

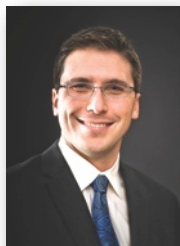
Trauma Rounds

Case Reports from the Mass General Hospital and Brigham & Women's Hospital

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THA for Femoral Neck Fractures



Michael J Weaver, MD

The reduction and fixation of displaced femoral neck fractures has an unacceptably high rate of failure, particularly in the geriatric population. Reconstruction with either hemiarthroplasty or total hip arthroplasty (THA) is the accepted treatment for these fractures. In active patients reconstruction with a total hip has advantages in terms of pain relief, functional outcome, and prosthesis longevity¹.

While many surgeons are skilled in performing THA for degenerative conditions of the hip - including osteoarthritis and avascular necrosis - patients with femoral neck fractures present several unique challenges. Here are my experiences:

Intraoperative Fracture

Femoral neck fractures are fragility fractures associated with poor bone quality, a marker of osteoporosis. The trend in arthroplasty has been toward press-fit femoral components that allow for bone ingrowth and long-term stability. Thus, I use ingrowth femoral stems with a more canal-filling geometry instead of taper-type stems to reduce hoop stresses and prevent fracture. A doubled up 16-gauge circlage wire should be placed prophylactically between the greater and lesser trochanters prior to broaching.

Care must also be taken with placement and impacting of the acetabular component. There is usually no subchondral sclerosis, and it can be easy to breach the medial wall with the acetabular reamers. Supplementing acetabular fixation with at least 2 screws can prove useful.

Stability

The rate of dislocation is higher in fracture patients treated with THA than osteoarthritis patients treated with THA². An anterolateral approach is thus recommended to reduce the risk of dislocation, despite the higher incidence of Trendelenburg gait³. Patients have an easier time complying with modified anterior hip precautions than posterior hip precautions - an important consideration for patients with mild cognitive deficits. The



Figure 1: Pre-operative pelvic AP is the template to guide radiographic placement of the cup. Adjust the C-arm orientation to recreate this image.

newer highly cross-linked polyethylene liners allow for larger femoral head sizes that improve stability.

Leg Length Discrepancy

Many arthroplasty surgeons use pre-operative leg lengths to guide component position and gauge leg lengths. This is more challenging in fracture patients as there is no one perfect guide. A combination of the following is helpful: visual inspection to ensure that the center of the new head is at the level of the tip of the greater trochanter; palpation of the contralateral knee through the drapes with the hip reduced; tissue tension; shuck; and c-arm guidance. Osteoarthritic patients have tighter tissues, while fracture patients typically have normal hip anatomy prior to injury leading to slightly looser tissue tension when limb length is restored.

Medical Complications

Hip fractures are associated with increased morbidity and mortality. Mobilizing the patient early is critical. It is thus important to optimize patients quickly, so they may go to the operat-

ing room as soon as possible after injury. A close relationship with the medical and geriatric teams is essential to minimize post-operative complications. Particular attention should be paid to mobilization, nutrition, and adequate pain control.

Patient Expectations

Many elderly patients with hip fractures have friends or family who may have had a THA for osteoarthritis. Since fractures are injuries of the whole hip, they are often associated with contusion and injury to the surrounding musculature. It is thus important to counsel patients and families that recovery may be more challenging.

The C-Arm

The C-arm improves reliability of cup position and accuracy in restoring normal leg lengths. Obtaining the correct view is critical to success. A few adjustments in the direction of the beam may be required before an appropriate view is obtained. Despite lateral positioning, the patient may slump forward or backwards in the bean-bag, causing over or under anteversion of the cup and adversely affecting stability. It is important to adjust the patient such that the x-ray is a true AP rather than an obturator or iliac oblique view. Positioning patients with the well leg flexed to ~ 40 degrees requires the beam to be adjusted to obtain a true AP of the pelvis. Displaying the pre-operative AP pelvis during the case and adjusting the patient or C-arm as needed to re-create that image prior to reaming helps placement of the acetabular component.

The C-arm is brought in twice: to confirm placement of final reamer and during impaction of the acetabular component; and again after the final broach is in place to confirm femoral fill and leg length equality.

