Seattle-King County EMS

Seattle-King County Emergency Medical Services Division
Public Health - Seattle/King County
401 5th Avenue, Suite 1200
Seattle, WA 98104
(206) 296-4863

January 2008

CBT/OTEP 302

# Orthopedic Injuries

Print version of EMS Online Course
www.emsonline.net

## Introduction

The skeletal system is a complex structure of bones and connective tissue. It provides the shape and form for our bodies, protects internal organs, allows bodily movement, produces blood, and stores minerals. This course will refresh your knowledge of these structures and injuries that can occur to them.

### Before You Begin

This is a continuing education and recertification course for EMTs. It covers fundamental EMT-Basic concepts and terminology as well as advanced material. We highly recommend completing the practice exam before completing the exam.

We also recommend that you review EMT textbook chapters covering orthopedic emergencies as a refresher before taking the exam; for example: Chapter 27 - Chest Injuries and Chapter 29 - Musculoskeletal Care in *Emergency Care and Transportation of the Sick and Injured*, 9th edition (AAOS).

### Practical Skills

To receive CBT or OTEP credit for this course a trained skills evaluator must evaluate your ability to perform the following hands-on practical skills including:

- Traction splinting
- Splinting
- Treatment of shock

### Objectives

CBT302 is an EMT continuing education and recertification course. After completing this course you will be able to:

1. Identify the structures of the skeletal system.
2. Identify the definition of perfusion.
3. Identify signs and symptoms of shock.
4. Identify the four components required for adequate perfusion.
5. Demonstrate an understanding of the physiology of shock.
6. Identify prehospital treatment for shock.
7. Identify the characteristic injuries of specific bones.
8. Identify proper application of the principles of splinting

## Terms

Terms You Should Know

compensated shock – The early stages of shock in which the body is able to compensate for blood loss or injury.

crepitus - Grating or grinding sensation caused by fractured bone ends or joints rubbing together. It also can be caused by rubbing of irregular cartilage tissue or scar tissue.

dislocation - Disruption of a joint in which ligaments are damaged and the bone ends are completely displaced.

distal - The more distant of two or more structures.

hypotension - Blood pressure that is lower than the normal range--generally a systolic blood pressure less than 90 mmHg in an appropriate clinical setting.

hypoxia - Condition in which the body tissues and cells do not have enough oxygen.

ligament - A band of fibrous tissue joining two bones together in a joint.

perfusion - Circulation of blood within an organ or tissue in adequate amounts to meet cellular needs.

proximal – Nearer to a point of reference such as a point of attachment or the midline of the body.

sprain - Joint injury in which there is some partial or temporary dislocation of the bone ends and partial stretching or tearing of the supporting ligaments.

strain - A stretching or tearing of the muscle, causing pain, swelling, and bruising of the soft tissue in the area. Also called a "pulled muscle."

tendon - Extension of a skeletal muscle that connects the muscle to bone.

New Terms

compartment syndrome - Elevation of pressure within the fibrous tissue that surrounds and supports muscles and neurovascular structures, characterized by extreme pain, pain on movement, pulselessness, and pallor. It is most frequently seen in fractures below the elbow or knee.

fascia - Sheets or bands of fibrous connective tissue that lie deep under the skin forming the outer layer of a muscle.

osteoporosis - Generalized degenerative bone disease common among postmenopausal women in which there is a reduction of bone mass making the bones fragile and susceptible to injury.

point tenderness - Tenderness sharply localized at the site of the injury. Found by gently palpating along the bone with the tip of one finger.

## Bones

Bone is a specialized form of connective tissue that is very strong and yet resilient. Bones produce blood cells and store important minerals, and electrolytes. The human skeleton, made up of 206 bones, supports the body and protects our internal organs.

Bones and muscles work together to create movement. Muscles are attached to bones by tendons. Tendons are an extension of the fascia that cover all skeletal muscles.

Fascia are sheets or bands of tough, fibrous connective tissue that lie deep under the skin. They form an outer layer of the muscles. These structures are supplied with arteries, veins, and nerves.

A joint is the location where two bones come together. Some joints are immovable, such as those between the bones of the skull. Some joints are slightly movable, such as those in the front of the pelvis. Others are movable, for example, the elbow and knee.

