HIP FRACTURES IN THE ELDERLY

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Objectives

- To understand the approach to managing a senior with a hip fracture
- To appreciate the consequences of hip fractures in the elderly
- To look at preventive strategies for hip fractures

Epidemiology

- In 1990, 1.7 million proximal femur fractures worldwide
- Predicted 6.26 million by 2050
- Greatest incidence in Elderly
  - ♂ > ♀
  - N. Europe & N. America
  - Whites > blacks
Consequences

- 25% 1y mortality rate after hip #
- Of survivors, 1/2 have longstanding disability
- Only 2/3 return home
  Pre# mobility, cognition, health, age, continence, marital status predict this

What is a hip fracture?

- Fracture in the proximal end of the femur, near the hip joint
- Types:
  Femoral neck #
  Intertrochanteric #
  Subtrochanteric #
Femoral Neck Fractures

- Subcapital or intracapsular fracture
- Located in femoral neck between head & greater trochanter
- Blood supply to femoral head passes retrogradely through femoral neck
- # here → high risk avascular necrosis, nonunion

Intertrochanteric Fractures

- # line between greater & lesser trochanters on intertrochanteric line
- Extracapsular
- Possible complication is malunion with leg shortening
Subtrochanteric Fractures

- Involves shaft of femur, immediately below lesser trochanter
Risk Factors For Hip Fracture

- FALLS
  >90% hip fractures due to low energy falls
- ↓ BONE STRENGTH
  # risk doubles for each SD ↓ in BMD
- CLINICAL FEATURES
  previous low trauma # after 50y, maternal history of hip #, current smoker, low BMI (<18.5)

Diagnosis of Hip Fracture

Based on clinical diagnosis + AP & lateral hip Xrays

- History of low energy fall onto hip → pain & inability to weight bear
- O/E: leg shortened, externally rotated, point tenderness over groin, any hip motion painful

Diagnosis of Hip Fracture

With this history, if no fracture on Xrays → angled view of hip, then pelvic XR; pubic ramus # can mimic hip #

- If pelvic XRay negative → MRI hip

Diagnosis of Hip Fracture

If is delay in diagnosis or contraindication to MRI, repeat radiography & bone scan may help

- Only 1% of fractured femoral necks are radiographically occult
Management

- Surgical in most (98%) unless very high anaesthetic risk
- Preoperative:
  - Stabilise any medical conditions if possible 1st
  - Minimize surgical delay <24h
  - Pressure sore prevention
  - No need for traction

Management: perioperative

ANALGESIA:
- Seniors with hip # often undertreated with analgesics, especially those with dementia
- Tailored to individual patient
- i.v. opiates: titrate, give early, before painful procedures
- Peripheral nerve blocks may allow a ↓ in postop opioid requirements

Management: perioperative

- 2 RCTs report epidural analgesia ↓ periop cardiac complications
- Paracetamol preferable to ASA; similar effects but less side effects
- Good analgesia likely to ↑ early mobilization & may be associated with earlier discharge from hospital

Management: perioperative

OXYGEN:
- Given to maintain adequate tissue oxygenation
- Persistent hypoxia may be present in all hip # patients from admission up to 5 days postop
- Give O₂ for ≥ 6 hours postop, at night for 48h postop & prn
**Management: perioperative**

**ANTIBIOTICS**

- Single or multiple dose periop iv antibiotic coverage should be given to ↓ wound infections
- Need adequate blood levels for a minimum of 12 hours

**Management: perioperative**

- Prolonged antibiotic coverage of no proven benefit for prophylaxis of wound infection
- Depending on antibiotic chosen, UTI & respiratory infections may also be ↓

**Management: perioperative**

**THROMBOEMBOLIC PROPHYLAXIS:**

- Adequate fluid balance & early postop mobilization important
- Recommended that heparin of any type (fractionated or unfractionated) or fondaparinux be used for ≥10 days postop

**Management: perioperative**

- Alternatively, vitamin K antagonist (INR>2.5) or mechanical pumping may be used
- If operation is delayed, start heparin preop
Management: perioperative

ANAESTHESIA: General v Regional

- Mixed results but spinal preferred for most
  - ↓ 1 month mortality (7.5 v 9.2%)
  - ↓ morbidity- DVT, PE, delirium

Surgical management

FEMORAL NECK FRACTURES:

- Treatment controversial, depends on
  - Amount of # displacement
  - Patient age (70y)
  - Mobility level
  - Concomitant conditions.. Pagets,RA....

