

Diffuse Idiopathic Skeletal Hyperostosis (DISH) and the Spine

A patient guide

In brief: Diffuse idiopathic skeletal hyperostosis, abbreviated to DISH and historically known as Forestier's disease, is a condition in which the ligaments and entheses of the body progressively turn to bone. In the spine, its defining feature is a flowing curtain of new bone laid down along the front and side of the vertebral column, most often in the thoracic region, bridging one vertebra to the next while the discs themselves remain largely preserved. It is common in older people, more frequent in men, and closely linked with metabolic factors such as diabetes and obesity. For long stretches it is silent and discovered by chance on a scan taken for another reason. From the point of view of the spine, however, DISH matters for a handful of specific reasons: large bony outgrowths at the front of the neck can press on the swallowing passage; the long, rigid, fused column behaves mechanically like a single long bone and can fracture in an unstable way after even minor trauma; and the same tendency to lay down bone can narrow the spinal canal. The single most important idea is that a DISH spine is a stiff, brittle spine, and that this stiffness changes how it behaves in almost every situation.

What DISH is, and how it differs from ordinary spinal wear

Diffuse idiopathic skeletal hyperostosis is best understood as a disorder of ossification, the process by which soft connective tissue is gradually converted into bone. The tissues affected are the entheses, the points where ligaments and tendons attach to bone, and the spinal ligaments themselves, particularly the anterior longitudinal ligament that runs down the front of the vertebral column. Over years, this ligament and the surrounding soft tissues calcify and then ossify, producing a thick, flowing layer of new bone draped over the front and side of the vertebrae.

It is worth being clear from the outset that this is not the same as ordinary degenerative disc disease, even though the two often coexist in the same older spine. In typical wear, the disc itself thins and dries out, the disc space narrows, and small bony spurs form at the margins of the worn vertebrae. In DISH, by contrast, the hallmark is that the disc height is relatively preserved. The new bone is laid down in front of the discs, flowing across them like candle wax, rather than arising from collapse of the disc itself. This distinction, preserved discs beneath flowing anterior bone, is central to recognising the condition and sets it apart from the changes of age alone.

The new bone in DISH characteristically has a particular appearance. It flows continuously from one vertebral body to the next, often with a lucent line visible between the new bone and the underlying vertebra, and it tends to be most exuberant on the right side of the thoracic spine. The reason for this right-sided predominance is thought to be the pulsation of the aorta on the left, which is believed to discourage bone formation on that side. These are descriptive features observed across many cases rather than rules that hold in every individual.

The Resnick criteria, and why DISH is not ankylosing spondylitis

The most widely used framework for recognising DISH on imaging is the set of criteria described by Resnick and Niwayama. Three features are required together. First, there must be flowing calcification and ossification along the front and side of at least four contiguous vertebrae, that is, four vertebrae in an unbroken row. Second, the height of the intervertebral discs in the affected region must be relatively preserved, without the extensive changes that would point to degenerative disc disease as the main process. Third, there must be an absence of bony fusion of the small facet joints at the back of the spine and an absence of erosion, sclerosis or bony fusion of the sacroiliac joints in the pelvis.

That third criterion is the one that does the most work in distinguishing DISH from ankylosing spondylitis, and the distinction matters a great deal because the two conditions can both produce a stiff, fused, fracture-prone spine yet are entirely different diseases. Ankylosing spondylitis is an inflammatory disorder, typically of younger people, in which the sacroiliac joints are involved early and characteristically fuse, and in which the spinal fusion produces thin, vertical bridges of bone, the so-called bamboo spine, arising from inflammation at the disc margins. DISH is not inflammatory in that sense; it spares the sacroiliac joints in the way that defines the disease, it affects an older population, and its bony bridges are thick and flowing rather than thin and vertical. Recognising which of the two is present changes the whole picture, because the underlying causes, the associated conditions and the wider implications differ.

Some authors have proposed that the requirement for four contiguous vertebrae captures only a late stage of the disease, and have suggested lower thresholds, such as flowing ossification across three vertebrae together with bony outgrowths in the pelvis, in order to recognise the condition earlier. These proposals reflect the understanding that DISH evolves slowly, often over a decade or more, from its earliest changes to the fully developed flowing bridges described in the classic criteria.

Why the thoracic spine is the heart of the condition

DISH can affect the neck and the lower back, but the thoracic spine, the long middle segment of the column to which the ribs attach, is where it is seen most consistently and most extensively. It is here that the flowing anterior bone is typically at its most developed, and here that the right-sided predominance is most apparent.

