



C4 OSTEOARTHRITIS WITHIN THE IMAGING FIELD



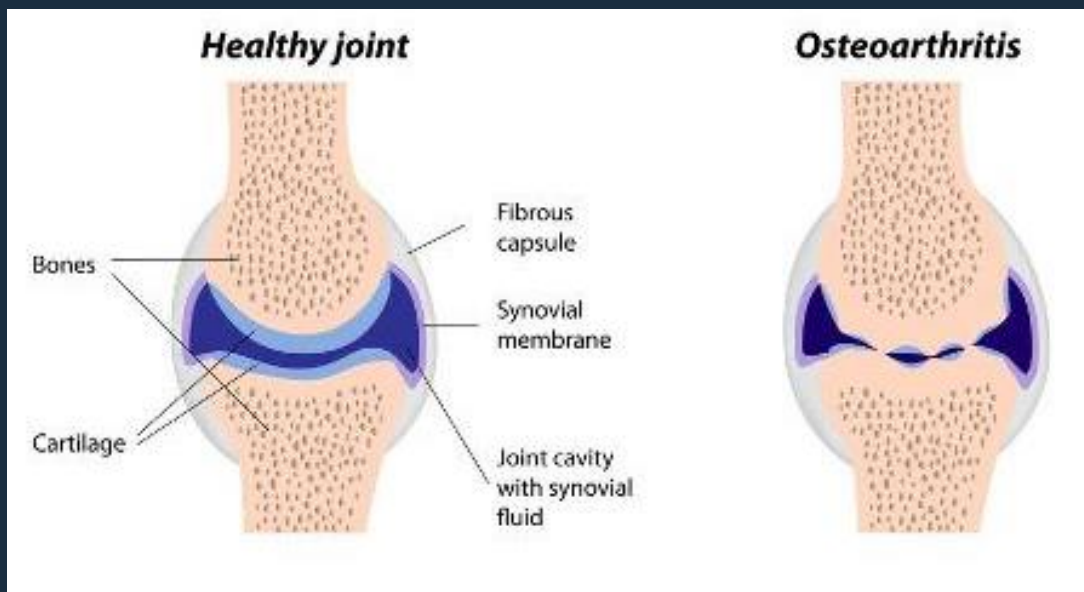
Objectives

- Understand what Osteoarthritis is by:
 - *What Osteoarthritis is*
 - *How Osteoarthritis can develop*
 - *Any symptoms or clinical signs*
 - *What kind of modalities help diagnosing/ what tests are done*
 - *How it manifests itself from medial viewpoint*
 - *What our role is as a medical imaging professional for diagnosing this type of disease*
 - *What the optimal image quality looks like*
 - *How the disease prognosis is developed*
 - *What kind of stages does Osteoarthrosis have*
 - *Treatments that can help*
 - *What surgeries can be done*

DISEASE ETIOLOGY

Osteoarthritis is caused by the deterioration of the cartilage that cushions the joints at the ends of bones.

- *eventually the cartilage completely deteriorates and bone on bone occurs.*



ETIOLOGY (CONT.)

Potential Factors

- *Increased age, 55+*
- *women*
- *Trauma to joint*
- *Repetitive stress*
- *Obesity*
- *Bone deformities*
- *Genetics*
- *Diabetes or hemochromatosis*



Disease Pathogenesis



Osteoarthritis develops when the cartilage among other tissues within a joint break down over time. Damage to the bone or a portion of the joint will cause degeneration quicker.

When cartilage breaks down, chondrocytes and inflammatory cells will result in bone remodeling.

This can occur when there is overuse of the joint or an injury occurs.

- Dislocation
- Fracture
- Bending
- Repetitive/extreme stress on a joint



<https://orthoinfo.aaos.org/en/diseases--conditions/osteoarthritis/>

Patient Symptoms/ Clinical Signs

- Localized
 - *Pain*
 - *Stiffness*
 - *Tenderness*
 - *Loss of range of motion*
 - *Popping or cracking sensation*
 - *swelling*
 - *Bone spurs*

DIAGNOSIS

Physical examination by physician

Assess flexibility, tenderness, swelling.

