

# National Society of Orthopedic Medical Assistants

## Orthopedic Lecture Series®

*Bone/ Structures, Fracture Types and Skeletal Disorders/ Specialty Casts and Appliances/Surgical Procedures, Positioning and Devices*

### **Lesson 9: Orthopedic Conditions – PART III**

# Directional Terminology

## Medial

- ▶ The medial line is the midline of the body
- ▶ The term medial refers to being nearer to the midline of the body
- ▶ Example:
  - The eye is medial to the ear
  - The knee has medial and lateral sides

## Lateral

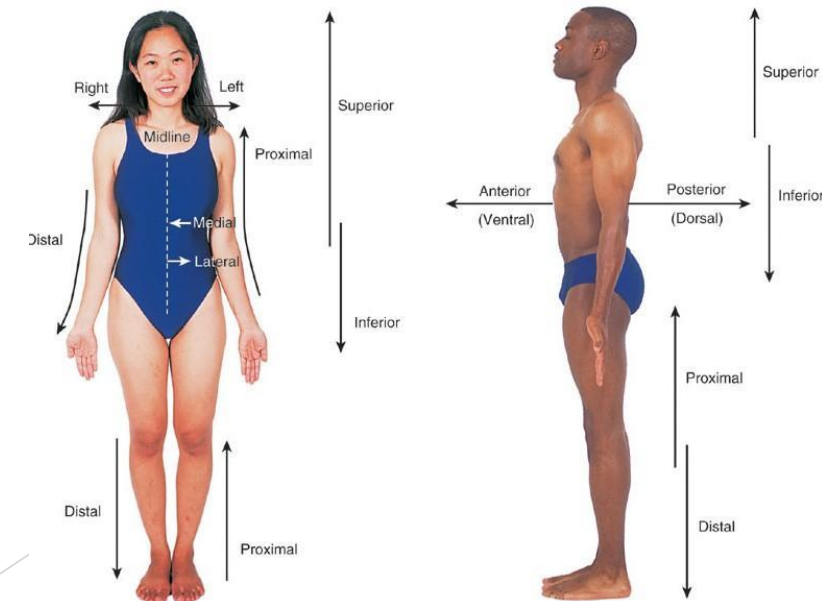
- ▶ Essentially the opposite of medial in that it refers to being further away from the midline of the body.
- ▶ Example:
  - The ear is lateral to the eye

## Proximal

- ▶ A descriptive term that refers to being closer to the center of the body
- ▶ Example:
  - The knee is proximal to the ankle

## Distal

- ▶ A descriptive term that refers to being further from the center of the body
- ▶ Example:
  - The ankle is distal to the knee



# Movement Terminology

**Abduction** - the movement of a body part away from the midline

**Adduction** - the movement of a body part toward the midline

**Circumduction** - the movement of a body part in a circular motion

**Rotation** - the movement of a part of the body around a central axis

**Dorsiflexion** - involves the bending of the foot from the ankle joint upward

**Plantar flexion** - involves the bending of the foot downward from the ankle joint

**Eversion** - involves the turning of the foot so that the sole of the foot is inclined outward

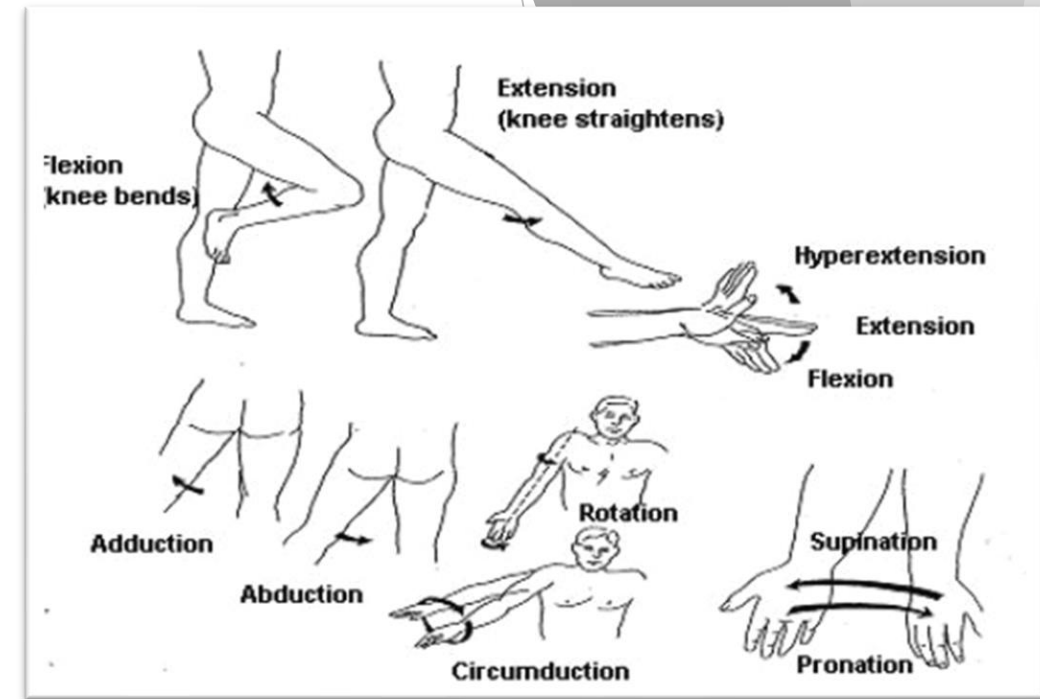
**Inversion** - involves the turning of the foot so that the sole is inclined inward

