

Femur traction splint application



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■ Introduction

The femur is the longest and strongest tubular bone in the body and is one of the primary weight-bearing bones in the leg. Fractures of the femoral shaft typically result from high-energy impact, such as motor vehicle collisions.^[1] Complications associated with femur fractures in adult patients can be life-threatening and may include hemorrhage, compartment syndrome, fat embolism, peripheral nerve injury, venous thromboembolism, wound infection, multiple organ dysfunction syndrome, and acute respiratory distress syndrome.^{[2][3]} Femoral fractures also cause severe spasms of the muscles surrounding the fracture, resulting in deformity and shortening of the limb.^[4] A femur traction splint may prevent further injury and reduce the patient's pain.^[5]

Application of a femur traction splint sometimes occurs in the field before a patient's admission to a health care facility. In some cases, application of this type of splint helps immobilize the femur after a patient's arrival in the facility. A femur traction splint consists of a frame that extends from the proximal thigh to an area distal to the heel. It has a padded portion that secures against the ischial tuberosity. The proximal portion of the splint may contain a ring that encircles the thigh, a partial ring, or a padded bar. A traction device is located on the distal portion of the splint.^[5]

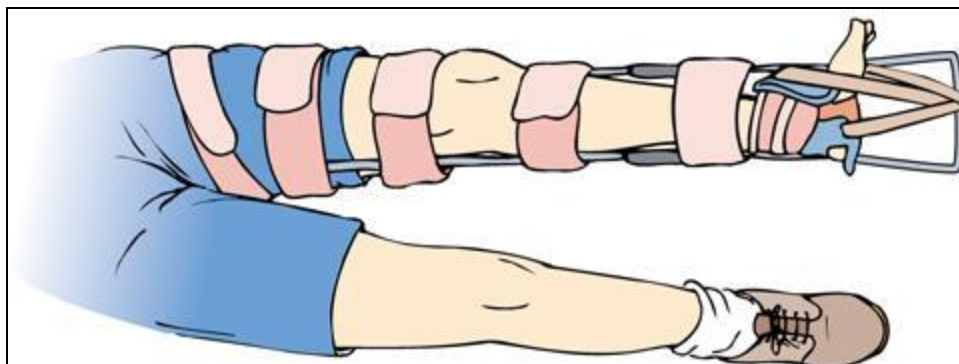
A traction splint can immobilize a simple or compound fracture, dislocation, or subluxation. (See [Traction splint](#).) Specialized training is required before applying a traction splint.



EQUIPMENT

TRACTION SPLINT

A traction splint (shown below) immobilizes a fracture and exerts a longitudinal pull that reduces muscle spasms, pain, and arterial and neural damage. Two trained people should apply a traction splint.^{[4][5]}



You should splint any suspected fracture, dislocation, or subluxation during an emergency. You shouldn't use a traction splint for a patient with a pelvic fracture, a supracondylar fracture of the knee, a fracture of the ankle or foot, or a compound or open fracture.^[4]

■ Equipment

- Facility-approved pain assessment tool
- Gloves
- Ice bag
- Padding
- Traction splint
- Vital signs monitoring equipment
- Optional: other personal protective equipment, prescribed pain medication, scissors, sterile compress

■ Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your facility.

■ Implementation

- Gather and prepare the necessary equipment and supplies.
- Perform hand hygiene.^{[6] [7] [8] [9] [10] [11]}
- Confirm the patient's identity using at least two patient identifiers.^[12]
- Provide privacy.^{[13] [14] [15] [16]}
- Obtain a complete history of the injury, if possible.
- Verify the practitioner's order.
- Provide emotional support to the patient. Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation.*^[17]
- Raise the bed to waist level before providing care *to prevent caregiver back strain.*^[17]
- Perform hand hygiene.^{[6] [7] [8] [9] [10] [11]}
- Put on gloves and, as needed, other personal protective equipment *to maintain standard precautions.*^{[18] [19]}
- Perform a thorough head-to-toe assessment, inspecting for obvious deformities, swelling, or bleeding.^[2]
- Ask the patient about the ability to move extremities.
- Inspect and palpate the injured area gently for evidence of fracture or dislocation.
- Remove or cut away the patient's clothing with scissors and remove jewelry and shoes, if necessary.^[4]
- Assess neurovascular status distal to the injury site.^[5]
- Screen for and assess the patient's pain using facility-defined criteria that are consistent with the patient's age, condition, and ability to understand.^[20]
- Treat the patient's pain, as needed and ordered, using nonpharmacologic, pharmacologic, or a combination of approaches. Base the treatment plan on evidence-based practices and the