Leg lengths are confirmed by taking an image of the well hip, and adjusting the rotation and abduction of the fractured hip with the broach in place until the same appearance of the lesser trochanter is obtained. The level of the lesser trochanters in relation to the ischium is used to gauge leg length.

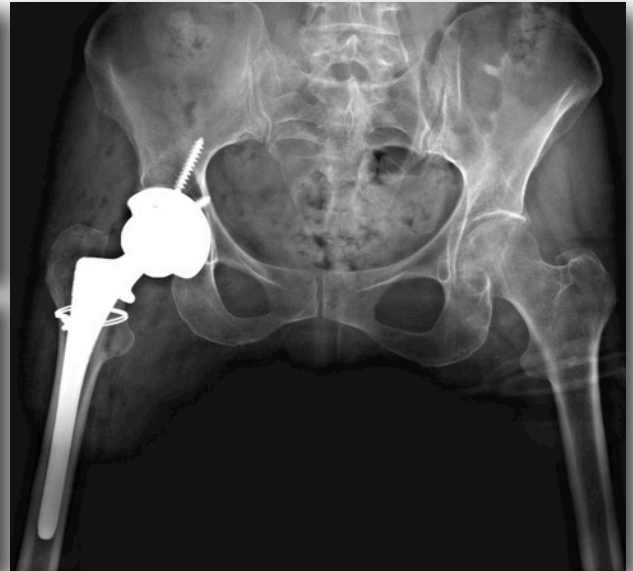
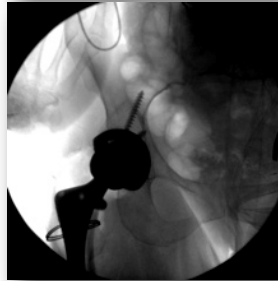
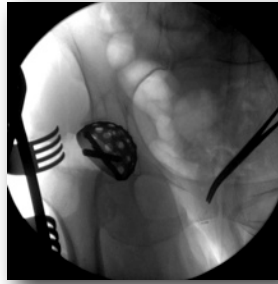


Figure 2 (left top): After reaming, check the image to ensure adequate medialization of the cup. This also gives an idea of the proper cup position.

Figure 3 (left bottom): The actual component is then impacted.

Figure 4 (right): Post-operative films demonstrate appropriate acetabular component position and restoration of leg lengths.

The C-arm is a tool like any other. If something does not feel right, it probably is not. It is important to visually inspect the cup and test stability once the femoral broach is in place.

Summary

The optimal care of femoral neck fractures has evolved. Many patients benefit from reconstruction with a total hip replacement to maximize pain relief, improve function and provide them with a durable result.

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Trauma Faculty

Mark Vrahas, MD — 617-726-2943
Partners Chief of Orthopaedic Trauma
mvrahas@partners.org

Mitchel B Harris, MD — 617-732-5385
Chief, BWH Orthopaedic Trauma
mbharris@partners.org

R Malcolm Smith, MD, FRCS — 617-726-2794
Chief, MGH Orthopaedic Trauma
rsmith1@partners.org

David Lhowe, MD — 617-724-2800
MGH Orthopaedic Trauma
dlhowe@partners.org

Michael Weaver, MD — 617-525-8088
BWH Orthopaedic Trauma
mjweaver@partners.org

Jesse Jupiter, MD — 617-726-5100
MGH Hand & Upper Extremity Service
jjupiter@partners.org

David Ring, MD — 617-724-3953
MGH Hand & Upper Extremity Service
dring@partners.org

Brandon E Earp, MD — 617-732-8064
BWH Hand & Upper Extremity Service
bearp@partners.org

George Dyer, MD — 617-732-6607
BWH Hand & Upper Extremity Service
gdyer@partners.org

Please share your comments online, or by email:
Mark Vrahas, MD / mvrahas@partners.org
Yawkey Center for Outpatient Care, Suite 3C
55 Fruit Street, Boston, MA 02114

Editor in Chief
Mark Vrahas, MD

Program Director
Suzanne Morrison, MPH
(617) 525-8876
smmorrison@partners.org

Editor, Publisher
Arun Shanbhag, PhD, MBA

www.MassGeneral.org/ortho
www.BrighamAndWomens.org/orthopedics

