ORIF Femoral Neck Fractures
What Went Wrong?

- Fixation Failure
- AVN
- Non-Union
- Wrong Implant

Donald Wiss MD Cedars-Sinai Medical Center Los Angeles, California

Femoral Neck Fractures
Controversies & Consensus

- Extremely Common Injury
- Large Body Of Published Literature
- Excellent Randomized Trials
- Registry Data (1st Europe)
- Controversies Remain
- Emerging Points Of Consensus

Femoral Neck Fractures
Have We Reached A Consensus?

Great Britain

1
Femoral Neck Fractures
The 4 Pillars Of Consensus

1. Non-Displaced Garden 1 & 2 Fractures All Ages
2. Displaced Femoral Neck Fractures Age < 55
3. Displaced Femoral Neck Fractures Age 55 – 75
4. Displaced Femoral Neck Fractures Age 75 & Up

ORIF Non-Displaced Femoral Neck Fractures
All Age Groups

- Virtually All Garden 1
- Vast Majority Of Garden 2
- In All Age Groups
- CRPP
- Remaining Controversy
  - Multiple Cannulated Screws
  - Sliding Hip Screw

ORIF Displaced Femoral Neck Fractures
Patients < 55 Yrs

- Mandates Anatomic Reduction
- Often Requires Formal ORIF
  - Direct Anterior Approach
  - Antero-Lateral (Watson-Jones)
- Screws vs Sliding Hip Screw
Displaced Femoral Neck Fractures
Patients 55-75 Years

- ORIF High Complication Rate
- Literature Supports Arthroplasty
- Hemi-Arthroplasty Mid-Term
  Acetabular Wear
- Recent Studies Supports THR

Displaced Femoral Neck Fractures
Patients 75 Years & Up

- ORIF Contra-Indicated
- Cemented Hemi-Arthroplasty @ 85%
- Press Fit Hemi-Arthroplasty In 10%-15%
- Surgical Approach Controversial
  - Anterior
  - Lateral
  - Posterior

Complications After ORIF Femoral Neck Fractures
What Went Wrong

- Poor Fracture Reductions
- Poor Fixation Techniques
- Wrong Implant
- Biology, Blood Supply, Bad Luck
Complications After ORIF Femoral Neck Fractures
What Went Wrong?

- Elderly Fragile Patient
- "Let's Do A Quick Pinning"
- On & Off Table in 30-40 Minutes
- Accept Inadequate Reduction
- Suboptimal Fixation
- Often The Wrong Implant

Clustered Screws in the Middle of The Femoral Head And Neck Do Not Prevent Translational Loss Of Reduction

Widely Placed Screws Placed In A Triangular Position
Femoral Neck Fractures

Screw Placement

AP: Along Calcar
Lateral: Center

AP: Superior Neck
Lateral: Anterior

AP: Superior Neck
Lateral: Posterior
Avoiding Complications

- **Reduction Crucial**
  - No Varus
  - 5°-10° Valgus Acceptable
  - < 5° Retroversion
- **Fixation Crucial**
  - Widely Spaced Screws
  - Abut The Cortex
  - Triangle Or Reverse Triangle

Complications Following Femoral Neck Fractures

- **Head Preservation**
  - Revision Fixation
  - Bone Graft Procedures
  - Valgus Osteotomy
  - Arthroplasty

Femoral Neck Non-Union And Mal-Union

- **Revision Fixation**
  - Difficult & Uncommon
  - Deformity Correction
  - Formal Open Reduction
  - Back-Up Plan
  - Little Personal Experience

Courtesy Dean Lorich MD
Femoral Neck Non-Union And Mal-Union Head Preservation Techniques

- Bone Graft Procedures
  - Judet-Meyers Quadradius Femoris Pedicle Graft
  - Fibula Strut Graft
- Well Aligned Fracture
- Evidence Medicine Lacking

Femoral Neck Non-Union And Mal-Union Head Preservation Techniques

- Valgus Osteotomy
  - Varus Deformity
  - Shear To Compressive Forces
  - Missed Or Neglected Fractures
  - Viable Femoral Head

Marti RK et al. Intertrochanteric Osteotomy For Non-Union Of The Femoral Neck. JBJS 71B: 782-787, 1989

50 Femoral Neck Non-Unions
Valgus Osteotomy & Blade Plate
Average Follow-Up 7.1 Years
7 Converted To Arthroplasty
22 Radiographic Evidence of AVN (3 Arthroplasty)