**Flexion** - involves the bending of a joint

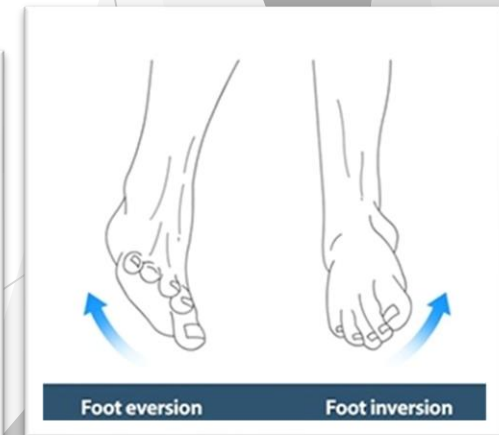
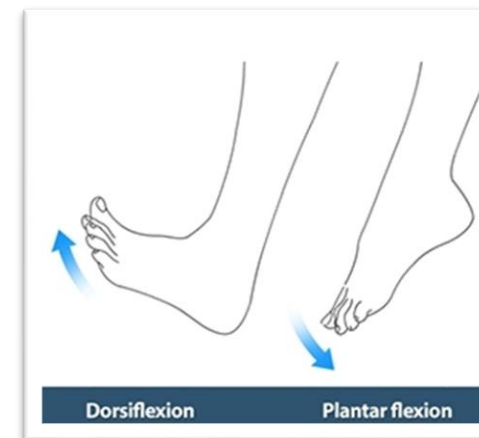
**Extension** - involves the straightening of a joint

**Pronation** - involves the turning of palm downward, or the eversion and abduction of the foot

**Supination** - involves the turning of the palm upward, or the inversion and adduction of the foot



[http://www.brooksidepress.org/Products/Nursing\\_Fundamentals\\_1/lesson\\_1/Section\\_1A.htm](http://www.brooksidepress.org/Products/Nursing_Fundamentals_1/lesson_1/Section_1A.htm)