- Blood supply to fractured area often disrupted → high risk of nonhealing & osteonecrosis of femoral head , especially with displaced #
Surgical management

- **nondisplaced/impacted** → reduction & fixation

  - Numerous implants available; quality of reduction more important than implant used

  - Sliding hip screw similar risk of # healing complications to multiple parallel screw technique but larger surgical exposure

- **displaced** →

  - internal fixation in <70y

  - hemiarthroplasty in >70y or with minimal ambulation
Hemiarthroplasty

Unipolar v bipolar
- Theoretically, bipolar ↓ acetabular wear
- But no important differences in outcomes
- Unipolar less complicated & less expensive

Cemented v uncemented arthroplasty
- Is some limited evidence that cemented may have better outcomes:
  - less pain
  - improved mobility
  - lower revision rate

Hemiarthroplasty v THA

With THA:
  - less pain, better function at follow-up
  - lower reoperation rate
  - BUT, greater periop morbidity, especially dislocation (10-20%)
  - Consider with preexisting moderate severe acetabular disease, & in active, cognitively & physically well patients with displaced femoral neck # s
Complications after hip replacement

- Implant failure
  - Wear out & loosen
  - Most last 10-20y
- Dislocation
  - Don’t cross legs
  - Use elevated seats
  - Don’t bend hip >90⁰ towards chest
  - Pillow between legs in bed
  - Avoid turning foot inwards

Complications after hip replacement

- Infection
  - Early- days, weeks postop
  - Late- years later
    - Take antibiotics before invasive procedures
- DVT

Intertrochanteric Fractures

- Usually older patients, less active & more functionally dependent
- Usually repaired without hip replacement as less concern re vascular damage
- Often ++blood loss, requiring transfusion
- Stable vs unstable #
  - 2 part # v >2 parts #

Intertrochanteric Fractures

SURGICAL MANAGEMENT:

- 2 implant types
  - Extramedullary fixation with sliding hip screw & side plate or
Intertrochanteric Fractures

- Intramedullary fixation with im nail devices
  - Less surgical time
  - Less blood loss
  - Earlier return to full weight-bearing
  - Possibly better mobility 1y postop
  - Better for unstable # than SHS

- Stability of # dependent on degree of comminution which will determine weight-bearing status postop

Subtrochanteric Fractures

- Intramedullary nails or compression screws with long side plates for fixation

- Im nail more stable but if trochanteric component to # that destabilises proximal fixation, screw & side plate best

- Often ++blood loss with these # & corrective surgery
Postop Mobilization

- Weight-bearing contributes to healing & maintains muscle strength
- Early mobilization also important in the complications associated with recumbency
- With stable & hemiarthroplasties, immediate postop weight-bearing as tolerated is possible

Postop Mobilization

- Unstable # more controversial
  - 3 or 4 part intertrochanteric or mildly displaced femoral neck treated by internal fixation
- Many restrict weight-bearing whenever there is concern about the stability of # repair

Post-op Mobilization

**STABILITY SCORE**

- **Bone quality**
  - osteoporotic 0 → 3 normal
- **Fracture**
  - comminuted 0 → 3 simple
- **Stability**
  - unstable 0 → 3 stable
- **Stability score**
  - 0-3 bedrest
  - 4-6 NWB/ feather
  - 7-8 partial weight-bearing
  - 9 WBAT with aids

Postop Wound Drainage

- Intention of this was to reduce hematoma formation but risk of introducing wound infection with suction wound drains
- Meta-analysis found no significant differences in infection rates, transfusions or reoperation for wound healing with wound drains
- Postop drains may not be required
Urinary Catheterisation

- Urinary retention occurs in 40% patients after hip # surgery
- Successful voiding resumes faster with regular intermittent catheterization (q8h) rather than indwelling catheter for 48h