Elaboration – Types of Cartilage

Immovable joints are held together by a strong, fibrous cartilage. Slightly movable joints are held together by an elastic cartilage. Movable joints consist of a layer of fibrous cartilage connected to ligaments that support the bones. The bone ends of movable joints are covered with smooth cartilage and are lubricated by synovial fluid.

## Perfusion

The cells of the body require a constant supply of oxygen and nutrients. Cells also must eliminate waste products such as carbon dioxide and metabolic acids. These functions are provided by the circulatory, respiratory, and gastrointestinal systems.

The body depends on four things to maintain adequate perfusion: a pump (heart) to move blood throughout the tissues, pipes (which are the blood vessels) to transport materials to the cells, fluids (adequate blood volume), and oxygen (adequate oxygenation).

Traumatic injuries can impact any of these four components thereby reducing perfusion. The result is shock.

## Shock

Shock is a life-threatening condition that develops when the circulatory system cannot deliver sufficient blood to the body's tissues. There are many causes including blood loss, cardiac failure, respiratory failure, or spinal cord injury. The common factor in all types of shock is inadequate perfusion.

Shock is characterized by reduced cardiac output, a rapid heart rate, and circulatory insufficiency. Specific signs and symptoms include:

- Anxiety
- Altered LOC
- Delayed capillary refill
- Weak, thready, or absent peripheral pulses
- Pale, cool, clammy skin
- Increased pulse rate (an early sign)
- Decreased blood pressure (a late sign)

If inadequate perfusion continues, organ failure, and death eventually will occur.

Elaboration – Shock

Shock is defined as inadequate tissue perfusion. In other words, the cells and organs of the body are not getting enough oxygenated blood. If there is not enough oxygenated blood, there will not be enough oxygen and nutrients for cellular needs. Adequate perfusion also is required to remove acids and other waste products produced by the cells. The causes of acute shock include:

- Pump failure (e.g., AMI)
- Pipe dilation (e.g., spinal cord injury or allergic reaction)
- Blood or body fluid loss (e.g., trauma, GI bleed or dehydration)
- Lack of oxygen (e.g., drowning, strangulation or CHF with pulmonary edema)

Peripheral perfusion is drastically reduced when there is a reduction in circulating blood volume. Trauma patients develop shock from internal and external blood loss This is referred to as hypovolemic or hemorrhagic shock.

## Clavicle

The clavicle, or collarbone, is a commonly fractured bone. A fracture of the clavicle usually results from a fall. It is sometimes the result of a direct blow.

Someone with a fractured clavicle will complain of shoulder pain and attempt to guard the injured shoulder by holding the affected arm across the chest. Pain, swelling, and point tenderness over the clavicle are signs of a fracture. It is difficult to determine if a clavicle is fractured without an x-ray since a separation at the acromio-clavicular joint can resemble a clavicle fracture.

A fractured clavicle is a serious injury because the bone is positioned over major arteries, veins, and nerves. When fractured, it can cause nerve and muscular damage. Treatment for clavicle injuries includes application of a sling and swathe and evaluation by a physician.

## Scapula

The scapula, also called the shoulder blade, is less often injured due to its location and protection by large muscles. This fan-shaped bone is hard to crack. Fractures usually occur from a direct blow, for example, a baseball bat striking the back.

Fractures of the scapula usually are the result of significant trauma to the back. Injury to the chest cavity and its components (e.g., the heart and lungs) can accompany an injured scapula. Examine the chest for evidence of other injuries and assess the patient's ability to breathe and auscultate breath sounds.

## Shoulder

The shoulder joint is the junction between the humerus and the scapula. It is a remarkably complex joint. It allows us to do many things like throw a ball, cradle a baby or scratch your back. Because of its complexity the shoulder is easily injured.

A common injury is a shoulder dislocation. The shoulder is the most commonly dislocated joint. Usually, the humeral head will dislocate anteriorly. Posterior dislocations can happen but are much less common.

A shoulder dislocation is very painful and a patient will exhibit aggressive guarding by holding the affected extremity away from the body. You usually can observe the injury by the deformity of the shoulder and the mechanism of injury.

Treatment for a shoulder dislocation includes application of a sling and swathe and evaluation by a physician.

## Humerus

The humerus can be fractured at the midshaft, elbow or shoulder. Midshaft fractures are seen more often in the young and as a result of direct trauma. Fractures of the proximal humerus are common in elderly patients who have fallen.