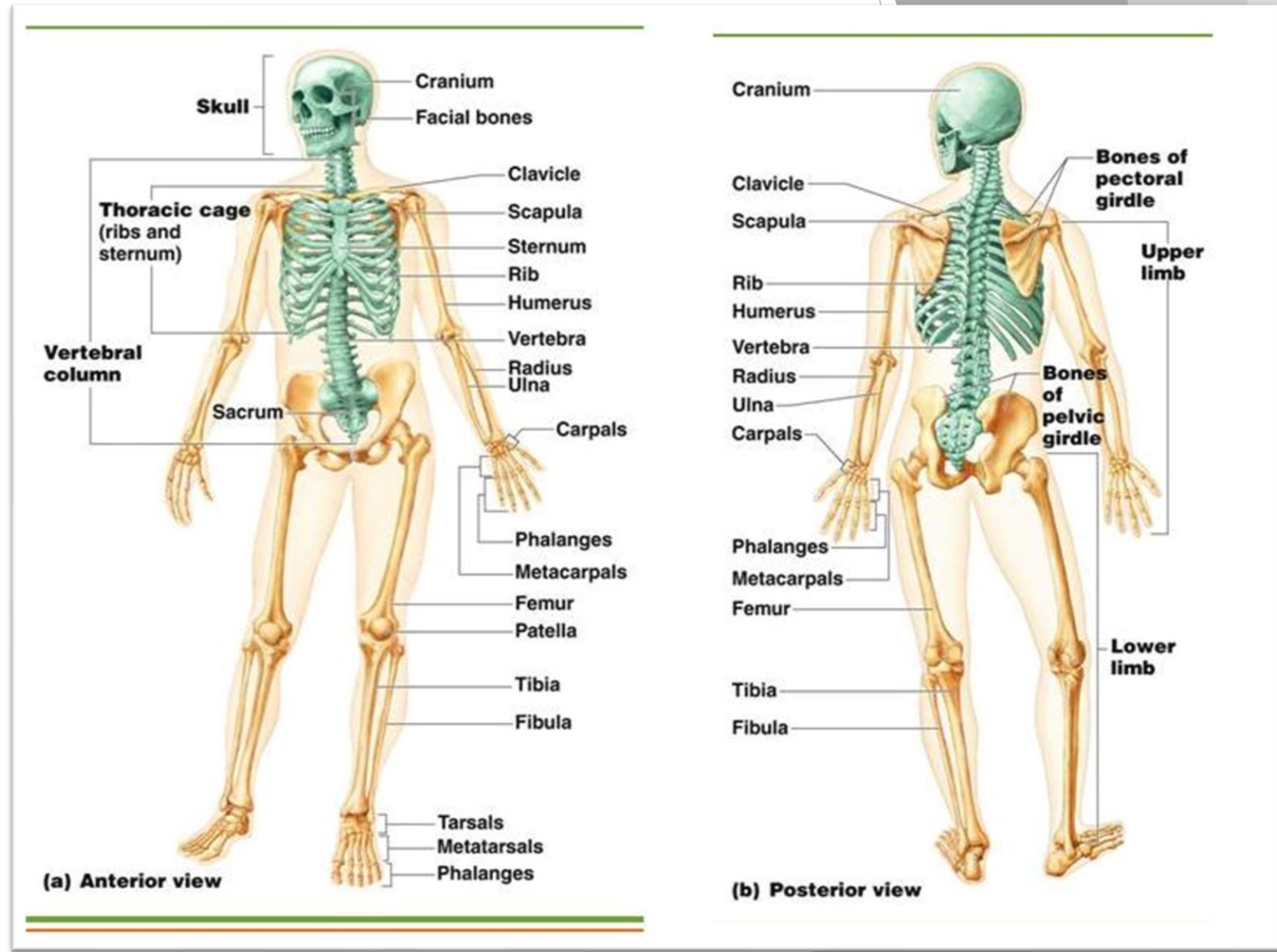


<http://www.hipkneespecialist.co.uk/foot-ankle-examination-gp-education.html>

# Skeletal Terminology

**Appendicular skeleton** - consists of the arms and legs. It contains 126 bones

**Axial skeleton** - consists of the cranium, vertebral column, sternum, and ribs. There are 80 bones in the axial skeleton



# Bony Landmark Structure Terminology

**Condyle** - a rounded process at the end of a bone which serves as a surface of articulation with another bone

**Crest** - a long elevated ridge on a bone

**Epicondyle** - a process on a bone. Located above a condyle, and are sites of attachment for ligaments and tendons

**Foramen** - a natural opening in a bone through which anatomical structures such as nerves, ligaments, and blood vessels pass.

**Fossa** - a depression on a bone

**Diaphysis** - shaft of a bone

**Physis** - also known as the epiphyseal plate, or growth plate. It is located between the epiphysis and metaphysis. It is the site of the longitudinal bone growth

**Epiphysis** - the end of a bone

**Metaphysis** - located between the diaphysis and epiphysis. Active bone formation occurs at this site

**Periosteum** - a thin dense fibrous tissue which covers the bones.

**Endosteum** - a thin layer of connective tissue which lines the inner part of the bones that have a medullary cavity

**Fovea** - the name for a cup-shaped depression on a bone. A fovea is smaller than a fossa

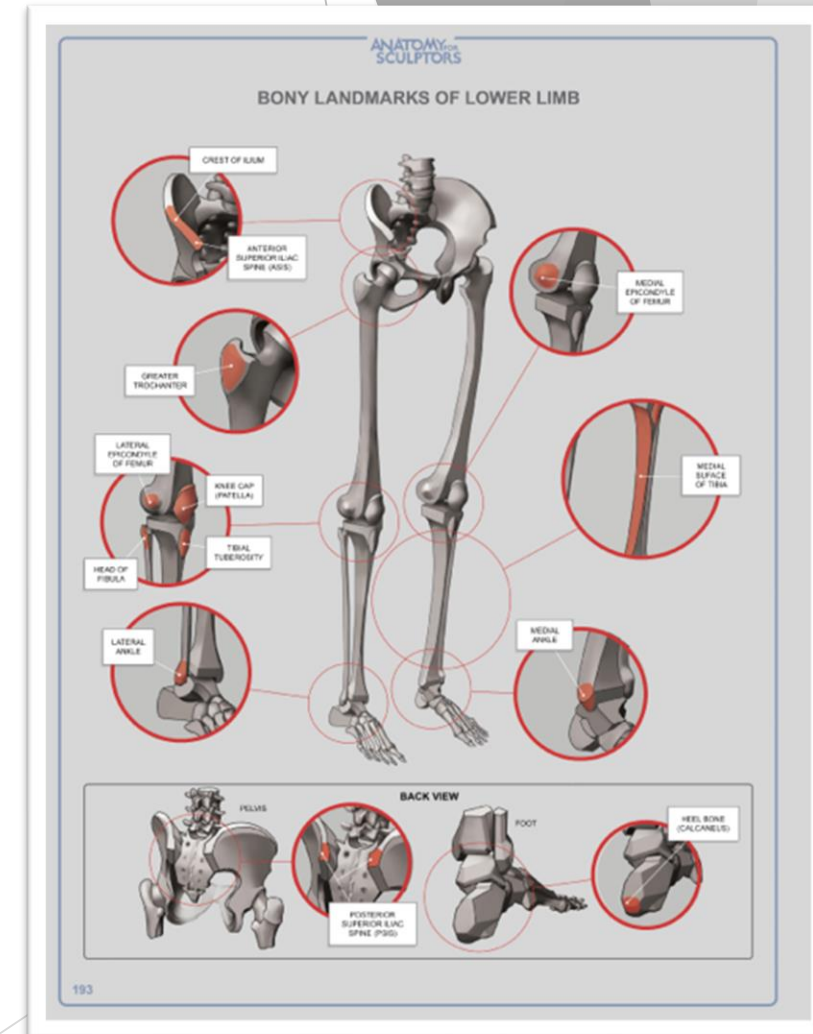
**Head** - head of a bone is the proximal end

**Process** - a natural projection from a bone

**Trochanter**

- ▶ A large process on the femur serving for the attachment of muscle
- ▶ There are two trochanters
  - The greater trochanter is situated on the outer and upper part of the shaft of the femur
  - The lesser trochanter is located at the junction between the shaft and neck of the femur

