Pulmonary Manifestations of Ankylosing Spondylitis

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KEYWORDS

• Ankylosing spondylitis • Apical fibrobullous disease
• Chest wall restriction • Spontaneous pneumothorax

Ankylosing spondylitis is a chronic multisystem inflammatory disorder with articular and extra-articular features. It mainly affects the joints of the axial skeleton.[1–7] Inflammation and arthritic destruction of the costovertebral, apophyseal, and sacroiliac joints result in pain and progressive stiffening of the spine, chest, and pelvis.[2] In addition, ocular, pulmonary, cardiovascular, renal, and neurologic complications have been described. Ankylosing spondylitis can affect the tracheobronchial tree and the pulmonary parenchyma and is associated with several unique pulmonary manifestations, such as chest wall restriction and upper lobe fibrocystic disease.

DEMOGRAPHIC FEATURES

Ankylosing spondylitis is estimated to affect 0.1% of the general population.[8] However, there is significant variability in prevalence, ranging from approximately 2 per 1000 individuals among black South Africans to 63 per 1000 individuals among Canadian Bella Bella Indians.[9] A strong familial pattern has been described with an estimated 10% increased likelihood of the disease identified among first-degree relatives of an affected individual.[3]

The disorder affects men more commonly than women. The male/female ratio has been estimated to range from 10:1[5] to 16:1.[10] Symptoms are also generally milder among women.[5]

PATHOPHYSIOLOGY

Ankylosing spondylitis has been described in persons with amyloidosis, psoriasis, regional enteritis, systemic sclerosis, ulcerative colitis, and urogenital infections. These associations suggest that an inflammatory or immunologic process is responsible for its pathogenesis.[2] It has been proposed that cross reactivity between microbial elements and specific histocompatibility antigens may trigger an altered immune reaction. *Klebsiella*-related antigens have been identified in persons with ankylosing spondylitis.[11]

Most patients possess the HLA-B27 antigen.[2–5] Nearly 90% to 95% of Caucasian patients with ankylosing spondylitis are positive for the HLA-B27 antigen; in contrast, the antigen is present in only 6% to 10% of healthy individuals.[3] Furthermore, the presence of this antigen may increase the risk of ankylosing spondylitis, with about 2% to 20% of affected persons developing the disorder.[5]

CLINICAL FEATURES

Inflammation of the sacroiliac joints is an early manifestation, and patients may present with back pain or morning stiffness. Other joints of the axial skeleton and extremities may eventually be affected also. About 30% of the patients have peripheral joint involvement.[3] Pain on inspiration secondary to limited chest wall expansion and straightening of the lumbar spine can occur.[2]

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Ankylosing spondylitis can affect the ocular, cardiovascular, renal, and neurologic systems (**Box 1**). Nongranulomatous anterior uveitis is encountered in approximately 25% of the patients and seems to be more common in those with peripheral joint disease.[3,5,12] Inflammation of the thoracic aorta can result in dilatation of the aortic root. Extension of the inflammatory process to, and below, the aortic valve can lead to aortitis, aortic insufficiency, and various conduction abnormalities.[5] Aortitis and dilatation of the aortic root have been noted in up to 20% to 30% of the affected individuals.[5] Other extraskeletal complications of ankylosing spondylitis include cardiomyopathy, pericarditis and arteritis,[2,5] amyloidosis,[13,14] urethritis, mucosal ulcerations,[10] cauda equina syndrome,[13] and neuropathy secondary to spinal fracture and trauma-related cord injury.[2]

Box 1
Extra-articular manifestations of ankylosing spondylitis

Ocular
- Nongranulomatous anterior uveitis

Pulmonary
- Bronchiolitis obliterans
- Bronchocentric granulomatosis
- Bronchogenic carcinoma
- Chest wall restriction
- Cricoarytenoid arthritis
- Pneumothorax
- Upper lobe fibrocystic changes

Cardiovascular
- Aortic valve abnormalities
- Aortitis
- Arteritis
- Cardiomyopathy
- Conduction abnormalities
- Pericarditis

Genitourinary
- Urethritis
- Chronic prostatism

Neurologic
- Neuropathy
- Spinal stenosis
- Cauda equina syndrome

Others
- Amyloidosis
- Mucosal ulcerations

RESPIRATORY MANIFESTATIONS

The presence of pleuropulmonary disease in patients with ankylosing spondylitis was first described by Dunham and Kautz[15] in 1941 and by Hamilton[16] in 1949. Pulmonary involvement in ankylosing spondylitis consists most frequently of abnormalities of the thoracic cage and lung parenchyma.[5,6] In one study, pleuropulmonary involvement was observed in 28 (1.3%) of 2080 patients with ankylosing spondylitis,[17] including 25 cases of apical fibrobullous changes, 2 of pleural effusions, and 1 of apical fibrosis and pleural effusion. Less commonly, significant cricoarytenoid joint disease can manifest with hoarseness, throat soreness, or, if severe, upper airway obstruction and acute respiratory failure.[18,19] A case of squamous cell carcinoma in a patient with pulmonary fibrosis and ankylosing spondylitis has been reported.[20] Lastly, there is an increase in risk of pneumothorax in ankylosing spondylitis.[17]

Chest Wall Restriction

A restrictive ventilatory impairment can develop in patients with ankylosing spondylitis because of either fusion of the costovertebral joints and ankylosis of the thoracic spine[3,5,6] or anterior chest wall involvement. Fournie and colleagues[21] identified enthesitis of the manubriosternal symphysis and sternoclavicular joints in half of 50 patients with ankylosing spondylitis.

Apical Fibrobullous Disease

Ankylosing spondylitis is a common cause of pulmonary apical fibrocystic disease[22]; conversely, upper lobe fibrobullous disease is commonly associated with ankylosing spondylitis, with a prevalence ranging from 1.3% to 30%.[3,4] In one review, this was the most common pulmonary manifestation in ankylosing spondylitis.[17] Apical fibrobullous disease is seen predominantly in men, with a male/female ratio of 50:1.[1] Wolson and Rohwedder[7] found 2 patients with unexplained upper lung zone fibrosis in their study of 52 patients with ankylosing spondylitis. In another study, 14 cases of ankylosing spondylitis with upper lobe changes during a 10-year period were observed.[23] Lastly, Repo and colleagues[24]