Elaboration — Compartment Syndrome

Compartment syndrome is an elevation of pressure within the fibrous tissue that surrounds and supports muscles and neurovascular structures. It is characterized by extreme pain, pain on movement, pulselessness, and pallor. Fractures of the forearm or lower leg are the most common injuries that cause compartment syndrome.

## Elbow

Elbow fractures occur as a result of a direct force or twisting of the arm. Fortunately, elbow dislocations are rare—they are very serious injuries. Dislocations often lead to nerve and vascular damage.

A dislocation of the elbow makes the olecranon process of the ulna much more prominent. The joint is usually locked with the forearm moderately flexed on the arm. This position makes any movement extremely painful. There is often swelling, significant pain, and the potential for vessel and nerve damage.

Treatment includes either sling and swathe or splinting in place depending on the situation.

## Forearm

Fractures of the radius and ulna are common. They can occur as a result of a fall on an outstretched arm, excessive twisting, or from a direct blow.

A fracture of the distal radius is sometimes called a Colles or "silver fork" fracture. This type of fracture can occur in the growth plate and cause future complications in children.

## Wrist and Hand

Fractures of the hand and wrist are common and usually the result of a fall or direct blow. Falls on an outstretched hand can crack the scaphoid bone at the base of the thumb. A fistfight can fracture the fourth or fifth metacarpal. Excessive force can dislocate fingers or a thumb.

Immobilize hand and wrist injuries with a rigid splint. The wrist and hand contain many small bones and ligaments and most injuries will require examination by a physician.

## Pelvis

Pelvic fractures often result from motor vehicle or pedestrian accidents or falling from a height. Pelvic fractures in the elderly can occur simply by falling. There are vital blood vessels and nerves passing near the pelvis and femur as well as organs in the pelvic area (e.g., the bowel, bladder, and uterus). Therefore, injuries to this region can be very serious.

Sometimes an indirect force may be transferred through the femur and hip, causing a pelvic fracture.

Because major blood vessels located in the pelvic cavity are susceptible to further injury, splint and immobilize all suspected pelvic fractures as quickly as possible to prevent further blood loss. Stabilize the patient on a backboard and anticipate the development of shock.

## Hip Dislocation

The head and neck of the femur, along with the greater trochanter, meet the pelvis to form the hip. The hip joint is a ball-and-socket joint that is quite strong, thus hip dislocations are rare although they are an extremely serious injury.

Dislocations of the hip can damage large vessels and nerves. Perhaps the most common cause of hip dislocations is motor vehicle accidents. As the knee strikes the dashboard the femur can dislocate backwards (posteriorily). With posterior hip dislocations the leg is shortened and rotated internally. With anterior dislocations the leg is lengthened and externally rotated.

Treatment includes splinting the extremity in the position it is found. Do not attempt to reduce a hip dislocation.

## Femur (Hip Fractures)

Fractures of the proximal femur, also called "hip" fractures, are the most common femoral fractures, especially in the geriatric population. Osteoporosis and reduced muscle mass contribute to the high incidence of this type of fracture. A break usually occurs at the neck or across the proximal shaft.

Hip fractures typically cause the patient's leg to rotate externally. The leg is also shortened. Falls are the most common reason for this type of fracture. A fractured femur can lead to the loss of a moderate amount of blood. Therefore, you should monitor for signs of shock. Follow these steps when caring for a suspected hip fracture:

- Check for other injuries (e.g., c-spine or head injury)
- Use a scoop stretcher to move patient to a padded backboard or stretcher
- Keep the patient warm
- Treat the patient gently and minimize movement
- Immobilize the injured leg in place, if possible
- Pad generously to immobilize the femur (including between the legs)
- Carefully move the patient to a stretcher or backboard (with a scoop stretcher, if available)

Elaboration – Treatment of Hip Fracture

First, assess the patient and immobilize the spine if the mechanism of injury indicates. If there is no reason to suspect a cervical spine injury, a c-collar is not

necessary (for example, a fall from a standing position onto the hip with no trauma to the head).

In most cases, splint the fracture without repositioning the leg:

- Place a pillow or rolled blanket between the patient's legs to prevent the hip from moving laterally
- Pad under the leg generously if femur is elevated
- Secure the legs together
- Use a scoop stretcher to lift the patient onto a backboard (padded with a blanket)
- Pad well for comfort and secure the patient

A scoop stretcher or clamshell stretcher is an excellent choice for moving someone with a hip fracture. Movement is minimized with a scoop stretcher when compared with using a backboard where you must log roll the patient. Place the patient directly on your padded stretcher from the clamshell stretcher.

