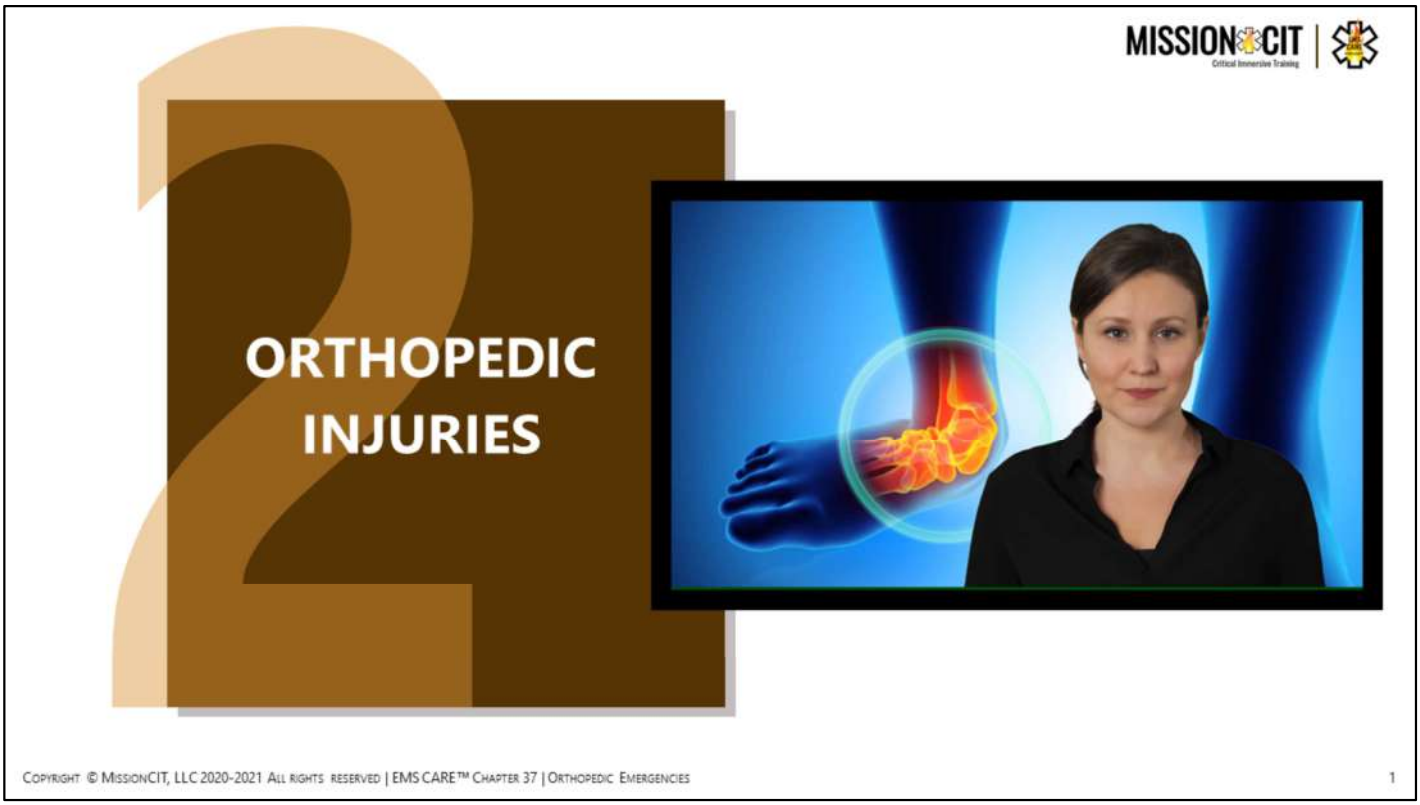
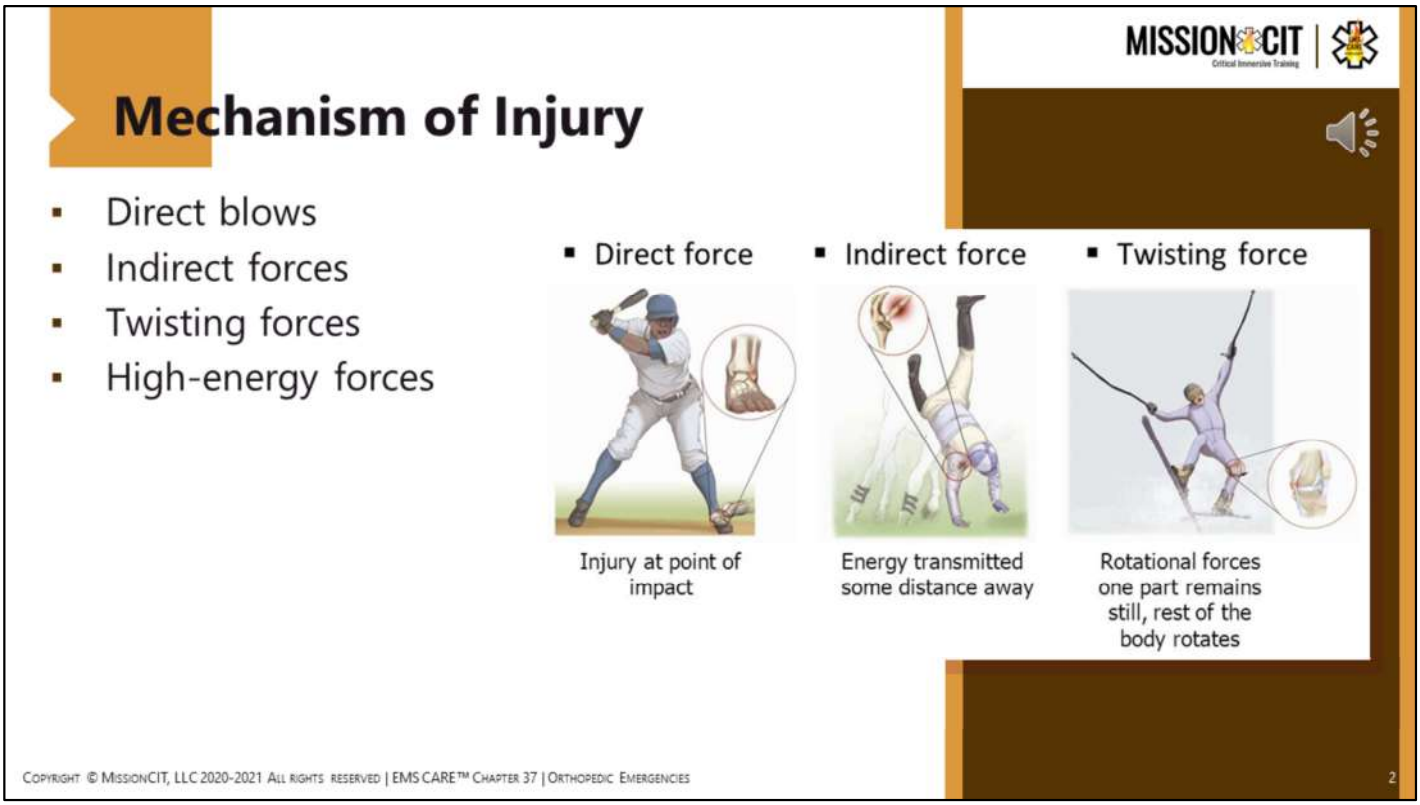