**Tuberosity** - a nodule on a bone which allows for the attachment of muscles and ligaments. It is larger than a tubercle



# Other Terminology

## 1. Bursa

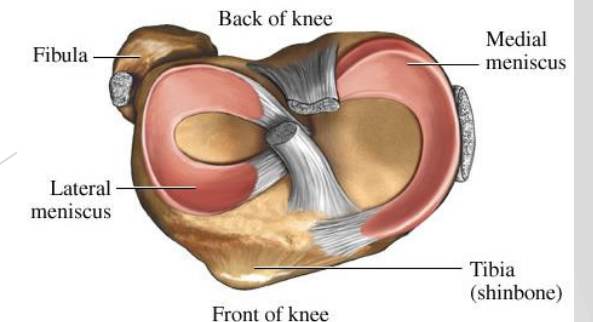
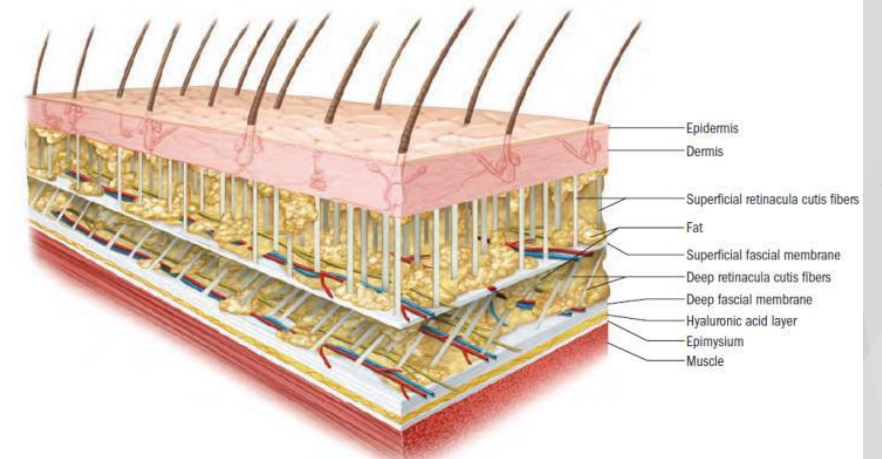
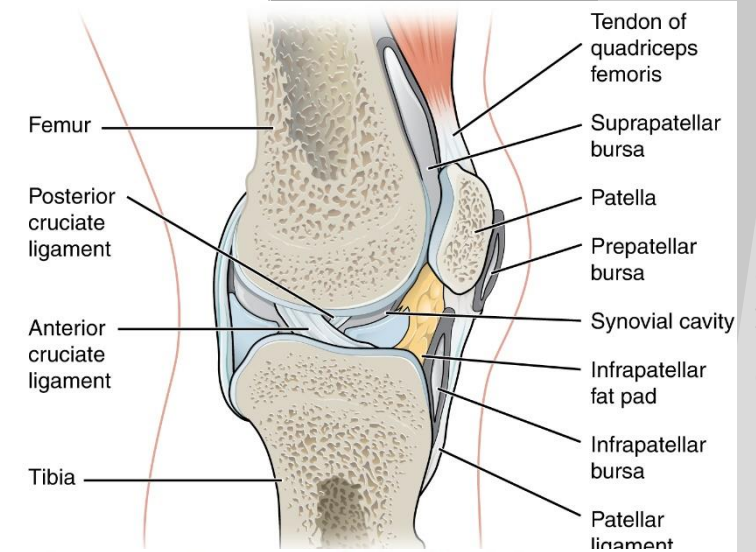
- ▶ Sacs containing synovial fluid which serve to reduce friction, and act as cushions between structures that move against each other
- ▶ They are found between muscles, or in places where tendons pass over bone
  - ▶ Tendon sheaths are bursae which wrap around tendons

## 2. Synovium

- ▶ Soft thin membrane lining the inside of a joint cavity
  - The membrane produces and absorbs synovial fluid, which lubricates the joint and nourishes the cartilage

## 3. Fascia - a band, or sheet of connective tissue that covers structures, such as muscles, blood vessels, and nerves and isolates

## 4. Meniscus - a disk of cartilage that cushions a joint, and protects and bones from the effects of friction



# Other Terminology

5. **Delayed union** - refers to lengthened healing time. This could result from a pathology, mechanical problem, or trauma

## 6. Nonunion

- ▶ Refers to any fracture that fails to heal in a reasonable time frame
- ▶ Any number of circumstances can lead to a nonunion
- ▶ Poor positioning, or improper immobilization, of a fracture can cause nonunions
- ▶ There are instances when certain fractures, such as those of the scaphoid, fail to heal under the best circumstances

## 7. Malunion

- ▶ A situation in which a fracture heals in any anatomically incorrect position
- ▶ Certain fractures, such as the fifth metacarpal, will allow for some malunion without altering function
- ▶ Some fractures, the distal radius for example, need nearly perfect anatomical reduction to restore normal function
- ▶ If a patient presents with a fracture that has gone on to a malunion, and it is causing problems, a corrective osteotomy may be performed

<http://www.health-writings.com/sports-injury-t-humerus-fracture/>



<http://www.mdguidelines.com/malunion-and-nonunion-of-fracture>



<http://medical-dictionary.thefreedictionary.com/malunion>

# Other Terminology

## 8. Osteomyelitis

- ▶ An acute or chronic inflammation and infection of the bone and bone marrow
  - The infection may start in another part of the body, and travel to the bone through the bloodstream