Note: Use a traction splint for mid-shaft femur fractures only.

## Femur (Shaft)

Fractures of the femur also can occur in the shaft and the femoral condyles just above the knee joint. When the femur is fractured, the large muscles of the thigh can go into spasms. Sometimes muscle spasms cause shortening and deformity of the limb with severe angulation or external rotation at the fracture site.

The broken ends of the femur can pierce the skin and cause an open fracture. Blood loss can be significant and lead to hypovolemic shock. Bone fragments and deformity can damage important nerves and vessels and have long-lasting effects and delay recovery.

You may reduce the angulation of an open femur fracture after removing foreign matter as well as possible. Apply manual traction and gently attempt to move the limb to achieve normal alignment. Use sterile dressings to cover open wounds at the fracture site.

Remember any upper leg or pelvic fracture can lead to considerable loss of blood so anticipate signs of shock. Check distal CMS at regular intervals and provide rapid transport.

## Knee

The knee joint, like the shoulder joint, is extremely complex and easily injured. Ligament or cartilage damage commonly is seen with twisting injuries. Injuries to the ligaments of the knee range from mild sprains to complete dislocation of the bone ends. The patella (kneecap) also is susceptible to injury such as fracture or dislocation.

## Tibia and Fibula

The tibia and fibula are the two bones of the lower leg. The fibula is the smaller of the two. Since these bones are located near the surface of the skin, open fractures are common. Mid-shaft fractures of the tibia and fibula usually result in gross deformity with significant angulation and rotation.

Fractures of the tibia and fibula are often accompanied by vascular injury. Realigning and splinting the limb may restore adequate blood flow to the foot. If you need to realign an angulated tib/fib fracture, check distal CMS before and after realignment. As with any fracture, prompt transport and physician evaluation are necessary.

## Ankle

The most common mechanism of injury to the ankle is twisting. It is often impossible to distinguish a fractured bone from a severe ankle sprain since both will lead to swelling and pain. Typically, fractures cause more pain and often limit the ability to walk. The lateral and medial malleolus are the distal ends of the fibula and tibia respectively. These often crack if the twisting force applied to the ankle is sufficient.

As with all joint injuries, sometimes it is difficult to tell a non-displaced ankle fracture from a simple sprain without an x-ray. Therefore, ankle injuries that produce pain, swelling, localized tenderness or the inability to bear weight must be evaluated by a physician.

Immobilize the ankle by securing the foot and the lower leg. A pillow splint in one technique that is effective in immobilizing the ankle.

## Foot

Foot injuries are common and typically the result of falls from heights or excessive twisting motions. The calcaneus bone (heel bone) may be fractured if the patient falls from sufficient height and lands on the heels. If the calcaneus is fractured there may be enough force to have other associated fractures such as vertebral fractures.

Pain, swelling, and ecchymosis may be seen with fractures of the foot.

## Mechanism of Injury

Significant force is usually required to fracture a bone or dislocate a joint. There are many types of forces that can cause these injuries including direct, indirect, twisting, and high-energy forces.

An example of a direct force is a fall on the tail bone that cracks the coccyx. An example of an indirect force is a person falling and landing on the feet causing a vertebral fracture. Skiing causes twisting injuries that can crack the ankle or tibia. An example of a high energy force is a car striking another car.

An important aspect of patient care is to assess the mechanism of injury and determine which forces have been applied to the patient's body. Consider signs of

blunt or penetrating trauma. Then consider which underlying structures may have been impacted by the force.

Elaboration — Types of Forces

A direct force is one that can cause a fracture at the point of impact. An indirect force can result in an injury at a point distant from the point of impact, for example, spinal compression from landing feet first during a jump from a height. Twisting forces, such as twisting of an ankle, are those that can tear or shear ligaments through pulling and stretching. High-energy forces are those caused by high speed, high height, projectiles, and other extreme forces.

Elaboration — Trauma and the Elderly

The risk of fatality from multi-system trauma is three times greater at age 70 than age 20. This happens because the elderly body does not compensate effectively from trauma. They also deteriorate more quickly than younger people.

Most trauma deaths in seniors are caused by falls and motor vehicle accidents.

Elderly people have slower reflexes than younger people. They are slower to react, less agile, weaker, and have poor vision and hearing. They may take drugs that affect coordination such as antipsychotics for dementia and tranquilizers for insomnia and anxiety. A diminished sense of smell also affects their reactions (e.g., fires and burns).