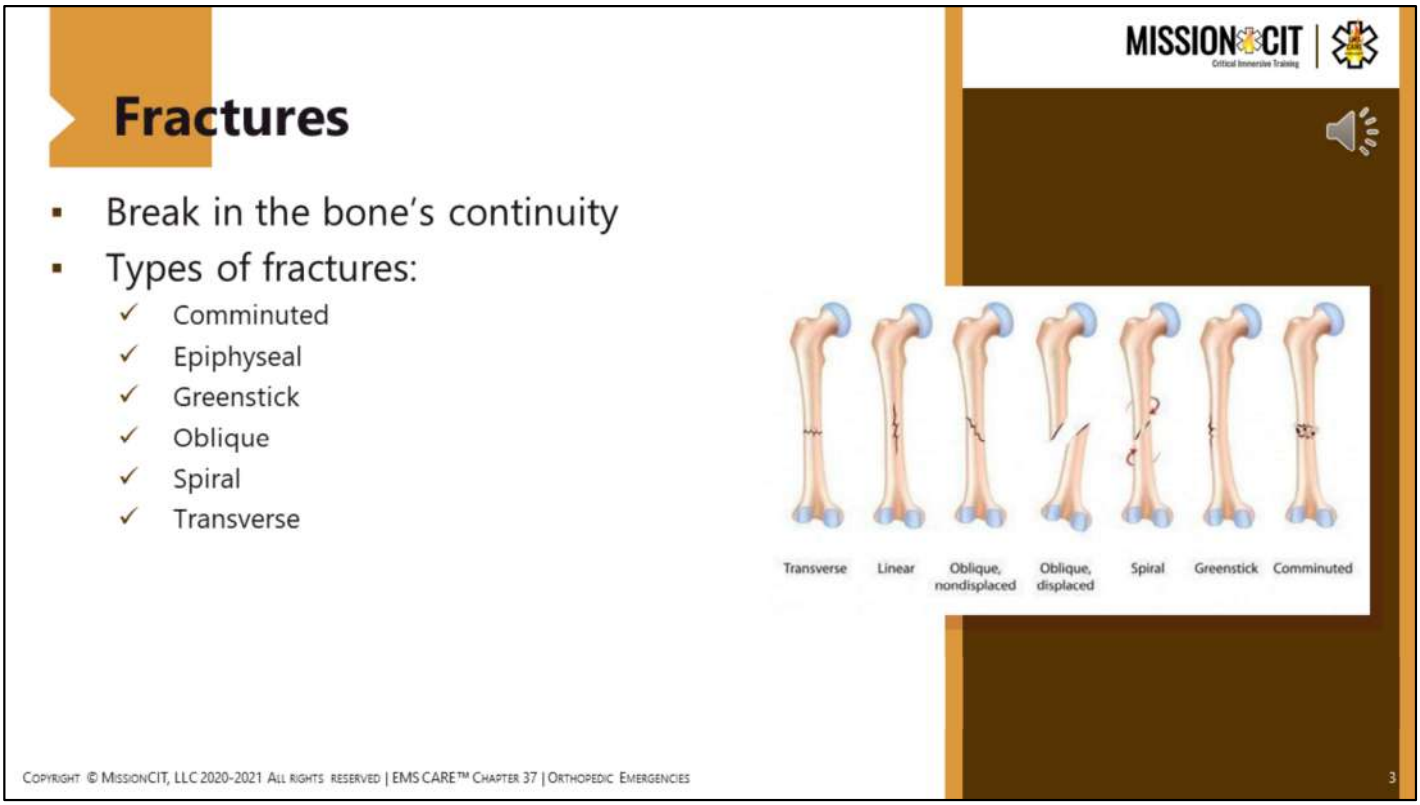
Thank you, Justin!

