Femoral Shaft Fracture

INTRODUCTION
Your child has a fracture of the femur, which is the main thigh bone. This is a fairly common injury. Treatment usually requires surgery to allow the fracture to be aligned and to hold it in place with a cast and/or other device. The femur has excellent blood supply from the surrounding muscles and the fracture usually heals well. Most children heal this fracture in 4-8 weeks without long term problems.

BACKGROUND
A femur fracture is the result of a forceful impact to the leg as in a fall or car accident. For younger children, the injury is not uncommonly a result of child abuse. The femur is one of the strongest bones in the body and it takes a lot of force to break it. There may also be other serious injuries.

DIAGNOSIS
A child with a femur fracture usually has significant pain and is brought to the emergency department by the parents or ambulance. The doctor will ask for details on exactly how the injury occurred and will examine the leg and the status of the nerves and blood vessels. X-rays are done to see the pattern of the fracture. The fracture is classified as...

closed (skin intact) or open (piercing the skin, sometimes called "compound")...
non-displaced (aligned) or displaced (out of alignment)...
transverse (horizontal), oblique (diagonal), spiral (twisting), or comminuted (multiple pieces)

TREATMENT
Treatment is based on age, fracture pattern and location, risk for infection, and treatment of any associated injuries. In general, young patients can be treated with a cast. Older patients generally do better with surgery and some type of internal fixation. Open fractures undergo surgery to clean the wound and stabilize the fracture to minimize the risk of infection.

BRACE TREATMENT: Infants heal quickly and have tremendous potential for growth and remodeling. Infants up to 6 months of age can be treated with a Pavlik harness.
CAST TREATMENT: For young children, a spica (full body) cast can be applied within 24 hours of the injury. The cast does not hold the fracture rigidly, but the fracture heals reliably and a young child’s rapid growth will remodel and correct mild shortening and angulation. Some shortening at the fracture site (overlap) is good because fracture healing tends to cause 1-2 cm of overgrowth for the leg over the next 6-12 months and can lead to the leg being too long.

OPEN REDUCTION AND INTERNAL FIXATION: In older children and adults, the fracture is put back in place and held with pins, plates, or rods to hold the fracture in place while healing progresses. Treatment in children is different because bones are smaller and there are growth plates at both ends of the bone. For adults, the most common means of treating a femoral shaft fracture is to use a rigid intramedullary rod, usually inserted from the hip down. This treatment is very effective, but it is not done in children because of the growth plates and risk for damaging blood supply to the hip. The other issues for operative treatment include risk for anesthesia, the incisional scar, the risk of infection, and usually a second surgery to remove the pins, plates and screws, or rods.

FLEXIBLE INTRAMEDULLARY RODS: For children from age 5 to 12, it is typical to use flexible intramedullary rods. In the operating room, the fracture is realigned and 2 thin metal rods can be inserted into the bone above the growth plate and passed upward inside the bone to cross the fracture site. The rods are thin and flexible to allow for placement and the combination of two rods with opposite curvatures, provide enough stability to the hold the fracture in place.

OTHER OPTIONS: There are occasions when the common treatments described above, cannot be used. If there is a large contaminated wound associated with the fracture, an external fixator is used to hold the fracture with pins placed above and below the wound site and held in place with external frame of bars and clamps. This allows the wound to be treated, while the fracture is held by the external fixator.

ADDITIONAL TREATMENT: If pins, plates and screws, or rods are used to fix a fracture in a young child, it is usually necessary to remove the implants after 4 to 6 months. This requires a second surgery, usually done as outpatient, with associated time out of school for recovery.

HOSPITAL CARE
Following the initial treatment by cast or surgery with internal fixation, the child is typically admitted to the hospital for pain...
management and additional care. The child usually goes home the day after the injury, once the child has recovered from anesthesia/sedation, the pain is adequately managed, and the family is prepared to manage at home.