## 9. Osteonecrosis

- ▶ Refers to death of bone tissue
- ▶ There are several forms of osteonecrosis
  - Post-traumatic
  - Non-traumatic
  - Idiopathic
- ▶ Often results from a disease, or trauma which destroys the blood supply to the area in question

## 10. Osteoma - a bone tumor

## 11. Osteoporosis

- ▶ A loss of bone density resulting from a loss of calcium
- ▶ Disorder results in weak bones which break easily
- ▶ Affects more women than men
  - In women, bone density decreases significantly after menopause

<http://radiopaedia.org/articles/osteomyelitis>



<http://radiopaedia.org/cases/osteonecrosis-lunate>



<http://radiopaedia.org/cases/codfish-vertebra-osteoporosis>

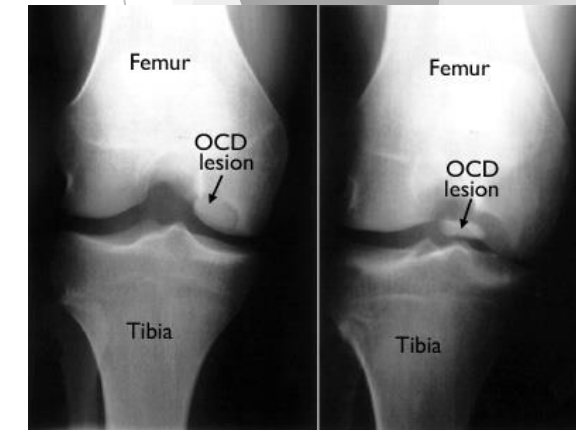
# Other Terminology

12. **Osteopenia** - a loss of bone mass to an abnormally low level (Osteoporosis and osteomalacia are types of osteopenia)
13. **Ankylosis** - an abnormal stiffness in a joint caused by injury or disease. It is often the result of rheumatoid arthritis
14. **Anthralgia** - refers to pain in a joint
15. **Osteochondritis** - the inflammation of bone and cartilage
16. **Osteogenesis imperfecta** - a genetic, congenital condition which results in the production of defective type I collagen by the body (The condition is characterized by deformed, brittle, and easily fractured bones)
17. **Osteogenesis** - refers to the formation of bones

<http://radiopaedia.org/cases/acquired-subtalar-joint-ankylosis-in-rheumatoid-arthritis>



<http://radiopaedia.org/cases/disuse-osteopenia>



<http://www.britannica.com/EBchecked/topic/434286/osteogenesis-imperfecta-OI>

<http://orthoinfo.aaos.org/topic.cfm?topic=A00610>

# Other Terminology

## 18. Osteomalacia

- ▶ A condition involving an abnormal softening of the bone due to a loss of bone mineral
  - The condition results from inadequate amounts of calcium and phosphorus in the blood which in turn results from a deficiency of vitamin D.

## 19. Osteoarthritis

- ▶ A disease of aging
- ▶ A degenerative joint disease in which the articular cartilage wears away causing bone to rub on bone
  - The ensuing friction between the bones causes pain

## 20. Arthrotomy

- ▶ The process of surgically opening a joint by an incision
- ▶ A arthrotomy can be done as a therapeutic measure, or as part of a larger procedure
  - Example: a total knee arthroplasty, an arthrotomy is made to give the surgeon access to the joint surfaces to be replaced

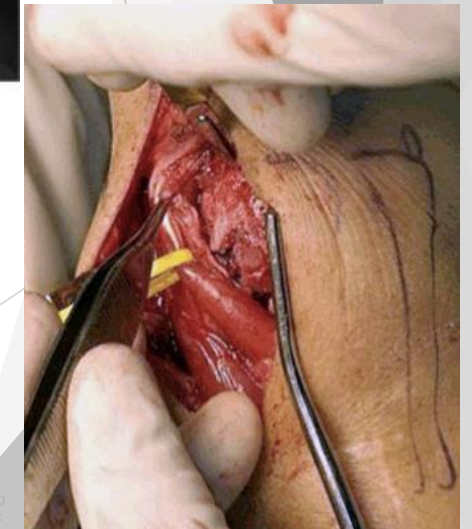
<http://www.victoriawellness.com/how-to-cope-with-osteoarthritis-and-the-knee/>



Normal knee



Osteoarthritic knee



# Other Terminology

## 19. Osteotomy

- ▶ Refers to the cutting of bone

## 20. Osteoclasis - the intentional fracturing of a bone in order to correct an abnormality in structure

## 21. Arthroscopy - the process of inserting a small camera into a joint to allow visualization (Often done through an incision to minimize soft tissue disruption)

## 22. Arthroplasty

- ▶ Replacement of a joint
- ▶ This is frequently done using an artificial implant