Welcome to this lesson where we talk about the different orthopedic injuries, their mechanism of injury, and the signs and symptoms you must watch out for.



A significant force is often a prerequisite for fractures and dislocations. This force can be divided into four types, and they are:

- Direct blows, where the force is transferred directly to the site of injury. For example, an injury due to being hit by a baseball bat.
- Indirect forces, where the force strikes one part of the body, and this is transferred to another part. For example, when a person falls from a certain height, the impact on his legs is transferred to the pelvic girdle and can result in pelvic fracture.
- Twisting forces, where one end of the bone is held in place and the other end is twisted. For example, a runner who suffers an ankle twist due to running on an uneven surface.
- High-energy forces, where the intensity of the force is high, thereby resulting in injuries at multiple places.



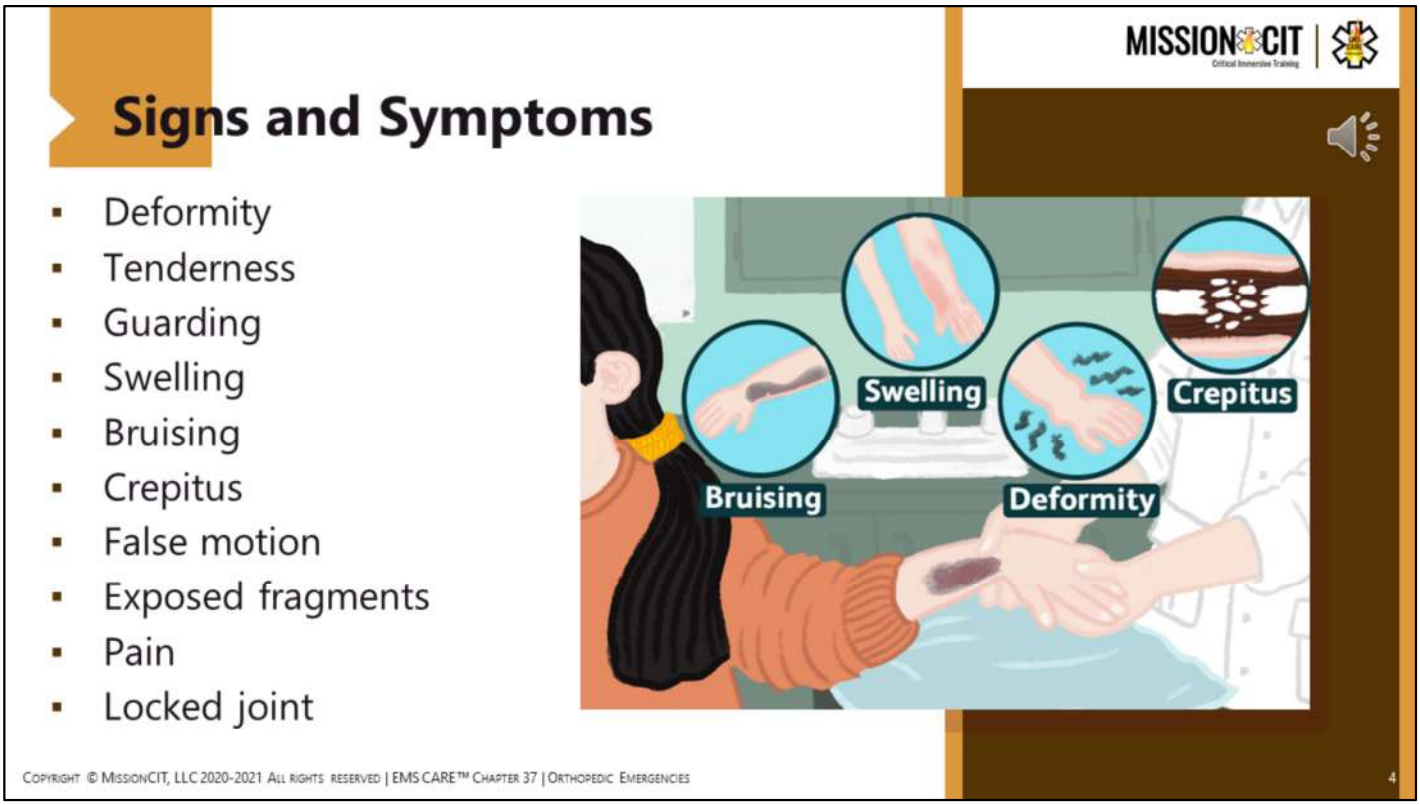
Fractures are a break in the bone's continuity, and they can be classified as open or closed. Always treat any injury that breaks the skin as an open fracture.

