7-2018

Osteoarthritis

Melissa Kloeppel
Otterbein University, turnwald@otterbein.edu

Osteoarthritis

Melissa Kloeppel BSN, RN
Otterbein University, Westerville, Ohio

Introduction

- The vast majority of patients who come in for surgery at the Institute for Orthopaedic Surgery present with a diagnosis of Osteoarthritis (OA).
- OA is a slow- progressing inflammatory joint disorder that significantly reduces a person's quality of life (QOL) (Ashford, 2014).
- OA is the most common form of arthritis and the leading cause of disability with symptoms arising in adults ages forty to sixty years old, and becoming more noticeable in the seventies (Shelton, 2013).
- OA affects nearly 27 million Americans worldwide and is increasing in prevalence and incidence. It is predicted that 67 million people in the United States (U.S.) will be diagnosed with this disease by the year 2030 (Ashford, 2014).
- This form of arthritis most frequently affects the weight-bearing joints and is characterized by the destruction of articular cartilage, sclerosis of underlying bone, chronic inflammation of the synovium, and formation of osteophytes (Ashford, 2014).
- Although there is no cure for OA, individuals who seek primary care are capable of maintaining an active lifestyle through the initiation of early therapy using self-management strategies to decrease the debilitating effects of joint destruction (Ashford, 2014).

Signs and Symptoms

Figure 2. Heberden Nodes (National Institute of Health, U.S. National Library of Medicine, 2018).

- The hand, spine, hip, and knee are most affected by the disease.
- **Hand**: Heberden nodes and Bouchard nodes
- **Cervical and lumbar spine**: neuropathy and radiculopathy from nerve compression
- **Hip**: groin or buttock pain that radiates to medial thigh or knee
- **Knee**: crepitus present in more than 90% of patients (Shelton, 2013).

Symptoms of OA may include:
- Pain, stiffness, and trouble performing activities of daily living

Signs of OA include:
- Joint swelling and loss of joint space
- Crepitus
- Bony enlargement
- Effusion
- Joint instability
- Decreased range of motion (Shelton, 2013).

Typical Presentation

- A 63-year-old female patient walks into the clinic with a limp.
- A detailed history and physical exam are retrieved.
- The patient states she has significant pain in her right knee that feels like grinding. Patient states that her pain is increasingly getting worse over the years and she cannot stand it anymore.
- The patient also states that her right knee is swollen, stiff, and beginning to affect her daily routines, especially going down steps.
- Upon physical examination crepitus, instability, point tenderness, and deformity of the right knee was noted.
- X-ray confirms osteophyte formation and narrowing joint space.

Risk Factors

- Gender (more prevalent in women than in men after the age of 55 with a female to male ratio of 12:1)
- Race/ethnicity
- Bone density
- Postmenopausal loss of estrogen
- Nutritional factors
- Heredity

There are also biomechanical factors that include:
- Obesity
- Quadriceps muscle weakness
- Joint injury
- Joint trauma
- Malformation (Ashford, 2014).

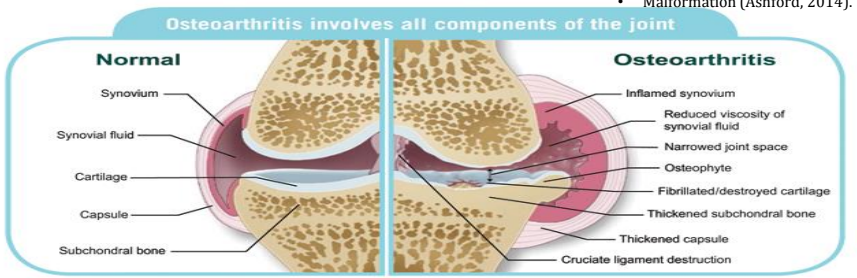

Figure 1. Normal bone compared to bone with osteoarthritis. (Physiomax Wellness, 2018).

Pathophysiology of Osteoarthritis

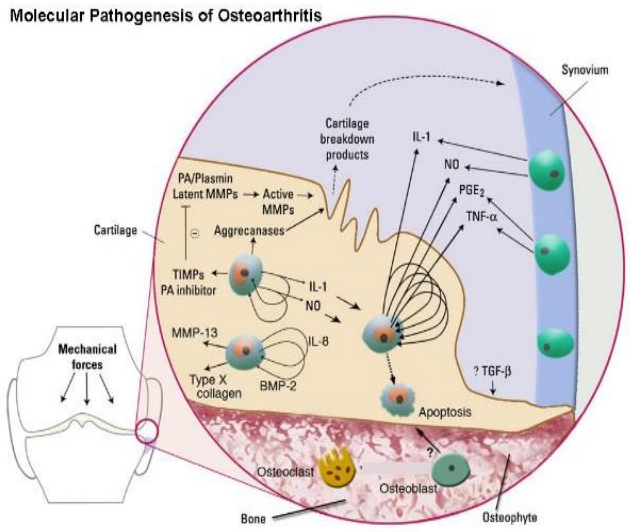

Figure 3. Pathophysiology of Osteoarthritis (NYU School of Medicine, Division of Rheumatology, 2007).