## 23. Arthrotomy - incision into a joint

## 24. Desmotomy - incision of a ligament

## 25. Myotomy - incision of the muscle

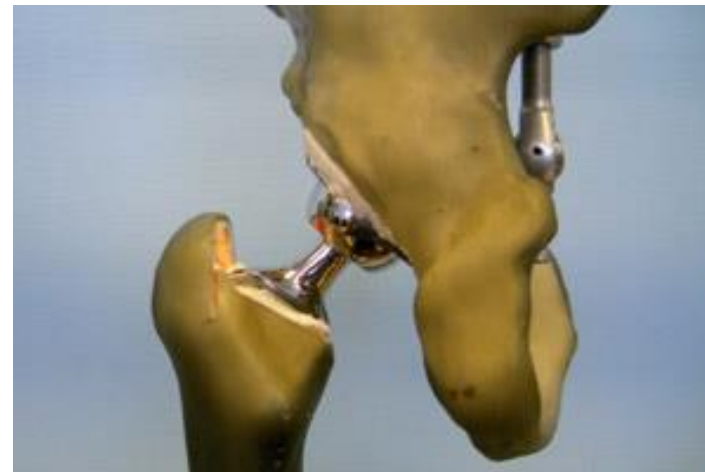
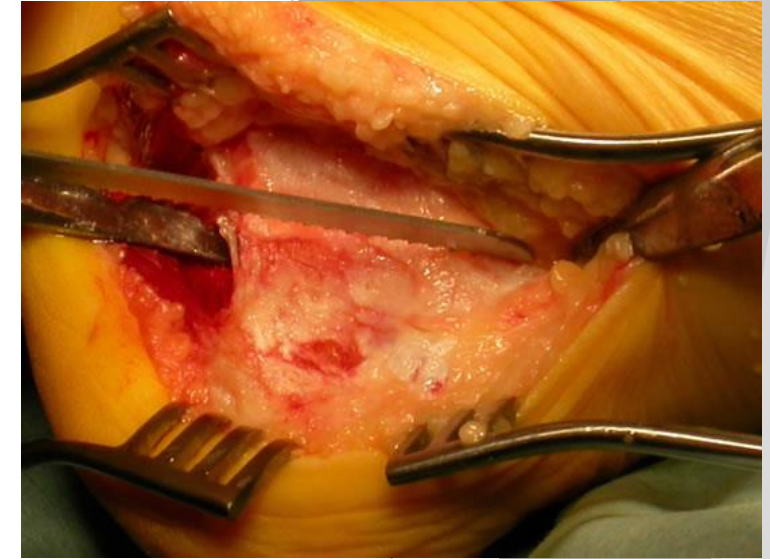
## 26. Neurotomy - incision of a nerve

## 27. Osteomy - cutting of a bone

## 28. Tenotomy - incision of tendon

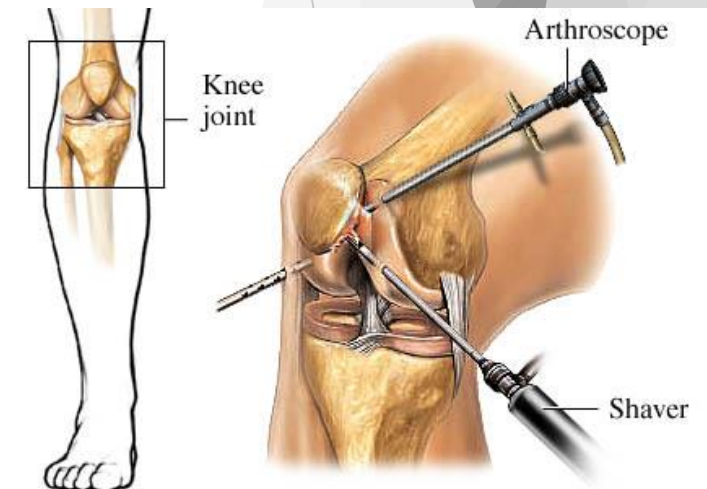
## 29. Arthrectomy - excision of a bone

<http://www.thefootandankleclinic.com/imgid203article113gallery13section13.htm>



<https://www.allmedicaltourism.com/procedures/arthroplasty/>

<http://www.webmd.com/pain-management/knee-pain/arthroscopic-procedure>



# Other Terminology

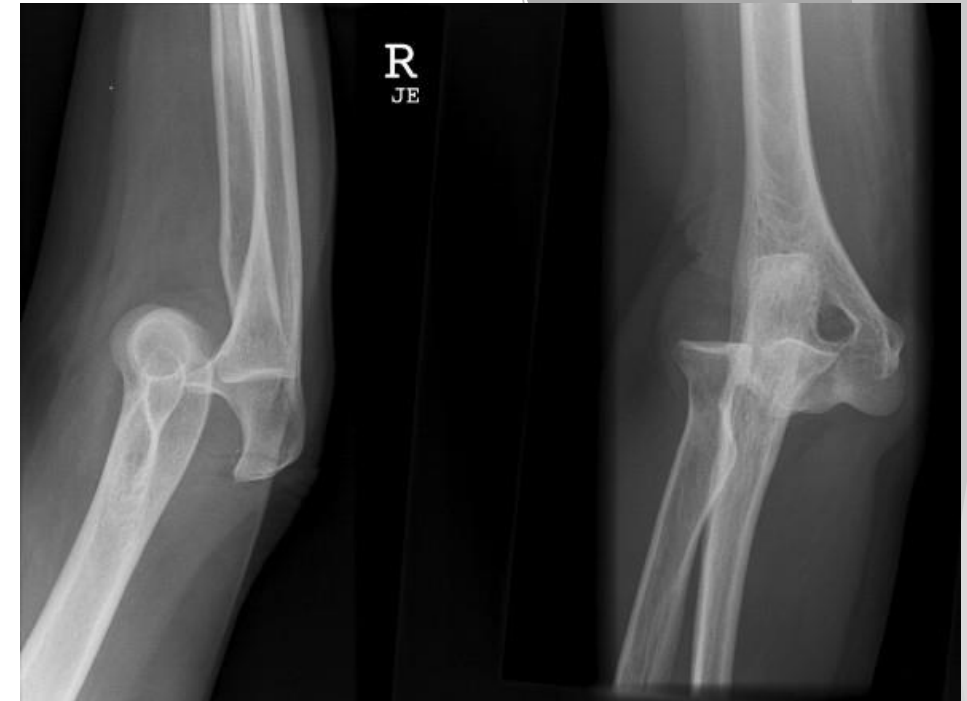
<http://radiopaedia.org/cases/teapot-syndrome-with-grade-4-acro-femoral-synostosis>

