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**EMS SKILL**

MUSCULOSKELETAL INJURY

**TRACTION SPLINTING**

**PERFORMANCE OBJECTIVES**

Demonstrate competency in applying a minimum of two (2) types of traction splints.

**CONDITION**

Apply a traction splint on a patient who has sustained an isolated mid-shaft femur fracture. There are no contraindications. The necessary equipment will be adjacent to the patient or brought to the field setting. There is an assistant.

**EQUIPMENT**

Adult CPR/trauma manikin or live model, assistant, two (2) traction splints, long spine board, all necessary straps, sterile dressings, 2" tape, goggles, masks, gown, gloves.

**PERFORMANCE CRITERIA**

• Items designated by a diamond (⧫) must be performed successfully to demonstrate skill competency.

• Items identified by double asterisks (\*\*) indicate actions that are required if indicated.

• Items identified by (§) are not skill component items, but should be practiced.

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| **PREPARATION** | |
| **Skill Component** | **Key Concepts** |
| ⧫ Establish body substance isolation precautions | • Mandatory personal protective equipment - gloves |
| ⧫ Assess scene safety |  |
| ⧫ Evaluate for additional BSI needs | • Situational - goggles, masks, gown |
| ⧫ Institute spinal motion restriction (SMR) - if indicated | • If unknown of possible If a spinal injury is suspected, institute spinal immobilization motion restriction (determined by environment and information obtained from bystanders). |
| ⧫ Direct assistant to stabilize the affected lower extremity | • Application of the bipolar traction splint requires two (2) rescuers:   * Rescuer #1 to apply the splint * Rescuer #2 to stabilize the extremity, apply and maintain manual traction. |
| ⧫ Expose the injured extremity:  • Cut the clothes away - *if indicated*  • Remove the shoes and socks  • Remove all jewelry from the injured extremity | • Femur fractures result from major force and in children is commonly the result of child abuse.  • The lower extremity is generally shortened, externally rotated with possible mid-thigh swelling due to hemorrhage.  • Shoes must be removed to assess for pulse and sensation and prevent interference with the stability of the ankle harness.  • Jewelry must be removed prior to swelling of the foot to avoid compromised circulation.  • Fractures of the tibia/fibula generally do not require traction splints |
| § Explain the care being delivered and the transport destination to the patient/caregivers | • Communication is extremely important when dealing with the patient, family, or caregiver. Providing an explanation of the care improves the patient’s trust and compliance. |

