

# American Society of Orthopedic Professionals

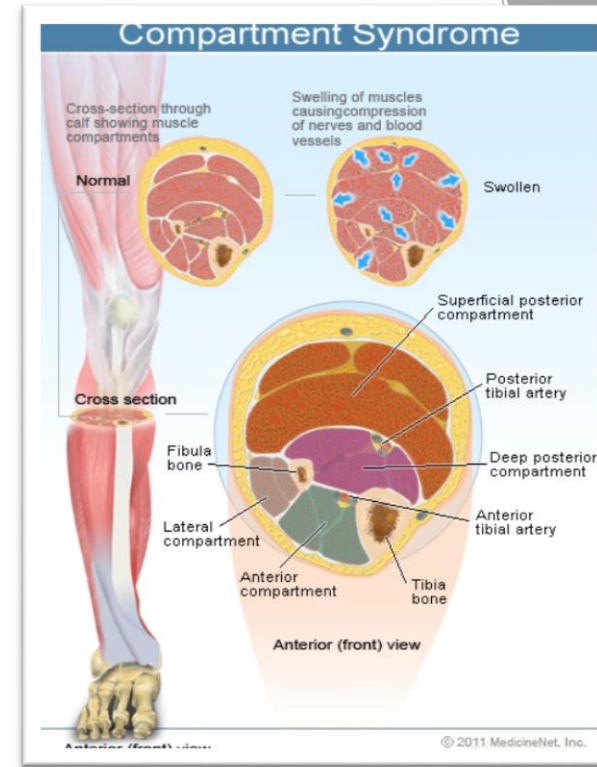
## Orthopedic Lecture Series<sup>©</sup>

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

### **Lesson 9: Orthopedic Conditions**

# Compartment Syndromes

1. The arms and legs are divided into several different compartments separated by connective tissue.
  - ▶ Each compartment contains muscles as well as nerves and vascular structures
  - ▶ Abnormal pressure in a particular compartment can interfere with blood flow and perfusion to the structures within that compartment
    - This can lead to rapid irreversible damage to tissue if not addressed immediately
2. Compartment syndrome can result from a fracture if a large amount of blood collects in the compartment
3. Improper, or premature casting can lead to compartment syndrome
  - ▶ If the affected extremity continues to swell, and the cast restricts the expansion, the muscles and nerves can become damaged
4. Bleeding into an extremity following surgery or traumatic laceration can quickly lead to compartment syndrome



[http://www.medicinenet.com/compartiment\\_syndrome/page2.htm](http://www.medicinenet.com/compartiment_syndrome/page2.htm)



<http://lifeinthefastlane.com/bone-and-joint/bamboozler-002/>

# Compartment Syndromes

5. Tibial plateau fractures, femur fractures, and stab wounds of the extremities are risk factors for the development of compartment syndrome.
  - ▶ Individuals with these injuries should be examined for signs of the disorder
6. Muscle ischemia is extremely painful
  - ▶ Pain out of proportion to the original injury is a symptom of compartment syndrome
  - ▶ On palpation, the affected extremity will feel full, and firm
  - ▶ Palpating the area will cause pain, as will passive movement of the extremity
7. Neurovascular status of the limb distal to the suspected compartment syndrome should be checked as an absent pulse, or disturbed sensation, is of great concern.
8. Measurements of the compartment pressure can be performed with a special instrument, and readings approaching 30mmHG are of concern.
9. Compartment syndrome is treated by surgical intervention to open the compartment and release the pressure.



<http://www.orthopaedicsone.com/display/Content/What+is+compartment+syndrome>



<http://lifeinthefastlane.com/ccp/compartment-syndrome/>

# Ewing's Family of Tumors

Ewing's family of tumors (EFT) are malignant tumors that affect adolescents and children.

- ▶ Malignant tumors that affect adolescents and children
- ▶ Tumors in this family all have the same characteristics

Although bones are most commonly affected, these tumors can be found in any tissue.

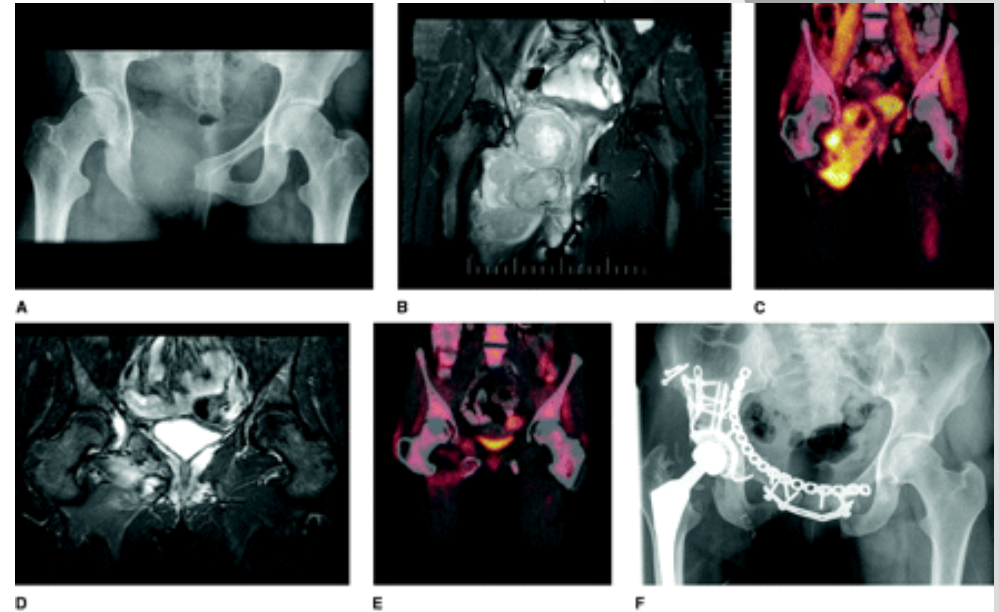
- ▶ It used to be thought that this tumor affected only bones, but now it is known that this is not the case
- ▶ Ewing's tumors that affect different types of tissue have different names
- ▶ Ewing's tumors affecting bone are usually found in the long bones, but other commonly affected sites are the pelvis and chest

The malignancy is thought to be caused by genetic mutations.

Treatment may include chemotherapy, surgery, and radiation

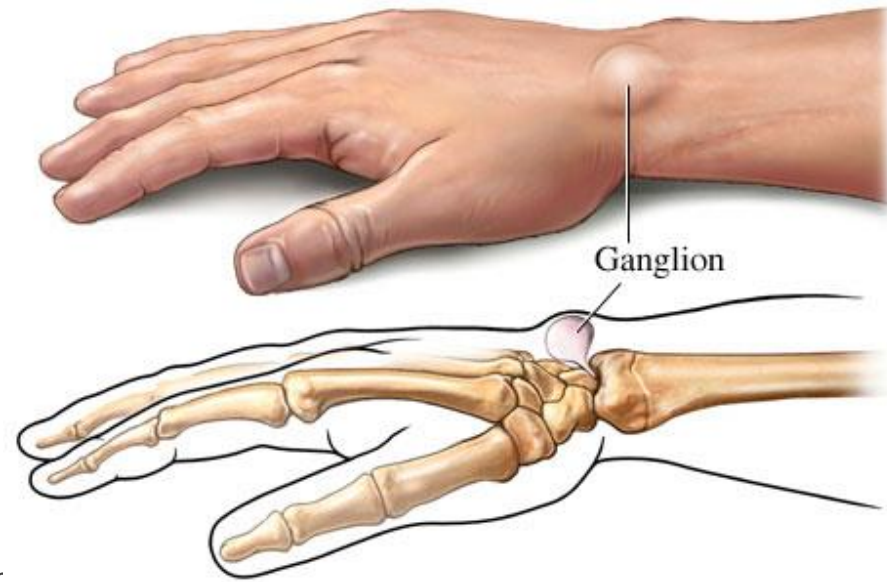
- ▶ The cure rate is fairly high

<http://www.jaaos.org/content/18/2/94/F5.expansion>



# Ganglion Cysts

1. Ganglion
  - ▶ A cystic growth that can develop anywhere on the wrist, or hand
  - ▶ It is not a malignant growth
2. A ganglion is a benign fluid-filled cyst.
  - ▶ It develops from a joint capsule, or tendon sheath
3. It has been theorized that these cysts result from damage to the tissue layer that produces synovial fluid.
  - ▶ This fluid builds up outside its proper location in a joint or tendon, and forms an enlargement
4. Ganglions may cause pain, and changes in bone structure.
5. Ganglions attach to an associated joint, or tendon sheath but not to the skin on top of them.
6. Ganglions may resolve without treatment, or resolve with the immobilization of the affected area.
7. Aspiration of the cysts may result in its permanent disappearance.
8. Surgery may be indicated to excise the cyst.
  - ▶ After excision, treatment involves a compression dressing, and splinting



# Chondroma

- ▶ Noncancerous tumor formed of cartilage
- ▶ Thought to originate in epiphyseal cartilage

1. This benign tumor generally develops in the bones of the hands or feet, but it also develops in the long bones, and ribs.

2. These tumors can occur in several types of tissue, and are categorized according to the tissue in which they are found.

## 3. Three Types of Chondroma

### ▶ Enchondroma (1)

- Benign cartilaginous growth arising from the metaphysis and/ or diaphysis of a long bone

### ▶ Periosteal Chondroma (2)

- Benign cartilage tumor that occurs on the surface of the bones, under the periosteum

### ▶ Soft Tissue Chondroma (3)

- Benign soft tissue tumors that most often form on the tendons that attach muscles to bone or to the tendon sheaths that keep tendons in place next to bone

Chondroma usually produces symptoms, but occasionally causes pain at the site of the tumor.

If the tumor produces not symptoms, treatment is not usually necessary.

- ▶ Treatment is excision

1



<http://orthoinfo.aaos.org/topic.cfm?topic=a00085>

3



<http://www.tumorlibrary.com/case/image.jsp?title=Chondroma%2C+soft+tissue++Hand+++X-ray&uri=/case/images/3493.jpg>

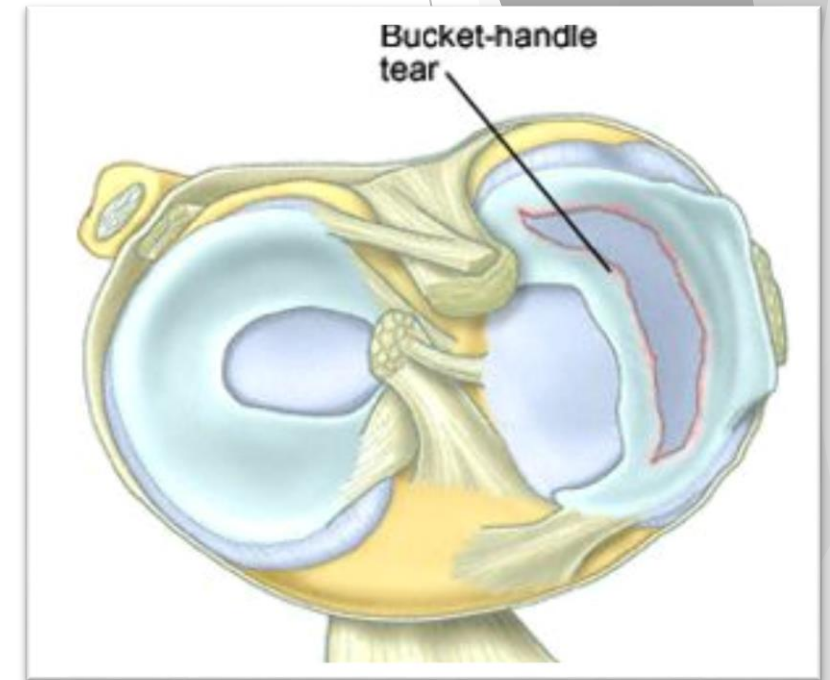
2



<http://www.tumorlibrary.com/case/image.jsp?title=Chondroma%2C+periosteal++Hand+++X-ray&uri=/case/images/3486.jpg>

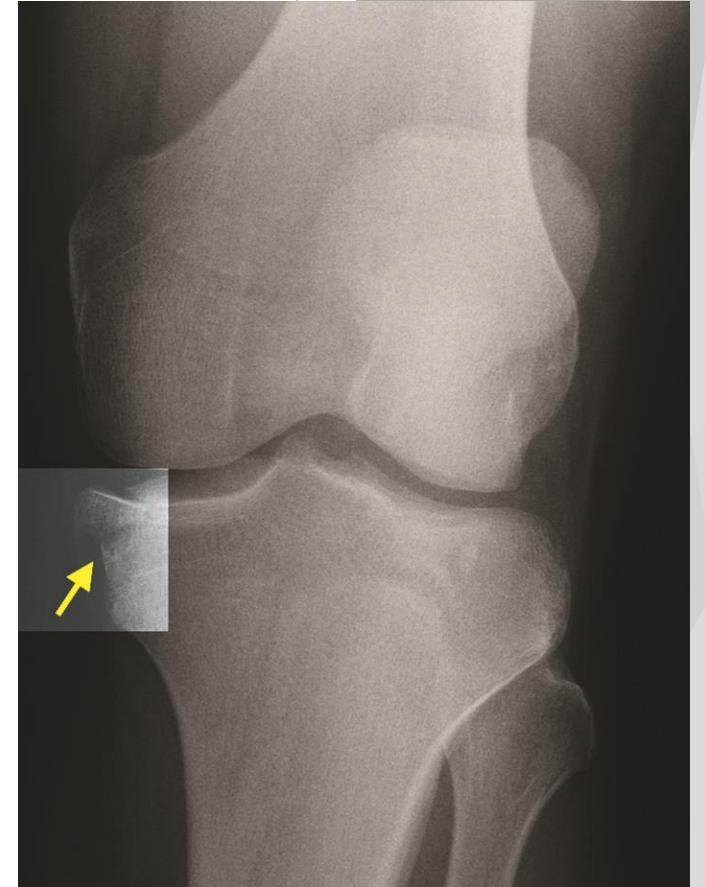
# Bucket Handle Tear

1. Bucket Handle Tear
  - ▶ A particular type of meniscal tear
    - This type of tear results from trauma
2. It is seen in younger and older patients.
  - ▶ Not the result of degenerative processes
3. In this injury, the meniscus is torn around the rim.
  - ▶ The middle part of the torn meniscus, which resembles a bucket handle, may become wedged in the joint
4. Although bucket handle tears may occur in both the medial and lateral menisci, they occur most often in the medial meniscus.
5. This type of meniscal tear interferes with normal functioning of the knee which cannot be fully extended.
  - ▶ This phenomenon is known as locking
6. Treatment may involve arthroscopic surgery to remove the fragment of meniscus.



