Optimal Fixation Strategies for Displaced Femoral Neck Fractures in Patients 18-59 years Old

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RESEARCH QUESTION

In young to middle-aged patients undergoing surgical repair for a displaced femoral neck fracture, is there a superior surgical fixation device, or combinations of devices that significantly affects clinical outcomes?

BACKGROUND

- Young and middle-aged patients with displaced femoral neck fractures (FNFs) are often treated with operative repair as outcomes of arthroplasty in this group have not been well defined and revision surgery is anticipated due to implant wear over time.
- Repair in younger populations have proved highly variable, resulting in failed fixation and/or nonunion in a sizable portion of those failing treatment. Superior strategies need to be delineated.

METHODS

- Retrospective study of 18 to 59 years old patient with a displaced femoral neck fracture treated with surgical repair from 2005 to 2017 at 27 Level 1 trauma centers.
- Data collected included patient, injury, treatment method focusing on the reparative construct via interval radiography, and treatment outcomes (nonunion/ failed fixation, osteonecrosis, need for THA or femoral osteotomy).

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Take Home: The superior fixation outcome amongst the entire cohort was seen in femoral neck fractures treated with a good-excellent reduction, utilizing a sliding hip screw with anti-rotation screw and medial buttress plate (11% failure rate).

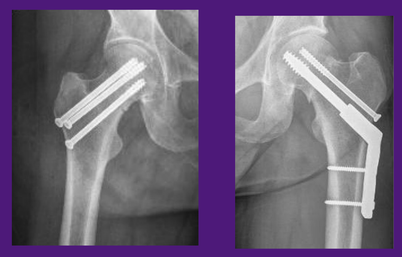

Figure 1: Examples of common internal fixation strategies
- Cannulated screw fixation (left)
- Fixed angle device/ sliding hip screw (right)

Case Example

Figure 2: Pre-operative Femoral Neck fracture (AP X-ray)

Figure 3: Post-operative Femoral Neck fracture 3 screw fixation (lateral X-ray)

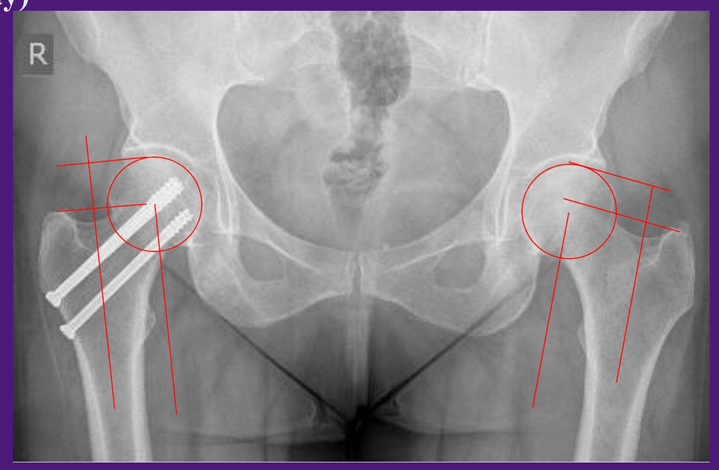

Figure 4: 6-month post-operative AP Pelvis X-ray

RESULTS

- Six hundred twenty-six patients included
- 277 hips treated with fixed angle (FA) constructs vs 349 treated with cannulated screw constructs (CS)
- Overall incidence of failure was much lower in FA constructs (40% vs. 60%, p=<0.001).
- Use of a SHS with addition of an anti-rotation screw (AR) and medial neck plate (Mdpl) demonstrated the lowest incidence of failure overall (15%).
- In patients with BMI >25, use of either a SHS+Mdpl or SHS+AR+Mdpl construct both demonstrated an overall 0% failure rate compared to 33% for SHS+AR's overall failure (P=0.03 and 0.04, respectively).
- SHS+AR+Mdpl having a good-excellent reduction quality failed least frequently (11%) compared to a SHS alone (80%, P<0.001) and a SHS+AR construct (34%, P<0.04) of equivalent good-excellent reduction quality.
- In patients <44 years old, use of SHS+Mdpl demonstrated decreased overall failure compared to SHS+AR (7% vs 31%, p=0.046).

CONCLUSIONS

- FA constructs preferred to CSs overall
- SHSs augmented with a Mdpl or AR screw or both improved treatment outcomes.
- Best outcomes seen in femoral neck fractures treated with a good-excellent reduction utilizing a SHS+AR+Mdpl construct.
- Further consideration of patient demographics including age and weight demonstrated benefits of the medial plate in particular.

FUTURE DIRECTIONS

- Establishment of a clinical calculator to evaluate best implemented subcontruct based on multiple patient factors simultaneously