30. **Sequestrectomy** - excision of a dead bone
31. **Arthrodesis** - removal of the cartilage of a joint performed to encourage the bones to fuse
32. **Synostosis** - the fusion of bones which are normally separate. This fusion could be surgical, or natural
33. **Arthrodesis**
- ▶ Surgical fusion of a joint
  - ▶ Procedure is performed for the purpose of pain relief, and to increase stability of the joint
  - ▶ It is performed mostly on wrists and ankles
34. **Arthrocentesis**
- ▶ Involves the removal of synovial fluid from a joint by needle puncture
  - ▶ This procedure is conducted for the purpose of diagnosis, or to remove excess fluid
35. **Laminectomy** - the surgical removal of the lamina of the vertebra to relieve pressure on a nerve root (The lamina is the posterior arch of the vertebra)
36. **Synovectomy**
- ▶ The surgical removal of the synovial membrane found within a joint
  - ▶ This procedure is conducted when the membrane is inflamed or damaged
  - ▶ It is a treatment for rheumatoid arthritis



# Other Terminology

- 37. **Disarticulation** - disarticulation of joint refers to the amputation through the joint
- 38. **Dislocation** - occurs when a joint alignment is disrupted due to the displacement of a bone from its usual position
- 39. **Subluxation** - essentially a partial dislocation
- 40. **Fracture** - a crack, or break through a bone
- 41. **Angulation** - the deviation of the broken bones from the normal position
- 42. **Rotation** - the turning of a bone fragment on the central axis
- 43. **Allograft** - referred to as allogenic graft and homograft, is the transplant of cells, tissues, or entire organs from an organism of one species to another organism of the same species
- 44. **Autograft** - referred to as autologous graft and autochthonous graft, is the transplant of cells, tissue, or entire organs from one part of an organism's body, to another site within that same organism
- 45. **Xenograft** - Also called a heterograft, heterologous graft, and heteroplastic graft, is the transplant of cells, tissues, or entire organs from an organism of one species into an organism of another species



<http://lifeinthefastlane.com/elbow-dislocation/>

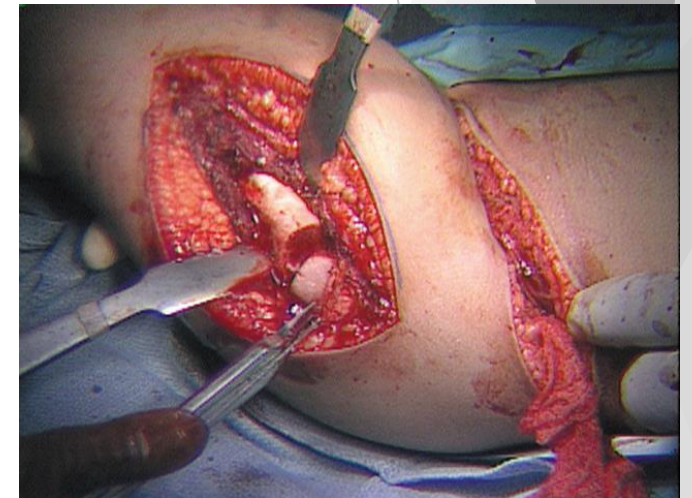


<http://www.learningradiology.com/archives/2008/02/20/2008-02-20-Extension%20Teardrop%20Fr/aasubluxationbox.html>

# Other Terminology

38. **Isograft** - called syngraft, is the transplant of cells, tissues, or entire organs from one organism to genetically identical recipient
39. **Chondroporosis**
  - ▶ The process by which spaces appear in cartilage
  - ▶ This process occurs normally, and in abnormal conditions
  - ▶ Ossification is a normal process which involves chondroporosis
40. **Chondrolysis** - process involving the loss of articular cartilage. It results from the breakdown of the cartilage matrix and cells
41. **Chondroplasia** - a process in which chondrocytes, which are specialized cells, form cartilage
42. **Chondropathy** - disease of cartilage
43. **Chondrotomy** - surgical cutting of a cartilage
44. **Chondroplasty** - surgical repair of a cartilage
45. **Chondroosteodystrophy** - group of disorders of the cartilage and bone
46. **Closed reduction** - repositioning of a fracture without use of an incision (the fracture is stabilized by external methods)
47. **Open reduction** - a method of repositioning a fracture which makes use of an incision at the fracture site