# Internal Derangement of the Knee Joint

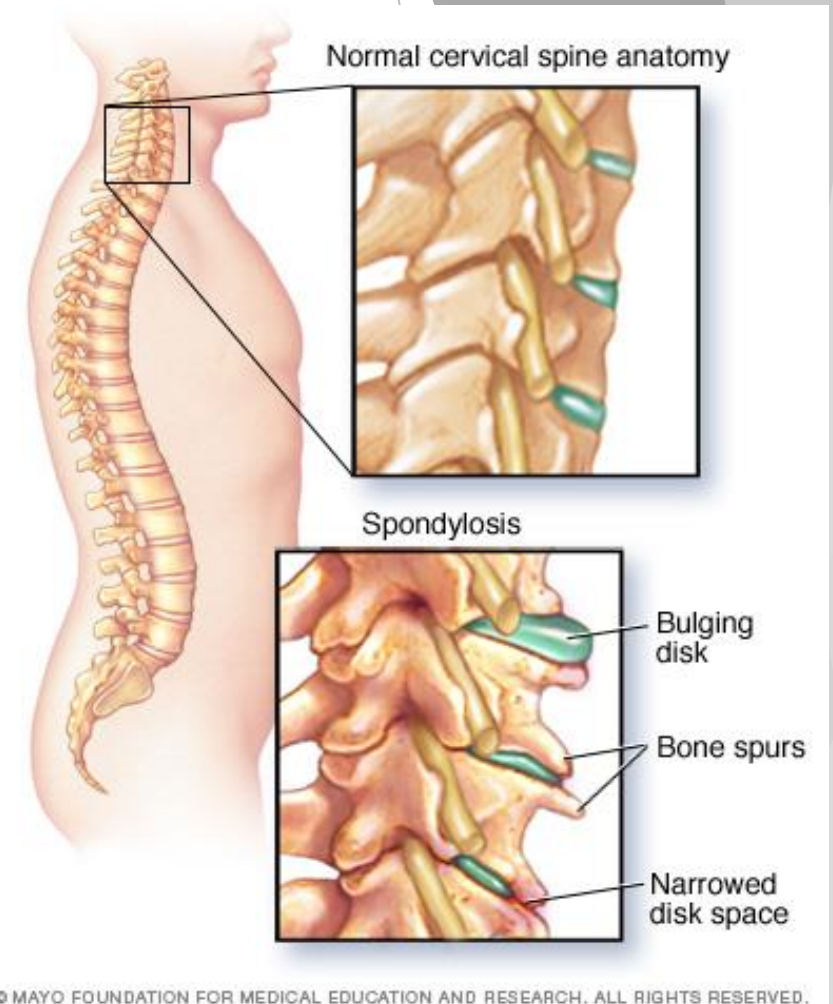
1. Internal derangement of the knee joint
  - ▶ A chronic condition involving a disruption in the inner structure of the joint
  - ▶ This condition interferes with normal function and activities
2. This term covers a number of abnormalities in the structure of the knee joint
3. Any of the following structures may be involved:
  - ▶ Collateral ligaments
  - ▶ Cruciate ligaments
  - ▶ Semilunar cartilages (menisci)
4. The most common internal derangement of the knee joint involves damage to the medial collateral ligament (MCL).
5. The medial meniscus and the anterior cruciate ligament (ACL) are the next most frequently affected.
6. Symptoms depend upon the severity of the injury.
  - ▶ Pain and swelling are common
  - ▶ Functional impairment occurs to varying degrees depending upon the structure injured, and the extent of damage
7. Treatment involves diagnosis and repair by arthroscopy, and arthroscopic surgery.
8. Prognosis depends upon the actual injury.





# Spondylosis

1. Spondylosis
  - ▶ A type of osteoarthritis of the spine
2. The disease is degenerative.
  - ▶ It damages the structure of the vertebral column, and interferes with its function
3. It is a disease of aging, but the course of the disease is variable and individual.
4. The cervical, thoracic, and lumbar divisions of the vertebral column are affected.
  - ▶ The intervertebral disks, facet joints, bones and ligaments of the vertebral column may be affected, and show degenerative changes
  - ▶ Cervical spondylosis
    - Causes neck pain which may radiate into the shoulder
  - ▶ Thoracic spondylosis
    - Can cause pain on flexion, and hyperextension
  - ▶ Spondylosis of the lumbar region
    - Can cause pain with sitting for extended periods of time, or activities requiring repetitive bending



[http://riversideonline.com/health\\_reference/brain-spine-stroke/ds00697.cfm](http://riversideonline.com/health_reference/brain-spine-stroke/ds00697.cfm)

# Spondylolysis

## 1. Spondylolysis

- ▶ Sometimes called pars defect
- ▶ A condition which involves a fracture of the pars interarticularis
  - Pars interarticularis is the bony ring of the back of the vertebra
  - This ring is the weakest section of the vertebra

## 2. Spondylolysis is generally the result of a strain.

- ▶ The strain occurs when the spinal column is bent backwards repeatedly

## 3. The fracture can occur at any age

- ▶ It occurs most often in children and adolescents because their vertebral columns are in the process of maturing

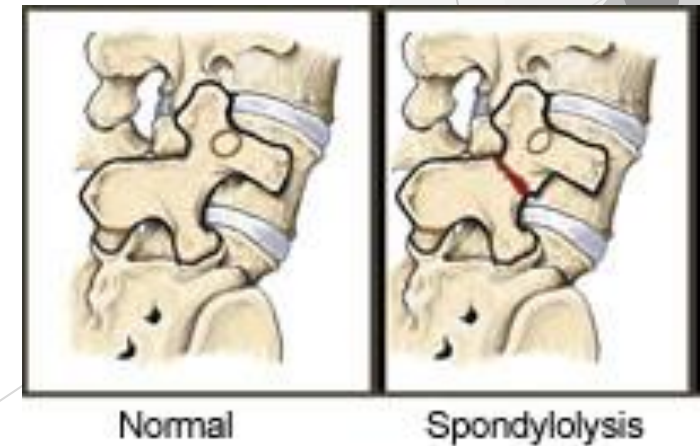
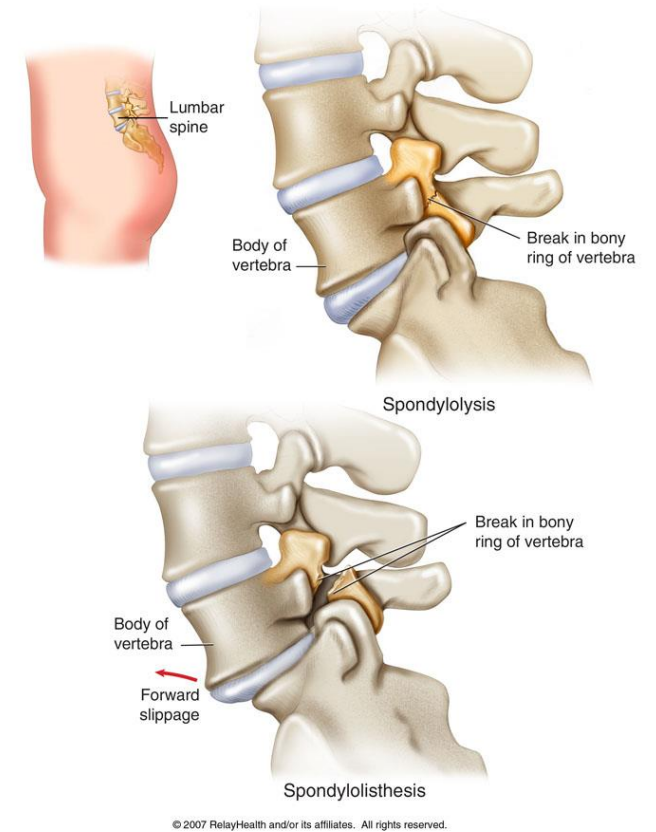
## 4. Symptoms of this fracture cause pain and stiffness in the lower back.

- ▶ The pain may radiate down the legs, because of pressure on the nerves resulting from the fracture
  - This is called neurogenic pain
  - This occurs because extra cartilage is formed as a part of the healing process, and this can press on the nerve
  - This pressure can produce tingling in the legs, and cause pain and weakness

Diagnostics tools include X-rays, and bone scans.

- ▶ The Scotty dog sign is indicative of spondylolysis
  - On x-ray, the outline of the vertebra normally looks like a dog
  - If spondylolysis is present, there is a small crack across the neck of the dog which has been likened to a collar

## Spondylolysis and Spondylolisthesis



# Spondylolisthesis

## 1. Spondylolisthesis

- ▶ A condition where 1 vertebra slides forward in the vertebral column
  - May be caused by spondylosis
  - Usually involves a vertebra in the lumbar region

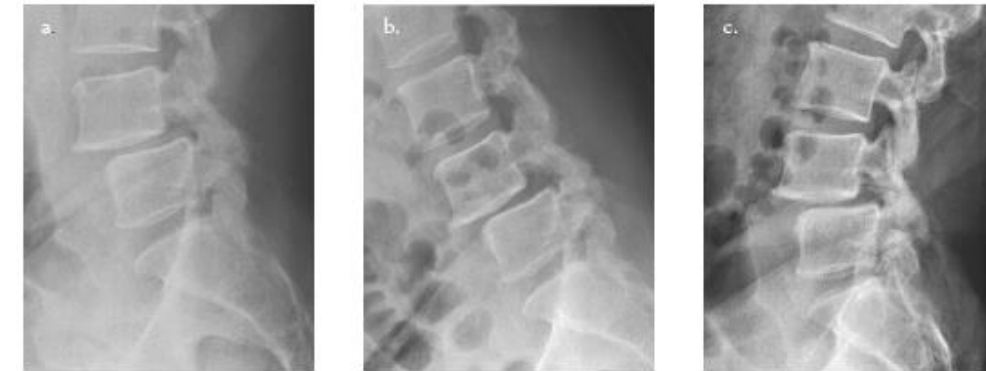
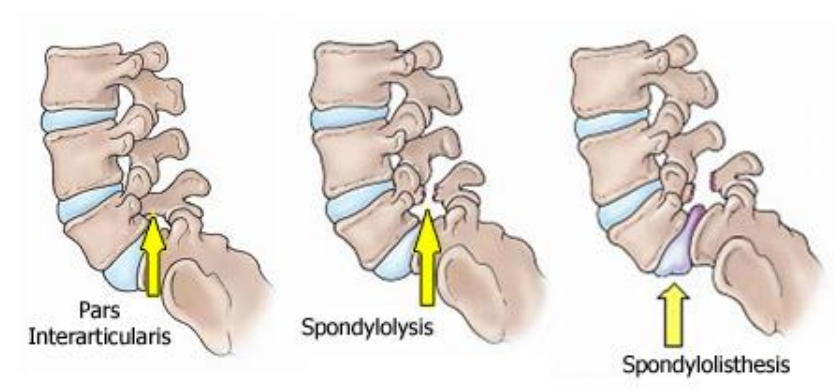
## 2. Symptoms

- ▶ Pain in the lumbar region, thighs, or legs
- ▶ Muscle spasms
- ▶ Weakness in the lumbar region
- ▶ Mild cases may show no symptoms
- ▶ Individuals with a severe case may look swayback, and waddle

## 3. The condition may be congenital, or acquired.

## 4. A congenitally thin bone in the vertebra may predispose an individual to developing the condition.

- ▶ The condition may also result from physical stress, and trauma



# Spondylolisthesis

The Wiltse classification system lists 5 types of spondylolisthesis:

## ▶ Dysplastic

- Occurs due to a congenital defect of the lumbrosacral junction
- This is a rare form of the condition
- It is progressive, and causes neurological problems
- Prognosis is poor, and treatment is difficult because of the poorly developed vertebra

## ▶ Isthmus

- The most frequently observed form of the disorder
- The condition is not usually progressive
- The condition is often asymptomatic

## ▶ Degenerative

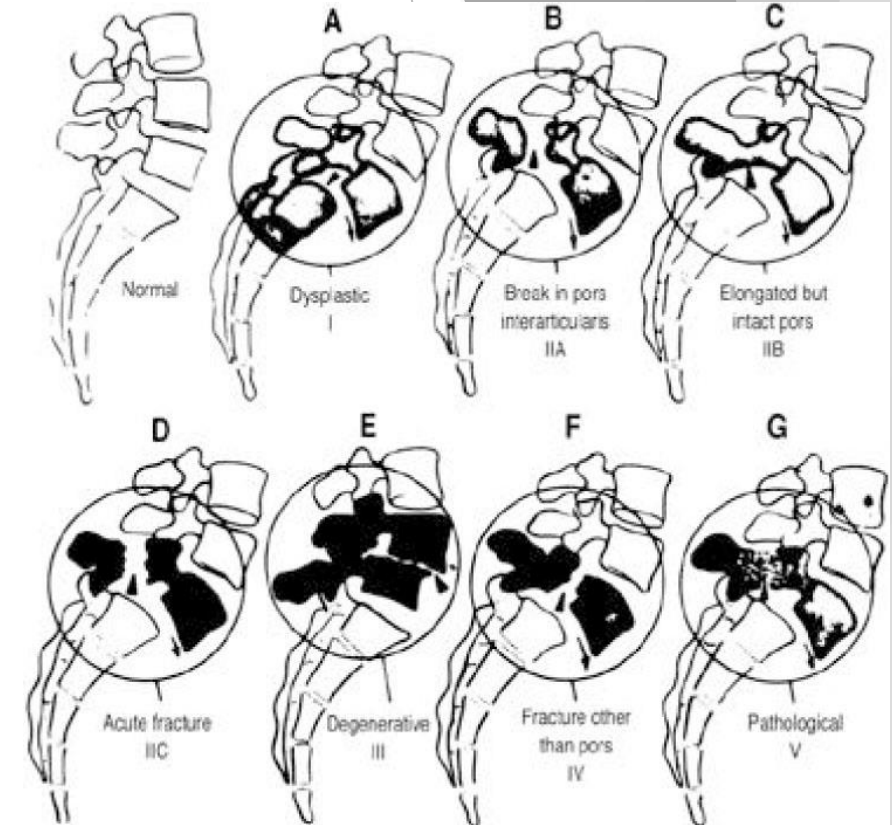
- ▶ The result of arthritis, and bone remodeling
- ▶ Occurs in individuals over the age of 50
- ▶ In this case, the spondylolisthesis can produce spinal stenosis

## ▶ Traumatic

- Extremely uncommon
- May occur due to severe fracture of the bony ring of the spine

## ▶ Pathologic

- Extremely rare
- Associated with cancer, metabolic bone disease, tumors, tuberculosis, and Paget's disease of bone



<http://synapse.koreamed.org/DOIx.php?id=10.4184/jkss.2001.8.3.336&vmode=PUBREADER#lpo=7.14286>

# Trigger Finger

## 1. Trigger Finger

- ▶ Involves damage to the tendons that aid in bending the fingers and thumb
  - It is classified as stenosing tenosynovitis
  - This is a condition in which the sheath surrounding a tendon becomes inflamed and swollen, or when a nodule forms a tendon: this prevents the tendon from moving freely in the sheath