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| **Skill Component** | **Key Concepts** |
| ⧫ Assess the distal extremities for:  • Circulation/**P**ulse  CSM  • Sensation  • Motor movement | • Pulse - palpate the posterior tibialis or pedal pulse and mark the location of the pulse with an “X.”  • Circulation - check for color, temperature, and capillary refill.  • Motor movement - have the patient move his/her toes.  • Sensation –determine if numbness, ~~or~~ tingling, and sensitivity to touch of the lower extremity exists, including the toes. |
| ⧫ Cover any open wound(s) with a sterile dressing and secures it in place - *if indicated* | • Blood loss from femoral fractures may exceed 500-1000 ml. This may be doubled if it is an open fracture. |
| ⧫ Determine if a traction splint should be applied  ***\*\* Consider rapid transport - if patient is critical*** | • If the patient is critical, splinting should be limited to securing the fractured limb to a long spine board and rapid transport.  • Splinting decreases pain, hemorrhage, the risk of converting a closed fracture to an open fracture, blood vessel and nerve damage, and fat emboli. |
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| **BIPOLAR TRACTION SPLINT PROCEDURE (HARE) PROCEDURE** | |
| **Skill Component** | **Key Concepts** |
| ⧫ Apply the ankle harness above the ankle and adjust harness to ensure a snug fit | • Application of the Hare splint requires two (2) rescuers:   * Rescuer #1 to apply the splint * Rescuer #2 to stabilize the extremity, apply and maintain manual traction. * Depending on patient’s condition, traction may need to be applied first before the splint is ready. It takes several minutes for spasm and pain to ease after traction is applied. Therefore, traction is recommended as soon as possible.   • It is easier, faster, and provides more stability if the harness is put in place prior to applying traction. This prevents having to work around hands that are holding traction.  • The bottom edge of the side flaps of the harness should be about 1" above the lateral protrusions of the ankle.  • Make sure that side flaps do not cross over the top of the foot, but at the ankle so that traction will be pulled against the ankle and not the top of the foot. |
| ⧫ Direct the assistant to initiate and maintain manual traction:  • Hold the harness (ring strap) in one hand  • Place the other hand under the extremity and above the harness  • Slowly pull the extremity until the pain is reduced and/or circulation improves | • The amount of traction applied should be enough to reduce pain and/or improve circulation, if compromised.  • Manual traction must be maintained until the splint has been applied.  • The assistant should position himself or herself without interfering with sliding the splint in place.  • The assistant should keep his or her arms straight and lean backward using the weight of the upper torso maintaining consistent traction.  • The fracture site must be supported consistently throughout procedure.  • DO NOT put fingers in D-rings. Fingers may get stuck as extremity is moved. |
| ⧫ Unlock the collet sleeves |  |
| ⧫ Measure the splint for length:  • Place against lateral aspect of the uninjured extremity  • Extend splint approximately 8"-12" beyond the patient’s heel | • The uninjured extremity is used to measure the splint. Using the injured extremity would give an inaccurate splint measurement due to shortening and external rotation of the extremity.  • It is better to go with extra splint length then having it be too short. If splint is too short, the appropriate amount of traction cannot be applied. |

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| **Skill Component** | **Key Concepts** |
| ⧫ Relock the collet sleeves | • It is important to ensure the splint does not shorten when traction is applied. This may lead to increased bleeding, muscle, nerve, and vascular damage. |
| ⧫ Fold down the heel stand and lock it in place |  |
| ⧫ Place the splint next to the injured lower extremity and prepare support straps:  • 1st above fracture site  • 2nd above knee  • 3rd below knee  • 4th above ankle | • Straps may be placed over the fracture site, but not over the knee. |
| ⧫ Support the fracture site under the thigh by using one (1) hand |  |
| ⧫ Direct the assistant to lift the extremity while maintaining manual traction  • Slowly elevate the foot 10”-12" off the ground for stable alignment.  ***\*\* Ensure the fracture site is supported*** | • The foot should be elevated approximately 10”-12" off the ground for splint placement.  • Both rescuers must lift the extremity at the same time. If the extremity is not kept in alignment, the movement will increase pain and possibly additional injury. |
| ⧫ Slide the splint under the affected extremity until it seats against the ischial tuberosity | • Make sure that the half ring is seated well against the ischial tuberosity. |
| ⧫ Direct the assistant to lower the extremity onto the splint while maintaining manual traction  ***\*\* Ensure that the fracture site is supported*** | • Both rescuers must lower the extremity at the same time. If the extremity is not kept in alignment, the movement will increase pain and possibly additional injury. |
| ⧫ Pad the groin area as needed | • Use a trauma dressing or equivalent for padding.  • Make sure pressure is **NOT** directly applied to the external genitalia or bony areas. |
| ⧫ Secure the groin strap high around the upper thigh of the injured extremity |  |
| ⧫ Hook the D-ring(s) into the “S” hook |  |
| ⧫ Adjust the traction by turning the winch until manual traction has been equaled | • You know that adequate traction is achieved when the patient feels some relief. |
| ⧫ Direct assistant to slowly release manual traction |  |
| ⧫ Secure the 4 support straps:  • 1st above fracture site  • 2nd above knee  • 3rd below knee  • 4th above ankle | • Straps must not be secured before traction has been established:  - may interfere with pulling traction along the entire length of the extremity  - may cause angulation and excessive tightening of the strap resulting in compromised circulation |
| ⧫ Secure the patient and splint to the backboard | • Securing the patient and splint to the backboard, for ease of movement and transport, will stabilize the hip joint and prevent movement of the splint during transport.  • The kick stand must be secured with 2” cloth tape to prevent collapse and additional pain and injury to the patient.  • Move the patient on a backboard toward the top of the gurney if there is a concern that the door will not shut.  • To minimize pain and swelling, apply an ice pack. |
| ⧫ Re-assess extremity distal to injury for:  • Circulation/Pulse  CSM  • Sensation  • Motor movement/function |  |