Lab Work

Blood test to rule out rheumatoid arthritis

Take a sample of the joint Fluid to rule out infection and gout.

Order Imaging

Xray, MRI, or CT



<https://my.clevelandclinic.org/health/diseases/21750-osteoarthritis-knee>

IMAGING MODALITIES FOR DIAGNOSIS

MRI

- Demonstrates soft tissue damage around the problemed joint.

Xray

- Demonstrates joint space, bone damage, bone spurs.

CT

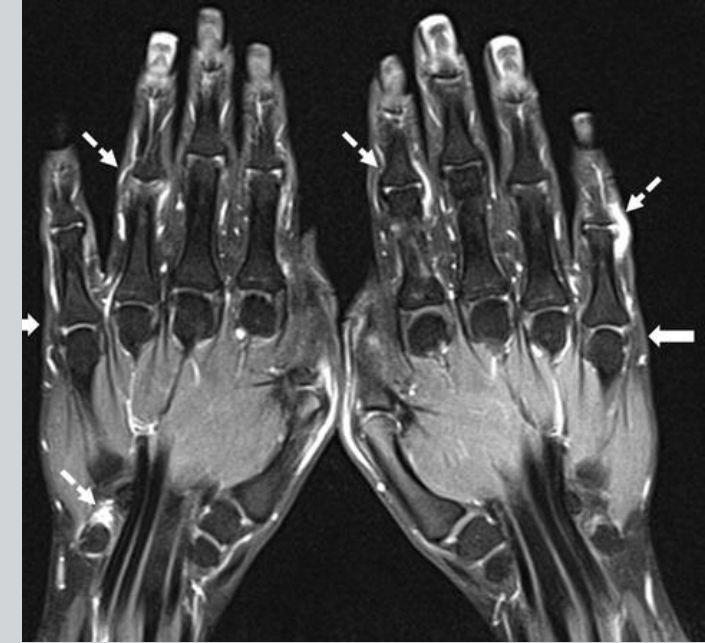
- Demonstrates bone spurs and the affects on nearby tissues.



<https://radiopaedia.org/cases/osteoarthritis-of-the-knee-3?lang=us>



<https://radiopaedia.org/cases/severe-hip-osteoarthritis?lang=us>



<https://radiopaedia.org/articles/osteoarthritis-of-the-hip?lang=us>

IMAGING

How Osteoarthritis manifests itself from a medical imaging viewpoint



<https://www.sciencedirect.com/science/article/pii/S1063458406003281>

- An Xray of a patient with osteoarthritis will demonstrate narrowing joint space with loss of cartilage
- Misalignment of joint surface resulting in bone spurs
- If bone on bone, can result in cysts or fluid filled cavity
- Increased bone density; Bone grows where cartilage once was.

Role of medical imaging professional for optimum image quality for disease diagnosis



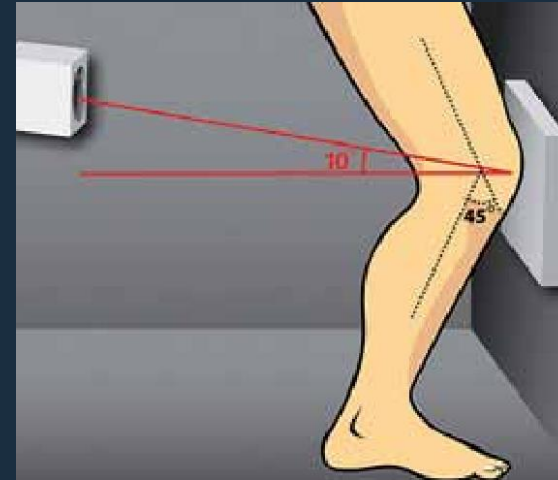
- ❖ Take medical history.
 - ❖ Why is the patient getting images done?
 - ❖ How long have symptoms been occurring?
- ❖ If disease is in early stages, will need to have MRI or CT for more sensitive imaging of bone, tissues, and joint.
- ❖ Check patient's image history for any past imaging of anatomical region if available
 - ❖ This will help determine techniques and joint quality.
- ❖ While imaging the imaging professional must understand that patient with osteoarthritis won't always have a joint space.
 - ❖ **DON'T MAKE UNCESSARY EXPOSURES.**

Optimal Image Quality (cont.)