## 2. The digit involved can be bent, but is difficult and painful to straighten

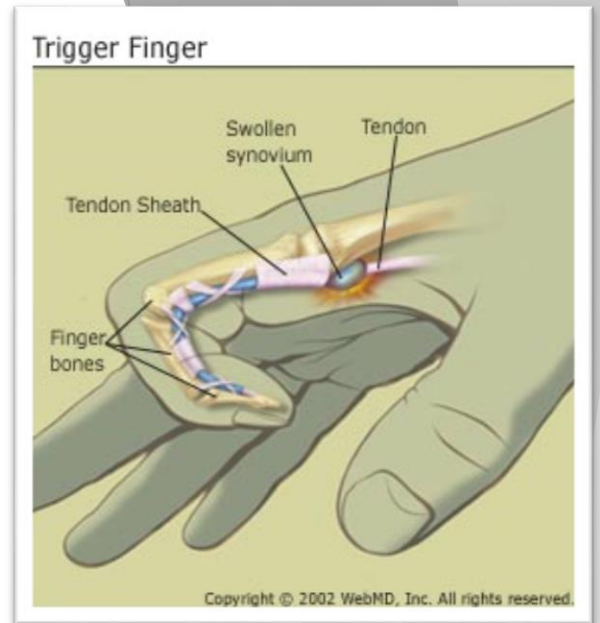
- ▶ A popping, or cracking noise may be heard when the finger is straightened.
- ▶ All digits may be affected

## 3. This injury is seen most commonly in individuals between 40 and 60 years of age

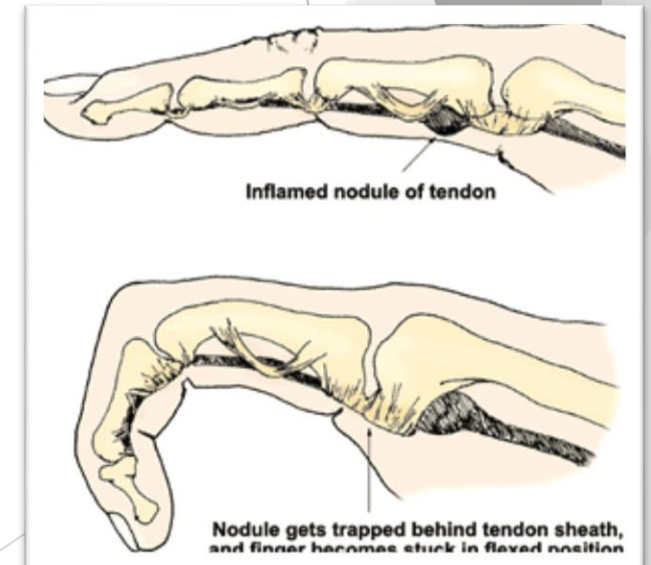
## 4. It occurs more often in individuals with diabetes, and rheumatoid arthritis

## 5. Treatment

- ▶ Splinting may allow this injury to heal
- ▶ Corticosteroid injects may ease the pain
- ▶ Surgery may be useful to stop permanent stiffness from developing
  - This involves opening the tunnel of the tendon sheath



<http://www.webmd.com/osteoarthritis/guide/trigger-finger>



[http://www.emed.ie/Rheumatology/Trigger\\_Finger.php](http://www.emed.ie/Rheumatology/Trigger_Finger.php)

# Gamekeeper's Thumb

## 1. Gamekeeper's Thumb

- ▶ An injury to the ulnar ligament at the joint of the thumb and palm
- ▶ Also called skiers thumb, or UCL tear
  - It was originally called gamekeeper's thumb because this injury used to be common in gamekeepers due to their technique of carrying
  - It is also called skiers thumb because this injury is often sustained during a fall when the thumb gets caught in the ski pole loop

## 2. The injury is the result of forceful abduction of the thumb.

## 3. The injury involves stretching, or tearing of the ligament away from the bone.

## 4. A small chip of bone may also be avulsed.

## 5. Treatment may involve:

- ▶ Casting
- ▶ Splinting
- ▶ Surgery to reattach the ligament
  - The ligament may be reattached to the bone with an anchor
  - Surgery should be performed as soon as possible for best results.

Game Keeper's Thumb



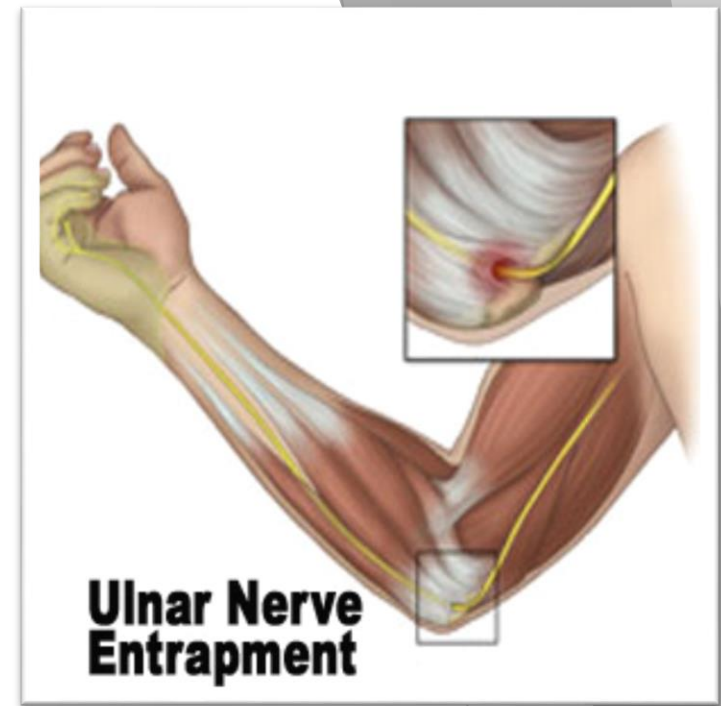
<http://www.3pointproducts.com/gamekeepers-thumb>

<http://radiopaedia.org/articles/gamekeeper-thumb>

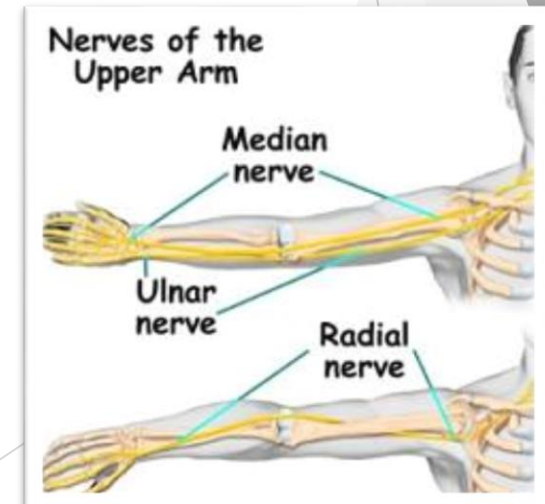


# Ulnar Nerve Entrapment

1. Ulnar nerve entrapment
  - ▶ Involves the compression of the nerve running from the collarbone down the inside of the arm
2. Cause
  - ▶ As the nerve travels down the arm, it passes through the cubital tunnel which is found behind the inner part of the elbow
  - ▶ The nerve then proceeds down the arm and into the hand
  - ▶ Once in the hand, the nerve passes through Guyon's canal
  - ▶ The most likely site of compression is in the back of elbow, but compression of the nerve at the wrist and near the neck also occur
3. Fractures of the elbow, bone spurs, cysts, and trauma are risk factors for development of ulnar nerve entrapment
4. Symptoms of the condition include numbness in the ring finger and pinky finger, muscle weakness, coordination problems in the hand, and muscle wasting
  - ▶ If muscle wasting should occur, it is irreversible



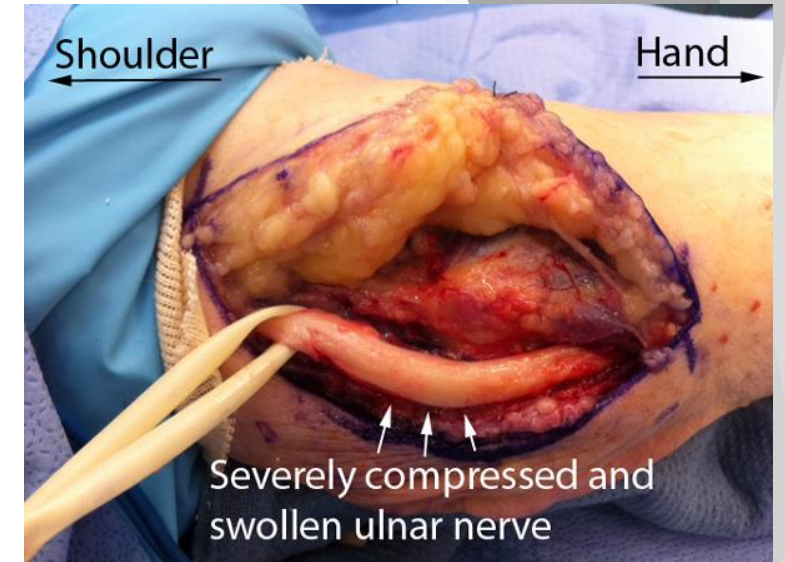
[http://www.fprmed.com/Pages/Ortho/ULNAR\\_NERVE\\_COMPRESSION.html](http://www.fprmed.com/Pages/Ortho/ULNAR_NERVE_COMPRESSION.html)



<http://physioworks.com.au/injuries-conditions-1/rsi-repetitive-strain-injury>

# Ulnar Nerve Entrapment

5. Physical examination is used to diagnose the problem.
  - ▶ This may involve manipulation of the joints in the affected extremity to determine symptoms of the condition
  - ▶ X-rays may be taken to look for bone spurs
  - ▶ A nerve conduction test may be conducted to see how well nerve impulses are transmitted down the arm
  - ▶ The patient may be advised simply to avoid movements that constrict the nerve
  - ▶ Anti-inflammatory drugs may be prescribed, as well as steroid injections
6. In the case of a severe problem that does not improve with non-surgical treatments surgery may be advised.
  - ▶ The exact type of surgery depends upon the area of compression
  - ▶ The most common compression site is the elbow, and therefore this is the most common surgical site
  - ▶ Surgery may be performed at the wrist, or at the wrist and elbow if necessary
  - ▶ Surgery around the elbow may involve cutting cubital tunnel
  - ▶ It may also involve the relocation of the nerve from its place behind the elbow to a place in front of the elbow
    - This procedure is known as an anterior transposition of the ulnar nerve.



[http://www.fprmed.com/Pages/Ortho/ULNAR\\_NERVE\\_COMPRESSION.html](http://www.fprmed.com/Pages/Ortho/ULNAR_NERVE_COMPRESSION.html)



# Kyphosis

- ▶ Refers to an exaggerated forward curve (rounding) - 50 degrees is deemed to be abnormal
- ▶ There are several types of kyphosis:
  - ▶ Postural kyphosis
  - ▶ Scheuermann's kyphosis
  - ▶ Congenital kyphosis

## 1. Postural kyphosis

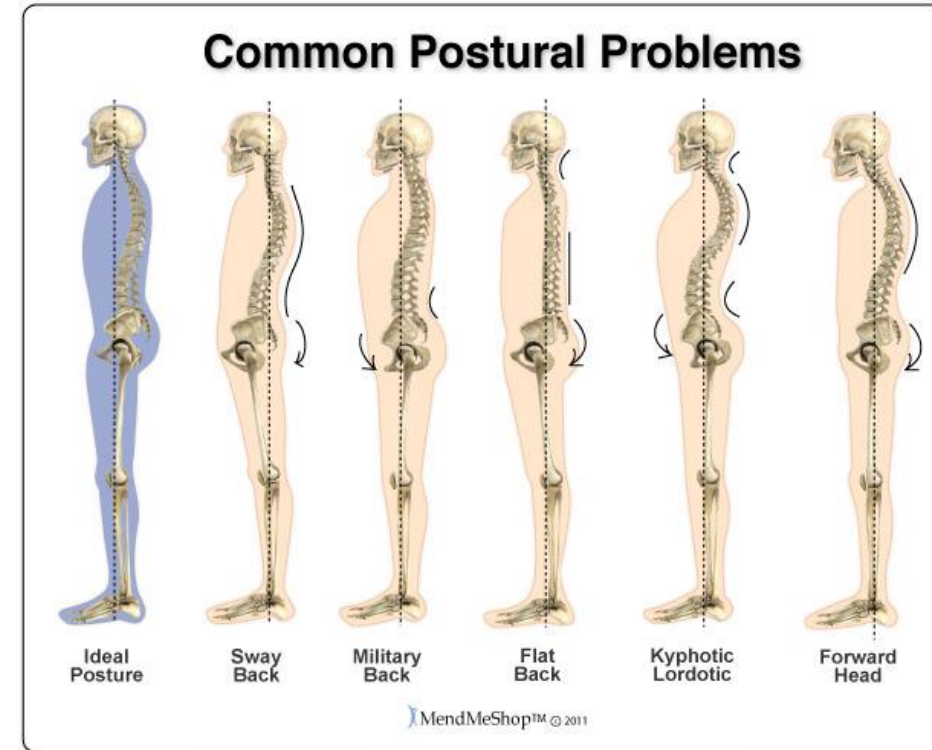
- ▶ Most common type
- ▶ This is a flexible curve in the spine which often becomes evident during the teenage years
- ▶ Radiography reveals normal vertebrae and discs, and the condition is not painful.
- ▶ Does not lead to problems in adulthood

## 2. Scheuermann's kyphosis

- ▶ Becomes evident in teens
- ▶ Involves a more extreme curve than that seen in postural kyphosis
- ▶ The condition affects the thoracic, or lumbar, section of the vertebral column
- ▶ Radiography reveals irregular and wedge-shaped vertebrae and discs

## Congenital kyphosis

- ▶ Results from the abnormal development of the vertebrae
- ▶ The vertebrae may not form properly, or several vertebrae may be fused



# Kyphosis

## 6. Causes of Kyphosis

- ▶ Trauma to the spine
- ▶ Muscular dystrophy
- ▶ Infection
- ▶ Developmental disorders and tumors

7. Cases of adult kyphosis may be the result of compression fractures caused by osteoporotic changes to the bone, or degenerative diseases of the vertebrae and disks, such as arthritis

## 8. Treatment for kyphosis

### ▶ Postural kyphosis

- There is no real treatment for postural kyphosis
- Rarely causes pain, and exercise does little to straighten the back
- This condition may improve over time on its own

### ▶ Scheuermann's kyphosis

- May cause pain which is worsened by activity
- The condition is often treated with exercises and anti-inflammatory drugs
- A brace may be advised until the skeleton is mature

### ▶ Congenital kyphosis

- May be progressive, and early surgical intervention is often indicated to help develop a more normal curve to the spine
- Continued monitoring is necessary

Surgery may be recommended for a case of kyphosis if the curvature of the spine is greater than 80 degrees

- ▶ The abnormal vertebrae may be straightened and fused

Kyphosis caused by infection or tumor may require surgery as well as treatment by medication of various kinds.

