83

Osteoarthritis

C. Kent Kwoh

DEFINITION AND EPIDEMIOLOGY

Osteoarthritis, also known as degenerative joint disease, is the most common type of arthritis and musculoskeletal disease. It is a disease of synovial joints that encompasses the pathophysiologic changes that result from alterations in joint structure due to failed repair of joint damage and the individual's experience of illness, which is most often characterized by pain.

More than 26.9 million Americans older than 25 years have some form of osteoarthritis, and the prevalence increases with age. The radiographic prevalence varies by the joint involved. Twenty-seven percent of adults and more than 80% of those older than 65 years have evidence of hand osteoarthritis, and 37% of those older than 60 years have radiographic evidence of knee disease. The prevalence of symptomatic osteoarthritis is lower, with 7% of adults having symptomatic hand disease and 17% of those older than 45 years having symptomatic knee involvement.

Hand and knee osteoarthritis is more common among women, especially after 50 years of age, and it is more common among African Americans. Nodal osteoarthritis, involving the distal and proximal interphalangeal joints, is significantly more common in women and among female first-degree relatives.

Osteoarthritis is associated with major morbidity and is the leading cause of long-term disability in the United States. Lower extremity osteoarthritis is the most common cause of difficulty with walking or climbing stairs, preventing an estimated 100,000 elderly Americans from independently walking from their bed to the bathroom.

Osteoarthritis has a large economic impact because of direct medical costs (e.g., physician visits, laboratory tests, medications, surgery) and indirect costs (e.g., lost wages, home care). With the aging of the U.S. population, the burden of osteoarthritis is expected to increase in the coming years.

For a deeper discussion of these topics, please see Chapter 262, "Osteoarthritis," in Goldman-Cecil Medicine, *25th Edition.*

PATHOLOGIC FACTORS

The causes of osteoarthritis are complex and heterogeneous, and its pathophysiology is not well understood. The cardinal feature is progressive loss of articular cartilage with associated remodeling of subchondral bone. In normal cartilage, there is continuous extracellular matrix turnover with a balance between synthesis and degradation. In osteoarthritis, there is an imbalance of these two processes, with an excess of matrix degradation that exceeds ongoing matrix synthesis. Excess degradation results from overproduction of catabolic factors such as proinflammatory cytokines and reactive oxygen species.

Osteoarthritis is best defined as joint failure, a disease process that involves the total joint, including the subchondral bone, ligaments, joint capsule, synovial membrane, periarticular muscles, and articular cartilage. After bone trauma or repetitive injury, joint failure may result from joint instability caused by muscle weakness and ligamentous laxity; nerve injury and neuronal sensitization or hyperexcitability, or both. Also contributing are low-grade systemic inflammation caused by subacute metabolic syndrome and local inflammation resulting from synovitis. Identifiable risk factors for osteoarthritis include biomechanical, metabolic, and inflammatory processes; congenital or developmental deformities of the joint that alter its shape; and genetic factors. Age, sex, and race are prominent risk factors for osteoarthritis.

Biomechanical contributors include repetitive or isolated joint trauma related to certain occupations or physical activities that involve repeated joint stress and predispose to early osteoarthritis. Altered joint shape may contribute to osteoarthritis through biomechanical factors. Obesity may contribute biomechanically or systemically through subacute or overt metabolic syndromes, both of which are associated with low-grade systemic inflammation.

Metabolic disorders such as hemochromatosis, ochronosis, Wilson's disease, and Gaucher's disease are associated with osteoarthritis. High bone mineral density is associated with hip and knee involvement. Estrogen deficiency may be a risk factor for hip or knee disease. Candidate gene studies and genome-wide scans have identified several potential genetic markers. Patients often have a family history of osteoarthritis or joint replacement.

Inflammatory joint diseases such as rheumatoid arthritis may result in cartilage degradation and biomechanical effects that lead to secondary osteoarthritis. The destruction of the joint, including articular cartilage damage, osteophyte formation, and subchondral bone remodeling, is best viewed as joint failure and the final product of a variety of etiologic factors.

The earliest finding is fibrillation of the most superficial layer of the articular cartilage. Over time, disruption of the articular surface becomes deeper, with fibrillations extending to subchondral bone, fragmentation of cartilage with release into the joint, matrix degradation, and eventually, complete loss of cartilage, leaving only exposed bone.

Early in the process, the cartilage matrix demonstrates increased water and decreased proteoglycan content, unlike the