



Figure 1. Radiographic features of rheumatoid arthritis. Diffuse and periarticular osteopenia, symmetric joint space loss, and multiple erosions are present in this advanced case. Large erosions are seen at the distal radial-ulnar articulation (arrows).

with the presence of an inflammatory process, and normal values suggest that an inflammatory process is not present. Serial measurement of acute phase reactants may be used to monitor the disease course, particularly for patients with RA, polymyalgia rheumatica, and giant cell arteritis.

The upper limit of the reference normal range for both the ESR and CRP are influenced by age and gender. Patients above the upper limit of normal for young adults but below the upper limit of normal for their age range may have an inflammatory process, or may have mildly elevated acute phase reactants based on age and sex alone. Simple bedside formulae for the upper limit of normal for the ESR are, for women, $(\text{age} + 10)/2$; and for men, $\text{age}/2$ (12). For CRP, the upper limit of the reference range is $\text{age}/50$ for males, and $\text{age}/50 + 0.6$ for females, in units of mg/dL (13).

IMAGING TECHNIQUES

Radiography

The routinely performed radiograph, or x-ray, is the basic imaging technique for diagnosis and staging of all rheumatic diseases. Radiographs form a basis for monitoring disease progression. Plain x-rays are a component of the ACR classification criteria for RA and degenerative joint disease, and are integral components of the diagnosis of ankylosing

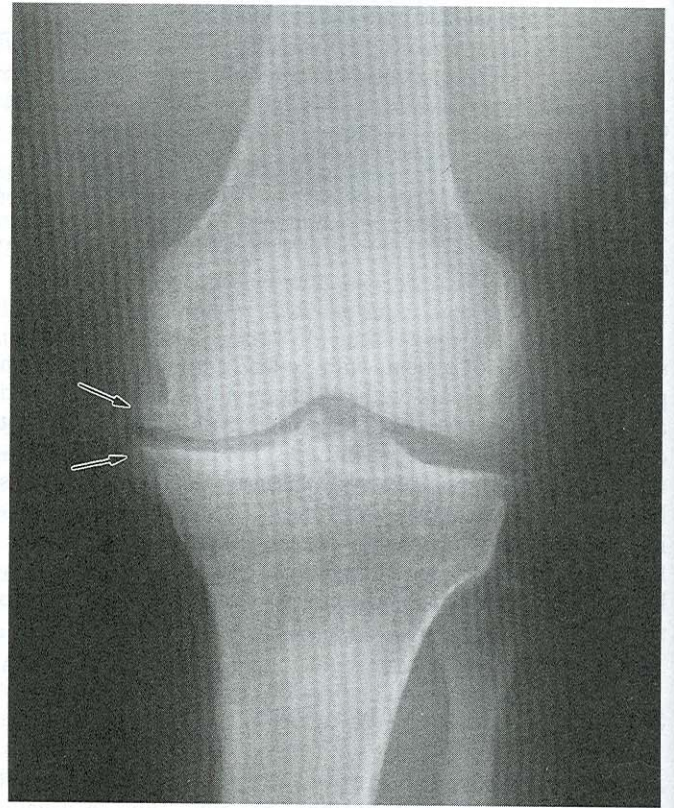


Figure 2. Radiographic features of degenerative joint disease. Osteophytes (arrows) and asymmetric medial cartilage loss are present in this knee x-ray.

spondylitis, diffuse idiopathic skeletal hyperostosis, and the spondylarthropathies. Radiographs have the advantage of ready availability, relatively low cost, and the absence of a need for specialized equipment or diagnosticians.

Radiographic changes in the rheumatic diseases are best exemplified by inflammatory arthritis and degenerative joint disease. The classic example of inflammatory arthritis is RA, in which there is symmetric joint disease with soft-tissue swelling, the development of periarticular osteopenia, marginal erosions, and loss of articular cartilage (Figure 1), coupled with the development of joint malalignment and characteristic deformities.

Degenerative joint disease (Figure 2) also has articular loss; unlike RA however, loss occurs in an asymmetric pattern. There is increased subchondral bone density or sclerosis and the development of marginal osteophytes, or local areas of new bone formation. Involvement of weight-bearing joints is common; however, some forms of degenerative joint disease may occur in non-weight-bearing joints, as exemplified by the degenerative changes in the distal interphalangeal joints of the hands (Heberden's nodes).

Plain x-ray technique may be enhanced by the use of arthrography, in which radiocontrast dye (usually an iodinated water-soluble material) is injected into a joint. Arthrography is useful in diagnosing cysts and other herniations from joints (Figure 3A). As less invasive imaging techniques such as ultrasound and magnetic resonance imaging have become more common, arthrography is employed with less frequency.