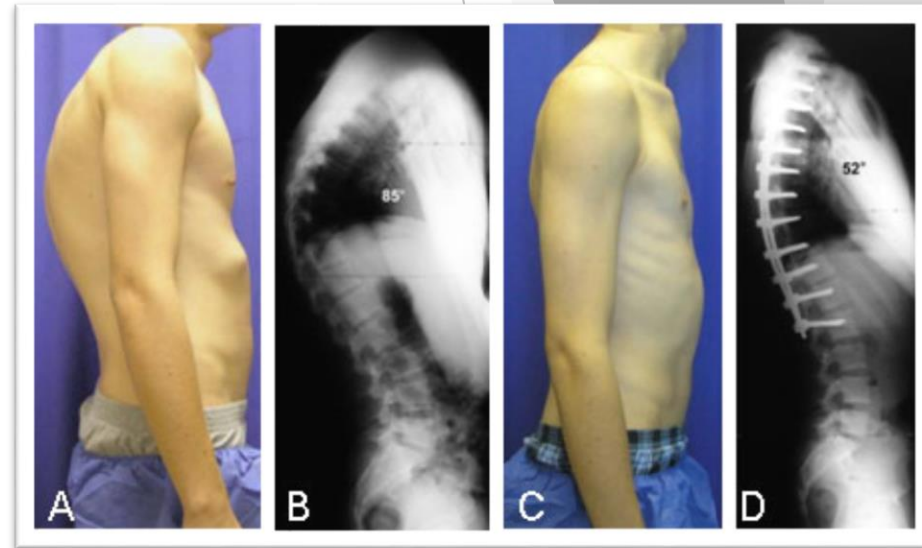


Figure 4A: Preoperative photo of patient with severe kyphosis secondary to Scheuermann's disease.

Figure 4B: Preoperative x-ray of the same patient.

Figure 4C: Postoperative photos of the same patient one year after surgical correction of the kyphosis.

Figure 4D: Postoperative x-ray of the same patient.

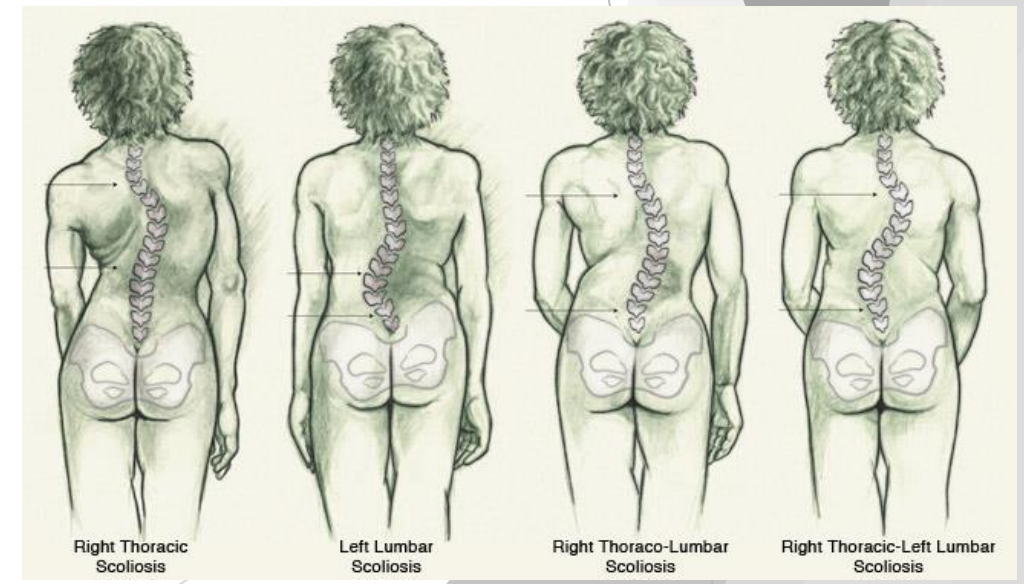
# Scoliosis

1. Scoliosis
  - ▶ The curvature of the spine from side to side
2. In a case of scoliosis, the vertebral column looks like the letters "S" or "C".
  - ▶ In this condition, some of the vertebra may be rotated
3. The disease can be congenital, idiopathic, or the result of another condition
4. Scoliosis has a hereditary component, but in most cases the cause of the condition is unknown
  - ▶ The disease can occur as a result of other disorders, but most often the condition occurs in healthy spines
5. The disease often originates in childhood, but can develop in adults.
  - ▶ A case of scoliosis in adulthood may have begun in childhood, but gone undiagnosed
  - ▶ Other cases of adult scoliosis may be the result of degenerative conditions involving the vertebral column



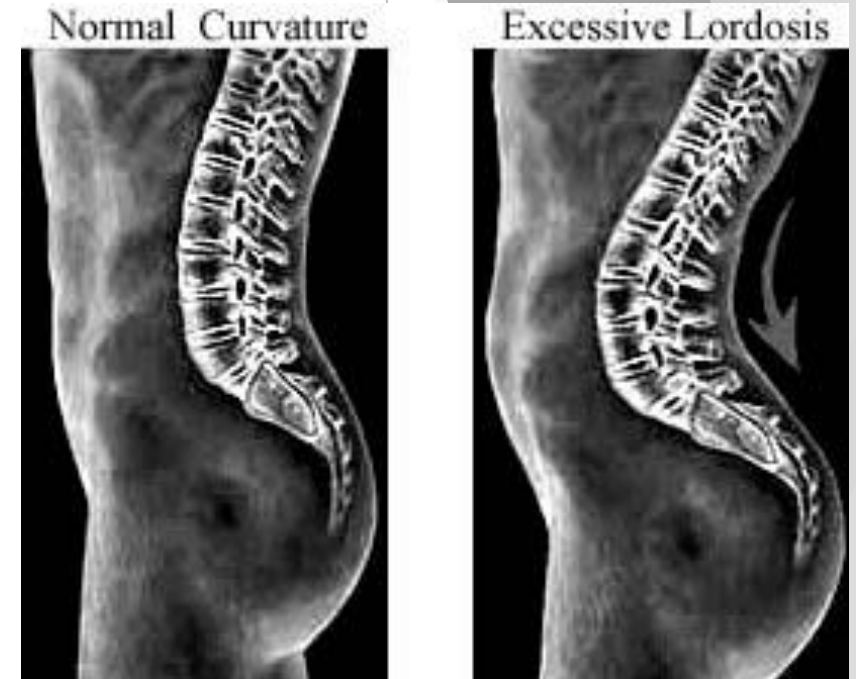
# Scoliosis

6. The symptoms of scoliosis include:
  - ▶ Shoulders that aren't level
  - ▶ A listing posture
  - ▶ Raised hips
  - ▶ Prominent shoulder blades
7. A physical examination for scoliosis includes Adam's Bend Test
  - ▶ In this test, the patient bends forward.
    - If a hump on the back is present, scoliosis is suspected, and radiographs involving full length standing spine views are indicated
8. Although scoliosis does not usually cause problems in childhood, untreated scoliosis can result in continuing and severe back pain, deformity, and respiratory problems.
9. Most curvatures of the spine require only monitoring, but if the curvature progresses, bracing of the spine is indicated.
  - ▶ This can prevent the condition from becoming worse.
  - ▶ A body cast may be advised
10. If the curvature is severe, or if an orthopedic brace does not prevent the worsening of the condition, surgery is indicated.
  - ▶ Surgical techniques include spinal fusion, and internal fixation with rods and screws



# Lordosis

1. Lordosis
  - ▶ Excessive inward curvature of the spine
  - ▶ Commonly called swayback
2. These curves serve to position the head over the pelvic region, and act as shock absorbers
  - ▶ When the curves become too pronounced, the condition is called lordosis
3. Lordosis affects individuals of all ages.
4. Although it is usually seen in the lumbar section of the vertebral column, it does occur in the cervical vertebrae.
5. Lordosis in the lumbar region of the spinal column causes the buttocks to stick out excessively
  - ▶ Lordosis in the lumbar region can be painful, and can affect movement



<https://erickaduftonyoga.files.wordpress.com/2012/11/lordosis.jpg>

# Lordosis

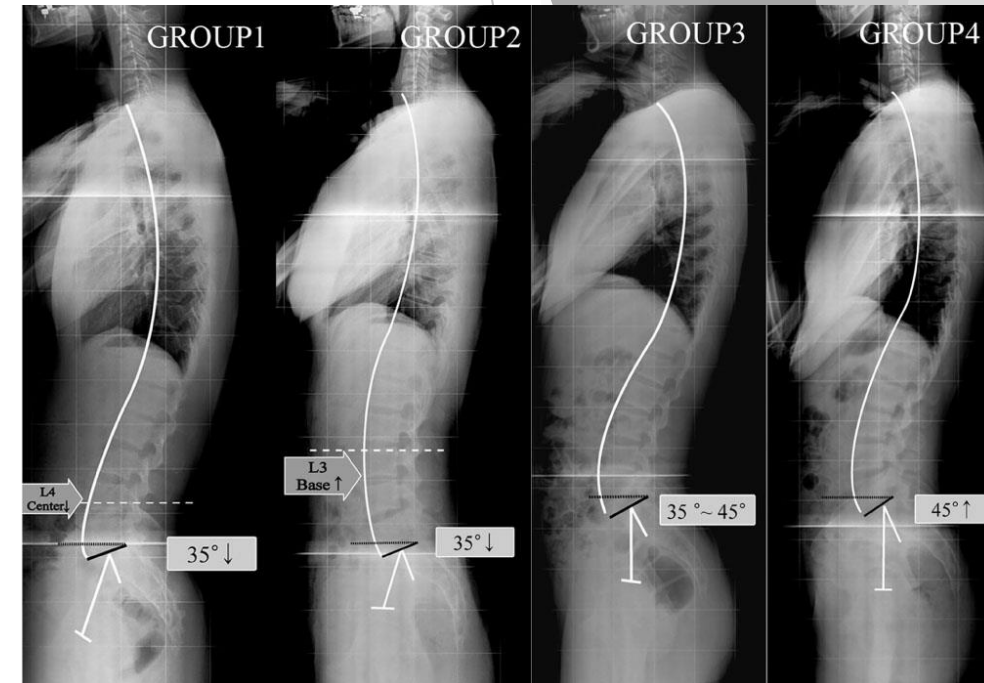
6. The curvature of the spine can be affected by certain diseases:

- ▶ Achondroplasia
  - A hereditary disorder of bone growth causing dwarfism
- ▶ Diskitis
  - An inflammation of the space between discs
- ▶ Kyphosis
  - Which may cause a curve in the lower back to compensate for a curve higher in the back
- ▶ Obesity
  - May cause lordosis by causing a backward leaning posture
- ▶ Osteoporosis
  - May cause the vertebrae to weaken
- ▶ Spondylolisthesis
  - Can cause the vertebrae to overlap

7. Lordosis can also be a benign juvenile condition.

8. Lordosis does not always require medical intervention.

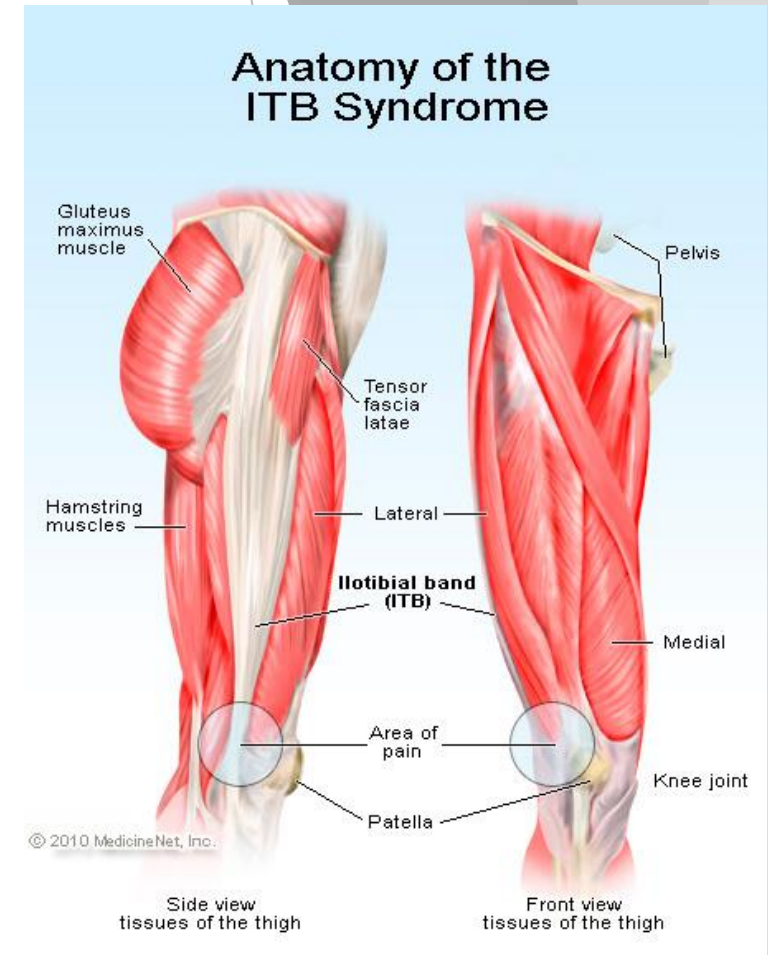
- ▶ If the curve is flexible, the condition is not generally of concern.
- ▶ If the curve is fixed, the condition should be evaluated medically



[http://synapse.koreamed.org/DOIx.php?id=10.4184/jkss.2010.17\(2\).66&vmode=PUBREADER#!po=7.14286](http://synapse.koreamed.org/DOIx.php?id=10.4184/jkss.2010.17(2).66&vmode=PUBREADER#!po=7.14286)

# Iliotibial Band Syndrome

1. Iliotibial band syndrome
  - ▶ Also called iliotibial band friction syndrome (ITBS or ITBFS)
2. This condition causes lateral knee pain. and is commonly caused by running, cycling, hiking, and weight lifting.
3. The iliotibial band is a superficial strip of thickened tissue located on the outside of the thigh.
  - ▶ Its starting point is on the outside of the pelvis, and it runs over the hip and knee
4. During the action of running, the band moves from the back of the femur to the front.
5. The insertion point of the band is just below the knee joint.
  - ▶ The iliotibial band stabilizes the knee joint
6. Activity causes the iliotibial band to rub over the lateral femoral epicondyle.
  - ▶ This rubbing, combined with continued extension and flexion, may result in inflammation, or irritation



[http://www.medicinenet.com/iliotibial\\_band\\_syndrome/article.htm](http://www.medicinenet.com/iliotibial_band_syndrome/article.htm)

