

Ankylosing spondylitis of the thorax

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About 0.1% of the total population has ankylosing spondylitis (AS). It affects mainly the attachment of ligaments to the axial skeleton. Solitary involvement of the thoracic spine and cage is seldom encountered because this is normally part of a generalized ankylosing spondylitis. Only 2–5% of all patients have chest pain as an initial symptom.^{1,2}

The condition usually starts in the sacroiliac joints and extends upwards to the spine, often to the thoracolumbar junction first, and then later to the lumbar, thoracic and cervical spines. Although involvement of the sacroiliac joints may remain silent, spinal localization of AS without sacroiliitis is very rare.³

Clinical findings

Ankylosing spondylitis of the thoracic spine

Patients complain of a chronic stiff back, especially early in the morning and easing with activity. Periods of worsening pain and stiffness come on spontaneously and are not provoked by activity or exercise. During the pain-free periods, the patient is effectively normal. Only slight radiation to the sides is present. Because several levels are usually involved and little referred pain is present, the pain is distributed in the vertical axis. All these are important differences from disc lesions, in which pain is usually referred horizontally, is worse during the daytime and is brought on by activity.

The findings on inspection depend on the duration of the disorder. Initially, a rigid lumbar segment is present, which later becomes flat, together with a slight accentuation of the thoracic kyphosis. This develops further to a thoracic hyperkyphosis with hyperextension of the upper cervical spine and flexion of the hip.⁴ Chest expansion may be diminished.

On functional examination, a clear capsular pattern is present with an equal amount of pain and limitation of both side flexions and rotations, more pain and limitation on extension, and only slight discomfort on flexion. The end-feel on rotation and extension is typically hard. The range of rotation has a significant negative correlation with the duration of the disease.⁵ Pain provoked by pressure on the spinous processes is usually much more severe than in an ordinary disc lesion.⁶ At a later stage, the vertebrae are much more vulnerable to fractures, because of loss of normal capsular and ligamentous elasticity.

The capsular pattern with hard end-feel, chronic prolonged morning stiffness and pain with periods of spontaneous exacerbations, together with other localizations of the same

disorder, all in young patients (mainly 18–30 years), strongly indicates AS.

A radiographic examination should be done at once and must always include the sacroiliac joints.

Ankylosing spondylitis of the anterior longitudinal ligament

Involvement of the anterior longitudinal ligament gives rise to pain felt only at the sternum or in the epigastrium, without central dorsal pain. The pain has the same characteristics as in other localizations of AS at the thoracic spine.

Ankylosing spondylitis of the thoracic facet joints

The apophyseal joints are usually involved, together with the intervertebral joints. The former are mainly responsible for bilateral paravertebral pain. AS may lead to total fusion of the facet joints.

Ankylosing spondylitis of the costovertebral joints

Costovertebral and costotransverse joints are often affected in AS. Computed tomography (CT) scans usually show the classic lesions: erosions, sclerosis, joint widening and bridging.⁷ It is accepted that these changes provide the anatomical basis for the understanding of the thoracic pain in AS patients.⁸ Although the pain is usually rather dull, it may sometimes be severe, even mimicking renal colic.⁹ Chest expansion is diminished. Therefore chest expansion should always be assessed when AS is suspected. It is measured level with the nipples. The normal difference between inspiration and expiration is at least 7 cm; less than 4 cm is regarded as abnormal.¹⁰ Surprisingly enough, reduced chest expansion seldom interferes with normal lung and heart function, because of normal diaphragmatic mobility.¹¹ If it does, chronic cor pulmonale is to be expected, with shortness of breath. The latter may also be the result of upper lobe fibrosis from involvement of the lung by AS.

Ankylosing spondylitis of the manubriosternal joint

This joint is affected in 50% of all cases.¹² Forced inspiration may be painful. Palpation reveals a precise area of local tenderness together with swelling of the ligaments.