Elderly people die from trauma that would not normally kill a younger person. Less severe injuries can have a profound impact on body systems such as the respiratory and circulatory systems. Many organs are not resilient. Consider the following factors:

- Elderly patients often lie in extreme environments for long periods of time before help arrives leading to hypothermia or hyperthermia)
- Elderly patients are more often dehydrated and malnourished
- Chest trauma is more likely to cause lung damage because the chest wall is less flexible

Even if death does not occur soon, the geriatric trauma patient likely faces a life in a nursing home and reliance on many other people for care and assistance with the simple tasks of everyday life.

## Osteoporosis

Extreme force or transfer of energy is not always necessary to fracture a bone. An insignificant force can easily fracture a bone that is weakened by a tumor or osteoporosis.

In geriatric patients with osteoporosis even a minor fall, a simple twisting injury or even a violent muscle contraction can cause a fracture.

Elaboration — Skeletal Changes in the Elderly

Many elderly experience loss of strength, range of motion and flexibility. This contributes to difficulty with balance and therefore falls are common. A simple fall to the ground can cause serious injury. Minor forces may cause injuries that you would not expect to see in younger people.

After age 40 osteoporosis can cause bones to become brittle. Osteoporosis is the loss of bone density. It is usually caused by calcium loss. It is common in women who have gone through menopause.

Kyphosis, a forward, hump-like curvature of the spine, is present in about 70 percent of the elderly. Advanced kyphosis may impair respiration. Other changes that occur in the musculoskeletal system are a decrease in muscle mass, altered posture, loss of flexibility, increased pain (e.g., arthritis), and a decreased range of motion.

## Assessment

Start your assessment of a traumatic injury by assessing the mechanism of injury. Try to determine which forces acted on the body and to what degree.

If you have categorized the patient as SICK, care of orthopedic injuries is not the highest priority—you must assure the ABCs. If the patient is NOT SICK, you will have a little more time to investigate the MOI and perform a physical exam and focused history.

Signs of orthopedic injury include:

- Deformity or angulation
- Pain and tenderness
- Grating (crepitus)
- Swelling
- Bruising (discoloration)
- Exposed bone ends
- Joint locked into position

Don't focus solely on obvious injuries and overlook other potential injuries such as spinal trauma, damage to internal organs or pre-existing medical conditions.

Elaboration — Time and Orthopedic Injuries

Remember that time is an important factor for care of some fractures and dislocations because poor perfusion can result in significant tissue damage. Always perform a check of CMS before and after splinting and record the results. Loss of ability to move, altered sensation, and loss of distal pulse after a fracture has been immobilized are serious signs—consider immediate transport.

Elaboration — CMS

CMS is a mnemonic that stands for circulation, motor, and sensory function. They are indicators of proper vessel and nerve function. Any extremity with an injury or

deformity can have underlying damage to important blood vessels and nerves. You should always check CMS of an extremity before and after splinting and note any changes. An assessment of CMS includes checking circulation, motor, and sensory function.

Circulatory Status

For upper extremity injuries check the radial pulse and check capillary refill. Check capillary refill by gently squeezing and releasing the nail bed of a finger. Full color should return within two seconds. These tell you the state of perfusion to tissues in the extremity. Poor circulation may be caused by shock or damaged blood vessels.

Check a lower extremity injury using the posterior tibial or dorsalis pedis pulse. Check capillary refill by blanching the nail bed of a toe.

Motor Function

Ask the patient to wiggle his or her fingers (or toes) to check for proper motor function. Lack of movement may reveal tissue or nerve damage.

Sensory Function

Lightly touch the fingers (or toes) and ask the patient to distinguish the exact location of the sensation. Numbness or tingling distal to the injury may indicate nerve damage.

## Treatment of Shock

Prehospital treatment for hypovolemic shock includes the following steps:

- Evaluate the mechanism of injury
- Maintain airway, assist ventilations if needed
- Control bleeding
- Administer high flow oxygen
- Place in shock position
- Splint fractures
- Maintain body temperature
- Monitor vital signs
- Rapid transport

## Splinting Principles

The primary reason for applying a splint is to prevent movement of a fractured bone. Proper splinting in the field can decrease pain and bleeding which in turn can reduce a patient's hospital stay and speed recovery.

