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Osteoarthritis

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Continuing Education Activity

Osteoarthritis is the most common form of arthritis in the world. It can be classified into two categories: primary osteoarthritis and secondary osteoarthritis. Classically, osteoarthritis presents with joint pain and loss of function; however, the disease is clinically very variable and can present merely as an asymptomatic incidental finding to a devastating and permanently disabling disorder. This activity reviews the etiology, presentation, evaluation, and management of osteoarthritis and reviews the interprofessional team's role in evaluating, diagnosing, and managing the condition.

Objectives:

- Identify in detail the pathophysiology of primary and secondary osteoarthritis.
- Assess the components of properly evaluating a patient with osteoarthritis, including any indicated imaging studies.
- Evaluate the various treatment options available for osteoarthritis.
- Communicate possible interprofessional team strategies for improving care coordination to advance the evaluation and treatment of osteoarthritis and improve outcomes.

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Introduction

Osteoarthritis is the most common form of arthritis in the world. It can be classified into 2 categories: primary osteoarthritis and secondary osteoarthritis. Classically, osteoarthritis presents with joint pain and loss of function; however, the disease is clinically very variable and can present merely as an asymptomatic incidental finding to a devastating and permanently disabling disorder.[1][2][3]

Etiology

Risk factors for developing osteoarthritis include age, female gender, obesity, anatomical factors, muscle weakness, and joint injury (occupation/sports activities). Primary osteoarthritis is the most common subset of the disease. It is diagnosed in the absence of a predisposing trauma or disease but is associated with the risk factors listed above. Secondary osteoarthritis occurs with a preexisting joint abnormality. Predisposing conditions include trauma or injury, congenital joint disorders, inflammatory arthritis, avascular necrosis, infectious arthritis, Paget disease, osteopetrosis, osteochondritis dissecans, metabolic disorders (hemochromatosis, Wilson’s disease), hemoglobinopathy, Ehlers-Danlos syndrome, or Marfan syndrome.[4][5]

Epidemiology

Osteoarthritis affects about 3.3 to 3.6% of the population globally. It causes moderate to severe disability in 43 million people, making it the 11th most debilitating disease worldwide. In the United States, it is estimated that 80% of the population over 65 years old has radiographic evidence of osteoarthritis, although only 60% of this subset has

symptoms. This is because radiographic osteoarthritis is at least twice as common as symptomatic osteoarthritis. Therefore, radiographic changes do not prove that osteoarthritis is the cause of the patient's joint pain. In 2011, there were almost 1 million hospitalizations for osteoarthritis, with an aggregate cost of nearly $15 billion, making it the second most expensive disease seen in the United States.[1][3]

Pathophysiology

Osteoarthritis is a disease of the entire joint, sparing no tissues. The cause of osteoarthritis is an interplay of risk factors (mentioned above), mechanical stress, and abnormal joint mechanics. The combination leads to pro-inflammatory markers and proteases that eventually mediate joint destruction. The complete pathway that leads to the destruction of the entire joint is unknown. Usually, the earliest changes that occur in osteoarthritis are at the level of the articular cartilage, which develops surface fibrillation, irregularity, and focal erosions. These erosions eventually extend down to the bone and continually expand to involve more of the joint surface. On a microscopic level, the collagen matrix is damaged after cartilage injury, causing chondrocytes to proliferate and form clusters. A phenotypic change to hypertrophic chondrocyte occurs, causing cartilage outgrowths that ossify and form osteophytes. As more of the collagen matrix is damaged, chondrocytes undergo apoptosis. Improperly mineralized collagen causes subchondral bone thickening; bone cysts infrequently occur in advanced disease. Even rarer, bony erosions appear in erosive osteoarthritis. There is also some synovial inflammation and hypertrophy, although this is not the inciting factor as with inflammatory arthritis. Soft-tissue structures (ligaments, joint capsule, menisci) are also affected. In end-stage osteoarthritis, calcium phosphate and calcium pyrophosphate dihydrate crystals are present. Their role is unclear, but they are thought to contribute to synovial inflammation.[6][7][8]

