

Nursing Management of Patients with Musculoskeletal Disorders.

- Assessment and diagnostic test
- Fracture
- Osteomyelitis

Bone Fracture

A bone fracture (abbreviated FRX or Fx) is a medical condition that involves a partial or complete break in the continuity of any bone in the body. Severe cases may result in the bone shattering into several fragments, known as a comminuted fracture.

Fractures can result from high-force impacts, stress, or minimal trauma due to underlying medical conditions such as osteoporosis, bone cancer, or osteogenesis imperfecta.

Signs and Symptoms

Bone fractures are painful due to several reasons, even though bone tissue lacks pain receptors. Pain arises from the breaking of the periosteum and endosteum, both of which contain pain receptors, and from oedema and hematoma in nearby soft tissues caused by ruptured bone marrow. Involuntary muscle spasms can also attempt to stabilize bone fragments, contributing to pain. Damage to adjacent structures such as nerves, muscles, or blood vessels may lead to additional symptoms.

Complications

Complications of fractures can be immediate, early, or late. Immediate complications include hypovolaemic shock and injury to major vessels, muscles, tendons, joints, and viscera. Early complications may include acute respiratory distress syndrome (ARDS), fat embolism syndrome, deep vein thrombosis, and sepsis in open fractures. Late complications include non-union, malunion, avascular necrosis, and osteomyelitis.

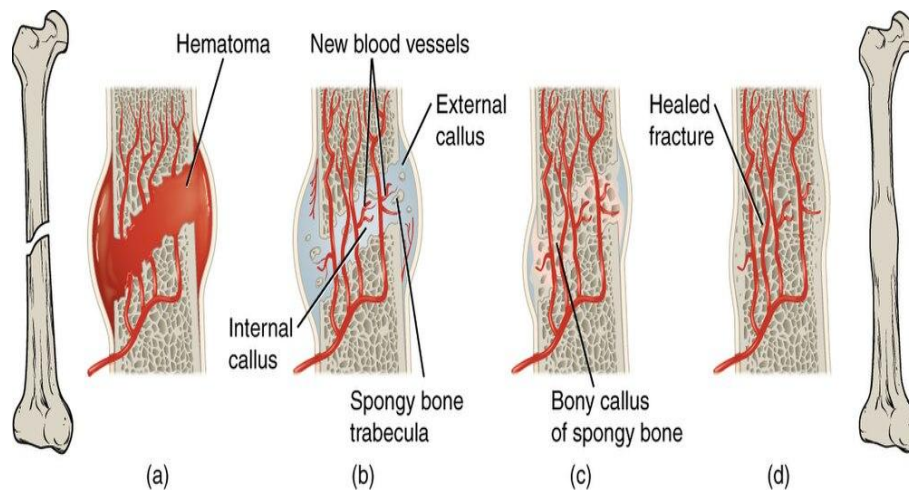


An old fracture with nonunion of the fracture fragments

Pathophysiology

The natural healing process of a bone fracture starts with the formation of a fracture hematoma. Blood clots form between broken fragments, followed by new blood vessels bringing

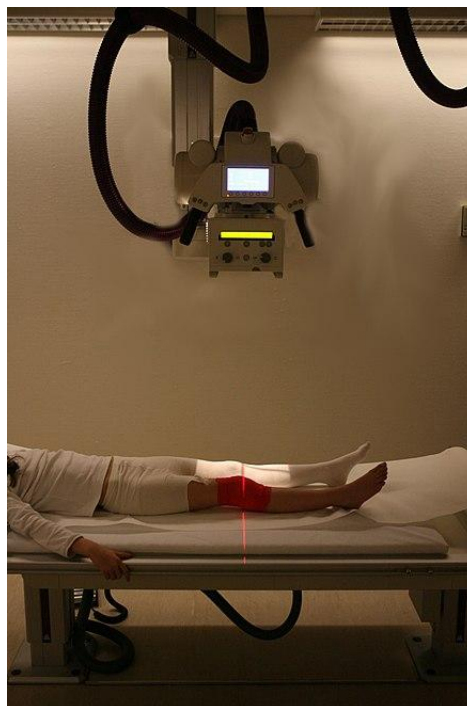
fibroblasts that produce collagen fibers. Over time, the collagen matrix mineralizes and stiffens, transforming into bone. This process involves initial "woven" bone being replaced by mature "lamellar" bone.