Also, fractures can be displaced or non-displaced. As the name suggests, a non-displaced fracture is a simple crack of the bone while a displaced fracture produces deformity of the limb by shortening, angulating, or rotating it.

Fractures can also be of the following types.

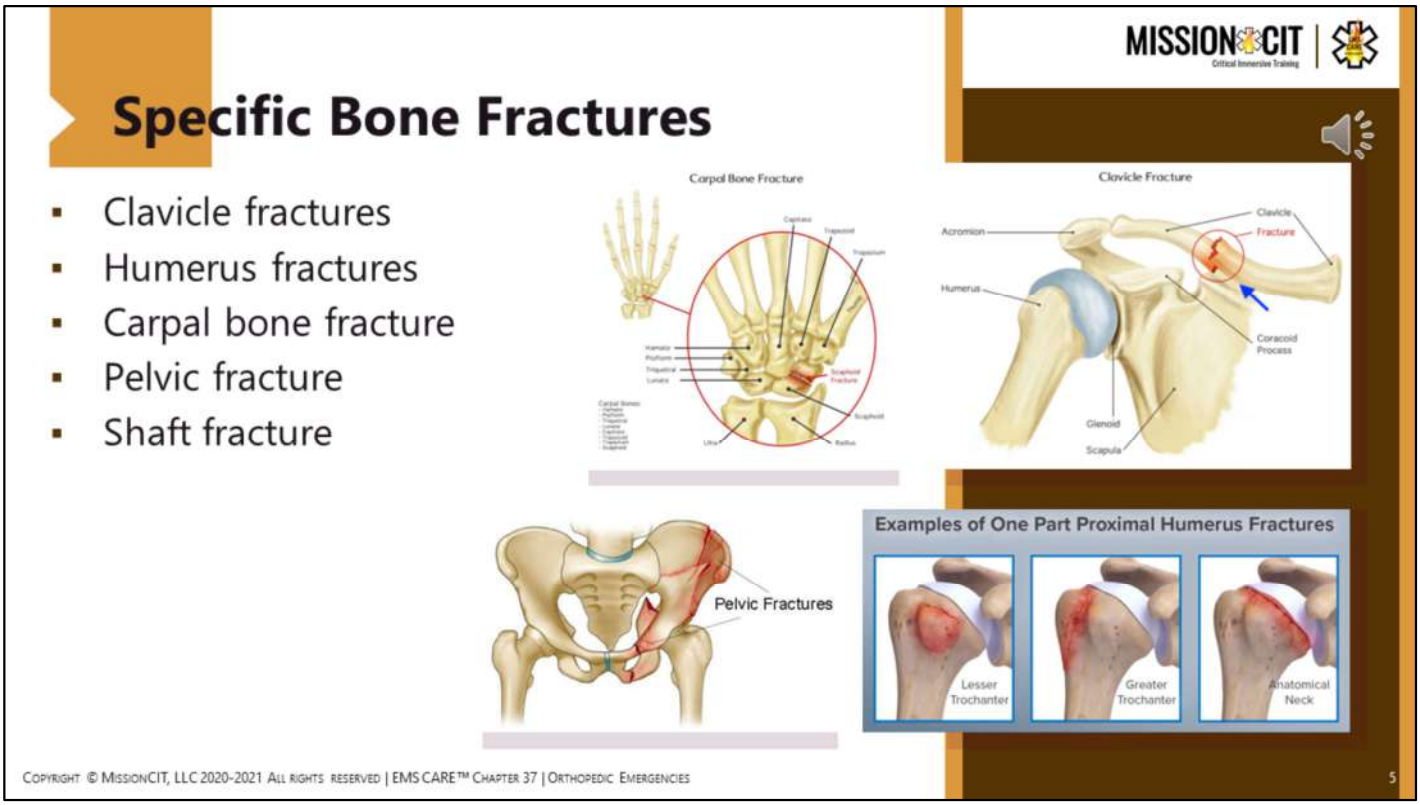
- Comminuted fractures, where the bones are shattered into three or more pieces.
- Epiphyseal or growth plate fractures occur in children. In these fractures, the growth plate that is located between the middle and end of the long bones are impacted.
- Greenstick fractures are partial-thickness fractures where only the cortex and periosteum are interrupted on one side of the bone but remain uninterrupted on the other. They occur most often in long bones, including the fibula, tibia, ulna, radius, humerus, and clavicle.
- Oblique fractures have an angled pattern.
- Spiral fractures are complete fractures of long bones that result from a rotational force applied to the bone. Spiral fractures are usually the result of high-energy trauma and are likely to be associated with displacement.

