

## Preconference Form

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Medical Diagnosis/Disease: Osteoarthritis and THA surgical procedure.

### NCLEX IV (8): Physiological Integrity/Physiological Adaptation

#### Anatomy and Physiology

##### Normal Structures

Purpose of the musculoskeletal system is to protect body organs, provide support and stability for the body, store minerals, and allow coordinated movement.

\*Internal and external growth and remodeling of bones are an ongoing process and can change throughout your lifespan.

\*Body has 206 bones. Long, short, flat, irregular, and sesamoid.

**6 types of connective tissue:** bone, cartilage, ligaments, tendons, fascia and bursae.

**Movement:** Muscle contraction applied to levers from bones.

**Ligaments:** Provide stability to joints.

**Bone Marrow:** Has tissues responsible for making RBC and WBC.

**Bone:** Support, protection of internal organs, voluntary movement, blood cell production, and mineral storage.

- They provide the supporting framework that keeps the body from collapsing, meaning it allows the body to bear weight.
- Point of attachment for muscles and ligaments. Act as a lever for muscles.
- Storage site for calcium (needed for strong bones) and phosphorus (formation of bones and teeth).
- Contains organic material, such as collagen and inorganic

#### Pathophysiology of Disease

Slowly progressive noninflammatory disorder of the diarthrodial/synovial joints that involves the gradual loss of articular cartilage with formation of bony spurs at the joint margins. It starts to affect adults as early as 40 years old but by age 65 almost 50% of adults have reported having arthritis. There is no cure. Care focuses more on, managing pain and preventing disability. It may be caused by a known event or condition that directly damages cartilage or causes joint instability, but there still is not a way to identify a cause for many people with OA.

Some situations affecting:

- Genetic traits that may contribute to the development of cartilage defects.
- With women, menopause causes a decrease in estrogen that may contribute to the increase of OA.
- Obesity can cause OA, but its most common in the knee and hip.

Genetic metabolic and local factors interact to cause cartilage deterioration from damage at the level of the chondrocytes (in charge of cartilage formation, crucial for endochondral ossification which is needed for bone development and plays a critical role in Fx repair).

With OA the normal smooth, white, translucent articular cartilage becomes dull, yellow, and granular as OA progresses. With that the effect of cartilage will slowly become softer and less elastic, which leads to cartilage being less able to resist wear and tear with heavy usage. As a result of this, the body

### NCLEX IV (7): Reduction of Risk

#### Anticipated Diagnostics

##### Labs

- CBC
- CRP (C-Reactive Protein) (detects inflammation)
- ESR (erythrocyte sedimentation rate) (measure high levels of inflammation)

##### Additional Diagnostics

- Full H and P
- X-ray
- CT scan
- MRI
- Bone scan
- Synovial fluid analysis
- Ultrasound

material, such as calcium and phosphate.

**Different types of bone:**

- Cortical which is compact and dense. Cylindrical structures called osteons fit together to create a dense bone structure. They contain blood vessels that travel to the bones anterior from the periosteum (fibrous sheath that covers bones). Surrounding each osteon are concentrated rings called lamellae which indicate mature bone.
- Cancellous which is spongy are filled with red and yellow marrow. Here this is where the blood reaches the bone cells due to them passing through pores in the marrow. The lamellae in these type of bones occur along the line of maximum stress placed on the bone.

**Bone Cells:** Osteoblasts, osteocytes, and osteoclasts.

- **Osteoblasts:** Make bone matrix, such as collagen and they are the basic bone forming cell.
- **Osteocytes:** Mature bone cells.
- **Osteoclasts:** Play a part in bone remodeling by helping break down bone tissue.

**Bone Remodeling:** Removal of old bone by osteoclasts, which reabsorb and then deposit of new bone is done by osteoblasts, which performs new bone formation (ossification).

**Structure of bone:**

- ***Long bones*** known as the tibia, femur and humerus. Every long bone has epiphysis (wide end on long bone that articulates with other bones and joints), diaphysis

tries to repair the cartilage, but it cannot keep up with the OA destruction, so as the collagen structure in the cartilage changes, articular surfaces become more cracked and worn. The central cartilage then becomes thinner, cartilage at the joint edges become thicker and osteophytes form (bony lumps on bones), joint surfaces become uneven which will affect the destruction of stress across the joint causing a decrease in motion.