- The pathophysiology of OA is complex and multifactorial with genetic, biological, and biomechanical components (Glyn-Jones et al., 2015).
- Until recently, pathophysiological research concerning OA has focused on articular cartilage and has not resulted in either biomarker of OA activity or active targets for disease-modifying therapy (Aaron & Racine, 2013).
- The current standard for OA considers the involvement of all joint tissues and shows that in late stages of OA, bone blood flow and oxygen content are noticeably reduced (Aaron & Racine, 2013).
- This reduction causes a harmful effect on bone cells inducing them to release cytokines that contribute to bone remodeling and cartilage breakdown (Aaron & Racine, 2013). Cytokines include interleukin 1β, interleukin 6, and tumor necrosis factor (TNF) α (Glyn-Jones et al., 2015).
- The innate immune system plays a role in OA and is activated when chondrocytes express toll-like receptors that are triggered by damage-associated molecular patterns. These patterns consist of extracellular matrix molecules (Glyn-Jones et al., 2015).
- The expression and activation of complement are found to be abnormally high in those with osteoarthritic joints (Glyn-Jones et al., 2015).
- Chondrocytes also express receptors that bind advanced glycation end products that accumulate in aging tissues resulting in catabolism. This process could explain the increasing prevalence of OA with age (Glyn-Jones et al., 2015).
- Therefore, therapeutic interventions are more likely to be useful when acting early rather than late in the disease process.

Significance

- Joint inflammation in OA contributes to exacerbation of tissue breakdown leading to painful episodes of disease (Sacitharan & Vincent, 2016).
- Recent advances in science suggest that cellular aging plays a role in OA through complex signaling networks that control metabolic processes and regulators in articular chondrocytes (Sacitharan & Vincent, 2016).
- Dysregulation of these factors could change the way cells respond to inflammatory and anabolic signals, as well as affect the mechano-responsiveness of the tissue (Sacitharan & Vincent, 2016).
- Practical approaches to disease management will need to comprise of how changes in body weight, nutrition, exercise, comorbidities, and risk factors influence these cellular responses to aging in different OA patient cohorts (Sacitharan & Vincent, 2016).
- A realistic future vision may include specific pharmacological approaches that target some of these pathways (Sacitharan & Vincent, 2016).
- Current joint preserving interventions under development include lifestyle modification, pharmaceutical, and surgical modalities (Glyn-Jones et al., 2015).

Implications for Nursing Care

- Assist in diagnosing and assessing the disease's functional and psychosocial impacts (Antonelli & Starz, 2012).
- Holistic pain and function assessment
- Education on osteoarthritis
- Exercise & weight loss advice (Edwards et al., 2015).
- Provide medication and pain management
- Monitor disease progress
- Coordinate care with other providers (physical, occupation, and psychosocial therapists) (Antonelli & Starz, 2012).

Conclusion

- The debilitating inflammatory joint disorder, OA is the most common form of arthritis, and it continues to reduce the QOL for Americans worldwide.
- With OA increasing in prevalence and incidence, it is critical for primary care providers to recognize the signs and symptoms associated with this disease process, and understand the related pathophysiology and contributing risk factors, especially those that are modifiable.
- Those affected by OA can decrease the debilitating effects of the disease by seeking primary care early on.
- Exercise, nutrition, and weight reduction are all practical approaches to managing the disease process since weight-bearing joints are most affected.
- An improved understanding of the pathogenesis of OA can facilitate advances in the prevention and treatment of this disease.
- Primary care providers aim to manage OA through the utilization of both nonpharmacologic and pharmacologic strategies to reduce pain and stiffness, improve joint mobility, decrease functional disability, and improve QOL (Shelton, 2013).

References

Aaron, R.K., & Racine, J. (2013). Pathogenesis and Epidemiology of Osteoarthritis. *Rhode Island Medical Journal, 96*(3), 19-22.

Antonelli, M.C., & Starz, T.W. (2012). Assessing for Risk and Progression of Osteoarthritis: The Nurse's Role: Understanding pathophysiology, epidemiology, and risk will aid nurses who are seeking to expand their role in management. *Orthopedic Nursing*, *31*(2), 98-102. doi: 10.1097/NOR.0b013e31824fcde4

Ashford, Susan. (2014). Osteoarthritis: A review. *The Nurse Practitioner, 39*(5), 1-8. doi:10.1097/01.NPR.0000445886.71205.c4

Edwards, J.J., Khanna, M., Jordan, K.P., Jordan, J.L., Bedson, J., & Dziedzic, K.S. (2015). Quality indicators for the primary care of osteoarthritis: a systematic review. *Annals of the Rheumatic Diseases, 74*(3), 490-498. doi:10.1136/annrheumdis-2013-203913

Glyn-Jones, S., Palmer, A. J. R., Agricola, R., Price, A.J., Vincent, T.L., Weinans, H., . . . Carr, A., J. (2015). Osteoarthritis. *The Lancet*, 386: 376-387. doi: 10.1016/S0140-6736(14)60802-3

National Institute of Health, U.S. National Library of Medicine (2018). *Arthritis.* Retrieved from https://medlineplus.gov

NYU School of Medicine, Division of Rheumatology (2007). *Current Osteoarthritis Research*. Retrieved from http://med.nyu.edu

Physiomax Wellness (2018). *Osteoarthritis* (OA). Retrieved from http://www.physiomaxwellness.ca

Sacitharan, P.K., & Vincent, T.L. (2016). Cellular ageing mechanisms in osteoarthritis. *Mammalian Genome*, *27*(7-8), 421-429. doi:10.1007/s00335-016-9641-z

Shelton, Lora. (2013). A closer look at osteoarthritis. *The Nurse Practitioner, 38*(7), 30-36. doi:10.1097/01.NPR.0000431178.4931

OTTERBEIN UNIVERSITY