Intramedullary nailing of humeral fractures. Is really distal locking necessary?

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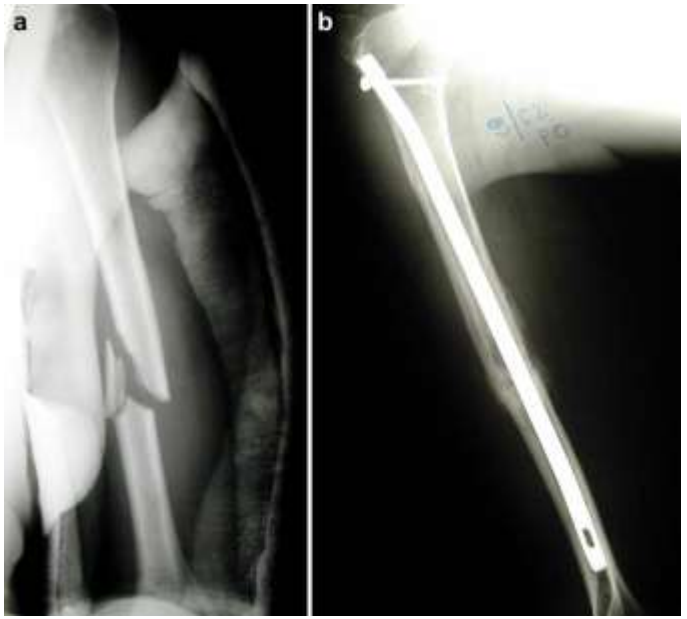

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University Hospital of Patras, Greece

Introduction

Distal interlocking is regarded an inherent part of the antegrade humeral nailing technique

Limitations:

- Appropriate position of the patient
- Exposes both the patient and surgeon to radiation
- Time consuming *(lateromedial locking screw technique)*

Injury, Int. J. Care Injured (2007) 38, 954–957

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INJURY
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The risk of injury to neurovascular structures from distal locking screws of the Unreamed Humeral Nail (UHN): A cadaveric study

M. Noger[a,*], M.C. Berli[a], J.H.D. Fasel[b], P.J. Hoffmeyer[a]

- Potential risk of damaging neurovascular structures:

radial and lateral cutaneous nerve,

ulnar and median nerve

brachial artery

Injury, Int. J. Care Injured (2006) 37, 109–119

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REVIEW

Literature review of current techniques for the insertion of distal screws into intramedullary locking nails

G.M. Whatling, L.D.M. Nokes*

Specifically for the shoulder:

- difficult to obtain a true lateral view
- flattened, slippery surface of distal humerus
- narrow holes of nails

Department of Shoulder & Elbow
University Hospital of Patras

25 years of experience, IM treatment of choice

Arch Orthop Trauma Surg (2005) 125: 27–32
DOI 10.1007/s00402-004-0757-3

ORIGINAL ARTICLE

Panayiotis Dimakopoulos · Andreas X. Papadopoulos
Michalis Papas · Andreas Panagopoulos · Elias Lambiris

Modified extra rotator-cuff entry point in antegrade humeral nailing

Material – Methods

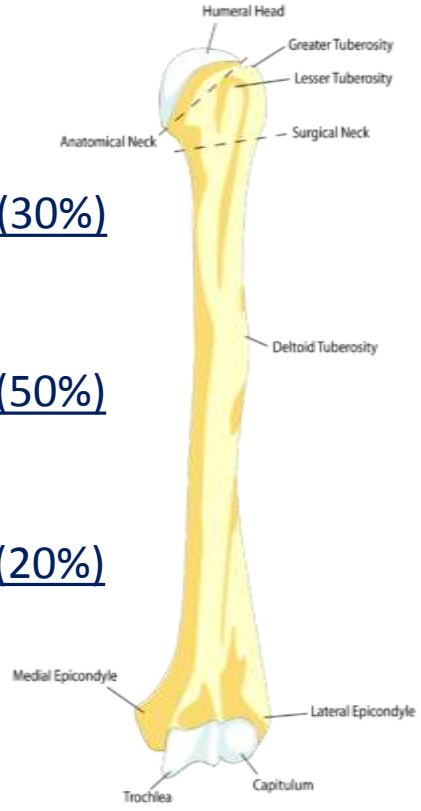
2000-2009

64 patients	33 M/31 F 29 L, 35 R
Mean age	41,5 y
Average	17-76 y
Open Fx	3
Traffic acc	39
Fall	25

Proximal 19 (30%)

Middle 32 (50%)