Stages in Fracture Repair: (a) Fracture hematoma forms. (b) Internal and external calli form. (c) Cartilage of the calli is replaced by trabecular bone. (d) Remodelling occurs.

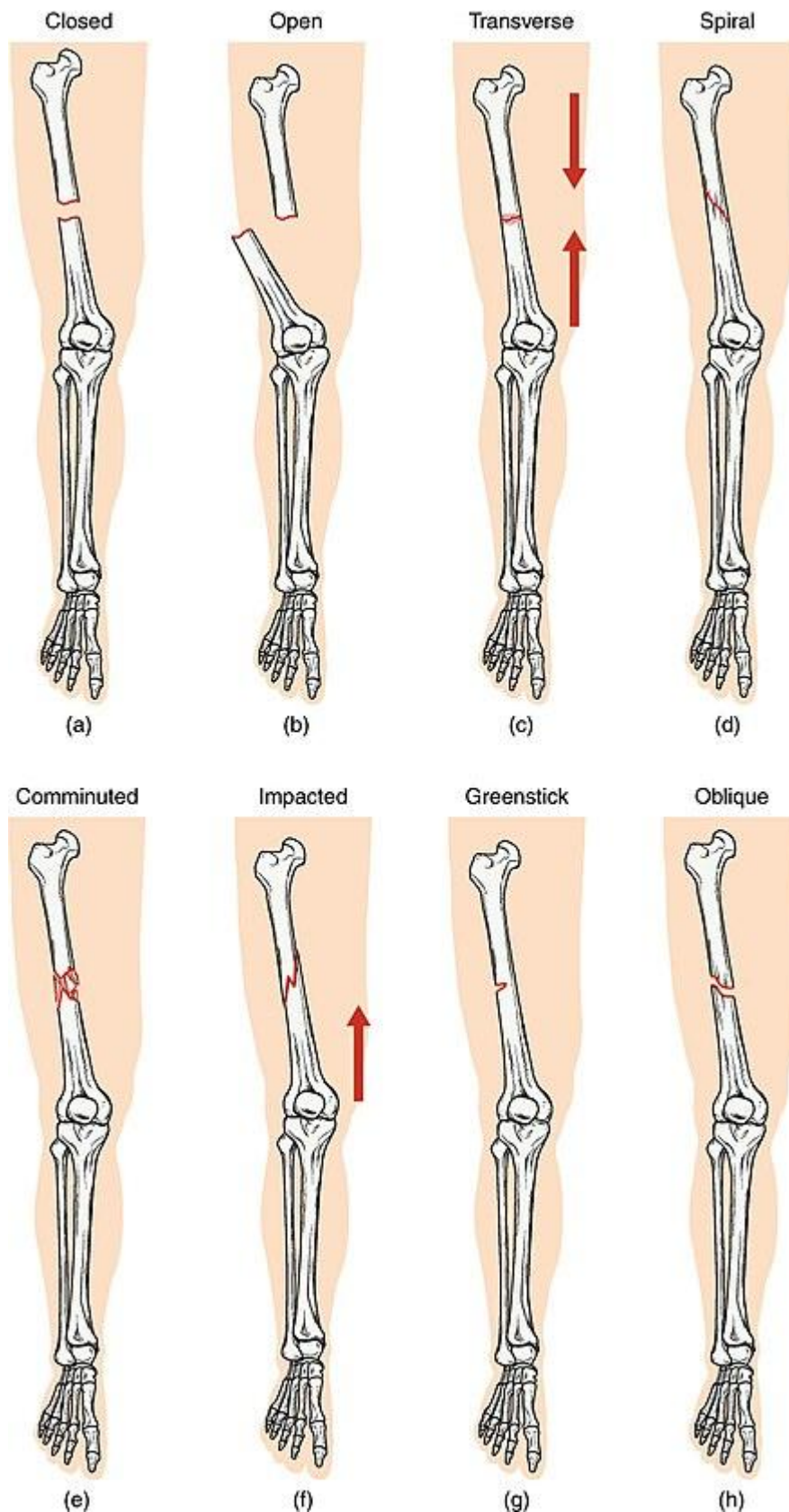
Diagnosis

Diagnosis of bone fractures is typically based on patient history and physical examination, confirmed by radiographic imaging such as X-rays. In cases where projectional radiography is insufficient, CT or MRI may be used.



Radiography to identify possible fractures after a knee injury

Fractures are classified based on various factors including the mechanism of injury (traumatic or pathologic), soft-tissue involvement (closed or open fractures), displacement, fracture pattern (linear, transverse, oblique, spiral), and anatomical location.



Compare healthy bone with different types of fractures: (a) closed fracture, (b) open fracture, (c) transverse fracture, (d) spiral fracture, (e) comminuted fracture, (f) impacted fracture, (g) greenstick fracture, (h) oblique fracture

Treatment

Treatment of bone fractures can be either surgical or conservative, with the goal of ensuring the best function of the injured part post-healing. Pain management is very important, with ibuprofen found to be effective in children. Immobilization with casts or splints helps maintain bone alignment, while surgical methods involve nails, screws, plates, and wires.



X-ray showing the proximal portion of a fractured tibia with an intramedullary nail

Physical therapy exercises are often recommended to help recover physical capacities post-healing. Bone stimulation using electromagnetic or ultrasound waves may also be suggested to reduce healing time for non-union fractures, although evidence supporting this is weak.



The surgical treatment of mandibular angle fracture; fixation of the bone fragments by the plates, the principles of osteosynthesis are stability (immobility of the fragments that creates the conditions for bones coalescence) and functionality