■ Osteoarthritis and knee imaging

- *AP and lateral. Best weightbearing to assess joint space and thickness of cartilage*
- *Rosenberg to determine cartilage loss of posterior side of knee*
- *Merchant view of patella*

https://www.researchgate.net/figure/Radiographic-method-to-obtain-the-Rosenberg-View_fig5_328388952



<https://www.semanticscholar.org/paper/Diagnostic-use-of-Rosenberg-X-ray-projections-and-%29-Montanari-Martella/fc8416d05138773f611b0fb7f8755a52365236db/figure/4>

Optimal Image Quality (cont.)

■ Osteoarthritis and hip imaging to identify site of early joint space narrowing and or bone alterations.

- *AP and lateral*
- *Lowenstein*
- *Cross table*

https://www.researchgate.net/figure/A-39-year-old-man-with-right-hip-pain-and-bilateral-hip-osteoarthritis-AP-view-of-the-fig35_226054375



https://www.researchgate.net/figure/LHJ-degenerative-osteoarthritis-X-ray-Lauenstein-projection_fig2_377070138

Disease prognosis



Osteoarthritis will affect individuals differently from different symptoms to level of functional abilities.

Osteoarthritis cannot be reversed and is a degenerative disease.

Stages

0

- Healthy joint. No signs of arthritis

1

- Minor bone spur growth; minimal to no pain.

2

- Tissues surrounding bone decrease; symptoms begin

3

- Cartilage between bone demonstrate damage; pain when walking, running, kneeling etc. or Stiffness when inactive.

4

- Cartilage deteriorates significantly, diminishing the fluid in joint space; severe symptoms

The Main Stages of Osteoarthritis (OA)

Stage 0
(Pre-Osteoarthritis)
Asymptomatic



Stage 1 (Early or Doubtful)
Mild joint pain
No serious symptoms yet



Stage 2 (Mild or Minimal)
Pain with activity
Difficulty straightening and bending joints
Stiffness