- Transverse fractures have a horizontal breakage line.



Some of the signs and symptoms that indicate fracture are:

- Deformity
- Tenderness
- Guarding
- Swelling
- Bruising
- Crepitus, which is the grinding, creaking, or crunching sound that occurs when a patient moves the joints
- False motion
- Exposed fragments
- Pain, and
- Locked joint



Clavicle fractures are common, and in this injury, the patient will report shoulder pain and will tend to hold the arm across the body. While scapula fractures are less common, they occur because of a forceful direct blow of the neck that can lead to chest injuries as well.

Fractures of the humerus occur proximally, in the midshaft, or distally at the elbow. Consider applying traction first to align the fragments. Distal fractures of the humerus are more common in children and the fracture fragments can rotate significantly, producing deformity and even causing injury to the nearby vessels and nerves.

This can also occur in athletes, where the ulna and the radius are more likely to get displaced. Fractures of the ulna are often associated with lacerations and abrasions and in this injury, the patient can't extend the elbow. In the case of radial fractures, it occurs from a fall on an outstretched arm or as a direct blow to the lateral aspect of the elbow. Any attempt to rotate the wrist or elbow can cause discomfort. Most times, the ulna and radius break at the same time.

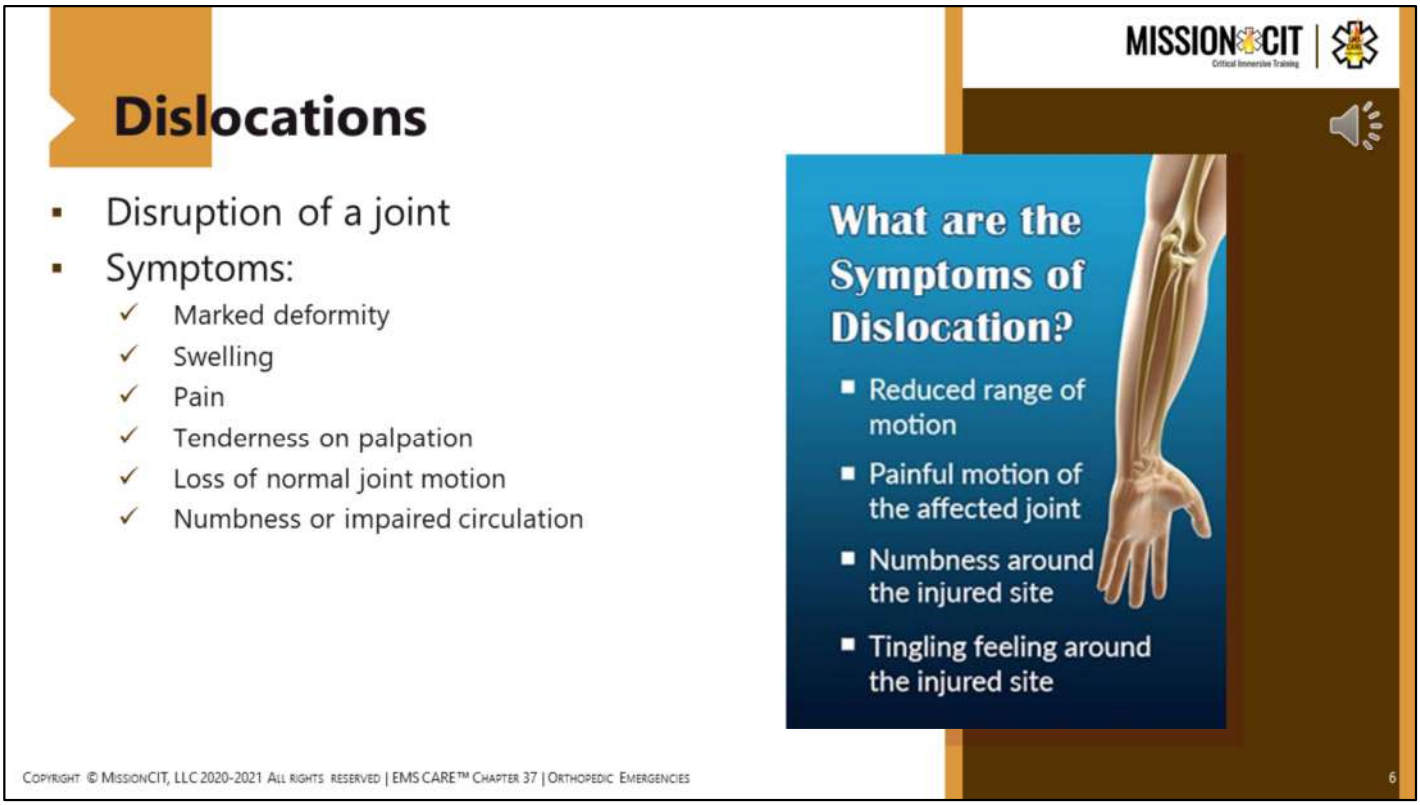
Non-displaced fracture of a carpal bone on the wrist is common as well and it can even cause some dislocations. Any of these injuries must be inspected and evaluated in the emergency department.