Self-assessment MCQs (single best answer)

1. What is a comminuted fracture?

- a. A fracture where the bone bends but does not break
- b. A fracture where the bone shatters into several fragments
- c. A fracture that occurs due to minimal trauma
- d. A fracture that involves only a partial break
- e. A fracture that is caused by muscle spasms

2. Which of the following complications is considered an immediate complication of bone fractures?

- a. ARDS (acute respiratory distress syndrome)
- b. Fat embolism syndrome
- c. Hypovolaemic shock
- d. Non-union
- e. Osteomyelitis

3. What is the initial stage of fracture repair?

- a. Formation of a fracture hematoma
- b. Formation of a callus
- c. Cartilage replacement by trabecular bone
- d. Remodeling of bone
- e. Mineralization of the collagen matrix

4. Which imaging technique is typically used first to confirm a bone fracture?

- a. MRI (Magnetic Resonance Imaging)
- b. CT (Computed Tomography) scan
- c. Ultrasound
- d. X-ray
- e. PET (Positron Emission Tomography) scan

5. Which type of fracture is described as a partial break in the bone?

- a. Closed fracture
- b. Open fracture
- c. Greenstick fracture
- d. Impacted fracture
- e. Comminuted fracture

6. What does the periosteum contain that contributes to pain in bone fractures?

- a. Blood vessels
- b. Fibroblasts
- c. Pain receptors
- d. Bone marrow
- e. Collagen fibers

7. Which of the following is a late complication of bone fractures?

- a. ARDS (acute respiratory distress syndrome)
- b. Deep vein thrombosis (DVT)
- c. Fat embolism syndrome
- d. Non-union
- e. Sepsis in open fractures

8. What is the role of fibroblasts in the fracture healing process?

- a. Forming blood clots
- b. Bringing new blood vessels

- c. Producing collagen fibers
- d. Mineralizing the collagen matrix
- e. Replacing trabecular bone with cartilage

