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IN BRIEF

In Brief

Fractures in Brief

Intertrochanteric Hip Fractures

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Introduction

Intertrochanteric (IT) femur fractures comprise approximately ½ of all hip fractures caused by a low-energy mechanism such as a fall from standing height. These fragility hip fractures occur in a characteristic population with risk factors including increasing age, female gender, osteoporosis, a history of falls, and gait abnormalities [3]. Surgery is almost always the recommended treatment as the morbidity and mortality associated with nonoperative treatment historically have been high. Patients often have preexisting comorbidities that dictate the ultimate outcome.

Structure and Function

The IT region comprises the proximal femur distal to the neck extending to the lesser trochanter. The majority of the bone in the region is cancellous, extracapsular, and highly vascularized (contrast with subcapital femoral neck) leading to a robust healing environment. Several anatomic features influence treatment. The greater and lesser trochanters are the points of attachment of the primary hip abductor (gluteus medius) and primary hip flexor (iliopsoas), respectively. The calcar femorale is a dense strut of posteromedial bone that supports force transfer from the neck to the shaft.

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Injury Considerations

The typical patient is a female in her 60s to 70s with a history of falls and bone disease, presenting with pain and inability to weightbear. Falls not clearly attributable to tripping require additional evaluation to exclude syncope, coronary syndrome, stroke, or other conditions; however, in general, a hip fracture from a standing height occurs not simply because the bone is fragile. The patient falls and concurrently is unable to dissipate the energy of the fall; by bracing oneself against impact, for example [3]. Lesions seen on radiographs, prior history of malignancy, or hip pain before the fall raises suspicion for a pathologic fracture. Patients should be risk-stratified before operative treatment and carefully monitored afterward. Overall care of patients with IT fractures includes correcting nutritional and metabolic deficiencies acutely, and preventing falls and improving gait and bone health over the long run. A metabolic bone panel including calcium, phosphorus, vitamin D3, albumin, and others should be drawn and levels corrected; alternatively, a metabolic bone specialist should be consulted.

Intertrochanteric fractures are unusual in younger patients and demand investigation; in this population, intertrochanteric fractures result from high-energy injuries or from a pathologic process. Thus, secondary injuries or malignancies must be excluded.

Diagnosis and Classification

Plain radiographs (AP and lateral) are standard. Traction views can be helpful with substantial fracture displacement if the patient is able to tolerate them. AP and lateral views of the entire femur also are recommended, especially if

long nail fixation is being considered; these views are mandatory if a malignancy is suspected.

Multiple classifications for IT fractures have been used [4], although none is universally accepted. As is the case with all fractures, noting comminution and displacement is important; additional key descriptors for IT fractures are orientation of the fracture line and stability. The typical IT fracture has a primary fracture line oriented from the greater trochanter (proximal and lateral) to the lesser trochanter (distal and medial). For the typical orientation, a primary fracture line connotes stability. If there is additional comminution extending into the medial buttress (calcar), the fracture is unstable. When the fracture line courses in a lateral direction, the fracture is designated a "reverse obliquity fracture" and it too is unstable.

Treatment

Surgical fixation is the standard of care unless contraindicated. Previous nonsurgical treatments were fraught with the complications associated with prolonged bed rest and immobilization such as decubitus ulcers, thromboembolic events, and pneumonia. The timing of surgery is still controversial; in general, delays are associated with higher mortality [5], but it may be that sicker patients are disproportionately delayed. The optimal time for surgery has not yet been defined. Based on our interpretation of the literature, operative fixation in a few days of the injury, after medical comorbidities have been addressed, is the best course [5]. Urgent surgery without medical evaluation on the one extreme, and semi-elective scheduling for the surgeon's convenience (as might be done with an ankle fracture) at the other do not seem justified.

The fixation method is guided by the fracture pattern; standard options include the sliding hip screw, intramedullary nail, or fixed angle plate (Fig. 1). Stable fractures traditionally have been fixed with a sliding hip screw (lateral plate with a fixed barrel through which a large screw enters the femoral head) (Fig. 1B). These devices are called "sliding" or "dynamic" as the fracture is expected to collapse and shorten in line with the angle of the barrel—this impaction is thought to stabilize the bone. Alternatively, a lateral plate can be used with fixed-angle screws after intraoperative fracture compression, promoting healing but preventing additional shortening.