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| **UNIPOLAR TRACTION SPLINT PROCEDURE (SAGER)** | |
| **Skill Component** | **Key Concepts** |
| ⧫ Place the Sager splint on ground with the top of the padded “T-bar” in-line with the patient’s groin | • The Sager provides counter-traction against the pubic bone and the ischial tuberosity (sitting bone) of the pelvis.  ***A common application mistake that is made is that the bar is placed too high into the groin area and not seated against the pubic bone and the ischial tuberosity.***  • The “T-bar” fits like a bicycle seat.  • The Sager allows for splinting of both lower extremities with one (1) device, if needed. However, there must be a provision for two (2) ankle harnesses. The groin strap will allow for traction of both lower extremities. |
| ⧫ Measure the splint for length:  • Place against the medial aspect of the injured or uninjured lower extremity  • Extend the pole to the level of the heel | • Either the splint may have a pulley wheel, a perpendicular “L,” or a cross bar for bilateral splinting.  • The spring, within the shaft of the distal section, allows some automatic self-adjustment to maintain proper traction when muscles spasm. |
| ⧫ Seat the padded “T-bar” firmly against:  • Medial side of the thigh of the injured lower extremity and genitalia at the ischial tuberosity and the pubic bone  **OR**  • Outside of the injured lower extremity | • Remove any bulky clothing and pad the area if necessary.  • Ensure that the genitals are not compressed.  • Use the groin strap to maintain traction against the pubis when placing the splint on the outside of the injured lower extremity.  • The “outside” method does not pull traction as well as the “inside” method. However, it is more comfortable. The “T-bar” is extremely uncomfortable after a brief period for both male and female patients. |
| ⧫ Pad the groin area and between the lower extremity and pole of the splint - *if indicated* | • Pad the groin area and make sure no pressure is directly on the external genitalia or bony areas. |
| ⧫ Secure the groin (ischial) strap high around the upper thigh of the injured lower extremity | • The groin strap should be angled up toward patient’s hip to prevent the strap from slipping down when traction is applied.  • The groin strap must be placed next to the side of the injured lower extremity. |
| ⧫ Size the ankle harness just above the ankle for a secure fit:  • Fold the extra ankle pads out - *if not needed* | • To maintain foot in proper alignment:  - place the fixed padded part of the ankle harness under the posterior aspect of the ankle  - ensure that the harness strap pulls from the underside of the foot |
| ⧫ Tighten the ankle harness above the ankle:  • Bring the end of harness up  • Cross the Velcro closures one end over the other  • Pull the strap down to the sole of the foot | • The ankle harness can be temporarily disconnected from the splint for easier application of the harness around the lower extremity. |
| ⧫ Attach the ankle harness to the splint and tighten *- if not already attached* | • Reduce slack in the traction strap. Failure to reduce the slack may result in inadequate traction and separation of the metal pole when traction is applied.  • The ankle harness cannot be applied to the second lower extremity if traction has already been applied. |