Harris Hip Score 91
37 Yr Female 7 Months S/P ORIF Femoral Neck Fracture After a Fall While Horseback Riding; With Painful Non-Union

Now in Varus; Femoral Neck Shortening; Poor Fixation

Varus Non-Union Femoral Neck

Essential Pre-Operative Planning

Pre-Op Plan  Valgus Osteotomy and 120° Blade Plate
Post-Op Osteotomy & Internal Fixation

Fracture & Osteotomy Healed; No Evidence AVN; Resumed Horseback Riding

Thank You From Beautiful Southern California

Donald.Wiss@cshs.org
Complications Following Femoral Neck Fractures
Younger Patients Arthroplasty

- Failed Reconstruction
- Avascular Necrosis
- Hip Arthritis

Femoral Neck Non-Union And Mal-Union
Younger Patients Arthroplasty

- No Other Good Option
- Failed Reconstruction
- Avascular Necrosis
- Acetabular Damage

29 Yr Female S/P MVA Sustaining Ipsilateral Femoral Neck Shaft Fracture 1987 In A MVA
Closed Antegrade Femoral Nailing With Screws Around The Nail

Post-Op Internal Fixation 1987

Varus Non-Unión Femoral Neck 1988

1988 Proximal Femoral Valgus Osteotomy With 120° Blade Plate

Now Age 31

2003 Hip Radiographs 15 Years S/P Osteotomy With Painful Hip, AVN & DJD
Femoral Neck Non-Union And Mal-Union Treatment In The Older Patient

- Arthroplasty
  - Total Hip Replacement
  - Hemi-Arthroplasty


107 Matched Pairs Case Controlled Design

Group 1 Salvage Cemented THR After Failed ORIF
Group 2 Primary Cemented THR For Acute Femoral Neck Fracture

Complications Group 1 39/107 (36%) Complications Group 2 22/107 (21%)
P < 0.05

5 & 10 Year Prosthetic Survival Better In Group 2
88 Yr Old Physician With A Painful Hip 8 Years After Internal Fixation Of Intertrochanteric Hip Fracture

85 Year Old Female Patient With Painful Non-Union S/P Failed ORIF; Treated With A Total Hip Replacement

AVN After ORIF Femoral Neck Fx Uncemented THR
62 Yr Female With Displaced Femoral Neck Fracture After Fall While Horseback Riding; Treated With Hemi-Arthroplasty; Persistent Groin Pain 18 Months After Surgery

Early Acetabular Wear; Infection Work-Up Negative

Complete Resolution Of Symptoms Following Conversion To THR
52 Yr Male With Femoral Neck Fracture After Fall 12 Feet From A Ladder; Treated With Hemi-Arthroplasty

Hip & Groin Pain Resolved After Conversion To THR

71 Female With Painful Hemi-Arthroplasty 3 Years Following A Displaced Femoral Neck Fracture
Conversion To THR With Resolution of Pain

58 Yr Male 13 Yrs S/P IM Nailing Of Femoral Shaft Fracture Now 5 Weeks S/P “Missed” Femoral Neck Fracture After ETOH Related Fall

Reasonable Option Given High Risk Of AVN

44 Yr Old Obese Female 8 Months S/P ORIF Femoral Neck Fracture Painful Non-Union With Broken Screws
Pre-Operative Planning
Valgus Osteotomy 120° Blade Plate

Complex Closed Removal Of Hardware
Supine On A Fracture Table

Valgus Osteotomy & 120° Blade Plate Fixation
2 Year Follow-Up, Healed, Working, No Evidence Of AVN

36 Yr Male S/P Motorcycle Accident With Ipsilateral Neck-Shaft Frx

Cephalomedullary (Recon) Nailing At An Outside Hospital
4.5 Months Post-Op; Fixation Failure; Varus Hip; Delayed Union Both Fractures

Valgus Osteotomy & Blade Plaoure Fixation Hip; ORIF Femoral Shaft

16 Month Follow-Up; Healed Working Riding His Motorcycle!
Femoral Neck Fractures
Predictors Of Fixation Failure

- Offset
- Reduction Angle
- Classification
- Bone Density
- Comminution

Femoral Neck Non-Union And Mal-Union
Decision Making

- Patient Factors
  - Patient Age
  - Medical Co-Morbidities
  - Bone Quality (Osteoporosis)
  - Fracture Alignment
  - Status Of Hip Joint
# Femoral Neck Non-Union And Mal-Union Decision Making

- **Surgeon Factors**
  - Acute Versus Chronic
  - Implant Type & Location
  - Fracture Alignment
  - Bone Quality
  - Head Viability