The thoracic region matters for a structural reason. The thoracic spine is already the stiffest part of the column, splinted by the rib cage and naturally curved. When a flowing layer of new bone is added across its front, the segment becomes progressively more rigid until, in advanced cases, a long run of vertebrae is effectively fused into a single immobile beam. The clinical consequences of DISH in the spine, particularly the susceptibility to unstable fracture, flow directly from this transformation of a flexible, segmented column into a long, stiff, lever-like structure.

People with extensive thoracic DISH often notice surprisingly little in the way of symptoms given the dramatic appearance on imaging. Some experience stiffness of the back and a sense of reduced flexibility, and a minority have aching discomfort, but it is common for the condition to be entirely silent in the thoracic spine and to be discovered incidentally on a chest scan performed for some other purpose. This mismatch between striking imaging and modest symptoms is a recurring theme of the condition.

Dysphagia from large anterior cervical osteophytes

In the neck, the flowing bone of DISH can grow forwards into the space occupied by the throat. The swallowing passage, the pharynx and oesophagus, lies directly in front of the cervical vertebrae, and when large bony outgrowths develop on the front of these vertebrae they can press upon and displace this passage. The result can be difficulty swallowing, known as dysphagia, which is the most frequently described symptomatic consequence of DISH in the cervical spine.

The mechanism is partly mechanical, the bone simply forming an obstruction or indentation against which food must pass, and partly the result of local irritation and altered movement of the swallowing structures. The levels most often implicated are in the mid and lower neck, around the fourth, fifth and sixth cervical vertebrae, which correspond to the part of the throat where swallowing is most dynamic. Beyond difficulty swallowing, large anterior cervical osteophytes have been described as a cause of changes in the voice, a sensation of something stuck in the throat, and, rarely, more serious problems such as obstruction of the airway or interference with the structures used in breathing.

It is important to keep this in proportion. Although large anterior cervical osteophytes are a recognised cause of swallowing difficulty, swallowing problems in older people have many other and more common causes, and the

presence of cervical DISH on a scan does not by itself establish that it is responsible for any given person's symptoms. The literature describing dysphagia from cervical DISH consists largely of case reports and small series, which document the association and the results of treatment but do not establish how often the bone is the true cause when it is present.

The high fracture risk of the long, rigid, ankylosed spine

The most serious spinal consequence of DISH is its effect on how the spine fractures. A normal spine is a chain of small, mobile segments that share and dissipate the forces of an injury across many levels. A spine that has been turned into a long, rigid, fused beam by extensive DISH behaves quite differently. It loses its capacity to flex and absorb load, so that forces which a normal spine would distribute are instead concentrated at a single point, much as a long, stiff stick snaps cleanly when bent rather than bending gradually.

Several features combine to make these fractures dangerous. They occur after what seems like trivial trauma, classically a fall from standing height or a minor knock, because the long lever arm of the fused column magnifies even small forces. They tend to run through all three columns of the spine, front, middle and back, making them mechanically unstable, in contrast to the more contained fractures seen in a normal spine. The bone in the ankylosed spine is often of poor quality, which compounds the tendency to fracture and the difficulty of holding the fracture together. And because the fractured segment is part of a long rigid lever, there is a marked tendency for the broken ends to move, with a real risk of injury to the spinal cord that may develop not at the moment of injury but in the hours and days afterwards.

Two further features make these injuries particularly treacherous. The first is that they are easily missed. The mechanism seems minor, the person may be able to walk, the fracture line can be obscured by the surrounding flowing bone, and ordinary plain films can fail to show it against the abnormal background. A fracture that is not recognised may be handled without the precautions an unstable injury demands, and may then displace. The second is that the rigid column above and below the fracture acts as two long levers pulling on the break, so that movement which would be harmless in a normal spine can shift these fractures and threaten the cord. For all these reasons, fractures of the ankylosed spine, whether from DISH or from ankylosing spondylitis, are recognised across the literature as a distinct and high-risk category of spinal injury.

Spinal stenosis, and the associations with OPLL and OLF

The same biological tendency that lays down bone along the front of the spine in DISH can, in some people, also lay down bone in the ligaments that line the spinal canal itself. Two such processes are recognised. Ossification of the posterior longitudinal ligament, abbreviated to OPLL, is the conversion to bone of the ligament running down the back of the vertebral bodies, directly in front of the spinal cord. Ossification of the ligamentum flavum, abbreviated to OLF, is the same process in the ligament lying behind the cord. When either of these ossified ligaments encroaches on the spinal canal, the space available for the cord is reduced, a situation termed spinal stenosis, and pressure on the cord can produce the cluster of problems known as myelopathy, including changes in walking, balance and hand function.