History and Physical

The presentation and progression of osteoarthritis vary greatly from person to person. The triad of symptoms of osteoarthritis is joint pain, stiffness, and locomotor restriction. Patients can also present with muscle weakness and balance issues. Pain is typically related to activity and resolves with rest. In those patients in whom the disease progresses, pain is more continuous and begins to affect activities of daily living, eventually causing severe limitations in function. Patients may also experience bony swelling, joint deformity, and instability (patients complain that the joint is "giving way" or "buckling," a sign of muscle weakness). Osteoarthritis typically affects proximal and distal interphalangeal joints, first carpometacarpal joints, hips, knees, first metatarsophalangeal joints, and lower cervical and lumbar spine joints. Osteoarthritis can be monoarticular or polyarticular in the presentation. Joints can be at different stages of disease progression. Typical exam findings in osteoarthritis include bony enlargement, crepitus, effusions (non-inflammatory), and a limited range of motions. Tenderness may be present at joint lines, and there may be pain upon passive motion. Classic physical exam findings in hand osteoarthritis include Heberden's nodes (posterolateral swellings of distal interphalangeal joints), Bouchard's nodes (posterolateral swellings of PIP joints), and "squaring" at the base of the thumb (first carpometacarpal joints). See **Image.** Osteoarthritis, Hand.

Evaluation

A thorough history and physical exam (with a focused musculoskeletal exam) should be performed on all patients, with some findings summarized above. Osteoarthritis is a clinical diagnosis and can be diagnosed with confidence if the following are present: 1) pain worse with activity and better with rest, 2) age more than 45 years, 3) morning stiffness lasting less than 30 minutes, 4) bony joint enlargement, and 5) limitation in range of motion. A differential diagnosis should include rheumatoid arthritis, psoriatic arthritis, crystalline arthritis, hemochromatosis, bursitis, avascular necrosis, tendinitis, and radiculopathy, among other soft tissue abnormalities.[9][10] Blood tests such as complete blood count, erythrocyte sedimentation rate, rheumatoid factor, and antinuclear antibody test are usually normal in osteoarthritis. However, they may be ordered to rule out inflammatory arthritis. If the synovial fluid is obtained, the white blood cell count should be less than 2000/microL, predominantly mononuclear cells (non-inflammatory), which is consistent with a diagnosis of osteoarthritis.

X-rays of the affected joint can show findings consistent with osteoarthritis, such as marginal osteophytes, joint space narrowing, subchondral sclerosis, and cysts; however, radiographic findings do not correlate to the severity of the disease and may not be present early in the disease. MRI is not routinely indicated for osteoarthritis workup; however, it can detect osteoarthritis at earlier stages than normal radiographs. Ultrasound can also identify synovial

inflammation, effusion, and osteophytes, which can be related to osteoarthritis. There are several classification systems for osteoarthritis. In general, they include the effects on joints, the age of onset, radiographic appearance, presumed etiology (primary vs secondary), and rate of progression. The American College of Rheumatology classification is the most widely used classification system. At this time, it is not possible to predict which patients progress to severe osteoarthritis and which patients have their disease arrest at earlier stages.

Treatment / Management

Treatment goals for osteoarthritis are to minimize both pain and functional loss. Comprehensive management of the disease involves both non-pharmacologic and pharmacologic therapies. Typically, the former can manage patients with mild symptoms, while more advanced diseases need a combination of both.[11][12][13] Mainstays for non-pharmacologic therapy include 1) avoidance of activities exacerbating pain or overloading the joint, 2) exercise to improve strength, 3) weight loss, and 4) occupational therapy for unloading joints via brace, splint, cane, or crutch. Weight loss is a critical intervention in those who are overweight and obese; each pound of weight loss can decrease the load across the knee 3 to 6-fold. Formal physical therapy can immensely assist patients in using equipment such as canes appropriately while also instructing them on exercises. Exercise programs combining aerobic and resistance training have been shown to decrease pain and improve physical function in multiple trials and should be encouraged by physicians regularly. Malalignment of joints should be corrected via mechanical means such as realignment knee brace or orthotics.

Pharmacotherapy of osteoarthritis involves oral, topical, or intraarticular options. Acetaminophen and oral NSAIDs are the most popular and affordable options for osteoarthritis and are usually the initial choice of pharmacologic treatment. NSAIDs are usually prescribed orally or topically and, initially, should be started as needed rather than scheduled. Due to gastrointestinal toxicity and renal and cardiovascular side effects, oral NSAIDs should be used very cautiously with close monitoring long term. Topical NSAIDs are less efficacious than their oral counterparts but offer fewer gastrointestinal and other systemic side effects; however, they often cause local skin irritation.

