External Fixation for Closed Pediatric Femoral shaft Fractures: Where Are We Now?

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Is there no role for External Fixation?

AAOS Clinical Practice Guideline Summary

Treatment of Pediatric Diaphyseal Femur Fractures

Abstract
Methods of treating pediatric diaphyseal femur fractures are dictated by patient age, fracture characteristics, and family social situation. The recent trend has been away from nonsurgical treatment and toward surgical stabilization. The clinical practice guideline on pediatric diaphyseal femur fractures was undertaken to determine the best evidence regarding a number of different options for surgical stabilization. The recommendations address treatments that include Pavlik harness, spica casts, flexible intramedullary nailing, rigid trochanteric entry nailing, submuscular plating, and pain management. The guideline authors conclude that controversy and lack of conclusive evidence remain regarding the different treatment options for pediatric femur fractures and that the quality of scientific evidence could be improved for the revised guideline.


No mention of external fixation!!
Hypothesis

External fixation is still a viable treatment option for certain closed pediatric femur fractures.
Methods

- IRB approval
- Retrospective review (1997-2012)
- Single surgeon
- Chart/ Radiographs reviewed by another MD
- 289 Femur fractures treated with various methods
  - 27 treated with external fixation
  - 2 with missing x rays (excluded)
- 25 femur fxs.- All closed injuries
Demographics

25 Patients

- **Age:** 10.4 years (4-15 yrs)
- **Gender:** 20 M, 5 F
- **BMI:** 21.7 (12-44)
- **Mechanism of injury:**
  - Low energy fall 12
  - Pedestrian struck 7
  - High energy fall 3
  - MVA 3
- **Multiple injuries:** 4/25
- **Underlying disorders:**
  - Osteogenesis Imperfecta 3
  - Cerebral palsy 2
Fracture Characteristics

- **Location**
  - Diaphyseal 18
  - Meta-diaphyseal 7

- **Pattern**
  - Transverse 5 (Pathologic/ Metabolic)
  - Oblique/Spiral 9
  - Comminuted 11
Surgical Technique
Results

- **Type of fixator:**
  - Hybrid 15
  - Monolateral 5
  - Fixator-aug nailing 4
  - Circular 1

- **Time to union (3 or 4 cortices healed):**
  - 14.5 wks (8-26)

- **Time in Fixator:**
  - 15 (4-27) weeks
14 year old male. Fell running
11 year female Spastic CP (GMFCS 5)
Swollen leg-10 days
3 year follow-up...
12 year old female with TBI
Post-op Follow up
Results

- **Post-op immobilization:**
  - HKAFO 7
  - Long leg cast 7
  - Hip abduction brace 6
  - Knee immobilizer 2

- **Length of follow-up:**
  - 23.3 (1-78) months

- **Final angulation:**
  - AP 2.3° (0-6°)
  - Lat 6.1° (1-17°)

- **Final LDFA:**
  - 87.2° (82-93°)

- **Final LLD:**
  - 0.6 cm (0-2.2cm)
Complications

- **Refracture** (2):
  - ORIF submuscular plating
  - Long leg cast (Fixator assisted nailing)

- **LLD >2cm** (1):
  - Observation

- **Deep Pin site infection** (1):
  - IV antibiotics

- **?Neuropraxia(1):**
  - Revision of ex fix
9 year old pedestrian
Fell on porch 2 d after fixator removal
ORIF with Plating
Complication: LLD 2.2 cm
Obese adolescent with Blount disease
Fell down a few months later
Unable to Dorsiflex - Sensation normal
Conclusions
External Fixation for Pediatric Femoral Shaft Fractures

- No non-unions
- Complications: LLD, refracture
- Largely preventable
- Still a viable Rx option for certain fractures
- Potential for further improvement in outcome