

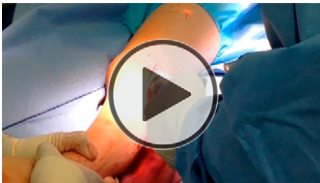
SUBSPECIALTY PROCEDURES

FLEXIBLE INTRAMEDULLARY NAILING OF PEDIATRIC FEMORAL FRACTURES

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Published outcomes of this procedure can be found at: *J Bone Joint Surg Am.* 2004;86:770-7, *J Bone Joint Surg Br.* 2006;88(10):1361-6, and *J Bone Joint Surg Am.* 2008;90:1305-13.

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Abstract

Background: Flexible intramedullary nailing is performed for femoral fractures in pediatric patients who may be too large for spica cast immobilization but who have substantial growth remaining and who are not a candidate for rigid intramedullary nailing. Flexible nailing allows the surgeon to obtain correct alignment of the femur fracture so as to allow for healing without a lower extremity deformity.

Description: The patient is positioned on a radiolucent table, flexible nails are chosen according to the diameter of the medullary canal, medial and lateral incisions are made along the distal aspect of the thigh, and access to the canal is obtained with use of a drill-bit of the appropriate size. Flexible nails are contoured to place the apex at the location of the fracture site and then passed 1 at a time up to the fracture through the medial and lateral corticotomies. Fracture reduction is obtained, and the nails are passed across the fracture 1 at a time. Leave a small amount of nail prominent at the entry site; the nails are then cut and advanced with a tamp.

Alternatives: Spica cast immobilization, rigid intramedullary nailing, external fixation, and submuscular plating.

Rationale: Flexible nailing provides relative stability of a femoral fracture similar to external fixation, submuscular plating, and rigid nailing; however, external fixators come with pin-track complications and infections, as well as a bulky device external to the thigh. Submuscular plating is beneficial for length-unstable fractures but is a longer procedure and implant removal is more difficult. In an older child with growth remaining, a rigid femoral nail is an option with similar outcomes to flexible nailing; however, the implant is harder to remove. Flexible nailing provides a cosmetic incision with reliable relative fixation in length-stable fractures, and easy removal of implants with equal or even improved outcomes compared with other surgical techniques.

Expected Outcomes: The outcomes of this procedure are excellent. Most pediatric femoral fractures treated with flexible nailing heal well with few complications. Angulation at the fracture site is the most common complication and is more common in fractures of the proximal or distal third of the femur¹. Worse outcomes occur in older children and children who are heavier¹.

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Outcomes are improved when flexible nailing is done in length-stable fractures; however, postoperative immobilization in a single-leg spica cast or knee immobilizer can augment fixation in fractures that are not stable. Implant irritation can occur at the insertion site; however, the implants are easy to remove once the fracture has healed. There is a substantially lower rate of malunion when stainless-steel nails (6%) are utilized compared with titanium nails (23%). Consideration should therefore be given to the use of stainless-steel nails for pediatric femoral fractures².

Important Tips:

- Use a radiolucent table with either a post or a sheet for counter-traction aids during reduction
- Use stainless-steel nails
- Pass the easier nail first
- Advance into the femoral neck or trochanteric apophysis
- Do not wrap rods around each other
- Cut off the machined tip of the nail and custom-contour the nail in patients with poor bone quality

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