Intraarticular joint injections can also be an effective treatment for osteoarthritis, especially in a setting of acute pain. Glucocorticoid injections have a variable response, and there is ongoing controversy regarding repeated injections. Hyaluronic acid injections are another option, but their efficacy over placebo is also controversial. Notably, there is no role for oral glucocorticoids. Duloxetine has modest efficacy in osteoarthritis; opioids can be used in those patients without an adequate response to the above and who may not be candidates for surgery or refuse it altogether.

It is important to note that patients vary greatly in their response to treatment, and there is a large component of trial and error in selecting the most effective agents. In those patients, specifically with knee or hip osteoarthritis, who have failed multiple non-pharmacologic and pharmacologic treatment modalities, surgery is the next option. Failure rates for both knee and hip replacements are quite low, and they can provide pain relief and increased functionality. The timing of surgery is key to predicting success. Very poor functional status and considerable muscle weakness may not lead to improved postoperative functional status versus those undergoing surgery earlier in the disease course.[14][15]

Differential Diagnosis

The differential diagnosis for osteoarthritis includes:

- Rheumatoid arthritis
- Psoriatic arthritis
- Crystalline arthritis
- Bursitis
- Tendinitis
- Hemochromatosis
- Avascular necrosis

- Radiculopathy
- Other soft-tissue conditions

Prognosis

The prognosis for osteoarthritis patients depends on which joints are affected and the level of symptomatology and functional impairment. Some patients remain relatively unaffected by osteoarthritis, while others can experience severe disability. In some cases, joint replacement surgery offers the best long-term outcome.

Complications

The complications that can manifest with osteoarthritis include:

- Pain
- Falls
- Difficulty ambulation
- Joint malalignment
- Decreased range of motion of the joint
- Radiculopathies

Postoperative and Rehabilitation Care

Lifestyle changes - especially enrollment in exercise and weight reduction.

Deterrence and Patient Education

The clinical team needs to explain the etiology and pathophysiology of the arthritic process and outline the plan for intervention, which varies significantly based on the degree of pathology, joints affected, level of dysfunction, patient age, expectations for future activities, and what is therapeutically possible. Compliance with medication, weight loss, and exercise/physical therapy routines must be stressed.

Enhancing Healthcare Team Outcomes

Osteoarthritis is a chronic progressive disorder that affects millions of people with advancing age. The condition has no cure and is managed by a team of healthcare professionals that includes an internist, radiologist, endocrinologist, orthopedic surgeon, and rheumatologist. The nurse, pharmacist, and physical therapist are also integral interprofessional healthcare team members. Only through cohesive activity and communication involving all healthcare disciplines are optimal results achievable. Patients with osteoarthritis require education on the disease's natural history and understanding of their treatment options. Obese patients need a dietary consult and enroll in an exercise program. Evidence shows that water-based activities can help relieve symptoms and improve joint function; hence, consultation with a physical therapist is recommended. Further, many of these patients may benefit from a walking aid. Patients with pain should become familiar with the types of drugs and supplements available and their potential adverse effects. Only through the education of the patient can the morbidity of this disorder be decreased. [16][17][18]

Evidence-Based Outcomes

The prognosis for osteoarthritis patients depends on the joint involved, how many joints are involved, and the severity. There is no cure for osteoarthritis, and all the currently available treatments are directed towards reducing symptoms. Factors associated with the rapid progression of the disease include obesity, advanced age, multiple joint involvement, and the presence of varus deformity. Patients who undergo joint replacement tend to have a good prognosis with success rates of over 80%. However, most prosthetic joints wear out in 10 to 15 years, and repeat surgery is required. Also important is that patients must undergo preoperative workup as the post-surgical complications can be serious and disabling.[19][20][21]

Review Questions

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Figures

Osteoarthritis, Hand. This image shows osteoarthritis of the first metatarsal phalangeal joint. Note the dorsal-lateral erosion and exposed subchondral bone. Contributed by MA Dreyer, DPM, FACFAS

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