<https://invisiblemikey.wordpress.com/2010/04/08/tales-of-the-table-ii/>



<http://www.vjortho.com/2000/12/operative-treatment-of-ddh-with-open-reduction-and-salters-osteotomy/>

# Other Terminology

[http://www.healio.com/media/Journals/ORTH/2011/9\\_September/10\\_3928\\_01477447\\_20090922\\_16/fig2.ashx](http://www.healio.com/media/Journals/ORTH/2011/9_September/10_3928_01477447_20090922_16/fig2.ashx)

## 48. External fixation

- ▶ Involves the use of pins, or screws inserted through the skin, and the bone
- ▶ These are positioned above the and below the site of the fracture
- ▶ These pins, or screws, are then attached to a metal bar, or bars, placed against the injury outside the skin
  - This creates a frame, which is removed after sufficient healing has taken place

## 49. Internal fixation - involves surgery. The bones are realigned and then held in place with screws, metal plates, or rods through the marrow space

## 50. Dehiscence

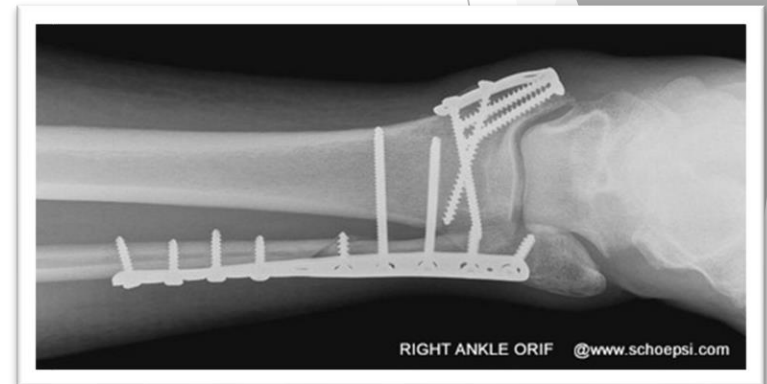
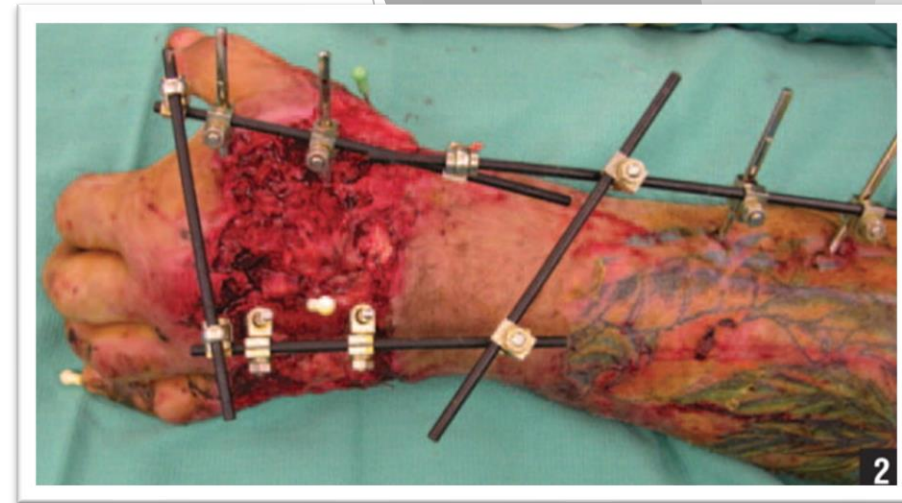
- ▶ The separation of the edges of a wound
- ▶ This is sometimes a complication of surgery that occurs as a result of poor wound healing
  - Risk factors for dehiscence include diabetes, obesity, and advanced age

## 51. Cauterization

- ▶ The use of heat to stop bleeding
- ▶ 2 types of cauterization used in medicine today (electro cautery and chemical cautery)

## 52. Anastomosis

- ▶ Joining together of 2 structures
- ▶ Usually refers to a connection created between 2 hollow structures, such as blood vessels, or sections of intestine



<https://invisiblenikey.wordpress.com/2010/04/08/tables-of-the-table-ii/>



<http://www.aaos.org/news/aaosnow/mar09/clinical1.asp>

# Other Terminology

## 53. Debridement

- ▶ Removal of dead, damaged, contaminated, or infected tissue
- ▶ Process is carried out to improve healing
- ▶ May be held by surgical, mechanical, chemical, or autolysis means
- ▶ Further, maggots can be used to debride in cases where the tissue is necrotic

## 54. Adhesion

- ▶ The joining together of normally separated tissues
- ▶ It can be caused by inflammation of the tissues, injury to the tissues, or surgery
- ▶ Can result in painful conditions, or conditions that interfere with normal functioning
- ▶ Can be treated by surgery, but there is a possibility that this will make the condition worse

## 55. Plica

- ▶ A fold, ridge, or pleat, in the synovial tissue of the joint capsule
- ▶ Often results from injury, but can be a developmental condition
- ▶ Generally diagnosed, and treated, through arthroscopic procedures

## 56. Atrophy

- ▶ Wasting of a body part
- ▶ Condition can be caused by poor nutrition, poor circulation, inadequate nerve supply to the area, decrease in hormone levels, lack of use, and disease

## 57. Bifurcation - the splitting of an anatomical structure into 2 parts