9. Which of the following surgical methods is used to treat bone fractures?

- a. Immobilization with casts
- b. Physical therapy exercises
- c. Bone stimulation using ultrasound waves
- d. Using nails, screws, plates, and wires
- e. Pain management with ibuprofen

10. Which of the following statements is true regarding bone pain in fractures?

- a. Bone tissue contains numerous pain receptors.
- b. Muscle spasms do not contribute to pain.
- c. Pain arises from the breaking of the periosteum and endosteum.
- d. Oedema and hematoma in nearby soft tissues do not cause pain.
- e. Pain is solely due to the disruption of nerves.

WEEK 7: Nursing Care for Patients With

- Arthritis
- Amputation

Arthritis

Arthritis is a term used to denote disorders affecting joints, characterized by symptoms such as joint pain, stiffness, redness, swelling, and decreased range of motion. Some forms of arthritis can also affect other organs. The onset can be gradual or sudden. There are over 100 types of arthritis, with osteoarthritis and rheumatoid arthritis being the most common.



photograph of elderly hand depicting advanced rheumatoid arthritis

Signs and Symptoms

Joint pain and stiffness are universal symptoms across all types of arthritis. Other symptoms include redness, warmth, swelling, and decreased range of motion. Certain types of arthritis, such as lupus and rheumatoid arthritis, can affect other organs, leading to diverse symptoms like rash, malaise, fatigue, weight loss, poor sleep, muscle aches, and difficulty using the

affected joints. Advanced arthritis can lead to secondary symptoms such as muscle weakness, loss of flexibility, and decreased aerobic fitness.



Illustration of gout affected foot

Diagnosis

Diagnosis is typically made through clinical examination, supported by radiology and blood tests. Key diagnostic features include the speed and time of onset, pattern of joint involvement, symmetry of symptoms, and presence of systemic symptoms. Blood tests may include rheumatoid factor, antinuclear antibodies, and specific antibodies. Imaging tests such as X-rays, MRIs, and ultrasounds are used to diagnose and monitor arthritis.



Osteoarthritis in the left hand index finger of a 63-year-old woman

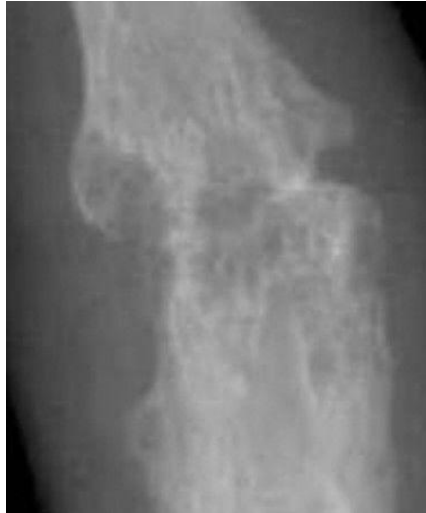
Types of Arthritis

Osteoarthritis

Osteoarthritis is the most common form and is often age-related. It affects weight-bearing joints like the knees, hips, and vertebral column, and results from the wear and tear of the cartilage. Risk factors include age, obesity, and prior joint injury.

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is an autoimmune disorder where the immune system attacks joint linings and other tissues, leading to joint erosion and deformity. RA often affects symmetrical joints such as those in the hands and feet. Risk factors include female sex, family history, age, obesity, and smoking.



Bone erosions by rheumatoid arthritis

Other Types

Lupus, gout, psoriatic arthritis, and infectious arthritis are other notable forms. Lupus can cause joint pain alongside systemic symptoms like skin rash and kidney problems. Gout results from uric acid crystal deposition in joints. Psoriatic arthritis often follows a skin psoriasis diagnosis and can lead to joint pain, stiffness, and swelling. Infectious arthritis results from bacterial infection and requires prompt treatment to prevent joint damage.