# Iliotibial Band Syndrome

7. There is a range of symptoms associated with iliotibial band syndrome.
- ▶ Symptoms can occur anywhere along the length of the band
  - ▶ Symptoms may include:
    - Stinging sensation felt on the outside of the knee, or along the length of the iliotibial band
    - Swelling of the band where it crosses from the front to the back of the femur
    - Pain below the knee

8. The pain associated with the disorder may worsen with activity.

9. Pain may persist after the activity has been stopped.

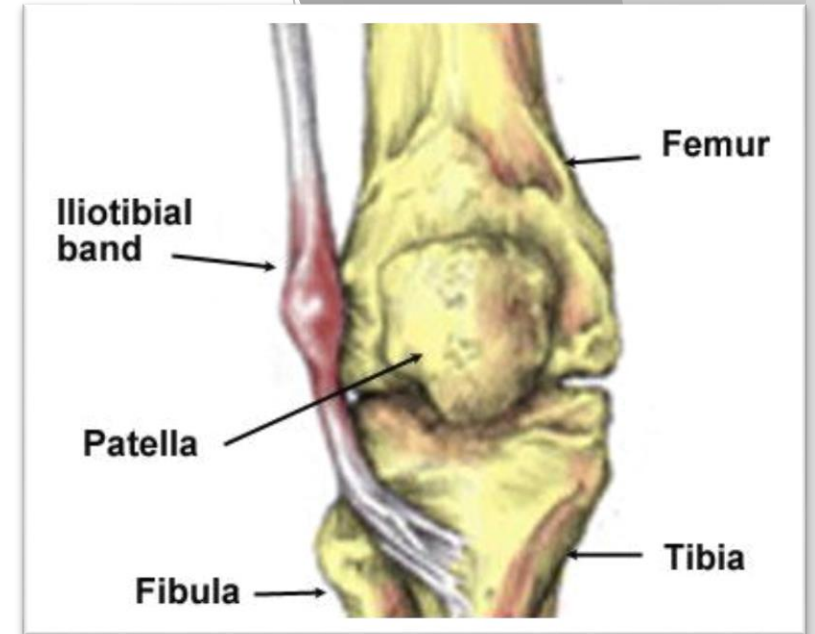
10. Iliotibial syndrome can also occur where the band attaches to the hip.

- ▶ Pain at this site is not likely due to a sports injury, but occurs often with pregnancy as the connective tissues in the area loosen.

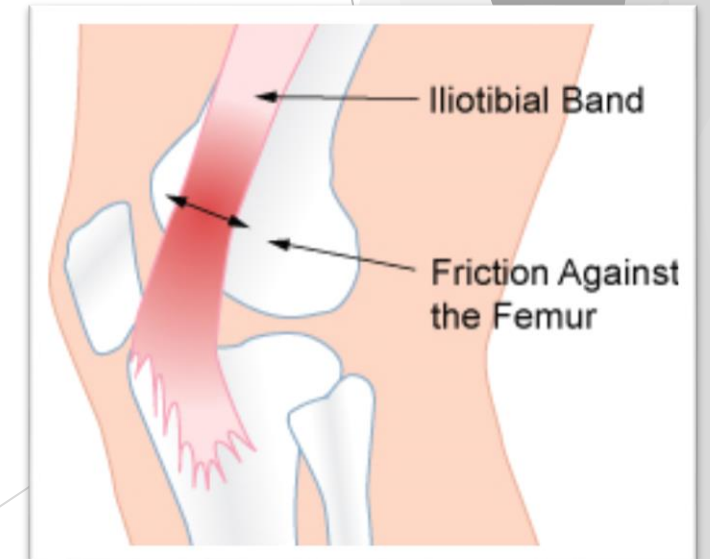
Iliotibial band syndrome in the hip is also common in the elderly.

Iliotibial band syndrome often presents with pain on palpation of the lateral knee.

- ▶ Pain increases when the patient is standing with the knee flexed to an angle of 30 degrees



<http://www.sportsinjuryclinic.net/sport-injuries/knee-pain/iliotibial-band-syndrome>



<http://ourhealthnetwork.com/conditions/iliotibial-band-syndrome/>



# Iliotibial Band Syndrome



<http://www.positivehealth.com/article/bodywork/muscle-energy-techniques-mets-applied-to-knee-pain>

13. Physical examination involves the use of Ober's test.
- ▶ This test is used to determine the tightness of the iliotibial band
  - ▶ The patient is asked to lie on the table on the unaffected side of the body
  - ▶ The unaffected hip and knee are flexed to 90 degrees
  - ▶ The examiner aligns the affected leg with the rest of the patient's body by abducting and extending the leg
  - ▶ The affected leg is then adducted
  - ▶ If the iliotibial band is of normal length, the leg will adduct without pain
  - ▶ If the iliotibial band is abnormally short, adduction will be difficult and cause pain to the lateral knee
  - ▶ Tightness prevents the smooth functioning of the iliotibial band contributing to the development of iliotibial band syndrome

# Iliotibial Band Syndrome

14. Iliotibial band syndrome can be prevented by building strength in the muscles of the hips.
- ▶ Exercises to stretch the iliotibial band and gluteal muscles can aid in preventing the development of this condition
  - ▶ Runners with iliotibial band syndrome are advised to reduce running distance for a period of time, and to run only on flat ground
    - After the cessation of pain, distance can be increased gradually
    - Persistent pain requires complete rest from running for about 2 weeks
    - If pain still persists, rest for another month is advised
    - As the injury improves, activity can be resumed slowly and gradually
    - Changing the running route may help prevent recurrence of symptoms as running the same route constantly may put more stress on one side of the body
    - Rest, cold compresses, and elevation should be used to treat acute symptoms
    - NSAIDS will relieve inflammation and pain
    - Corticosteroid injections may be prescribed.



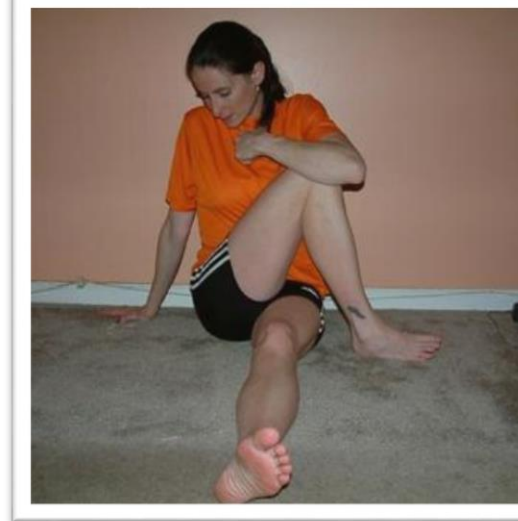
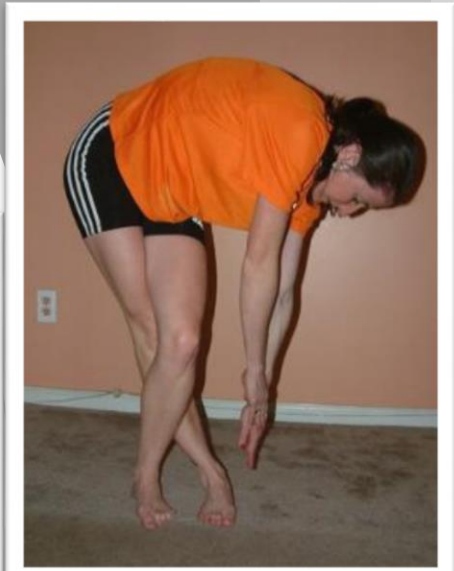
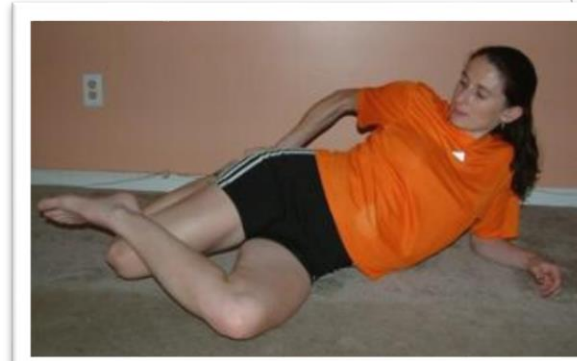
[http://running.competitor.com/2014/08/injury-prevention/keeping-runners-knee\\_143](http://running.competitor.com/2014/08/injury-prevention/keeping-runners-knee_143)



[http://www.medicinenet.com/iliotibial\\_band\\_syndrome/page3.htm](http://www.medicinenet.com/iliotibial_band_syndrome/page3.htm)

# Iliotibial Band Syndrome

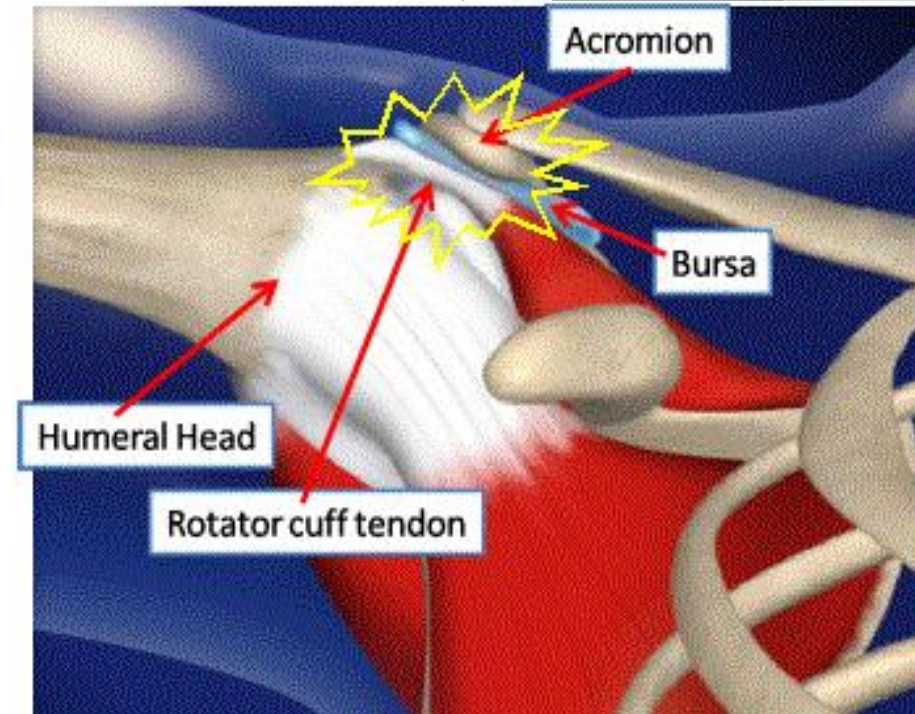
15. Surgery is rarely used to treat iliotibial band syndrome.
- ▶ It is only used in cases where the condition persists after 6 -12 months of conservative treatment
  - ▶ It should be a treatment of last resort, and only used when all other treatment have failed to produce relief
  - ▶ Patients who refuse to change their exercise routine are generally the population treated by surgery
  - ▶ Surgery is only performed after arthroscopic examination has ruled out other possible causes for the pain
  - ▶ Surgical treatment involves an iliotibial band release-excision performed using arthroscopic techniques
16. Rehabilitation includes
- ▶ Stretching
  - ▶ Gradual introduction of exercise
  - ▶ Deep tissue massage
  - ▶ Non-steroidal anti-inflammatory drugs (NSAIDS)
  - ▶ Strengthening exercises for the quadriceps femoris, and gluteus medius muscles



# Shoulder Impingement

## 1. Shoulder Impingement

- ▶ Common cause of shoulder pain in adults
- ▶ It is caused by the shoulder blade exerting pressure on the rotator cuff as the arm is raised
  - The acromion of the shoulder blade pushes on the muscles of the rotator cuff causing pain, and hindering the motion of the shoulder
  - The pressure created by the shoulder blade may cause bursitis, or tendonitis
  - A tear of the rotator cuff may also be present
  - This condition is commonly seen in athletes engaged in sports requiring overhead motion
    - The motions involved in tennis, baseball, and swimming may cause the shoulder impingement
  - Certain jobs may also increase the risk of developing shoulder impingement
    - Paper hanging, construction, and painting may increase risk for the condition
  - The condition may also occur for no apparent reason



# Shoulder Impingement

2. The symptoms of shoulder impingement may be mild at first, and become increasingly severe.
  - ▶ A low level of discomfort may be present continuously
  - ▶ Pain may radiate from the front of the shoulder down the arm
  - ▶ Reaching movements, or lifting, may cause sudden pain
  - ▶ Shoulder impingement can cause localized swelling and tenderness
  - ▶ As the condition progresses, the condition may cause pain at night
  - ▶ It may result in the loss of strength, and affect range of motion
    - Pain may be experienced on lifting, or lowering the arm
  - ▶ Pain may be experienced on lifting, or lowering the arm
  - ▶ Activities requiring the arms to be used behind the back may cause extreme pain
  - ▶ In severe cases, the condition may result in a frozen shoulder
  - ▶ The area of injury may be tender to the touch



<http://www.me-jaa.com/October2013/Shoulder.htm>

# Shoulder Impingement

3. An examination for shoulder impingement includes a physical examination to determine areas of pain, and to determine the range of motion possible

- ▶ Radiographs and other imaging studies will determine if there are any bony abnormalities
  - For example, an outlet view radiograph may show a bone spur on the leading edge of the acromion which is sometimes the cause of the condition
- ▶ An MRI can be used to examine the area for signs of inflammation, or fluid, in the bursa and rotator cuff
  - MRI can identify any torn sections of the rotator cuff
- ▶ An impingement test which involves the injection of a regional anesthetic can be used to confirm the diagnosis of shoulder impingement