**PAIN MANAGEMENT**
Fractures hurt and appropriate pain management is important. With good pain management, children will eat better, sleep better, heal better, and have less apprehension as they continue treatment. Ibuprofen and a tylenol narcotic combination, when given together, work well and provide good pain relief for most children. It is worth while to set an alarm (even in the middle of the night) to stick to the schedule. It takes a few minutes to wake up and take the medicine, as opposed to letting pain build up and spending hours trying to get it under control. The source of pain is the fracture and it will be a steady pain, which will gradually improve. Steady dosing of pain medication and then a slow taper will provide the best pain relief, with the fewest side effects, and usually with the least pain medication.

Ibuprofen is a non-steroidal anti-inflammatory medication, which has few side effects and low risk, but is usually not strong enough for the first few days. For best effect, it should be given every 8 hours for a least 5 days and as long as needed after that.

Lortab is an acetaminophen hydrocodone combination (similar to Tylenol Codeine but doesn't taste quite so bad) which is a narcotic medication. It will provide better pain relief, but also has more side effects, which often include sleepiness, nausea, constipation, etc. Start by giving a full dose every 4 hours. If pain relief is good, continue at the same dose for several doses and then decrease the dose by half. If pain relief continues to be good, continue at the half dose for several doses and then stop. If pain relief is not adequate, restart the medication and increase back to the half dose. If this is not adequate, increase back to the full dose.

In summary, give ibuprofen every 8 hours for 5 days and on top of the ibuprofen, give the Lortab codeine every 4 hours, adjusting the dose based on the level of pain. Most kids are off the Lortab within 2-3 days and off the ibuprofen by 5-7 days. Children usually do very well are usually pain free within 5-10 days.

**SPICA CAST MAINTENANCE**
If your child is being treated with a spica cast, the success of treatment is very dependent on keeping the cast in good condition. best to apply a cast that will work as well as possible. The family must work with the cast to keep edges padded, to avoid pressure spots, and most importantly, to keep the cast and your child clean. The hard part of the cast is plaster of paris and/or fiberglass. The inside of the cast is a special gortex liner with webril padding. The cast takes several hours to dry, so the cast must be finished and maintained by the family. Once the
cast is dry, waterproof tape or moleskin is applied to "petal" the cast to protect the openings and to protect the child from rough edges. It is also to get diapers well positioned inside the cast.

**ACTIVITY IN A SPICA CAST**
It is okay to lift and move your child in the spica cast. In fact, it is important to reposition every few hours to avoid excessive pressure on contact areas. The child can sit up or recline, can be propped on either side, or even lay face down. A variety of pillows and cushions will help with position. A wagon can also be helpful for moving from room to room. You will need a special car seat or safety harness for transporting your child in the car. Larger than normal pants, shirts, dresses and skirts may be worn normally over the cast.

**CAUTIONS**
Whenever there is a cast in place, it is important to check the function of the nerves and blood vessels. Check the following 3-4 times a day. The color of the toes should be pink and warm to the touch. Your child should be able to feel all sides of his/her toes when touched. There may be little swelling of the toes and this may come and go depending on positioning. Your child should be able to wiggle the toes the same as before casting.

**EXPECTED OUTCOMES**
For children, femoral shaft fractures are common and almost always heal reliably and without problems. Arterial and nerve injuries occur rarely. It is uncommon, but possible for growth to be stimulated by the healing process. Overgrowth can be up to an inch (1-2 cm) over the year following the injury. Often the fracture is left short in the cast in anticipation of this overgrowth process. A significant leg length discrepancy following a femur fracture is relatively uncommon and if present rarely leads to future problems.

**MORE INFORMATION**
Further information can be obtained on the internet. Your local public library can help you explore these sources if you are interested. Two good sites for expert and peer reviewed information are the American Academy of Orthopedic Surgeons at [www.aaos.org](http://www.aaos.org) and [www.emedicine.com](http://www.emedicine.com).

**FEEDBACK**
If you have questions or comments, please contact the office or submit them to the web site at [www.pedortho.com](http://www.pedortho.com).