Treatment

Physical Therapy

Exercise and physical therapy are very important in managing arthritis, improving pain relief, function, and delaying surgical intervention. Exercises focus on muscle strength, endurance, flexibility, and balance.

Medications

Medications vary by arthritis type. Osteoarthritis treatments typically start with acetaminophen, while inflammatory arthritis treatments may include NSAIDs, corticosteroids, and disease-modifying antirheumatic drugs (DMARDs). Topical NSAIDs and intra-articular corticosteroid injections may also be considered.

Surgery

Joint replacement surgery can repair damage, restore function, and alleviate pain in severe cases. Arthroscopic surgery is generally not beneficial for osteoarthritis of the knee beyond optimised physical and medical therapy.

Adaptive Aids and Alternative Medicine

Adaptive aids help manage daily activities for those with hand arthritis. Transcutaneous electrical nerve stimulation (TENS) and low-level laser therapy are alternative methods that

may provide pain and stiffness relief. Pulsed electromagnetic field therapy (PEMFT) has tentative evidence for improving function but is not FDA-approved for arthritis treatment.

Epidemiology

Arthritis predominantly affects the elderly but can also occur in children. It is more common in women and affects all races and ethnic groups. In the US, 22.7% of adults reported doctor-diagnosed arthritis, with increasing prevalence expected due to an ageing population. Co-morbid conditions like heart disease and diabetes increase the prevalence of arthritis.

History

Arthritis has been present since prehistoric times, with evidence found in dinosaurs and ancient human remains. Early reports often referred to it as a common ailment. Notable historical accounts include those by William Musgrave and Augustin Jacob Landré-Beauvais, who first described the symptoms of rheumatoid arthritis.

The term "arthritis" is derived from the Greek words "arthr-" meaning joint and "-itis" meaning inflammation. The plural form, "arthritis," denotes the collective group of arthritis-like conditions.

Self-assessment MCQs (single best answer)

- 1. What is the most common form of arthritis?**
 - a. Rheumatoid arthritis
 - b. Lupus
 - c. Gout
 - d. Osteoarthritis
 - e. Psoriatic arthritis

- 2. Which type of arthritis is characterized by the immune system attacking the joint linings?**
 - a. Osteoarthritis
 - b. Psoriatic arthritis
 - c. Rheumatoid arthritis
 - d. Gout
 - e. Infectious arthritis

- 3. Which of the following is NOT a common symptom of arthritis?**
 - a. Joint pain
 - b. Stiffness
 - c. Swelling
 - d. Increased range of motion
 - e. Redness

- 4. What is the primary risk factor for osteoarthritis?**
 - a. Smoking
 - b. Family history
 - c. Age
 - d. Female sex
 - e. Skin psoriasis

- 5. Which diagnostic tool is NOT typically used for diagnosing arthritis?**
 - a. X-rays
 - b. MRIs
 - c. Blood tests

- d. Ultrasounds
- e. Electrocardiograms (ECG)

6. Which medication is commonly the first line of treatment for osteoarthritis?

- a. Corticosteroids
- b. NSAIDs
- c. Acetaminophen
- d. DMARDs
- e. Topical NSAIDs

7. What is the primary treatment goal of physical therapy in arthritis management?

- a. To cure arthritis
- b. To improve pain relief and function
- c. To avoid all medications
- d. To encourage complete rest of joints
- e. To shorten the duration of arthritis symptoms

8. Pulsed electromagnetic field therapy (PEMFT) for arthritis is:

- a. FDA-approved
- b. Not FDA-approved
- c. A surgical procedure
- d. A type of medication
- e. The first line of defence

9. Which of the following statements about rheumatoid arthritis is true?

- a. It typically affects asymmetrical joints.
- b. It is caused by wear and tear of cartilage.
- c. It can lead to joint erosion and deformity.
- d. It only affects joints, not other organs.
- e. It is more common in men.

10. What percentage of adults in the US reported doctor-diagnosed arthritis?

- a. 12.3%
- b. 22.7%
- c. 32.5%
- d. 42.1%
- e. 52.8%