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| |  | | --- | | **UNIPOLAR TRACTION SPLINT PROCEDURE (SAGER)** | | |
| **Skill Component** | **Key Concepts** |
| ⧫ Extend the splint’s inner pole to apply traction about 10% of body weight to maximum of 15 lbs.  • Hold the upper portion of the metal pole while pulling traction  • Apply counter-traction to the groin  • Align red arrow with the proximal weight marker  • Stabilize upper part of splint to prevent movement of the injured lower extremity | * Manual traction must be applied if the lower extremity is raised. * The ankle harness may be used to assist in elevating the lower extremity.   • Recommended traction applied is 10% of body weight per femur fracture with maximum of 15 lbs. per lower extremity. If both femurs require traction, apply maximum of 30 lbs.  • Maximum traction for lower extremity fractures is 10 lbs. However, traction is generally not indicated for lower extremity fractures unless the limb has neurovascular compromise.  • **DO NOT** over stretch the limb, this may cause further injury.  • Adequate traction is applied when the injured lower extremity is the same length as the other lower extremity or until the patient feels relief.  • Most patients will not get pain relief until the splint has been applied for several minutes and the muscle spasm subsides. |
| ⧫ Release the pull on the distal section and ensure the ratchet is locked |  |
| ⧫ Check the groin strap and tighten it as needed for snug fit | • If the strap slips and traction is released, this will result in potential increased damage to tissue, nerves, and blood vessels. |
| ⧫ Secure the splint to lower extremity(s) with the cravats (elastic straps) at the level of the:  • Thigh(s)  • Knee(s)  • Lower leg(s) - above the ankle harness  • Both extremities together - *if extra long (figure 8) strap is available* | • May secure one (1) lower extremity or both extremities at the same time.  • Avoid excessive pressure on the knees if possible when securing the cravats.  • Cravats cannot be secured before traction has beenapplied:  - It may interfere with pulling traction along the entire length of the lower extremity  - It may cause angulation and excessive tightening of the strap, which may result in compromised circulation  • Use the hollow of the knee to initially place the cravats and then move into proper position to minimize lower and mid-limb movement. Stack cravats on top of the other in order of use.  • Slide the cravats into position starting with the one closest to the ground.  • The Sager does not elevate or stabilize the lower extremity when the patient is moved, therefore, additional support and splinting is required. This is accomplished by securing both extremities and feet together.  • Secure both feet together with figure 8 strap *- if not already secured*:  • Place the strap under ankles  • Cross the straps and bring them between both feet  • Bring the crossed straps under soles of feet  • Bring straps over top of feet  • Secure the straps |
| ⧫ Attach the ankle harness to the splint and tighten *- if not already attached* |  |
| ⧫ Secure the patient and the splint to the back board | * Securing the patient and splint to the backboard with the straps will stabilize the hip joint and prevent movement of the splint during transport. |

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| **Skill Component** | **Key Concepts** |
| ⧫ Re-assess the distal extremities for:  • Circulation/Pulse  CSM  • Sensation  • Motor movement | • Since the uninjured lower extremity is also secured, it is important to make sure that nerves and circulation are not compromised in either lower extremity. |
| |  | | --- | | **UNIPOLAR TRACTION SPLINT PROCEDURE (SLISHMAN)** | | |
| **Skill Component** | **Key Concepts** |
| ⧫ Place the Slishman splint on ground next to the injured extremity. | * The benefits of the Slishman splint include:   + May be used if the patient has a concurrent ankle or foot injury by adjusting the position of the ankle strap.   + The pole does not extend beyond the patient’s foot thereby facilitating transport by ambulance or helicopter. * For pediatric patient under 43 inches or < three (3), allow the splint to rest proximal to the hip |
| ⧫ Remove the ankle strap and receiver cap from the pole |  |
| ⧫ Apply the Velcro ankle strap to the ankle  ***\*\*Ensure the Velcro strap does not come in contact with the lower leg***  ***\*\*Ensure the pole receiver is on the lateral aspect of the ankle and is in the “up” position*** | * The lower leg consists of the area just distal to the knee and is proximal to the ankle. |
| ⧫ Pad the groin area and between the lower extremity and pole of the splint - *if indicated* | • Pad the groin area and make sure no pressure is directly on the external genitalia or bony areas. |
| ⧫ Attach the groin (ischial) strap high around the upper thigh of the injured lower extremity  ***\*\* Snaps the male to female buckle***  ***\*\* Checks the groin strap and tighten it as needed for snug fit*** | • The groin strap should be angled up toward patient’s hip to prevent the strap from slipping down when traction is applied.  • The groin strap must be placed next to the side of the injured lower extremity.  • If the strap slips and traction is released, this will result in increased damage to tissue, nerves, and blood vessels |
| ⧫ Open the lower clamp and extend the pole | * The pole **SHOULD NOT** extend past the end of the ankle. If it is, it cannot be placed into the receiver on the ankle strap. |
| ⧫ Place the end of the pole into the receiver | * The receiver is located on the ankle strap. |
| ⧫ Pull on the pole to apply course traction until resistance is met  ***\*\*Close the clamp***  ***\*\*Insert the pole into the receiver cap*** | * As soon as resistance is met, do not apply any additional traction. * You know that adequate traction is achieved when the patient feels some relief. |
| ⧫ Apply fine traction – if indicated  ***\*\*Open the clamp and pull on the cord at the top of the pole***  ***\*\*Close the clamp*** | * If the patient has not experience any relief from the initial application of traction, apply fine traction until the patient experiences relief. |
| ⧫ Apply the leg strap to both legs just distal to the knee | * Application of the leg strap helps with stabilization during transport. |
| ⧫ Re-adjust the two (2) clamps prior to transport: |  |
| ⧫ Secure the patient and the splint to the back board | * Securing the patient and splint to the backboard with the straps will stabilize the hip joint and prevent movement of the splint during transport. |

