Diffuse idiopathic skeletal hyperostosis

Diffuse idiopathic skeletal hyperostosis (DISH), also referred to as Forestier's disease, was first described by Jacques Forestier and his student Jaume Rotes-Querol in 1950.

It is a non-inflammatory skeletal disease characterized by calcification and ossification of soft tissues, primarily ligaments and entheses. DISH is also known as senile ankylosing hyperostosis [1].

However, it is now known that this disease is neither limited to the spine nor to older subjects. In 1976, Resnick and Niwayama coined the term “diffuse idiopathic skeletal hyperostosis” (DISH), which is currently widely utilized. Independently of how this condition is named, it consists in a systemic noninflammatory disease characterized by ossification of the entheses – the bony attachment of tendons, ligaments, and joint capsules [2].

This common disorder of unknown etiology is characterized by back pain and spinal stiffness. There may be mild pain if ankylosis has occurred. The condition is recognized radiographically by the presence of “flowing” ossification along the anterolateral margins of at least four contiguous vertebrae and the absence of changes of spondyloarthropathy or degenerative spondylosis. Even in patients who present with either lumbar or cervical complaints, radiographic findings are almost universally seen on the right side of the thoracic spine. Thus, radiographic examination of this area is critical when attempting to establish a diagnosis of DISH. The potential sequelae of hyperostosis in the cervical and lumbar spine include lumbar stenosis, dysphagia, cervical myelopathy, and dense spinal cord injury resulting from even minor trauma. There may be a delay in diagnosis of spinal fractures in a patient with DISH because the patient often has a baseline level of spinal pain and because the injury may be relatively trivial. The incidence of delayed neurologic injury due to such fractures is high as a result of unrecognized instability and subsequent deterioration. Extraspinal manifestations are also numerous and include an increased risk of heterotopic ossification after total hip arthroplasty. Prophylaxis to prevent heterotopic ossification may be indicated for these patients [3].

Epidemiology

The disease has about the same frequency in men (65%) and women (35%); it is most common in the thoracic spine and occurs less frequently in the lumbar and cervical spine. The disease most commonly presents in the sixth and seventh decades of life and its estimated frequency in the elderly is 5-15%.

DISH most commonly affects the elderly, especially 6th to 7th decades [4].

The cervical and thoracic (particularly T7-11) [5]. spines, in particular, are affected. Additionally, enthesopathy may be identified in the pelvis and extremities.

Etiology

The aetiology of DISH is still unknown.

Although many external and genetic factors have been reported as being contributors of the

pathogenesis of DISH, most of the current theories focus on the pathologic calcification of the anterior longitudinal ligament of the spine. The majority of these theories postulate that this process is due to the abnormal growth and function of the osteoblasts in the osteoligamentary binding [6].

However, it is important to clarify that not all authors accept the association between pathologic calcification and increased bone mineral density [7].

Pathology

Histopathological features of spinal DISH include :

focal and diffuse calcification and ossification of the anterior longitudinal ligament

paraspinal connective tissue and annulus fibrosis

degeneration in the peripheral annulus fibrosus fibres

anterolateral extensions of fibrous tissue

hypervascularity

chronic inflammatory cellular infiltration

periosteal new bone formation on the anterior surface of the vertebral bodies [8].

Clinical features

The condition is commonly identified as an incidental finding when imaging for other reasons.

Spinal hyperostosis can predispose the affected to chronic myelopathic symptoms and acute spinal cord injury.

The involvement of vertebral and extravertebral sites including the pelvis, calcaneum, ulnar olecranon, and patella is frequently found in the literature. The lesions described are the anterior and lateral ossification of the spine, hyperostosis at sites of tendon and ligament insertion, ligamentous ossification, and periarticular osteophytes.

Signs and symptoms include stiffness and pain in the back, dysphagia due to direct esophageal compression/distorsion, pain related to associated tendinitis, myelopathy related to core compression associated to the ossification of the posterior longitudinal ligament, and pain related to vertebral complications–e.g. fracture/subluxation [9].

Neurological complications occur in DISH when the pathological process of ossification extends to other vertebral ligaments, causing ossification of the posterior longitudinal ligaments (OPLL) and/or ossification of the ligamentum flavum (OLF) [10].

Recognised associations include:

Hyperglycaemia [11]. approximately one-third of patients tests positive for HLA-B27

Diagnosis

The criteria for the diagnosis of diffuse idiopathic skeletal hyperostosis involving the spine are: flowing ossification along the anterior and anterolateral aspects of at least four contiguous vertebrae, preserved intervertebral disc height, no bony ankylosis of the posterior spinal facet joints, and finally no erosion, sclerosis or bony ankylosis of the sacroiliac joints [12] [13].

On imaging, it is typically characterised by the flowing ossification of the anterior longitudinal ligament involving the thoracic spine and enthesopathy (e.g. at the iliac crest, ischial tuberosities, and greater trochanters). There is no involvement of the sacroiliac synovial joints.

