team-based care.

Outlook

The outlook in Pott disease has been transformed by effective anti-tuberculous medication, and for many people who are diagnosed and treated the infection can be brought under control and cured. When the disease is recognised before major bone collapse or neurological damage, and when the full course of medication is completed, the prospects are generally good, and even paralysis that is caused by active inflammation and abscess pressing on the cord often improves substantially with treatment.

The outlook is less favourable where the disease is advanced at diagnosis, where a severe deformity has already developed, or where paralysis has been present for a long time and arises from established mechanical deformity and scarring rather than from active, treatable inflammation. Drug-resistant tuberculosis and coexisting conditions that weaken the immune system, including HIV, add to the complexity and can worsen the outlook. A deformity that has already formed tends to persist even after the infection is cured, which is one of the reasons that early recognition and treatment matter.

Across the field, the consistent themes are that Pott disease is a serious but treatable chronic infection; that the prolonged anti-tuberculous medication is the foundation of cure and must be completed in full; that surgery has a clear but selective role; and that any individual outlook depends on the level and extent of disease, the degree of deformity and neurological involvement, the presence of drug resistance or immune compromise, and how early treatment begins. These are matters for assessment by the specialist multidisciplinary team rather than conclusions that can be drawn from a category alone.