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| ⧫ Re-assess the distal extremities for:  • Circulation/Pulse  CSM  • Sensation  • Motor movement | • Since the uninjured lower extremity is also secured, it is important to make sure that nerves and circulation are not compromised in either lower extremity. | |
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| **RE-ASSESSMENT**  **(Ongoing Assessment** **)** | | | | |
| **Skill Component** | | | **Key Concepts** | |
| ⧫ Re-assess the patient a minimum of every five (**5) minutes or sooner:**  • Primary assessment  • Relevant portion of the secondary assessment  • Vital signs: BP, P and RR   * CSM of injured extremity | | | • This is a priority patient and must be re-evaluated at least every  five (5) minutes or sooner, if any treatment is initiated, medication administered, or condition changes. | |
| ⧫ Evaluate results of reassessment and note any changes from patient’s condition and vital signs  ***\*\*Manage patient condition as indicated.*** | | | * Evaluating and comparing results assists with recognizing if the patient is improving, responding to treatment, or if their condition is deteriorating. | |
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| **PATIENT REPORT AND DOCUMENTATION** | | | | |
| **Skill Component** | | | **Key Concepts** | |
| § Verbalize/Document:  • Mechanism of injury  • Description of injury  • Treatment provided  • Patient response to treatment  • Circulation/ Sensation/Motor movement before and after splinting | | | • Documentation must be on either the Los Angeles County EMS Report, ePCR, or departmental Patient Care Record form. | |

Developed 11/01, Revised 10/2018



MUSCULOSKELETAL INJURY

**BIPOLAR TRACTION DEVICE - HARE SPLINT**

**Supplemental Information**

**INDICATIONS:**

• Mid-shaft femur fracture

**CONTRAINDICATIONS:**

* Injury close to the knee
* Injury to the knee
* Injury to the hip
* Injury to the pelvis
* Partial amputation or avulsion with bone separation, distal limb is connected by marginal tissue
* Lower leg or ankle injury

**COMPLICATIONS:**

• Neurovascular compromise, if traction splint is applied incorrectly.

• Injury to genitals, if groin strap is not positioned correctly.

**NOTES:**

• Traction splints may be used on open or closed femur fractures, especially when there is neurovascular compromise, uncontrollable bleeding and severe pain due to muscle spasm.

• **DO NOT** secure the straps before traction has been established. This may interfere with pulling traction along the entire length of the extremity and can cause angulation and excessive tightening of the strap resulting in compromised circulation.

• Adequate traction is applied when the injured extremity is the same length as the other extremity or the patient feels relief.

• Never release the mechanical traction unless manual traction is re-established. The release of traction may cause additional injury to the extremity.