While conventional radiography clearly confirms the diagnosis of diffuse idiopathic skeletal hyperostosis, CT and MRI better detect associated findings (e.g. ossification of the posterior longitudinal ligament) and complications (e.g. spinal cord compressive myelomalacia) [14].

Radiographic features

DISH involving the spine is identified radiologically by flowing ligamentous ossification and calcification of the anterolateral aspect of the vertebral body with relatively well-preserved disc space of at least four contiguous vertebrae, so-called flowing ossifications [15].

The radiographic criteria, as defined by Utsinger et al., includes:

(1) bridging osteophytes extending over four contiguous vertebral bodies

(2) relatively normal intervening disk space height in relation to height in relation to age

(3) absence of apophyseal joints, bony ankyloses, and absence of erosion, sclerosis, or osseous fusion of the sacroiliac joints [16].

Extraspinal features

enthesopathy of the iliac crest, ischial tuberosities, and greater trochanters and spur formation in the appendicular skeleton (olecranon, calcaneum, patellar ligament) are frequently present 'whiskering' enthesophytes [17].

Differential diagnosis

Diffuse idiopathic skeletal hyperostosis (DISH) and ankylosing spondylitis (AS) share involvement of the axial skeleton and peripheral entheses. Both diseases produce bone proliferations in the later phases of their course. Although the aspect of these bone proliferations is dissimilar, confusion of radiologic differential diagnosis between the two diseases exists mostly as a consequence of a lack of

awareness of their characteristic clinical and radiographic features. The confusion may extend to the clinical field because both advanced DISH and advanced AS may cause the same limitations of spinal mobility and postural abnormalities. However, the radiologic spinal findings are so different that changes due to each disease can be recognized even in patients in whom both diseases occur. This article reviews the clinical and radiologic characteristics that should help clinicians differentiate between the two diseases without much difficulty [18)].

ankylosing spondylitis

syndesmophytes: thinner, form over the annulus, and are vertically oriented (“bamboo spine”)

sacroiliac joint involvement early on and is in the synovial portion (inferior two-thirds)

osteoporosis is prominent

degenerative spine disease

usually has prominent facet and apophyseal joints degenerative changes as well

disc degenerative changes

retinoid arthropathy

patients using retinoid acid for skin diseases

skeletal hyperostosis

predominantly involves the cervical spine

fluorosis

fluorite intoxication due to long-term ingestion

can cause paraspinal ligament calcification

if seen in a child, consider juvenile idiopathic arthritis (JIA).

Complications

Dysphagia Provoked by Diffuse Idiopathic Skeletal Hyperostosis in the Cervical Spine.

A study aimed to predict the surgical outcomes of diffuse idiopathic skeletal hyperostosis (DISH)-related dysphagia (DISH-phagia) and to evaluate the importance of prevertebral soft tissue thickness (PVST).

In total, 21 surgeries (anterior osteophytectomy or anterior cervical decompression and fixation) were included in this study for DISH-phagia from 2003 to 2019. Clinical outcomes were assessed using the Dysphagia Outcome and Severity Scale (DOSS) preoperatively, at 1 month postoperatively, and last follow up (mean 29.5 months). PVST was measured using lateral plain radiographs. Paired t-test and Spearman's correlation test was used to identify relationships between various PVST indices and

DOSS.

Comparisons were made from 17 patients out of 21, in which the record had all of three measurements. The narrowest PVST preoperatively was 2.55±0.90 mm, with a DOSS score of 4.47±1.61, and that at 1 month after surgery was 5.02±2.33 mm, with a DOSS score of 6.12±1.32. At last follow up, PVST and DOSS values were 3.78±0.92 mm and 5.82±1.34, and three patients experienced symptom relapse. Significant relationships were found between PVST and DOSS at all time points: before surgery ($R=0.702$, $p<0.001$), 1 month after surgery ($R=0.539$, $p=0.012$), and last follow up ($R=0.566$, $p=0.020$).

Surgical removal of anterior osteophytes is an effective treatment option for DISH-phagia, and PVST is a useful parameter in DISH-phagia. The goal of DISH surgery should be to remove DISH as much as possible to ensure sufficient PVST postoperatively [19].

Treatment

DISH is generally managed clinically with analgesics and non-steroidal anti-inflammatory drugs when pain and stiffness are related. Possible complications may require specific treatment:

acute spinal fractures

chalk stick fracture

rarely dysphagia caused by mechanical compression due to anterior cervical bone production [20].

Outcome

DISH rarely causes neurological complications, as evidenced by isolated case reports on the subject; however, if neurological complications do occur, they are often severe enough to warrant major neurosurgical intervention [21] [22] [23] [24].

Case series

Diffuse idiopathic skeletal hyperostosis case series

Case reports

Diffuse idiopathic skeletal hyperostosis case reports.

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