OA is asymmetric (affects only 1 side of the body). Joints involved are your weight-bearing joints, such as your hips and knees, metatarsalphalangeal joint of the foot, cervical, lower lumbar vertebrae, distal interphalangeal, proximal interphalangeal joints of the fingers, and the metacarpophalangeal joint of the thumb.

\*Even though inflammation typically does not occur with OA, synovitis may occur because the phagocytes are trying to get rid of the small pieces of cartilage that have been torn from the joint surface. Due to this change, it can cause early pain and stiffness. Continuous pain later on within the disease occurs when articular cartilage is lost and bony joint surfaces start to rub together...bone on bone.

OA is painful at the joint but with early OA, pain is relieved with rest. Those with advanced OA may have pain at rest or have trouble sleeping due to the increase in joint pain. Pain may also worsen when the atmosphere pressure falls before the onset of severe weather.

**Progressive OA:** An increase in pain can contribute to disability, loss of function, and pain may be referred to the groin, buttocks or outside the thigh or knee. Due to this it may be hard to sit down or get

(main shaft of long bone that provides structural support), metaphysis(flared area between the epiphysis and diaphysis).

**Epiphyseal Plate:** Growth plate and is a cartilage between epiphysis and metaphysis.

**Periosteum:** Fibrous connective tissue that covers the bone.

- **Short bones** known as the carpals in the hands and tarsals in the foot. They are composed of cancellus bone that are covered in a thin layer of compact bone.
- **Flat bones** known as the pelvis, skull, sternum, ribs, vertebrae, and scapula. They all have two layers of compact bone that are separated by a layer of cancellous bone with the spaces containing bone marrow.
- **Irregular bones** known as the sacrum, mandible, and ear ossicles. They appear in a variety of shapes and sizes.
- **Sesamoid bones** are round or oval bones such as the patella, and they develop in tendons.

**Joints:** Degree of movement that they allow. AKA articulation where two ends of bones are close and move in relation to each other. *Most common* is a feely moveable joint called *diarthrodial* which is a synovial type. Each joint is enclosed in a capsule of fibrous connective tissue, which joins the two bones together to form a cavity. Within the capsule, it is lined by a synovial membrane, which secretes thick, synovial fluid. Within fluid it lubricates the joint, reduces friction, and allows surfaces to slide smoothly over each other. \* This fluid also supplies, oxygen and nutrients, as well as removes carbon dioxide and metabolic waste from the chondrocytes (cells responsible for

up from a chair when the hips are lower than the knees.

**Stiffness:** Occurs after a period of rest or an unchanged position and typically early morning stiffness is the most common, but it often resolves within 30 minutes.

**Crepitation:** Grating sensation caused by loose cartilage in joint cavity can also cause stiffness. It is very common in patients with OA in the knee.

**Synovial Fluid:** Helps distinguish OA from other types of inflammatory arthritis. OA fluid is clear yellow with little to no sign of inflammation.

**Total Hip Arthroplasty:** A surgical replacement of a damaged/malformed ball and socket of the hip joint using and artificial joint. It involves the removal the head of the femur (ball) and the hip socket.

**Why would someone need a THA?**

To restore function, resolve chronic hip pain, OA, RA in the hip, or severe traumatic injuries involving the hip.

**Procedure:** During the procedure the damaged cartilage and bone from the ball and socket joint is removed and replaced with an artificial one that will function just like a normal ball and socket joint.

cartilage formation) within the articular cartilage.

**Types of joints:**

- Hinge joint allows for flexion and extension, such as an elbow joint or a knee joint.
- Ball and socket joint allows for flexion, extension, abduction, adduction, circumduction such as a shoulder or hip.
- Pivot joint allows rotation movement, such as atlas-axis, proximal radioulnar joint.
- Condylloid joint allows for flexion extension, abduction, adduction, circumduction, such as a wrist joint between the radial and carpals.
- Saddle joint allows for flexion extension, abduction, adduction, circumduction, thumb-finger opposition, such as carpometacarpal joint of thumb.
- Gliding joint allows for one surface to move over another surface, such as between the tarsal bones and sacroiliac and between carpal bones.