There are six principles for applying a splint:

- Support the fracture site
- (Bone fracture) immobilize the joint above and below the fracture site
- (Joint injury) immobilize the bones above and below the dislocation

- Check CMS before and after splinting
- Pad the splint well
- Elevate the extremity after splinting, if possible

Elaboration — The Benefits of Splinting

A splint will provide many benefits when properly applied because it will immobilize fractured bone ends. Loose bones ends can cause the following problems:

- Damage to muscles, nerves and blood vessels
- Lacerations of the skin
- Impeded blood flow
- Increased bleeding
- Increased pain

Elaboration — Realigning Joint Injuries and Dislocations

Splint dislocations or other joint injuries in the position found. An exception is loss of a distal pulse and neurological function where definitive care is delayed. In that case:

1. Attempt to straighten into anatomical position until the pulse returns, excessive pain is felt, or resistance is encountered.
2. Support with blanket, pillow or well-padded splint.
3. Elevate the limb.
4. Pack the injured area in ice or use an ice pack.
5. Document your attempts to re-align the injury.

Elaboration — Realignment of Long Bone Fractures

You can attempt to realign fractures of long bones that occur in the middle 1/3 of the bone only. Long bone fractures, which occur in the proximal or distal 1/3, may be realigned only if compromise of distal circulation or nerve function is detected and definitive care is delayed.

## Traction Splinting

You should use a traction splint for mid-shaft femur fractures only. They stabilize bone ends and help reduce muscle spasms in the large thigh muscles. This helps prevent further injury to vessels, nerves, and tissues as well as reducing pain.

Contraindications for the use of a traction splint include:

- Injury close to or involving the knee
- Hip injury
- Pelvis injury
- Partial amputation or avulsion with bone separation
- Lower leg or ankle injury

The key points for applying a traction splint are:

- Do not apply if there is a destabilizing injury to the hip, knee, or ankle

- Support the fracture site when limb is lifted
- Apply manual traction and hold until splint is secured
- Check CMS before and after apply splint

Elaboration — Signs of a Femur Fracture

A fractured femur will exhibit a variety of signs including:

- Localized, intense pain
- Exposed bone ends
- Swelling or deformed thigh
- Shortened limb
- Inability to move limb
- Signs of shock
- No distal pulse or motor function
- Numbness, tingling or altered sensation distal to the injury
- Crepitus

## Treating Pelvic Injuries

Immobilization of pelvic fractures can be accomplished by use of a bed sheet or an approved, commercially-available splinting device. Instructions for splinting with a bed sheet are as follows:

1. Fold the sheet lengthwise into an 8" to 14" width.
2. Place the sheet beneath the patient. Wrap the ends around the patient and twist while crossing over the pelvic area.
3. Tie the sheet with square knot or plastic ties to apply moderate pressure around the circumference of the pelvis.
4. Secure the ends of the sheet to the backboard, if possible.

## Summary

Muscles are attached to bones by tendons. Fascia are sheets or bands of fibrous connective tissue that cover muscles. A joint is a location where two bones come together. The bone ends of movable joints are covered with cartilage.

The common factor in all types of shock is inadequate perfusion. Perfusion is circulation of blood within an organ or tissue. To maintain adequate perfusion the body requires four intact components:

- Pump (heart)
- Pipes (blood vessels)
- Fluids (adequate blood volume)
- Oxygen (adequate oxygenation)

Signs and symptoms of shock include:

- Anxiety
- Altered LOC
- Delayed capillary refill
- Weak, thready or absent peripheral pulses
- Pale, cool, clammy skin

- Increased pulse rate (an early sign)
- Decreased blood pressure (a late sign)

Treatment of hypovolemic shock includes:

- Assess the MOI
- Maintain airway, assist ventilations if needed
- Control bleeding
- Administer high flow oxygen
- Place in shock position
- Splint fractures
- Maintain body temperature
- Monitor vital signs
- Rapid transport

The principles of splinting are:

- Support the fracture site
- (Bone fracture) immobilize the joint above and below the fracture site
- (Joint injury) immobilize the bones above and below the dislocation
- Check CMS before and after splinting
- Pad the splint well
- Elevate extremity after splinting, if possible

You can attempt to realign fractures of long bones that occur in the middle 1/3 of the bone only.

Splint dislocations or other joint injuries in the position found except in the case of loss of a distal pulse and neurological function where definitive care is delayed.