

# Spondyloarthritis and Diffuse Idiopathic Skeletal Hyperostosis: Two Different Diseases That Continue to Intersect

Spondyloarthritis (SpA) and diffuse idiopathic skeletal hyperostosis (DISH) are different diseases obliged to converge<sup>1</sup>.

SpA is an inflammatory disease involving the axial skeleton and the peripheral entheses and joints and showing a wide clinical spectrum that encompasses ankylosing spondylitis (AS), reactive arthritis (ReA), psoriatic arthritis (PsA), arthritis related to inflammatory bowel disease (IBD), and forms that do not meet established criteria for these definite categories and are designated as undifferentiated SpA (uSpA)<sup>2,3</sup>. Recently, classification criteria have been suggested by ASAS (Assessment in Spondyloarthritis International Society) for axial and peripheral SpA<sup>4,5</sup>. In contrast, DISH is a degenerative condition characterized by calcification and ossification of ligaments and enthesal sites in the axial and the peripheral skeleton<sup>6</sup>. Classification criteria for DISH used so far require involvement of the spine<sup>6</sup> although extravertebral bone proliferations are frequent and characteristic and may precede axial changes<sup>7,8</sup>. An international study for the development of new criteria is in progress<sup>8</sup>.

At the beginning of the story, AS and DISH resembled each other only on radiographs because of the bony outgrowths they produce in the spine<sup>1</sup>. Clinically, they were considered very different diseases. Symptoms of AS begin at a young age, frequently in second and third decades, and consist of inflammatory back pain and buttock pain, reduced spinal movement, and progressive typical postural abnormalities known as “Bechterew stoop.” In contrast, DISH was considered a disease with an asymptomatic course or with mild dorsolumbar pain and/or some restriction of spinal motion.

Radiographically, DISH is characterized by “flowing mantles” of ossifications occurring in the anterior longitudinal ligament, and to a lesser extent, in the paravertebral connective tissue and the peripheral part of the annulus fibrosus<sup>6</sup>. Frequently on lateral view, radiolucency is noted between new bone and the vertebral body. The thoracic region is mostly affected but all level levels may be involved. The ossifications are mostly marked along the

anterior and right anterolateral vertebral borders, on the lower half of the dorsal spine. The predominant involvement of the left side in patients with *situs inversus viscerum* suggests that pulsation of the descending thoracic aorta may have an effect on site of ossification. DISH may also involve the sacroiliac (SI) joints. The upper (ligamentous) portion of the joint may exhibit abnormalities such as narrowing, sclerosis, vacuum phenomenon, and even partial or complete bony ankylosis. The lower two-thirds (synovial area) of the joint is spared. However, ossification of the joint capsule on the anterior surface of the SI joints on anteroposterior pelvic radiographs and may mistakenly be interpreted as postinflammatory ankylosis of the joint (grade 4 sacroiliitis)<sup>9</sup>. Computed tomography (CT) can be helpful in these cases by demonstrating the normal aspect of the joint space and bony margins together with the presence of the anterior capsular ossification<sup>9</sup>.

Radiographic views of axial involvement of SpA are characterized by bone damage caused by sacroiliitis and by inflammation at the discovertebral junction at the attachment of the annulus fibrosus<sup>1</sup>. The consequent adjacent subchondral osteitis is radiologically characterized by a destructive vertebral lesion and sclerosis confined to the anterior corners of the vertebral bodies (“Romanus lesion”). The healing of these lesions and the adjacent periosteal reaction results in “squaring” of the vertebral bodies on lateral view of the spine. Simultaneously, healing takes place in the periphery of the annulus fibrosus, resulting in the formation of syndesmophytes that are vertical bony bridges joining adjacent vertebral bodies anteriorly and laterally and ultimately forming a “bamboo spine.” The inflammatory process also involves the costovertebral, costovertebral, and zygapophyseal joints, slowly resulting in their ankylosis, which causes impairment of chest expansion and spinal mobility. The ossification of the supraspinous and interspinous ligaments can result in the formation of a vertical radioopaque stripe in the midline on anteroposterior view of spinal radiographs, the so-called “tram-track” and “dagger” signs.