Reverse obliquity and unstable patterns are best stabilized with a cephalomedullary nail. The nails are placed

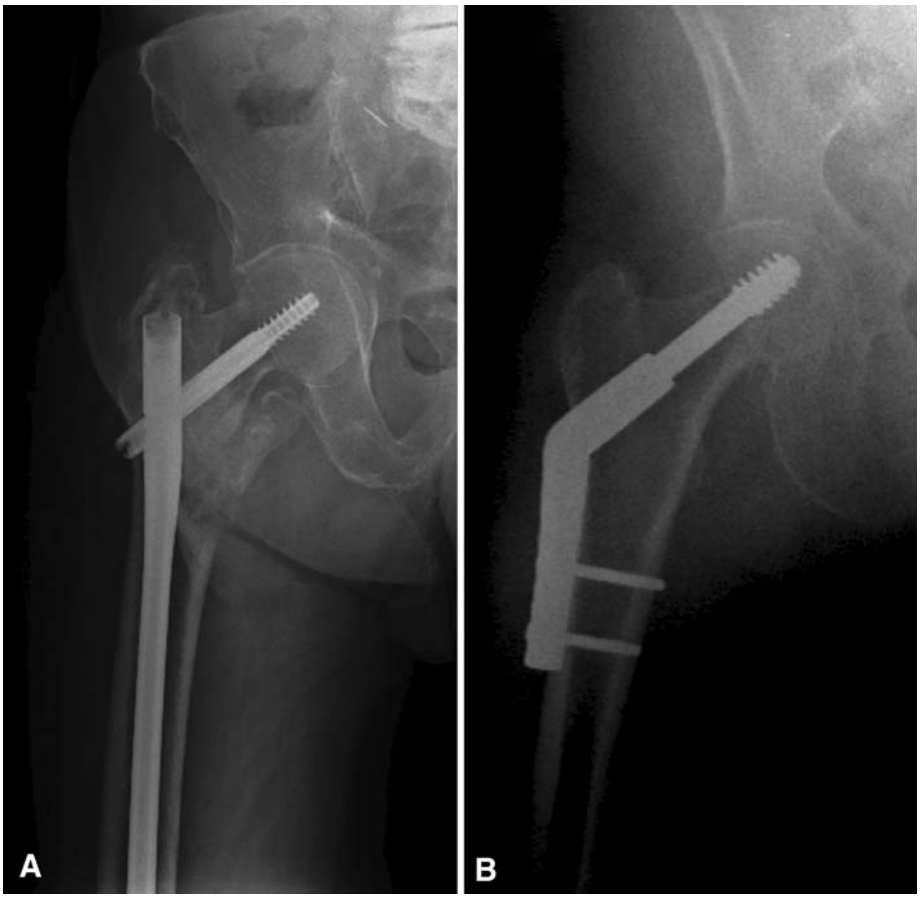

Fig. 1A–B The AP radiographs show intertrochanteric fractures of the proximal femur fixed with (**A**) a cephalomedullary nail and (**B**) a sliding hip screw with side plate.

through the greater trochanter; then a large screw is passed through the nail into the femoral head (Fig. 1A) allowing for a controlled sliding collapse. Because they are intramedullary, nails can help prevent displacement of reverse obliquity fractures.

Postoperatively, patients should receive thromboembolic prophylaxis and should be mobilized. The amount of weightbearing allowed is proportional to fracture stability; although mentally alert patients seem to autoregulate their weightbearing correctly.

Outcomes

Because the IT region is a rich metaphyseal bed, fracture union is the norm. Shortening and imperfect gait with mild residual discomfort, however, are not uncommon [3]; and the 1-year mortality after hip fractures can exceed 20% to 30% [3].

Multiple randomized trials and meta-analyses [1, 2] have failed to show a clear advantage of nails over plates or vice versa for stable fractures. Improperly reduced fractures, technical errors, and failure to recognize instability can lead to failure of fixation.

Five Pearls

1. **Prevention is key. Low-energy wrist fractures (especially if combined with vertebral body fractures) should prompt a workup and treatment plan to prevent future hip fractures.**
2. **Calcar comminution and reverse orientation make IT fractures unstable.**
3. **Nail stable fractures if you wish, but do not think the evidence compels you to do so.**
4. **Operative reduction must be performed before fixation; the fixation device cannot help you achieve better reduction.**
5. **The combined distance from the tip of the screw to the apex of the head on AP and lateral views (tip-apex distance) must be less than 25 mm; err in posterior and inferior directions.**

References

1. Ahrengart L, Tornkvist H, Fornander P, Thorngren KG, Pasanen L, Wahlstrom P, Honkonen S, Lindgren U. A randomized study of the compression hip screw and Gamma nail in 426 fractures. *Clin Orthop Relat Res.* 2002;401:209–222.
2. Bhandari M, Schemitsch E, Jönsson A, Zlowodzki M, Haidukewych GJ. Gamma nails revisited: gamma nails versus compression hip screws in the management of intertrochanteric fractures of the hip: a meta-analysis. *J Orthop Trauma.* 2009;23:460–464.
3. Grisso JA, Kelsey JL, Strom BL, Chiu GY, Maislin G, O'Brien LA, Hoffman S, Kaplan F. Risk factors for falls as a cause of hip fracture in women. The Northeast Hip Fracture Study Group. *N Engl J Med.* 1991;324:1326–1331.
4. Lindskog DM, Baumgaertner MR. Unstable intertrochanteric hip fractures in the elderly. *J Am Acad Orthop Surg.* 2004;12:179–190.
5. Moran CG, Wenn RT, Sikand M, Taylor AM. Early mortality after hip fracture: is delay before surgery important? *J Bone Joint Surg Am.* 2005;87:483–489.