DISH, OPLL and OLF are increasingly understood as related members of a family of ossifying conditions of the spine, sharing a tendency to form bone in ligamentous tissue and sometimes occurring together in the same person. They are not the same condition, and most people with DISH do not develop significant canal narrowing, but the recognised overlap means that the presence of one of these ossifying processes raises the possibility of the others. Where ossification narrows the thoracic or cervical canal, it can do so on its own or in combination, and the upper thoracic spine in particular has been described as an occasional site where OPLL and OLF coincide to compress the cord.

This association is one reason why DISH is considered in the round rather than as a purely anterior phenomenon. The flowing bone at the front is its signature, but the wider propensity to ossify spinal ligaments means that the canal behind the vertebrae is also relevant to understanding the full range of ways in which the condition can

affect the spine.

How DISH in the spine is assessed

Because DISH is so often silent, it is frequently first identified on imaging obtained for an unrelated reason, and imaging remains the foundation of its assessment throughout.

Plain X-rays show the characteristic flowing ossification along the front and side of the vertebrae, the preservation of disc height beneath it and the sparing of the sacroiliac joints, and they remain the basis on which the Resnick criteria are applied. Their limitation, important in the setting of injury, is that a fracture running through an ankylosed spine can be difficult to see against the abnormal background of flowing bone, so that a normal-looking plain film does not exclude a fracture in this population.

Computed tomography, the CT scan, gives a far more detailed three-dimensional picture of the bone. It demonstrates the extent of the flowing ossification, defines the bony anatomy of the canal in OPLL and OLF, and is especially valuable where fracture is a concern, because it shows fracture lines that plain films may miss and clarifies how many of the spinal columns are involved.

Magnetic resonance imaging, the MRI scan, is the means of assessing the soft tissues, above all the spinal cord. It shows whether the cord is being compressed by ossified ligaments and whether it has sustained injury, and in the setting of trauma it reveals damage to the discs, ligaments and cord that bone-based imaging cannot.

Together these tests describe both the bony architecture of the DISH spine and the state of the neural structures within it, and the choice between them depends on the question being asked, whether that is recognising the condition, assessing the canal, or evaluating a possible fracture.

What the evidence shows about management

It is important to be clear that much of the evidence concerning DISH and the spine consists of case reports, retrospective series and narrative reviews rather than large randomised trials, and that the descriptions which follow report what the literature observes rather than guidance for any individual. Decisions in practice are made on a case-by-case basis by the treating team.

For the condition itself, when DISH is found incidentally and is not causing symptoms, the literature describes no specific treatment directed at the ossification, which cannot be reversed. Attention in such cases is typically directed at the associated metabolic factors, such as diabetes, obesity and the components of the metabolic syndrome, which are managed in their own right for general health reasons rather than to alter the spinal bone.

Where large anterior cervical osteophytes cause significant and persistent swallowing difficulty, the literature describes surgical removal of the bony outgrowths, an operation termed osteophylectomy, sometimes combined with fusion of the involved segment, and reports generally favourable results in carefully selected cases. Because the bone can re-form and because the operation is undertaken near important structures of the throat and neck, the decision is individualised and weighed against the severity of the symptoms.

For fractures of the ankylosed spine, the literature strongly emphasises recognition and stability. Because these injuries are unstable, prone to displace and associated with a real risk of cord injury, operative stabilisation, often spanning several levels above and below the fracture to control the long lever arms, is the approach most commonly described, frequently using minimally invasive percutaneous techniques to limit the considerable risks of surgery in this frail population. Non-operative management is described in selected cases but carries its own risks of failure to heal and of late neurological deterioration. Where ossification of the canal produces myelopathy, the literature describes surgical decompression, again individualised and balanced against the risks of operating in an ossified, rigid spine. Across all of these scenarios, the recurring theme is that the stiffness and brittleness of the DISH spine shape both the problems and their management.

Outlook

For most people, DISH of the spine is a benign and often silent condition, discovered by chance and never causing serious trouble. Its slow evolution, its frequent lack of symptoms even when extensive, and the fact that the discs beneath the flowing bone are relatively spared all contribute to a generally reassuring picture for the majority.

The outlook is shaped less by the ossification itself than by the specific complications to which it predisposes. Swallowing difficulty from cervical osteophytes is uncommon and, where it occurs and is treated, often improves. The narrowing of the canal from associated ossification affects only a minority. The complication that dominates the serious end of the spectrum is fracture of the rigid spine, where the outlook depends heavily on whether the injury is recognised promptly and managed as the unstable, high-risk injury it is, because delayed recognition and displacement are what drive the worst outcomes.

Across the whole field, the consistent themes are that a DISH spine is a stiff and brittle spine, that the appearance on a scan is often far more dramatic than the symptoms a person experiences, that the condition sits within a wider family of ossifying disorders and a backdrop of metabolic health, and that any individual outlook is a matter for assessment by the treating team rather than something that can be read from the imaging alone.