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Presence of concomitant osteoporosis adds to the risk of development of progressive spinal kyphosis.

McEwen and coworkers identified 2 different forms of spondylitis<sup>10</sup>. Primary AS and spondylitis associated with IBD showed bilateral sacroiliitis, symmetrical and marginal syndesmophytes, ligamentous ossification, and progression of syndesmophytes from the lumbar to the cervical spine. In contrast, spondylitis associated with psoriasis and ReA was characterized more often by asymmetrical findings both in the SI joints and the syndesmophytes; moreover, the syndesmophytes were mostly paramarginal rather than marginal. The bone proliferations of DISH are more frequently confused with these last syndesmophytes. However, the radiological findings of axial involvement in SpA and DISH are so different that in patients with coexisting DISH and AS, it is possible to recognize the changes due to the 2 diseases at any spinal level<sup>11,12,13</sup>.

As regards peripheral enthesopathy, in general the bone proliferative changes of enthesitis of SpA are ill-defined and finely speculated and differ from the course and well defined noninflammatory bone outgrowths of DISH<sup>14</sup>.

In the second phase of the story, it was realized that the differential diagnosis of DISH and long-lasting advanced AS is not limited to radiological findings but extends to the clinical aspects. More than 15 years ago, Mata and coworkers examined 56 patients with DISH, 43 control patients with spondylosis, and 31 healthy control patients<sup>15</sup>. Patients with DISH reported a history of upper extremity pain, medial epicondylitis, patellar and heel enthesitis, and dysphagia more frequently than patients with spondylosis, and they had more extremity and spinal pain and stiffness than healthy controls. In addition, patients with DISH had a greater reduction in neck rotation and thoracic movement in comparison with spondylosis patients or healthy controls and had a greater reduction of lumbar movement than healthy subjects. In 2007, we described 15 patients with DISH showing severe limitation of spinal mobility together with the typical postural abnormalities of advanced AS<sup>16</sup>. In the clinical field the differential diagnosis also extends to peripheral entheses. Recently, we encountered patients with typical postural abnormalities of long-lasting AS who also showed diffuse swelling at the insertion of Achilles tendon, resembling the typical fusiform soft-tissue swelling of Achilles enthesitis of SpA<sup>17</sup>. However, instead of the inflammatory findings of enthesitis, palpation of the region revealed the bony consistency of large spurs, also seen on radiographs.

In this issue of *The Journal*, a Toronto-based study group on PsA opens a third phase of the story<sup>18</sup>. The authors evaluated the frequency of DISH in 938 patients with PsA and the features associated with its occurrence. The most relevant conclusions of this study are as follows: (1) DISH can be diagnosed in patients with psoriatic spondylitis, confirming that a rheumatologist or a radiologist with

expertise in DISH and SpA can easily differentiate the 2 diseases and recognize the typical aspects of both when they coexist in the same patient. (2) Patients with PsA and DISH have increased limitation of spinal movement and decreased quality of life in comparison with patients with only PsA, confirming the observation that DISH is not an asymptomatic disease. (3) Patients with PsA and DISH have more damage in peripheral joints than patients with PsA without DISH. The peripheral joints may be involved in patients with isolated DISH and show juxtaarticular bone proliferation in the absence of joint surface abnormalities<sup>7</sup>. Patients with osteoarthritis (OA) and DISH show more hypertrophic joints compared with patients with isolated OA<sup>19</sup>. Similarly, the damage to peripheral joints of PsA, which is characterized by juxtaarticular new bone formation, can be worse if DISH coexists. (4) Patients with PsA are at increased risk for cardiovascular morbidities<sup>20</sup>, and the presence of DISH may identify patients at higher risk.

A new phase has begun in the understanding of relationships between DISH and SpA. Establishing the presence of DISH in patients with SpA can be useful in better evaluating the damage to the musculoskeletal system and the cardiovascular risk. It is desirable that interest in DISH continue to expand because an understanding of the mechanisms involved in the bone proliferation of DISH could also elucidate the relationships between inflammation and bone proliferation in axial and peripheral SpA<sup>21</sup>.

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