- patient's clinical condition, past medical history, and pain management goals.^[20]
- Align the injured extremity in its normal anatomic position, if possible.
 - Don't attempt to straighten a dislocation *to avoid damaging misplaced vessels and nerves*.
 - Apply a sterile compress to an open wound. Don't attempt to reduce a contaminated bone end, *because doing so may further lacerate soft tissues, vessels, and nerves as well as grossly contaminate deep tissues*.
 - Choose a splint that will immobilize the joints above and below the fracture.
 - Place the splint beside the uninjured leg. Adjust the splint to the correct length, and open and adjust the Velcro straps.^[5]
 - Place the splint beside the injured leg in preparation for application.^{[4] [5]}
 - Pad the patient's groin *to avoid excessive pressure on external genitalia*.^{[4] [5]}
 - Have an assistant keep the leg motionless and fasten the ankle hitch around the foot and ankle.^[5]
 - Have the assistant lift and support the leg at the injury site as you apply firm, gentle traction.
 - Have the assistant slide the splint under the leg while you maintain traction. Apply the ischial strap gently.
 - Have the assistant connect the loop of the ankle hitch to the end of the splint.^[4]
 - Adjust the splint to apply enough traction to secure the patient's leg comfortably in the corrected position.^{[4] [5]}
 - After applying traction, fasten the Velcro support splints *to secure the leg close to the splint*.^{[4] [5]}
 - Monitor the patient's vital signs frequently according to the patient's condition *to detect signs of shock*. Fractured bones may cause significant bleeding into surrounding tissues.^[5]
 - Reassess and respond to the patient's pain by evaluating the response to treatment and progress toward pain management goals. Assess for adverse reactions and risk factors for adverse events that may result from treatment.^[20] Notify the practitioner if the patient doesn't experience adequate pain relief.^[21]
 - Monitor the patient's neurovascular status by assessing the skin color, temperature of the extremities, level of pain, presence of paresthesias, pulses, and ability to move extremities. *Numbness or paralysis distal to an injury indicates nerve injury*.^[5] (See [Assessing neurovascular status](#).)
 - Apply ice to the injury.
 - Return the bed to the lowest position *to prevent falls and maintain the patient's safety*.^[22]
 - Remove and discard your gloves and, if worn, other personal protective equipment.^{[18] [19]}
 - Perform hand hygiene.^{[6] [7] [8] [9] [10] [11]}
 - Document the procedure.^{[23] [24] [25] [26]}

ASSESSING NEUROVASCULAR STATUS

When assessing an injured extremity, include these steps and compare your findings bilaterally:

- Inspect the color of fingers or toes.
- Note the size of the digits *to detect edema*.
- Simultaneously touch the digits of the affected and unaffected extremities and compare temperature.
- Press on the distal tip of one digit until it's white *to assess capillary refill time*. Release the pressure and note how soon normal color returns. It should return quickly in the affected and unaffected extremities.

- Touch the fingers or toes and ask the patient about feeling the touch *to assess sensation*. Note reports of numbness or tingling.
- Tell the patient to close both eyes *to assess proprioception*. Move one digit and then ask the patient which position the digit is in.
- Tell the patient to wiggle the toes or move the fingers *to test movement*.
- Palpate the distal pulses *to assess vascular patency*.

Record your findings for the affected and unaffected extremities using standard terminology *to avoid ambiguity*. Warmth, free movement, rapid capillary refill time, and normal color, sensation, and proprioception indicate sound neurovascular status.^[27] ^[28]

■ Special Considerations

- Always examine the patient completely for other injuries at an accident scene.^[2] Avoid unnecessary movement or manipulation, *which might cause additional bleeding, pain, and injury*.
- Always consider the possibility of a cervical spine injury in an unconscious patient. Apply the splint before repositioning the patient, if possible.
- Arrange to transport the patient to an appropriate health care facility as soon as possible.
- Fat embolism usually occurs within 36 hours of an injury or manipulation. Early stabilization and surgical correction of the fracture may prevent fat embolism.^[29] Signs and symptoms of fat embolism include hypoxemia, tachypnea, dyspnea, agitation, changes in mental status, tachycardia, and a petechial rash.^[30]
- The health care team should evaluate the appropriateness and indication of splint use and monitor prolonged traction use *to avoid skin complications*.^[31]

■ Complications

Complications associated with femur traction splint application may include:

- aggravation of the existing injury or damage to surrounding tissues
- compression of the sciatic nerve or perineal area
- compromised neurovascular status
- deep skin wound and pressure injuries (especially among older patients with more fragile skin and patients with multiple comorbidities)^[32]
- displacement of the proximal third of the femur
- fat embolism (from multiple transfers and repeated manipulation of a fracture)^[29]
- flexion and outward rotation of the proximal femur
- overstretching of the affected limb due to excessive traction.

■ Documentation

Documentation associated with femur traction splint application includes:

- cause and circumstances of the injury
- complaints from the patient
 - whether symptoms are localized
- pain assessment
 - nonpharmacologic interventions performed
 - pain medication administered
 - response to those interventions
- neurovascular assessment before and after applying the splint
- type of wound
- type and amount of any drainage
- time of splint application

- changes in condition
 - name of the practitioner notified
 - date and time of notification
 - prescribed interventions
 - response to those interventions
- teaching provided to the patient and family (if applicable)
 - understanding of that teaching
 - follow-up teaching needed.

This procedure has been reviewed by the Academy of Medical-Surgical Nurses.



■ Related Procedures

- [Alignment and pressure-reducing device application](#)
- [Alignment and pressure-reducing device application, long-term care](#)
- [Alignment and pressure-reducing device application, physical therapy](#)
- [Femur traction splint patient care](#)
- [Foot-drop contracture prevention splint use](#)
- [Rigid splint application](#)
- [Rigid splint application, pediatric](#)
- [Splint application, ambulatory care](#)

■ Related UpToDate Patient Teaching Handouts

- [How to care for a splint](#)
- [Splint care – ED discharge instructions](#)

■ References

([Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions](#))

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Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is adapted from *Evidence-Based practice in nursing & healthcare: A guide to best practice*, Fifth edition, by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt (2023).

Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)
Level II	Evidence from well-designed single RCTs (experimental)
Level III	Evidence from well-designed nonrandomized controlled trials (quasi-experimental), systematic reviews of a complete body of evidence, and intervention studies using mixed methods
Level IV	Evidence from well-designed case-control and cohort studies (observational)
Level V	Evidence from systematic reviews of qualitative and descriptive studies
Level VI	Evidence from single descriptive and qualitative studies, evidence-based practice implementation, and quality improvement projects
Level VII	Evidence from expert opinion, expert committee reports, and literature reviews

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