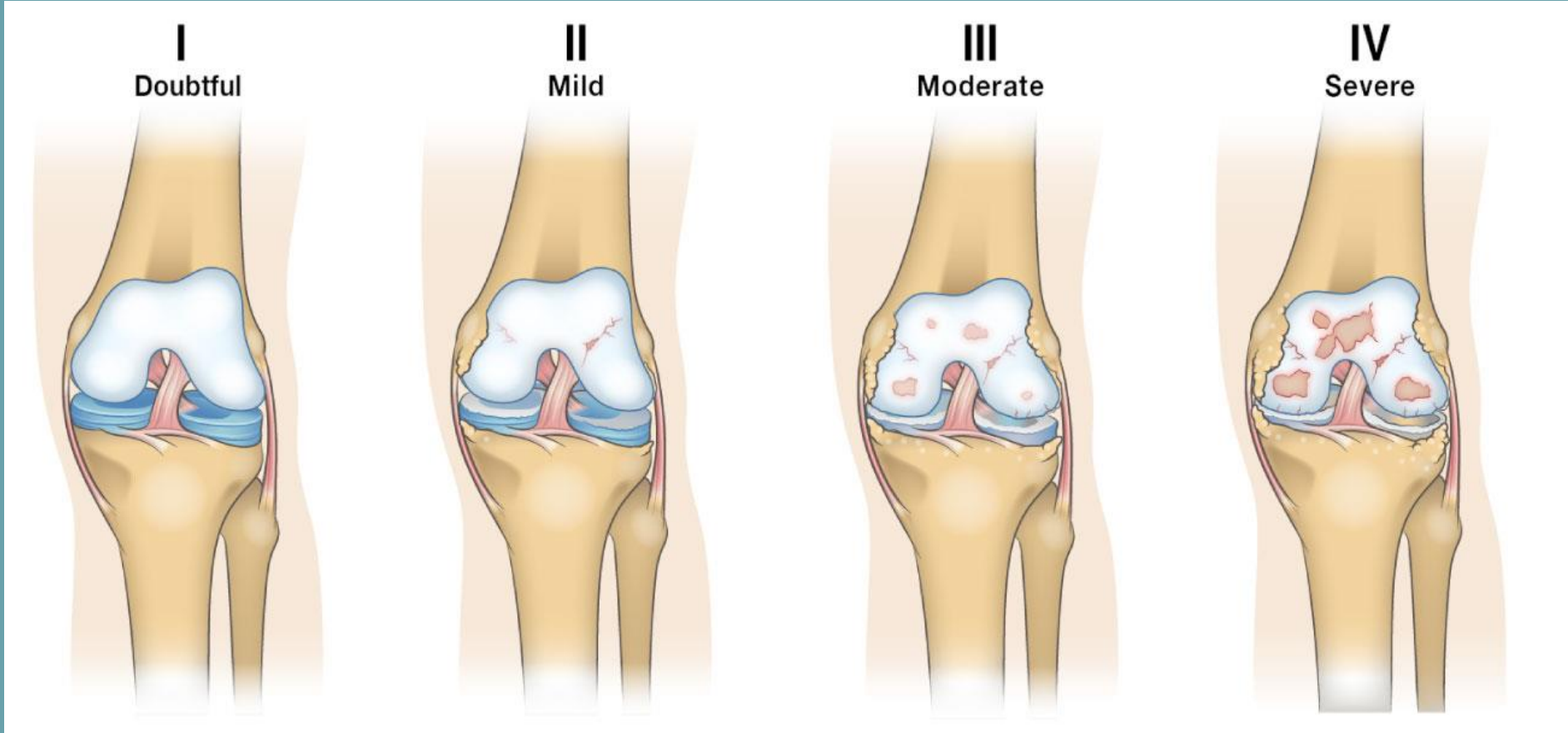
Stage 3 (Moderate)
Frequent pain with movement
Stiffness in the morning or after sitting
Visible swelling of joints possible



Stage 4 (Severe)
High pain with joint usage
Daily activities very difficult
Intense stiffness
Severe swelling and inflammation



verywell



Treatment

- Medications
 - Topical or nonsteroidal anti-inflammatory
- Injection therapy
- Exercise
- Heat/ice therapy
- Healthy diet and vitamins/supplements
- Supportive measures
- Show inserts, cane, braces.
- With stage 4 osteoarthritis, surgery is recommended



IMPORTANT NOTE: NSAID'S



Medications taken to reduce pain for osteoarthritis can cause inflammation in the joint.

<https://www.itnonline.com/content/nsaids-may-worsen-arthritis-inflammation>

SURGERY

<https://www.davisandderosa.com/Injuries-Conditions/Hand/Surgery/Thumb-Fusion-Surgery/a~3921/article.html>



<https://www.mountsinai.org/health-library/surgery/knee-joint-replacement>



Arthrodesis

Joint fusion

Total Joint Arthroplasty

Joint replacement where the joint is replaced with prosthesis that mimics a health moveable joint.

Closing considerations

Osteoarthritis is the most prevalent joint disorder in America

As medical imaging professionals being aware of what occurs with osteoarthritis and how it appears on images is important.

Limitations will occur as osteoarthritis progresses and knowing and listening to patient limitations with this condition is critical.