Pelvic fractures are also common and result from direct compression in the form of a heavy blow. It can be accompanied by intense blood loss. Suspect this injury if a patient complains of intense pain in the abdomen or lower back area.

Moving on, fractures of the proximal femur can occur in the intertrochanteric region or across the proximal shaft of the femur. In these injuries, the patient will display classic signs of deformity, where the injured limb will be shorter than the uninjured one. They will also tend to lie with the leg externally rotated.

These fractures can occur in any part of the shaft, and they tend to be open, thereby resulting in heavy blood loss. Be on the lookout for penetrations by bone fragments, so periodically assess the distal neurovascular system. Cover the wound with a dry and sterile dressing.

In all these fractures, assess the pulse, and check the motor and sensory function. Splint the area and transport.



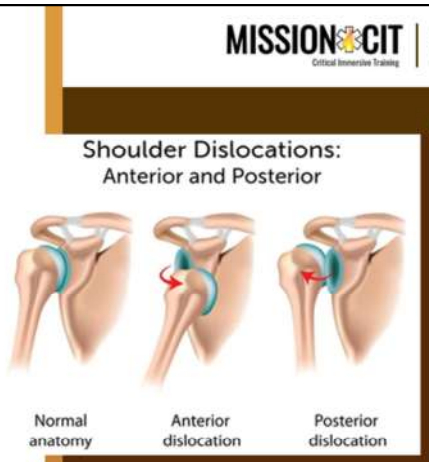
Dislocation is the disruption of a joint in which a bone end. As a result, there is no more contact between the bone and the joint.

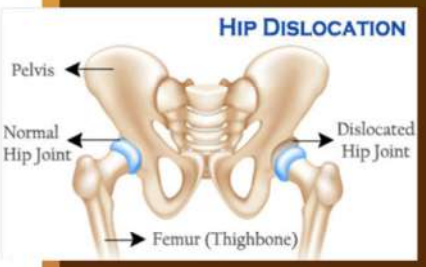
Some of the signs and symptoms that point to dislocation are:

- Marked deformity
- Swelling
- Pain that is aggravated by any movement
- Tenderness on palpation
- Loss of normal joint motion
- Numbness or impaired circulation

Shoulder and Hip Dislocations

- Hip dislocation:
  - ✓ Significant
  - ✓ Sciatic nerve affected
- Shoulder dislocation:
  - ✓ Humerus head dislocation
  - ✓ Painful
  - ✓ Hard to stabilize