## 4. Treatment

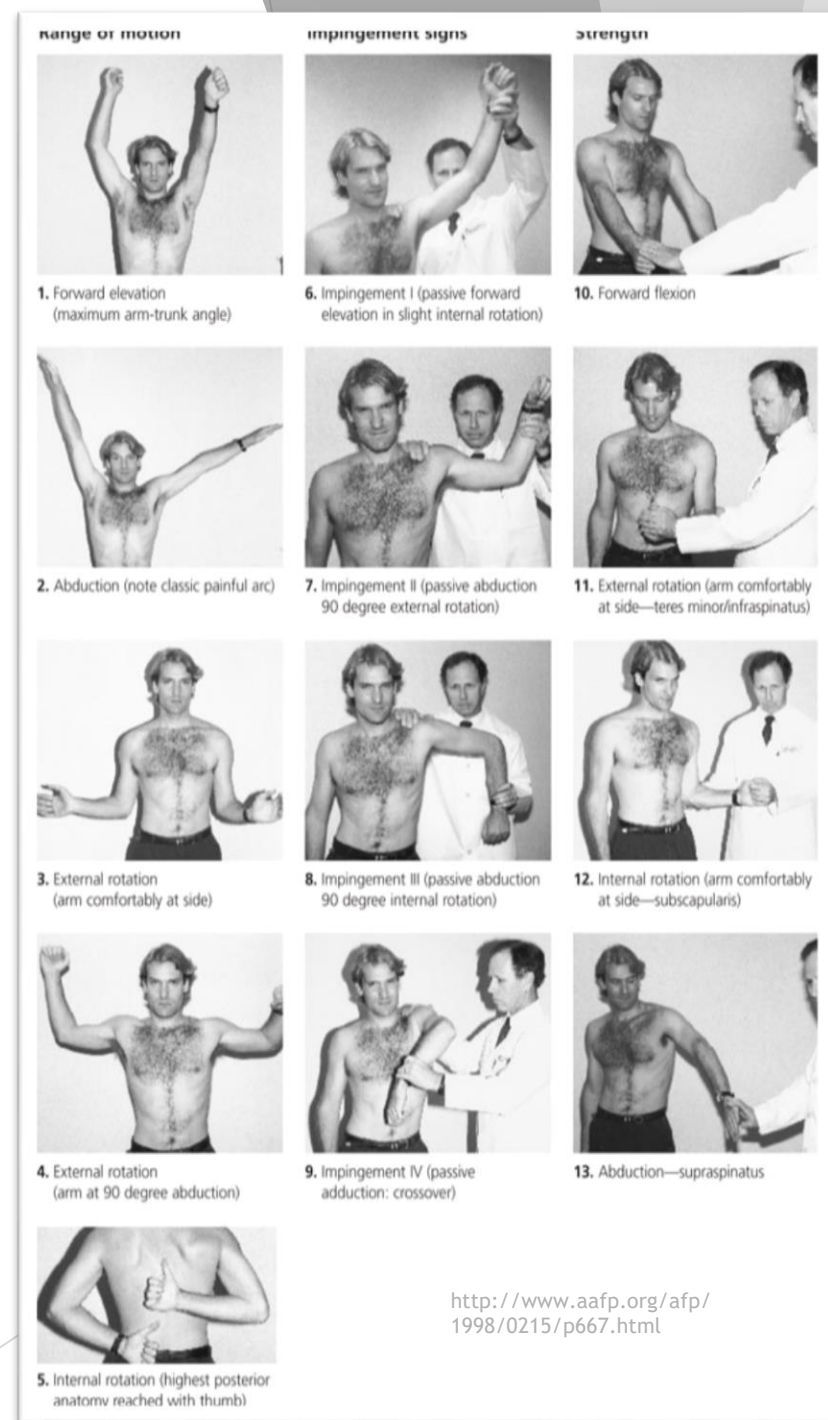
- ▶ Conservative treatment for shoulder impingement is tried first
  - Rest and the avoidance of overhead movements that cause pain are recommended at this stage
  - Nonsteroidal anti-inflammatory drugs may be prescribed for pain
  - Stretching exercises may be recommended to improve range of motion if the shoulder
  - A cortisone injection may relieve pain, and help restore range of motion
  - Conservative treatment may take several weeks to months to have an effect
- ▶ Surgical treatment may be advised if conservative methods fail to resolve the problem.
  - The goal of this surgery is to increase the space available for the rotator cuff
  - Surgery may be arthroscopic, or use open techniques
  - Possible surgical procedures include subacromial decompression, and anterior acromioplasty
  - In most cases of surgery, the anterior edge of the acromion is removed to create more space



# Shoulder Impingement

## 5. Rehabilitation

- ▶ Rehabilitation following surgery may involve the use of a sling.
  - This will take the weight off of the affected area, relieve pain, and allow healing
  - When the pain starts to subside, the sling can be removed
  - Although the sling should be removed as soon as possible to get the shoulder moving, it should not be removed too soon
    - The healing tissue must be protected
- ▶ Exercises will help restore the range of motion of the shoulder, and the strength in the arm and shoulder
- ▶ Therapy will start with passive motion
- ▶ The rehabilitation program will be individualized based on needs and surgical findings
- ▶ It may take 2 to 4 months for complete recovery, and for the pain to subside completely



# Medial Epicondylitis

- ▶ A condition know by many names
  - Little Leaguer's elbow
  - Reverse tennis elbow
  - Golfer's elbow

1. This condition is a tendonitis affecting the flexor wad at the anterior medial epicondyle of the humerus.
  - ▶ It is the most frequent cause of pain in the medial elbow although it occurs less frequently than lateral epicondylitis
2. Medial epicondylitis affects twice as many men as women.
3. It occurs most often in individuals between 20 - 49 years of age, but can occur in all age groups.
4. Certain sporting activities, like golf, baseball, and tennis raise the risk of developing medial epicondylitis.
5. Repetitive work can also cause the condition
  - ▶ Although most often caused by overuse, it frequently begins as a result of an acute injury



[http://www.aspetar.com/journal/viewarticle.aspx?id=16#.VSg6PvnF\\_DY](http://www.aspetar.com/journal/viewarticle.aspx?id=16#.VSg6PvnF_DY)



# Medial Epicondylitis

## 7. Symptoms

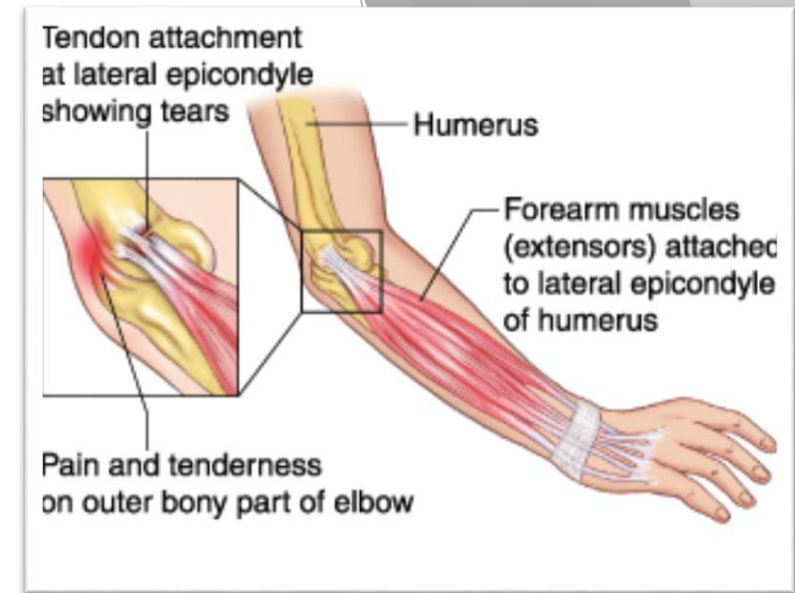
- ▶ Main symptom of medial epicondylitis is pain over the medial epicondyle
  - This pain worsens with flexion and pronation of the wrist
  - The ulnar nerve may be involved as evidence by a tingling or numbness that spreads into the ring, and little fingers
    - This tingling or numbness may be intermittent, or constant
  - Soreness to the touch over the anterior part of the medial epicondyle is the most commonly reported symptom
  - Symptoms of neuropathy of the ulnar nerve are often evident
    - These symptoms may include decreased sensation in the areas served by the ulnar nerve
    - Severe cases may be associated with weakness, and muscle atrophy

8. An individual with medial epicondylitis feels pain with resisted wrist flexion, and perhaps with resisted elbow flexion

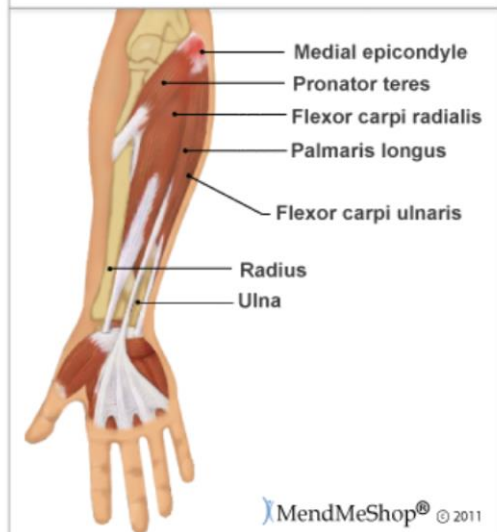
9. In an examination, radiographs are generally taken of the elbow to determine if there are any associated problems, such as osteoarthritis, avulsions, or loose bone fragment

- ▶ Antero-posterior and lateral views are usually sufficient to diagnose this condition, but if loose bodies are suspected, oblique views of the joint are advised

Loose bodies may be suspected due to clicking sensation in the elbow joint, or if the joint appears to be catching



## Medial Epicondylitis (Golfer's Elbow)



# Medial Epicondylitis

11. Valgus stress radiographs are indicated if medial instability appears to be a possibility
- ▶ An MRI is not usually considered necessary for the diagnosis of this condition
  - ▶ A nerve conduction study and electromyography are advised if the ulnar nerve is involved
12. Treatment
- ▶ Occupational and physical therapy are recommended treatments of medial epicondylitis
  - ▶ Rest, icing of the injury, compression, and bracing are used to reduce inflammation and decrease pain.
  - ▶ Rest is generally recommended for 1-6 weeks
  - ▶ The use of ice is particularly important with acute injuries
    - The area over the ulnar nerve should not be iced, however
  - ▶ Compression of the elbow by means of a medial counterforce brace, with a pad placed over the flexor pronator wad is the usual treatment for this condition
  - ▶ A wrist splint may be worn to keep the wrist in a neutral position to allow it to rest
  - ▶ If the ulnar nerve is also involved, a nighttime elbow extension splint may be advised
    - This splint allows 30-45 degrees of flexion, and protects the nerve from further damage
  - ▶ After the injury has become less painful, exercises are recommended to strengthen the flexor-pronator muscles
  - ▶ Ultrasound treatments may be recommended

## Medial Epicondylitis (Golfer's Elbow) Rehabilitation Exercises



Wrist active range of motion: Flexion and extension

Wrist stretch



Forearm pronation and supination



Eccentric wrist flexion



Eccentric wrist extension



Grip strengthening



Forearm pronation and supination strengthening



Resisted elbow flexion and extension

© 2010 RelayHealth and/or its affiliates. All rights reserved.

# Wrist Drop

▶ A symptom with many causes

1. In this condition, the wrist and fingers cannot be extended, and hang loose when the arm is held out, palm down.

2. Wrist drop may occur when the extensor muscles and their tendons, or the radial nerve supplying the extensor muscles are not working properly.

▶ It is most often caused by damage to the radial nerve

3. Wrist drop can be caused by lead poisoning, as lead poisoning can damage the radial nerve

4. Repetitive motion can cause wrist drop by damaging the radial nerve

▶ Prolonged pressure on the radial nerve, perhaps caused by the use of crutches, or by habitual leaning on the elbow, can cause wrist drop by damaging the radial nerve

5. Neuromuscular disease can also cause wrist drop

6. The condition is found in individuals of all ages

7. The assessment for wrist drop involves nerve conduction velocity studies to determine if the radial nerve is the source of the problem.

▶ X-rays can be used to rule out the presence of bone spurs and fractures which may be pressing on the radial nerve

▶ MRI may be used to distinguish between possible causes of the problem

8. Treatment depends upon the cause of the condition.

▶ Initial treatment may involve splinting of the wrist, and occupational, or physical therapy

▶ Surgical intervention to remove bone spurs may be required to remove pressure from the radial nerve

▶ Other causes of pressure on the radial nerve may also need surgical intervention

▶ Neuromuscular disorders require medication



# Physical Examination for Suspected Fracture

1. In examination for a suspected fracture, any unnecessary pain, or discomfort, to the patient must be avoided.
  - ▶ First, the history of the injury must be obtained
  - ▶ Next, the affected area should be visually examined for signs of damage, such as deformity, swelling, or skin breakdown
2. A neurovascular examination is in order as damage to blood vessels, or nerve tissue is a serious complication
  - ▶ Particular attention should be paid to the area distal to the fracture
    - The lack of a pulse in this area, or a lack of sensation, is a serious finding, and the orthopedic surgeon should be informed
  - ▶ The areas distal and proximal to the injury should be palpated with particular attention paid to nearby joints
  - ▶ A thorough examination can ensure additional fractures aren't overlooked
    - A physical examination can help determine what imaging studies should be completed, and ultimately what treatment option should be considered



# MRI

## 1. MRI

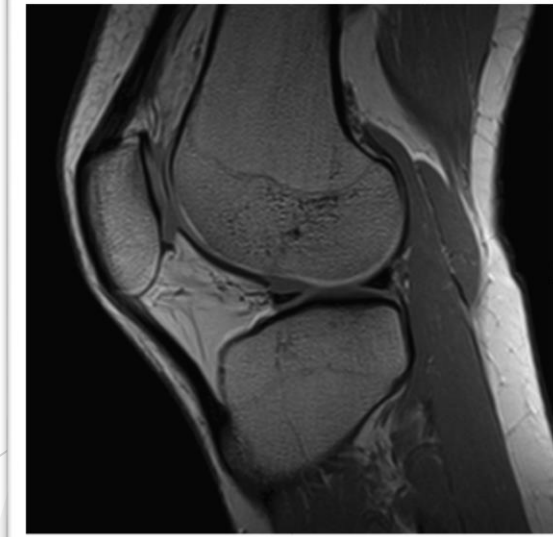
- ▶ Magnetic resonance imaging (MRI) allows accurate diagnostic visualization of the internal structures of the body
- ▶ It can produce cross-sectional images
- ▶ Uses radiofrequency waves and a magnetic field to produce its images
- ▶ Best used in the examination of soft tissue structures, but can also be used to visualize bony structures

## 2. This technique is highly accurate in detecting abnormalities and injuries.

## 3. MRI does not use radiation to produce images, and this can alleviate concern about extensive testing

## 4. MRI drawbacks:

- ▶ Can take up to an hour to complete which becomes a problem for patients who are claustrophobic
- ▶ Patients with certain metallic implants, such as pacemakers and vascular filters, cannot have MRIs because the magnetic field can be strong enough to disturb the functioning of these implants, or to displace them



# CT

- ▶ Computed tomography uses radiation to produce cross-sectional images
- ▶ Capable of producing a series of images
- ▶ A rapid exam which makes it much more tolerable than MRI for some patients