References

- Atlas of individual radiographic features in osteoarthritis, revised ... (n.d.-a).
<https://www.sciencedirect.com/science/article/pii/S1063458406003281>
- Baba, Y. (2024, February 21). *Osteoarthritis of the knee: Radiology case*. Radiopaedia.
<https://radiopaedia.org/cases/osteoarthritis-of-the-knee-3?lang=us>
- Bandoim, L. (2023, May 4). *The stages of osteoarthritis*. Verywell Health.
<https://www.verywellhealth.com/stages-of-osteoarthritis-5095938>
- Bickle, I. (2022, November 26). *Severe hip osteoarthritis: Radiology case*. Radiopaedia.
<https://radiopaedia.org/cases/severe-hip-osteoarthritis?lang=us>
- CN;, F. D.-F. (n.d.). *Rapidly progressive osteoarthritis: A review of the clinical and Radiologic Presentation*. Current rheumatology reports. <https://pubmed.ncbi.nlm.nih.gov/28689367/>
- How to manage osteoarthritis (OA)*. Max Health Institute & Physiotherapy. (2021, June 7).
<https://www.maxhealthfred.com/blog-osteoarthritis-oa/>
- Knee Joint Replacement*. Mount Sinai Health System. (n.d.). <https://www.mountsinai.org/health-library/surgery/knee-joint-replacement>
- Lateral projection of the hip joint. A. the Lauenstein projection ... (n.d.-b).
https://www.researchgate.net/figure/Lateral-projection-of-the-hip-joint-a-The-Lauenstein-projection-is-suitable-for_fig1_322684039
- Mayo Foundation for Medical Education and Research. (n.d.-a). *Osteoarthritis*. Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/osteoarthritis/symptoms-causes/syc-20351925>
- Mayo Foundation for Medical Education and Research. (n.d.-b). *Osteoarthritis*. Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/osteoarthritis/symptoms-causes/syc-20351925>

References

Niknejad, M. (2022a, October 8). *Osteoarthritis of the hip: Radiology reference article*. Radiopaedia. <https://radiopaedia.org/articles/osteoarthritis-of-the-hip?lang=us>

NSAIDs may worsen arthritis inflammation. Imaging Technology News. (2022, November 21). <https://www.itnonline.com/content/nsaids-may-worsen-arthritis-inflammation>

Osteoarthritis - orthoinfo - aaos. OrthoInfo. (n.d.). <https://orthoinfo.aaos.org/en/diseases--conditions/osteoarthritis/>

Osteoarthritis symptoms & care - james, Kevin (asodocs.com). Advanced Spine and Orthopedics. (2022, November 30). <https://www.asodocs.com/osteoarthritis-symptoms-care/>

professional, C. C. medical. (n.d.). *Osteoarthritis of the knee: Symptoms, causes and treatments*. Cleveland Clinic. <https://my.clevelandclinic.org/health/diseases/21750-osteoarthritis-knee>

S. Montanari | semantic scholar. (n.d.-c). <https://www.semanticscholar.org/author/S.-Montanari/49058730>

Support@valethealth.com. (2022, August 16). *Arthritis stages: What stage am I in?*. Southern Pain and Neurological. [https://southernpainclinic.com/blog/arthritis-stages-what-stage-am-i-in/#:~:text=Osteoarthritis%20\(OA\)%20is%20broken%20down,they%20reach%20an%20advanced%20stage.](https://southernpainclinic.com/blog/arthritis-stages-what-stage-am-i-in/#:~:text=Osteoarthritis%20(OA)%20is%20broken%20down,they%20reach%20an%20advanced%20stage.)

Thumb fusion surgery. Davis and DeRosa Physical Therapy. (n.d.). <https://www.davisandderosa.com/Injuries-Conditions/Hand/Surgery/Thumb-Fusion-Surgery/a~3921/article.html>

Watts, S. (2021, August 23). *Guide to severe knee arthritis (tricompartamental osteoarthritis)*. Spring Loaded Technology. <https://springloadedtechnology.com/guide-to-severe-knee-osteoarthritis/>