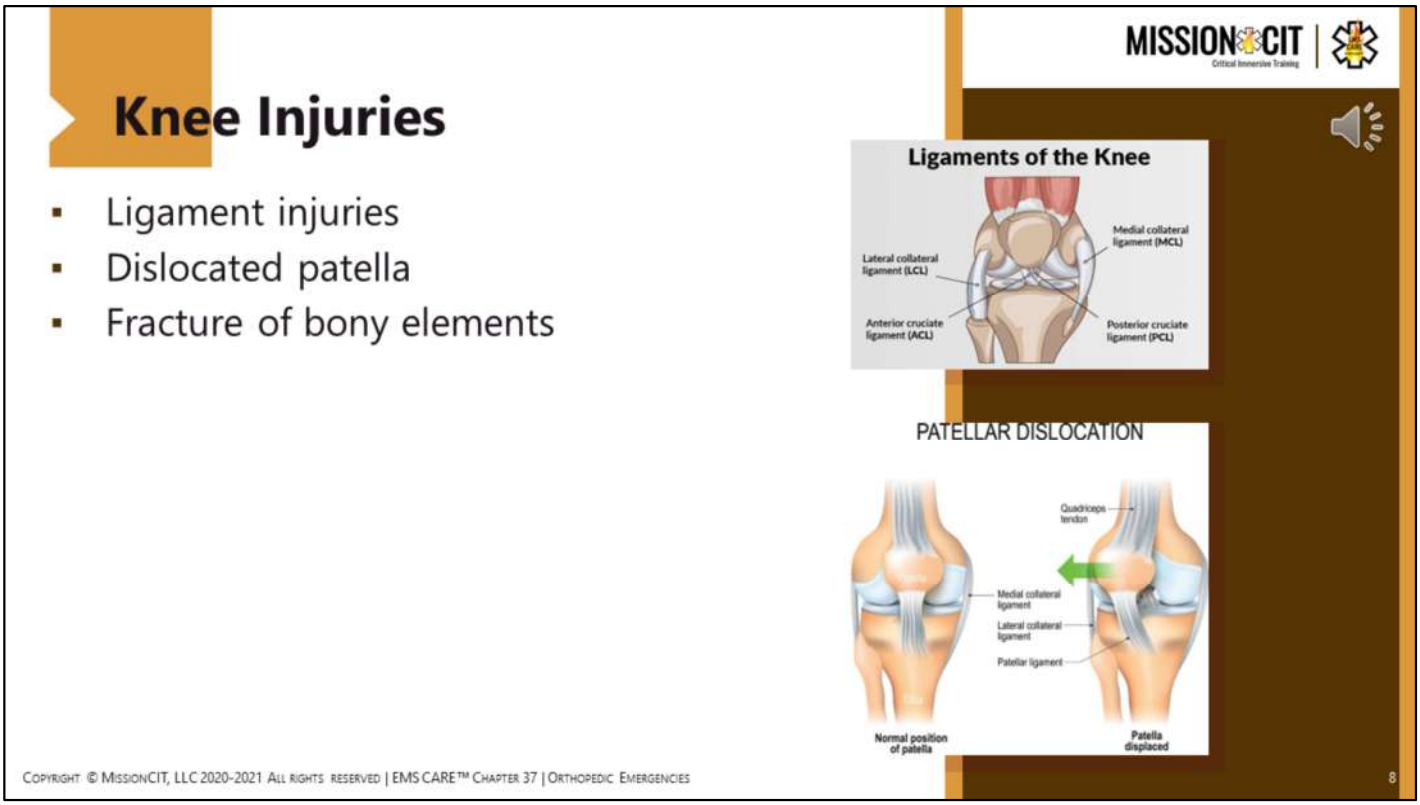




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Hip dislocations indicate a significant injury and most of them tend to be posterior, thereby affecting the sciatic nerve. Hip dislocations are distinctive and if you suspect this injury, never attempt to reduce the dislocated hip in the field.

In shoulder dislocations, you're likely to see the humeral head dislocate anteriorly. These dislocations can be painful, and stabilization is also difficult as any attempt to bring the arm towards the chest wall results in intense pain. Your best bet here is to splint the joint in a comfortable position.



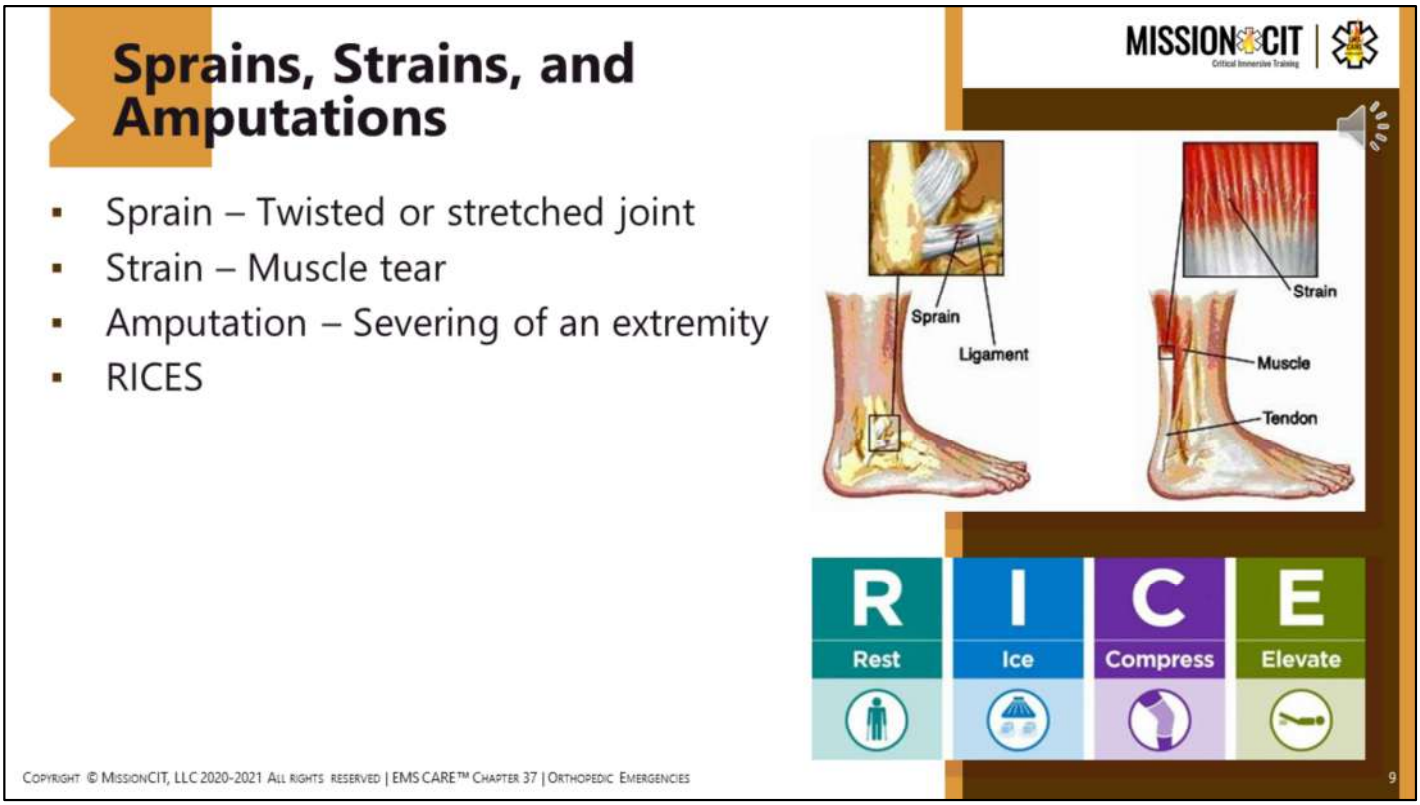
There are many types of knee injuries, and they are:

- Ligament injuries
- Dislocated patella
- Fracture of bony elements

Fractures occur from direct trauma to the front part of the knee such as a fall or a motor vehicle crash. If there are more than two pieces of bones, the patient can't straighten the knee. In young children, these fractures are mostly due to high-energy mechanisms, but in seniors, it can occur even with ground-level falls as their bones tend to be less dense.

As for ligament injuries, the Anterior Cruciate Ligament (ACL) injury is the most common. It can occur in high-contact sports like football or when a person is pivoting or moving with a heavy weight. Significant swelling occurs and can lead to functional impairment. It can also impact other associated structures.

Finally, the patella can get dislocated when an injury forces two bones to move away from normal contact with each other. These dislocations typically affect young people, especially active athletes. They are visible as the patella would have moved to the lateral side.



A sprain occurs when a joint is twisted or stretched beyond its normal range of motion. It can be mild or severe, with the most vulnerable joints being knees, shoulders, and ankles.

In most situations, the alignment returns to a fairly normal position. But there could be a visible swelling and intense pain in the joint area.

A strain, on the other hand, is a stretching or tearing of muscle and it causes pain, swelling, and bruising of the soft tissues in the area. Often, there is no deformity, but just a minor swelling at the site of the injury.

Finally, an amputation is an injury in which an extremity is completely severed from the body. These injuries can damage every aspect of the musculoskeletal system.

The best way to treat strains and sprains is the acronym RICES that stands for:

- Rest
- Ice
- Compression
- Elevation
- Splinting

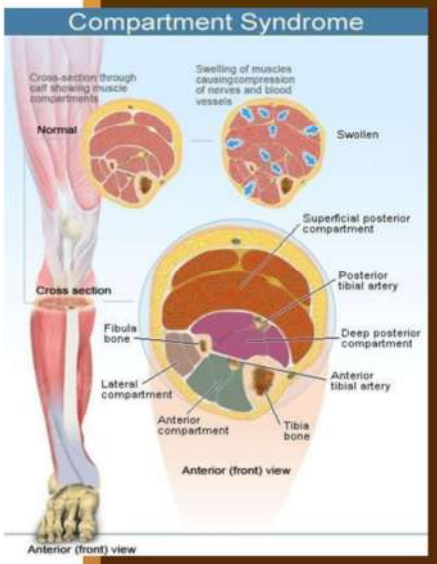
As for amputations, surgeons can reattach the amputated parts, so make sure they are

transported along with the patient. Never sever partial amputations and control the associated bleeding from the stump. Apply a tourniquet if needed.

In the case of a complete amputation, wrap the clean part in a sterile dressing, and place it in a plastic bag.

Compartment Syndrome

- Fractured tibia or forearm
- Common in children
- Cellular damage possible
- Splint the affected limb
- Assess vitals
- Transport



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A compartment syndrome occurs with a fractured tibia or forearm and is more common in children than adults. It develops six to twelve hours after the injury and is a result of excess bleeding, a severely crushed extremity, and the rapid return of blood to an ischemic limb.

Over time, the pressure and swelling will become so severe that the body will not be able to perfuse the tissues against pressure. Soon, cellular damage occurs leading to more swelling. There is also a chance for the limb to be lost unless pressure is relieved immediately in a hospital setting.

If you think the patient is suffering from compartment syndrome, splint the affected limb and keep it around the heart level. Assess neurovascular status and assess the vitals frequently, especially if transporting the patient.



Fractures of the tibia and femur are common as well. They can occur at any point between the knee and ankle joint, and many times, both the bones are fractured together.

Similarly, ankle injuries are also common and range from a simple sprain to a severe fracture or dislocation. Any ankle injury that produces pain, swelling, or localized tenderness must be evaluated by a physician.

Foot injuries can result in the fracture or dislocation of one or more of the tarsals, metatarsals, or phalanges. In these injuries, the force of the injury is transmitted to the spine.

If you notice any open wounds, dress them right away. Check for distal pulse and apply traction or a splint as needed. Always make sure you leave the toes exposed.



While orthopedic injuries are not life-threatening, they can lead to systemic changes or illnesses. The likelihood of a complication depends on the strength of the force that caused an injury, the location of the injury, and the patient's overall health.

In the case of an open fracture, the priority is to prevent infections to the open wound.

Since these injuries can also lead to long-term disability, it's important to take the following precautions.

- Prevent further injury
- Reduce the risk of wound infection
- Minimize pain with cold and analgesia
- Transport to an appropriate medical facility

To know more about your role in an orthopedic injury, Justin will take you through the next lesson.