1. The radiation used in CT, however, is a concern for some patients.

- ▶ Ionizing radiation is potentially cancer causing

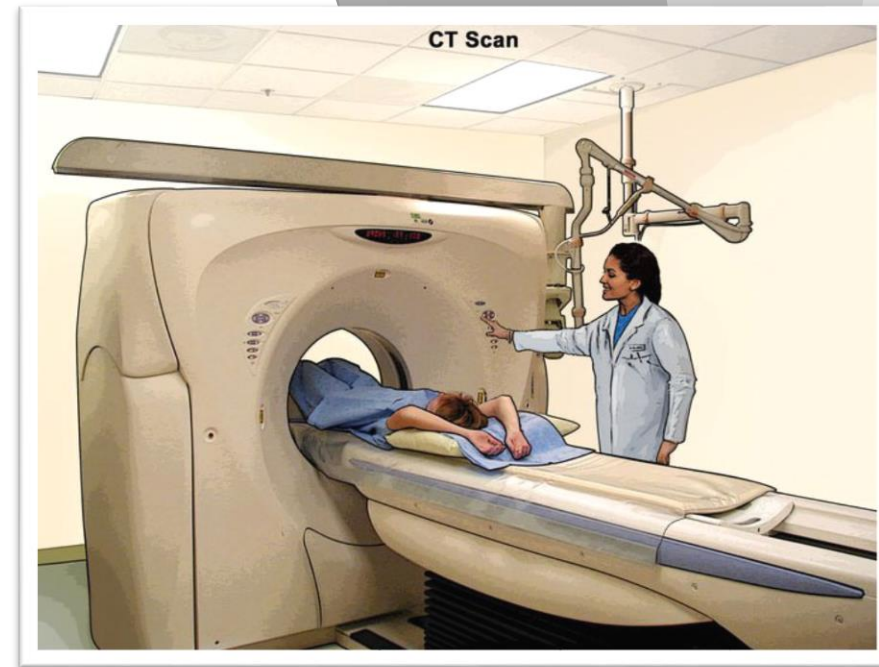
2. CT produces better images of bones and fractures than MRI is capable of producing

- ▶ Soft tissue may not show up as clearly as desired

3. To counteract this phenomenon, an injected contrast can allow better visualization.

- ▶ Some patients may react to the contrast with allergic symptoms

4. Patients with certain types of implants may not be able to have MRI, and may be referred for a CT scan instead.



<http://www.cancer.gov/cancertopics/diagnosis-staging/ct-scans-fact-sheet>



<http://www.radiologyinfo.org/en/info.cfm?pg=abdominct>

# Bone Growth Stimulators

- ▶ An appliance that delivers a low level electrical current to a fracture site
1. This device is thought to increase metabolic activity in the injured area resulting in faster healing, and more robust bone formation.
  2. Research suggests that the bone growth stimulator can have positive effects on acute and slow healing fractures
  3. Certain bones are more likely to heal poorly, perhaps resulting in nonunion
    - ▶ Poor healing can be due to fracture location, fracture shape, and blood supply
    - ▶ For this reason, bone growth stimulators are often used on acute fractures of the scaphoid, fifth metatarsal base, and tibia
  4. Different types of stimulators are worn for different lengths of time.
    - ▶ Proper education ensures best results from a particular device
    - ▶ The stimulator must be fitted to the patient's injury in a way which places the highest concentration of electrical current as close to the fracture as possible



[http://www.brettonmedical.com/product\\_details.php?DonJoy-Long-Bone-BGS-8](http://www.brettonmedical.com/product_details.php?DonJoy-Long-Bone-BGS-8)



[http://www.brettonmedical.com/product\\_details.php?DonJoy-Spinalog-BGS-9](http://www.brettonmedical.com/product_details.php?DonJoy-Spinalog-BGS-9)



[http://www.cfaas.com/phyRes\\_non\\_invasive\\_fracture.php](http://www.cfaas.com/phyRes_non_invasive_fracture.php)

# 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

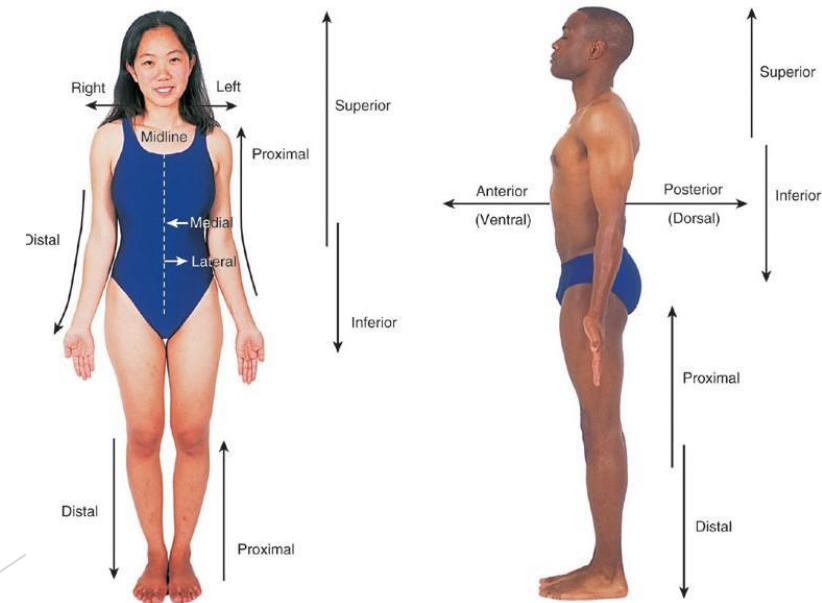
- ▶ Essentially the opposite of medial in that it refers to being further away from the midline of the body.
- ▶ Example:
  - The ear is lateral to the eye

## 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

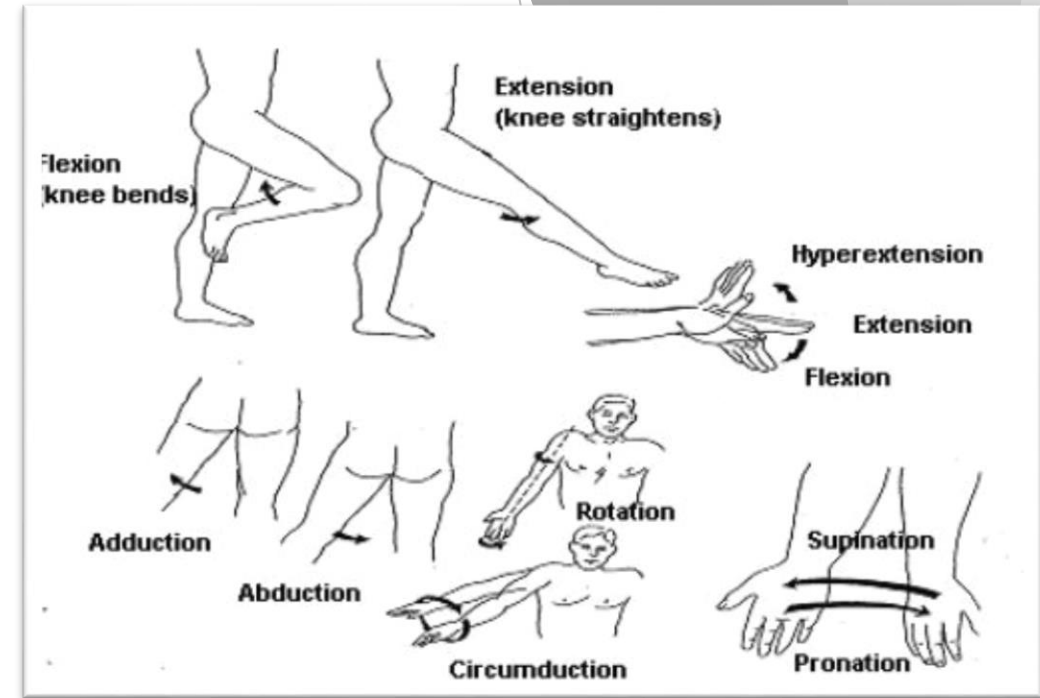
**Inversion** - involves the turning of the foot so that the sole is inclined inward

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

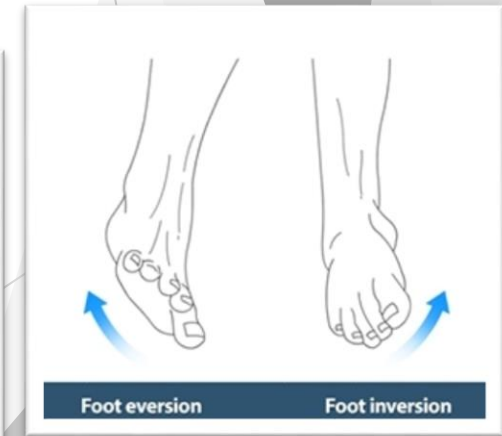
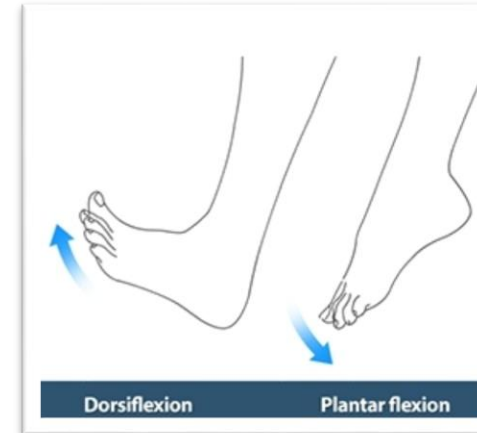
**Extension** - involves the straightening of a joint

**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\\_5\\_section\\_1A.htm](http://www.brooksidepress.org/Products/Nursing_Fundamentals_1/lesson_5_section_1A.htm)

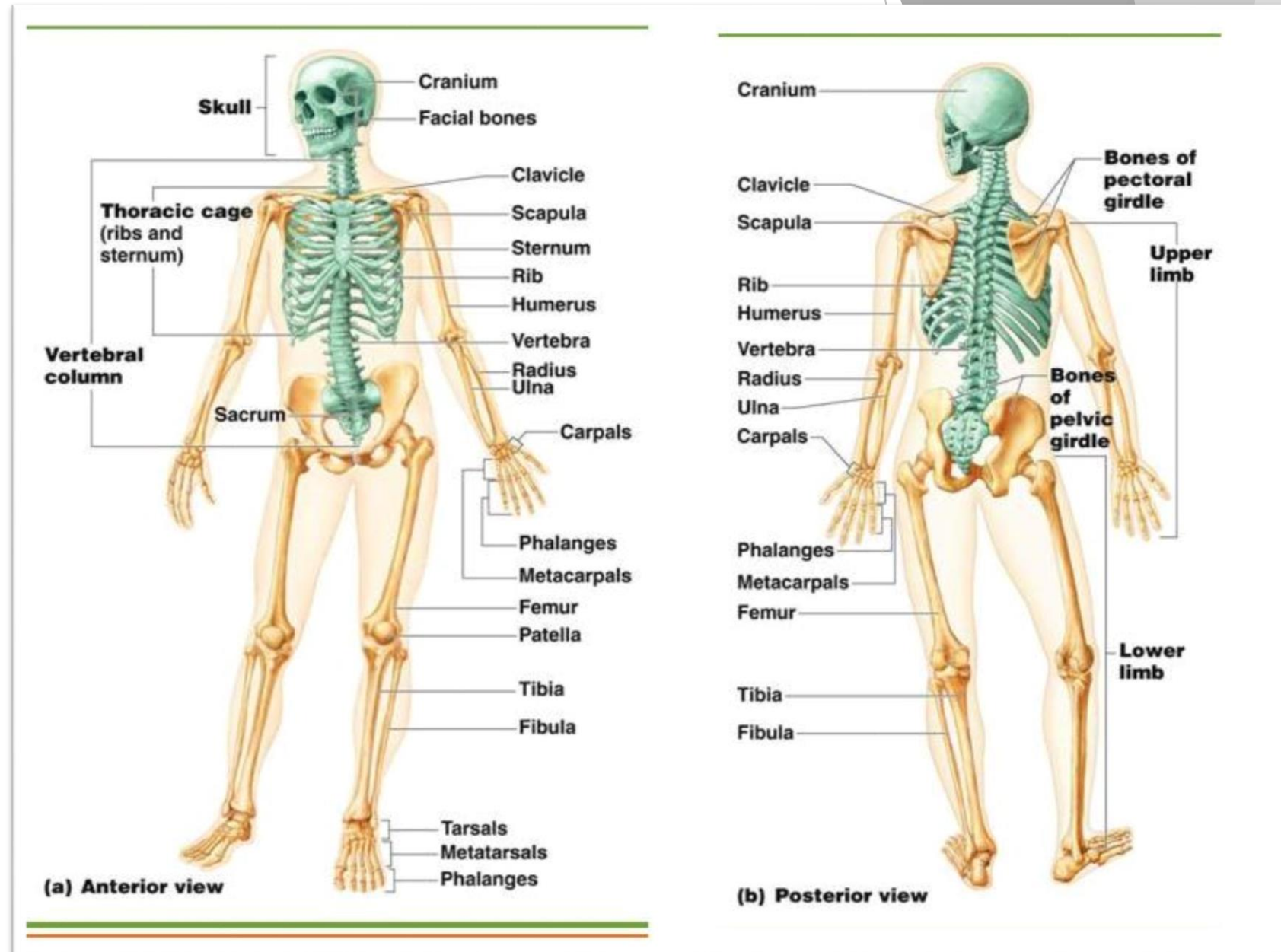


<http://www.hipkneespecialist.co.uk/foot-ankle-examination-gp-education.html>

# 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

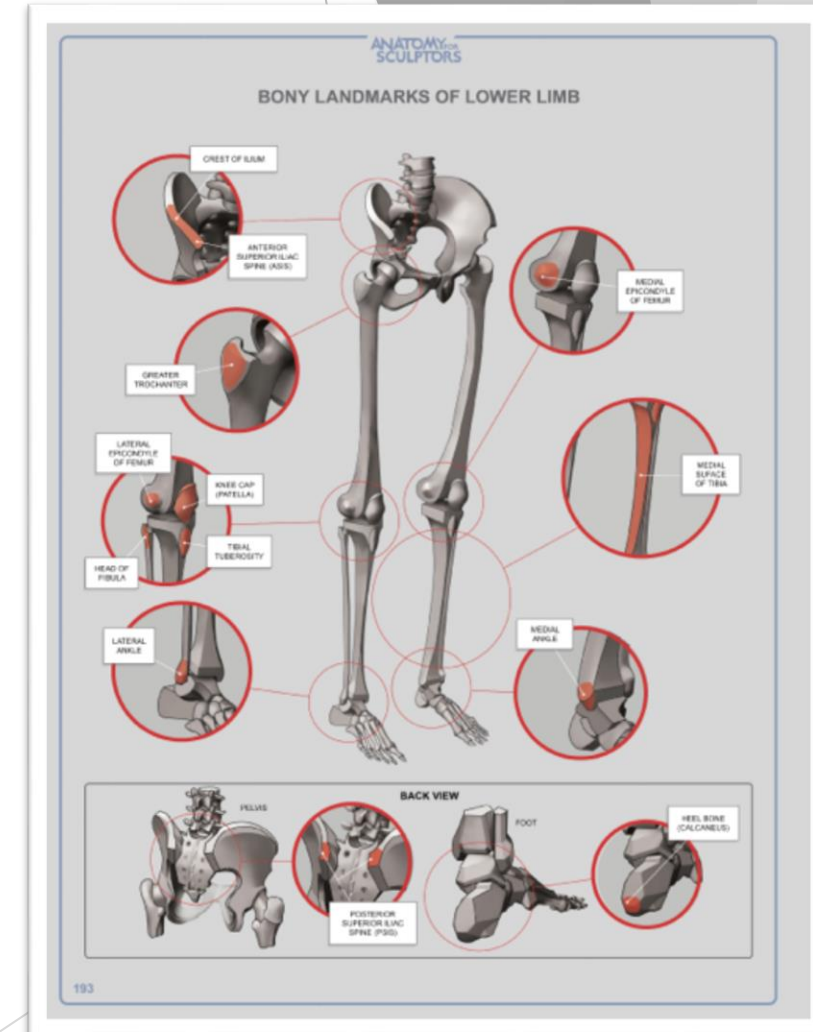
**Head** - head of a bone is the proximal end