**Cartilage:** Hyaline, elastic, and fibrous cartilage are the 3 types in the body.

- ***Hyaline:*** The most common cartilage. Has collagen fibers and is found in the trachea, bronchi, nose, epiphyseal plate, and articular surfaces of bones.
- ***Elastic:*** Has both collagen and elastic fibers and is more flexible than hyaline cartilage. It is found in the ear, epiglottis and larynx.
- ***Fibrous:*** AKA fibrocartilage, it consist of collagen fibers and is a tough tissue that functions as a shock absorber. It can be found between the vertebral discs. It forms a protective cushion

between the bones of the pelvic girdle, knee and shoulder.

\*Cartilage in synovial joints support soft tissue and provides articular surface for joint movement. It also protects underlying tissue and because articular cartilage is avascular, it must receive nourishment by the diffusion of material from the synovial fluid. The cartilage in the epiphyseal plate is involved in the growth of long bones before reaching physical maturity.

**Muscles:** 3 types- Cardiac, smooth, and skeletal muscle.

- **Cardiac:** Is a striated and involuntary muscle. It is found only in the heart.
- **Smooth:** Is a non-striated and involuntary muscle. It is found in the walls of hollow structures such as airways, arteries, GI tract, urinary bladder, and uterus.
- **Skeletal:** Is a striated and voluntary muscle. It requires neuronal stimulation for contraction and it accounts for half of the human body's weight. It is enclosed by the epimysium, which is a continuous layer of deep fascia and it helps muscles slide over nearby structures such as bone. Skeletal muscle fibers are long and have multinucleated cylinders that contain many mitochondria to support their high metabolic activity.

**Muscle contraction:** Allow for posture, maintenance, body movement, and facial expressions. **Isometric contractions** increase the tension within a muscle but do not provide movement. **Isotonic contractions** shorten muscles to produce movement.

**\*Typically contractions are a combination of both tension (isometric) and shortening (isotonic). Repeat of isometric and isotonic contractions provide stress to stimulate muscle growth.**

**NCLEX II (3): Health Promotion and Maintenance**

Contributing Risk Factors

- Joint instability.
- Trauma
- Competitive sports (running, soccer, hockey)
- Obesity
- Occupation
- Hip Fx
- Age
- Previous Injury

Signs and Symptoms

- Pain at affected joint or during movement
- Limited ROM
- Stiffness
- Mobility limitations
- Joint deformities
- Swelling
- Bone spurs (bone growth on a surface of bone)
- Crepitus

**NCLEX IV (7): Reduction of Risk**

Possible Therapeutic Procedures

Non-surgical

- Ice therapy to reduce swelling for acute inflammation
- Heat therapy for stiffness.
- ROM
- Rest
- Use of splints to help stabilize where there is pain or inflammation in joints.

Surgical

- Total joint arthroplasty
- Osteotomy (transferring weight away from the damaged compartment of the joint to the undamaged compartment).
- Arthrodesis (done on smaller joints. Fuses two or more bones in a joint)

Prevention of Complications

(What are some potential complications associated with this disease process)

- Joint damage
- Osteonecrosis (bone death)
- Bone spurs
- Hemarthrosis (bleeding in the joint cavity).
- Joint stiffness
- Infection
- Stress Fx
- Chronic pain

together).

### NCLEX IV (6): Pharmacological and Parenteral Therapies

#### Anticipated Medication Management

- Oral or topical NSAIDS
- Intraarticular corticosteroids
- Prednisone
- Dexamethasone
- hydrocortisone (analgesic)

### NCLEX IV (5): Basic Care and Comfort

#### Non-Pharmacologic Care Measures

- Proper ROM
- Aquatic therapy
- Heat and cold application
- Weight loss
- Assistive devices if needed

### NCLEX III (4): Psychosocial/Holistic Care Needs

#### What stressors might a patient with this diagnosis be experiencing?

- Fear of surgery and having to get a new joint
- Pain
- Difficulty walking/exercising
- Not being able to do their normal ADL
- Overtime developing a disability

### Client/Family Education

#### List 3 potential teaching topics/areas

- Educate on a change in style at home such as removing throw rugs, placing side rails on the stairs and bathtub, using night lights, wearing well-fitted nonskid shoes. Doing all these to prevent further injury from falling.
- Educate on the use of assistive devices to reduce the load on affected joint.
- If patient is overweight, educate on adequate nutrition.

### NCLEX I (1): Safe and Effective Care Environment

#### Multidisciplinary Team Involvement

(Which other disciplines do you expect to share in the care of this patient)

- Rheumatologist
- Primary care nurse
- Orthopedic surgeon
- PT
- OT
- Dietitians
- Radiologist
- Case management