Further investigations

Laboratory tests

The erythrocyte sedimentation rate may be elevated in active disease. A mild anaemia may be present. HLA-B27, although

not diagnostic as such, is present in over 90% of cases, whereas in a normal population it is only found in 8%.⁶

Radiography

Sacroiliac joint

Early confirmation of AS is based mainly on radiography of the sacroiliac joints. A single anteroposterior pelvic radiograph is sufficient. AS is characterized by loss of distinctness of the subchondral bone in the iliac portion of the joint, which shows as loss of outline and pseudo-widening. Later, subchondral sclerosis and joint bridges may develop, ultimately with total fusion of the joint.

Spinal changes

Plain radiography of the spine may show the following changes:

- *Erosion*: loss of bone cortex at the corner of the vertebral body, called the 'shiny corner sign' or 'Romanus lesion'.¹³
- *Squaring* of the vertebral body: another characteristic feature of AS. It is caused by a combination of corner erosions and periosteal new bone formation along the anterior aspect of the vertebral body.
- *Syndesmophyte* formation: refers to the process in which ossification of the outer fibres of the annulus fibrosus leads to bridging of the corners of one vertebra to another.
- *Ossification* of the adjacent paravertebral connective tissue fibres: posterior interspinous ligament ossification, combined with linking of the spinous process, produces an appearance of a solid vertical dense line in the midline on frontal radiographs.
- The *apophyseal and costovertebral joints*: these are frequently affected by erosions and eventually undergo fusion.
- A *bamboo spine*: results from complete fusion of the vertebral bodies by syndesmophytes and other related ossified areas.

Manubriosternal joint

The earliest information that can be gained on AS is sometimes a radiograph of the manubriosternal joint. Normally, the joint surfaces of the manubriosternal joint are flat but in AS they may become biconcave.¹⁴

Differential diagnosis

Diffuse idiopathic skeletal hyperostosis

Diffuse idiopathic skeletal hyperostosis (DISH) is a condition characterized by calcification and ossification of ligaments, mainly of the thoracic spine. This condition was described by Forestier over 50 years ago and was termed senile ankylosing hyperostosis.¹⁵ It affects middle-aged and elderly persons and is often asymptomatic, or is associated with mild dorsolumbar pain and/or some restriction of spinal mobility. Prevalence

studies based on the radiological characteristics have shown that between 2.4 and 5.4% of those over 40 years of age have DISH, as well as 11.2% of those over 70.¹⁶

The diagnosis of DISH is usually based on the definition suggested by Resnick and Niwayama¹⁷:

- The presence of flowing ossification along the anterolateral aspect of at least four contiguous vertebral bodies. The anterior margins of the vertebral bodies are usually distinct and separated from the hyperostosis by a vertical linear radiolucent zone.¹⁸
- The presence of relative preservation of the intervertebral disc height in the involved vertebral segment and the absence of radiographic changes of degenerative disc disease.
- The absence of apophyseal joint bone ankylosis and sacroiliac joint sclerosis, erosion and fusion.

Unlike in AS, there is no association with HLA-B27.

Osteoarthritis

In osteoarthritis, the disc spaces are narrowed. Osteophytes arise from the anterior and lateral margins of the vertebral

bodies and have a horizontal, beak-like orientation. There are also obvious signs of osteoarthritis of the facet joints and costovertebral joints.

Treatment

The aim of treatment is to keep pain and stiffness under control, to maintain mobility and a straight spine, and to preserve as satisfactory a respiratory excursion as possible.

The basic treatment is administration of anti-inflammatory drugs and a daily exercise programme. Exercises, sports and swimming are strongly recommended.

Significant involvement of the costovertebral joints may affect their mobility, and care should be taken to prevent this. Deep breathing should be practised regularly and can be assisted by a therapist. Mobilization exercises to increase joint movement on inspiration and expiration must also be performed.



Access the complete reference list online at www.orthopaedicmedicineonline.com

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