Postop Nutritional Supplementation

- Seniors with hip # often malnourished at time of # & have subsequent poor intake in hospital
- This may hinder recovery after hip surgery
- Is some evidence that oral protein & energy feeds effective in ↓ mortality & medical complications while in hospital, but overall evidence for nutritional supplementation is weak

Postop Nutritional Supplementation

- However, studies flawed methodologically
- Making links between # recovery & nutritional status complicated since markers of dietary protein depletion (albumin, prealbumin) affected by fluid shifts & responses to injury & infection

Complications after hip fracture

- General medical complications:
  DVT, PE, infections, delirium, pressure sores
- Complications related to the procedure:
  nonunion & osteonecrosis
  dislocation of prosthesis
  loosening of prosthesis
Complications after hip fracture

- **function**
  - 10-15% can’t walk outside
  - up to 20% become nonambulatory
  - only 14-21% regain their IADL abilities

- **Institutionalization**
  - less likely if <85y, ADL independent & walking independently preop, living with someone, able to walk independently on discharge

- **↑mortality** in 1st year postop - 12-37%

Multidisciplinary Care

- Cochrane review in 2002 examined effects of coordinated multidisciplinary inpatient rehab compared to usual orthopedic care after hip #

  - No stat. significant differences in outcomes between the 2 approaches BUT the trials were heterogeneous

- In 2007, Halbert et al published 1st review of randomized trials to show a benefit from multidisciplinary rehab after hip #

  - 11 trials, 2177 patients, all prospective RCTs
Multidisciplinary Care

- 16% ↓ in pooled outcome of death & NH admission
  Risk ratio=0.84, (95% CI 0.73-0.96)
- Trend towards higher levels of return home
  Risk ratio=1.07, (95% CI=1-1.15)
- No mortality differences between the 2 groups


Prevention of hip fracture

- A fall, in presence of osteoporosis, is main reason for the occurrence of a hip fracture
- Preventive strategies aimed at:
  - fall prevention
  - treatment of osteoporosis
  - hip protection

Fall prevention

- Of >65y living in community, 1/3 fall/year
- Higher with ↑ age & the institutionalized
- 1% falls result in hip #
- High prevalence of osteoporosis & age-related physiologic changes ↑ risk of fall-related injury in elderly
- Evidence from randomized trials shows that >15% falls can be prevented

Contributing factors in risk for falls

- EXTRINSIC
  - Environmental – obstacles, slippery floors, poor lighting, uneven surfaces.....
  - Other factors - inappropriate footwear, obstructive clothing
- 25-45% falls triggered by environmental hazards compounded by aging effects
Contributing factors in risk for falls

- **INTRINSIC**
  
  lower extremity weakness, balance disorder, visual impairment, ↓cognition, ↓coordination, postural changes, gait difficulties, ↓muscle strength, ↓flexibility, ↓alertness, drugs, others (SOB.....)

Falls risk factor reduction

- Addressing many of these extrinsic & intrinsic risk factors is 1st step in a fall prevention program; falls are usually result of interactions between multiple intrinsic & extrinsic risk factors
  
  - 10-30% risk reduction in falls is possible with such interventions

Falls risk factor reduction

- Those programs most effective in ↓fall rates have involved multifactorial intervention components including:
  
  **ENVIRONMENTAL ASSESSMENT & MODIFICATION**
  
  **EXERCISE** - Tai Chi, gait & balance training & strength building

**EDUCATION** about fall risk factors & their management- orthostatic hypotension, medications......

**VISUAL ASSESSMENT** & correction

**REFERRAL** to health care providers for treatment of chronic conditions that may contribute to fall risk
Reducing falls

- Of note, has been a ↓ in use of physical restraints given research outlining their adverse effects on functional status, quality of life & the concern that they may contribute to falls, injuries & death

Hip protectors

- 90% hip #s 2^0 direct force to hip area
- With more adipose tissue around the hip, there is less risk of # from a fall
- Hip protectors designed to reinforce this soft tissue protective effect & change the impact force so that it is less than the fracture threshold
What are hip protectors?