**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

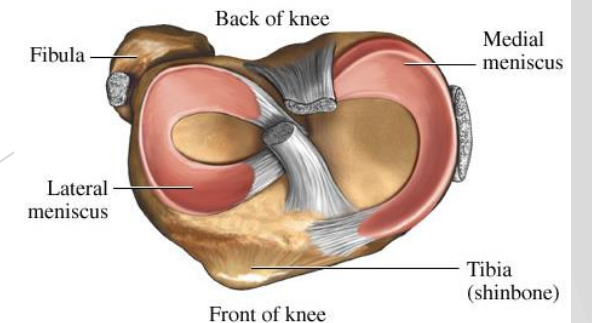
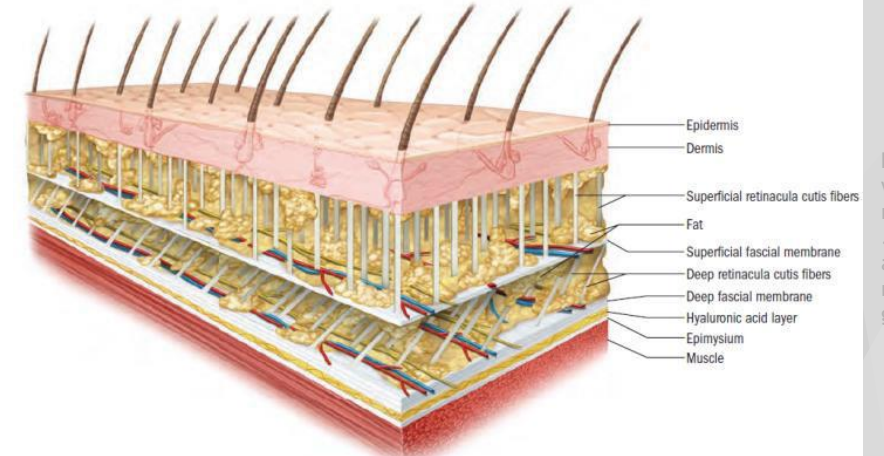
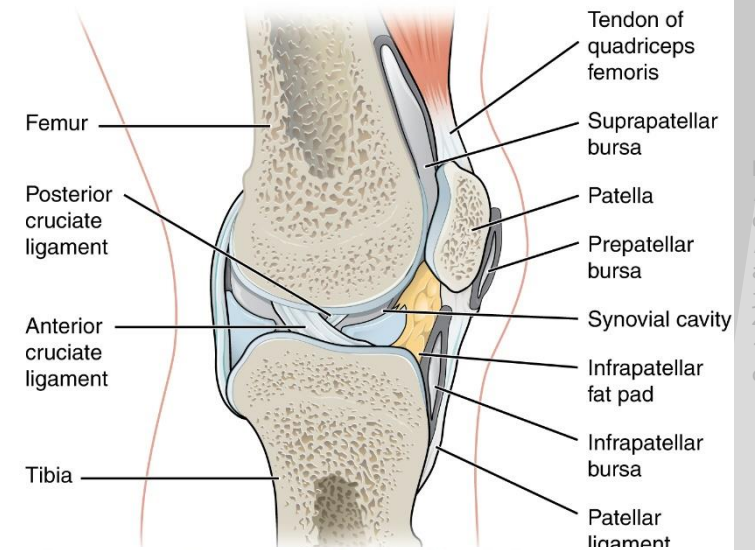
- ▶ Sacs containing synovial fluid which serve to reduce friction, and act as cushions between structures that move against each other
- ▶ They are found between muscles, or in places where tendons pass over bone
  - ▶ Tendon sheaths are bursae which wrap around tendons

## 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/spotlight-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

- Osteopenia** - a loss of bone mass to an abnormally low level (Osteoporosis and osteomalacia are types of osteopenia)
- Ankylosis** - an abnormal stiffness in a joint caused by injury or disease. It is often the result of rheumatoid arthritis
- Anthralgia** - refers to pain in a joint
- Osteochondritis** - the inflammation of bone and cartilage
- 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)
- Osteogenesis** - refers to the formation of bones

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



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



<http://www.britannica.com/EBchecked/topic/434286/osteogenesis-imperfecta-01>

<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.

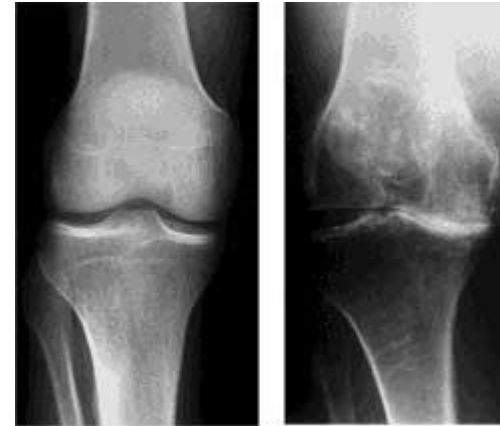
## 19. Osteoarthritis

- ▶ 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

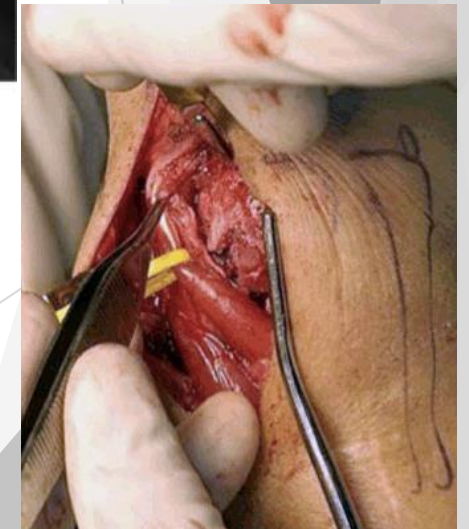
- ▶ The process of surgically opening a joint by an incision
- ▶ A arthrotomy can be done as a therapeutic measure, or as part of a larger procedure
  - Example: a total knee arthroplasty, an arthrotomy is made to give the surgeon access to the joint surfaces to be replaced

<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

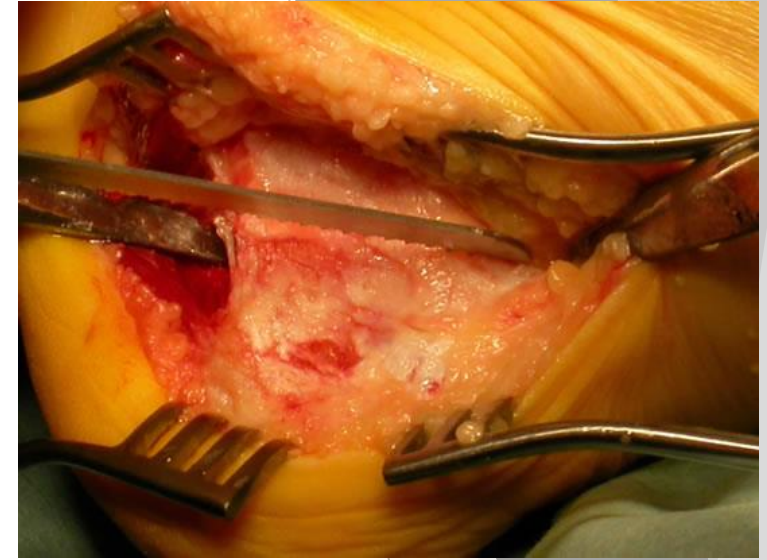
## 25. Myotomy - incision of the muscle

## 26. Neurotomy - incision of a nerve

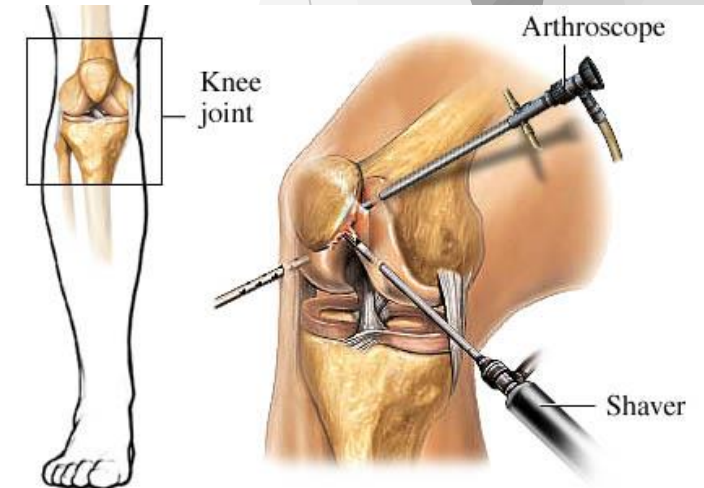
## 27. Osteomy - cutting of a bone

## 28. Tenotomy - incision of tendon

## 29. Arthrectomy - excision of a bone



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



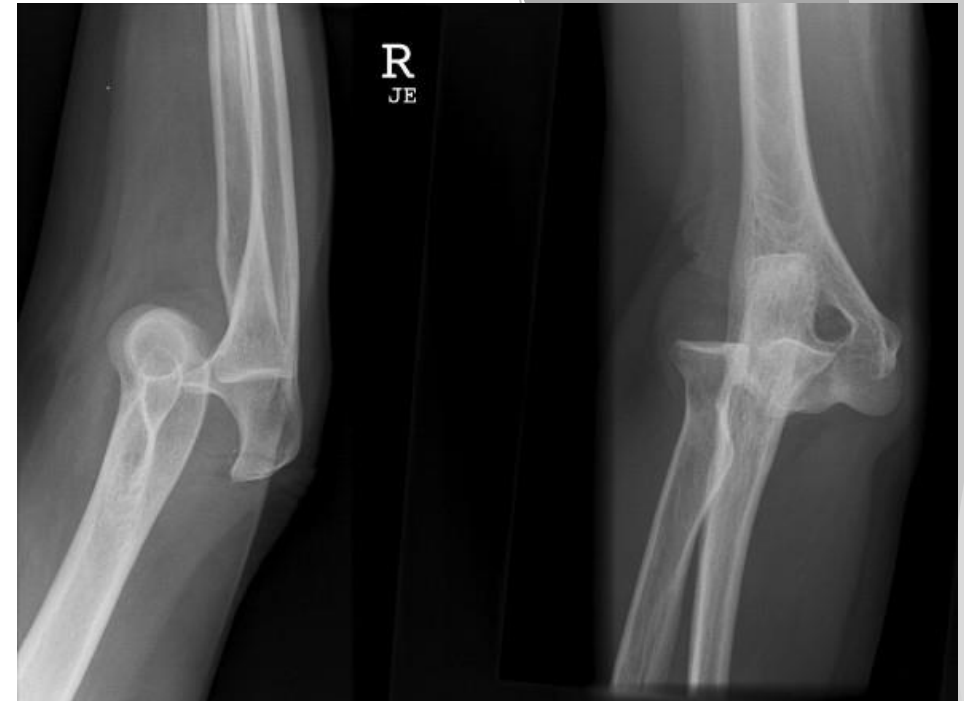
# Other Terminology

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/>

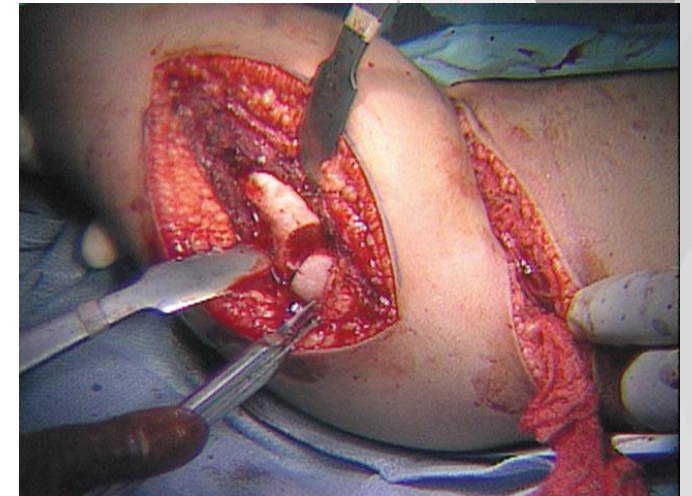


<http://www.learningradiology.com/archives/2008/COW%20302-Extension%20Teardrop%20Fx/aasubluxationbox.html>

# 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

## 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

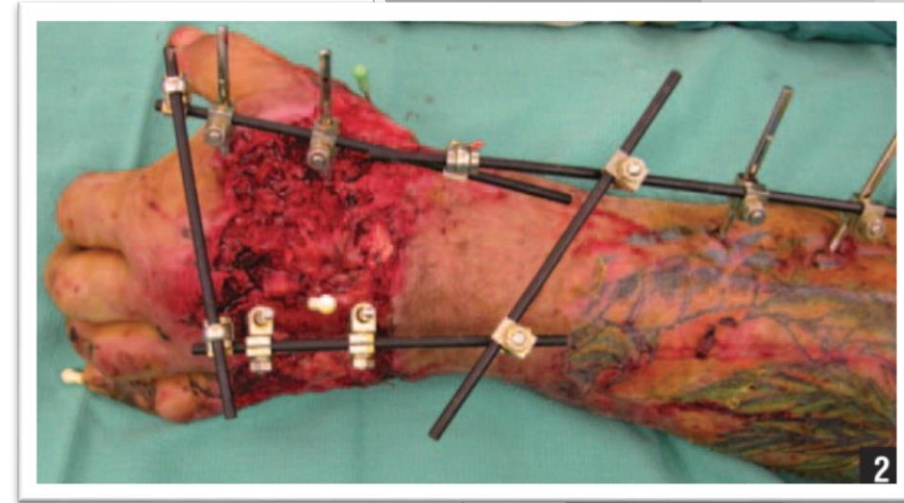
- ▶ The separation of the edges of a wound
- ▶ This is sometimes a complication of surgery that occurs as a result of poor wound healing
  - Risk factors for dehiscence include diabetes, obesity, and advanced age

## 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://invisiblemikey.wordpress.com/2010/04/08/tales-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