- Plastic shields or foam pads fitted in pockets within specially designed underwear
- 2 types:
  - HARD SHELL (energy-shunting)
  - SOFT SHELL (energy absorbing)
- Presumed to confer immediate protection against hip #s

Hip protectors

- Controversy as to their effectiveness
- Early randomized trials reported beneficial effects with use of hip protectors in ↓ hip # incidence
- Now, is ↑ evidence of lack of effect

Cochrane analysis in 2006 → meta-analysis of all randomized or quasi-randomized controlled studies using hip protectors in intervention v control group

Marginal stat. signif. ↓ hip # incidence in institutionalized seniors RR=0.77 (95% CI 0.62-0.97)

No difference in community dwelling seniors in hip # incidence with hip protectors

In July 2007, Kiel et al. published a RCT to determine whether an energy absorbing & dispersing hip protector would ↓ risk of hip # when worn by NH residents over 1 hip

- Tried to overcome biases from previous trial designs & to ↑ adherence with hip protector
Hip protectors

- Multicentre RCT
- 37 NH randomly assigned residents (1042) to wearing 1-sided hip protector on (L) or (R) hip
- Training sessions given to NH staff across all shifts on how pads should be worn
- Research team visited 3x/week to address any issues & monitor compliance

Use 24h/day was encouraged

Overall adherence = 73.8%

Intention to treat analysis:

Incidence rate of hip # on protected hip (3.1%) did not differ from that on unprotected hips (2.5%, p=0.7)

JAMA July 25, 2007; vol 298; No.4

In patients actually wearing the hip protector at the time of #, there were 13 hip #s on protected hips & 7 hip #s on unprotected hips

When the hip protectors were not worn (noncompliant), there were 6 #s on protected hips & 7 on unprotected hips

Issues surrounding this study:

Was pad used good enough to prevent hip #?
Not completely generalizable- 2-sided protectors normally used
Did having only 1 hip protected modify propensity to fall to protected side?
If falling, did they try to fall on protected side?
Hip protectors

- Adverse effects of hip protectors include skin irritation in 5%, ↑ nursing care in the institutionalized senior, cost ($170-240/y), discomfort (esp. with hard shell), bulky, hot
- ++problems with compliance; often <50%
- Uncertain if the different hip protectors used are of equal effectiveness for preventing #

Hip protectors may be effective in specific subgroups
- Highly motivated elderly in community
- Those at high risk of # in NH with use encouraged by staff
- An International trial is now ongoing regarding their use

Alternative strategies to reduce hip fractures

- After a 1st hip #, patients are at 2.5x times the risk of a new osteoporotic # compared to an age-matched group w/o previous hip #
- Risk of a 2nd hip # highest in 12-19 months post-hip #
- Osteoporosis is underdiagnosed & undertreated in the elderly

Alternative strategies to reduce hip fractures

- Lyles et al. administered 5mg zoledronic acid to see if there was any effect on incidence of new clinical # in patients with recent surgical repair of a hip #
- International, multicentre, double blind, placebo-controlled RCT
- 1065 patients assigned randomly to iv infusion of zoledronic acid v placebo within 90 days of hip # repair, & q12 months
Alternative strategies to reduce hip fractures

- Those enrolled could not, or would not, take oral bisphosphonate
- Both groups also took daily Ca, vitamin D
- Monitored for up to 5y, median 1.9y
- Concomitant treatment with other osteoporosis medications allowed

Alternative strategies to reduce hip fractures

- Zoledronic acid associated with new clinical # rate of 8.6% vs 13.9% in placebo group
- Relative risk reduction of new clinical # of 35%, p=0.001
- Results were significant for any #, nonvertebral & vertebral #s, with a nonsignificant trend for a ↓ in hip #s

Alternative strategies to reduce hip fractures

- Also, relative risk reduction of 28% in risk of death seen with zoledronic acid, p=0.01
  Exact reason for ↓ not clear
- Of note, no significant difference in delayed union of fractured bone seen between the 2 groups

In summary

- Hip fractures in seniors are associated with significant increases in morbidity & mortality
- Strategies to try & ↓ these risks perioperatively have been outlined
- Fall prevention programs & appropriate treatment of osteoporosis are important
- Hip protectors contentious issue- worth considering in a high risk, motivated group
Geriatric Grand Rounds (March 4, 2008)
Hip Fractures in the Elderly

Bibliography