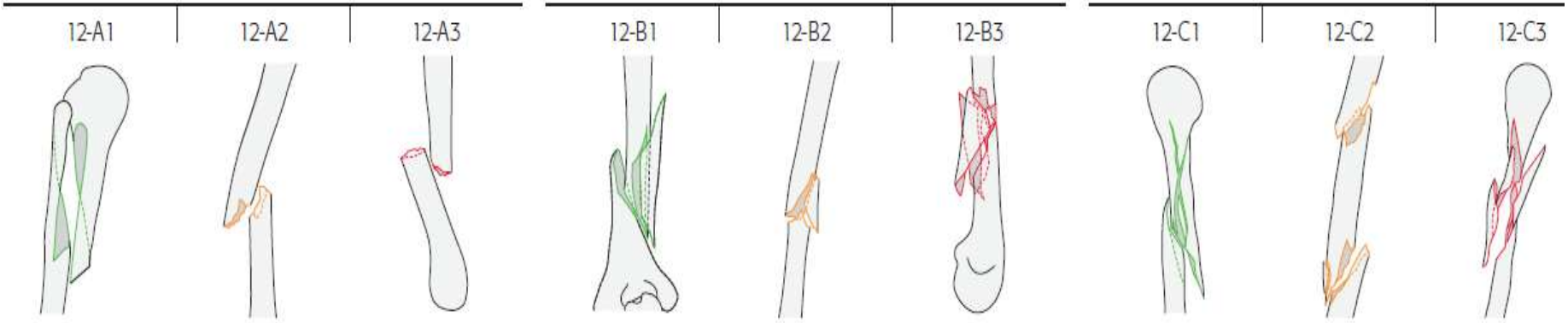
Distal 13 (20%)



Dimakopoulos P, Papas M, Kaisidis A, Panagopoulos A, Lambiris E. Antegrade intramedullary nailing in humeral shaft fractures. OsteoTrauma Care 2003;11:S58-63.
Dimakopoulos P, Papadopoulos AX, Papas M, Panagopoulos A, Lambiris E. Modified extra rotator-cuff entry point in antegrade humeral nailing. Arch Orthop Trauma Surg 2005;125:2732.

AO Classification

12 diaphyseal



12-A simple fracture
12-A1 spiral
12-A2 oblique (≥ 30°)
12-A3 transverse (< 30°)

12-B wedge fracture
12-B1 spiral wedge
12-B2 bending wedge
12-B3 fragmented wedge

12-C complex fracture
12-C1 spiral
12-C2 segmental
12-C3 irregular

36

22

6

Main Measurements

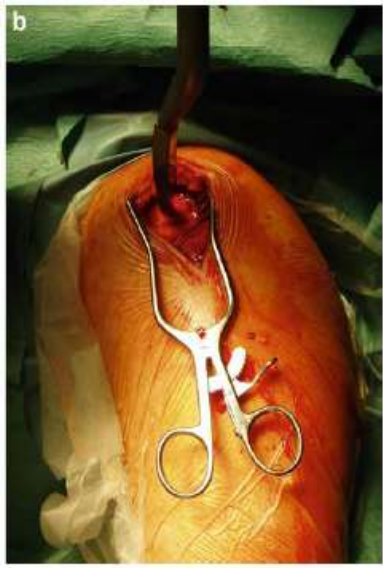
- Delayed Union: 14 w
- Non Union: 24w
- Follow Up: 2 independent observers
- Pain : Patients interview
- Function : Constant Score
- Visualization : 2 planes X-Ray

Exclusion Criteria

- Open growth plates
- Pathological fractures
- Delayed union, nonunion
- Preop radial nerve palsy, polytrauma

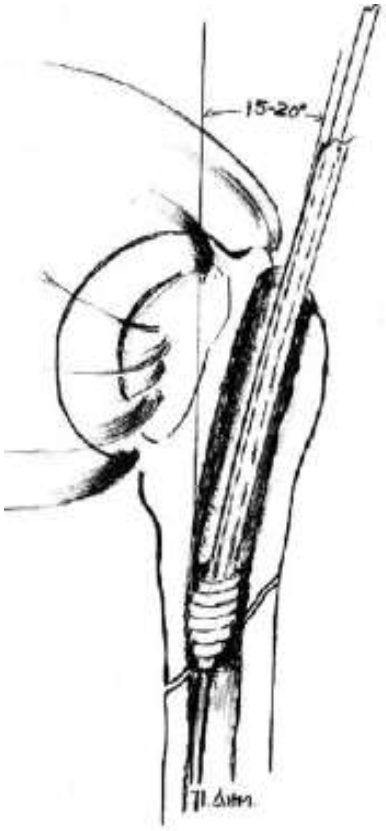
Surgical technique

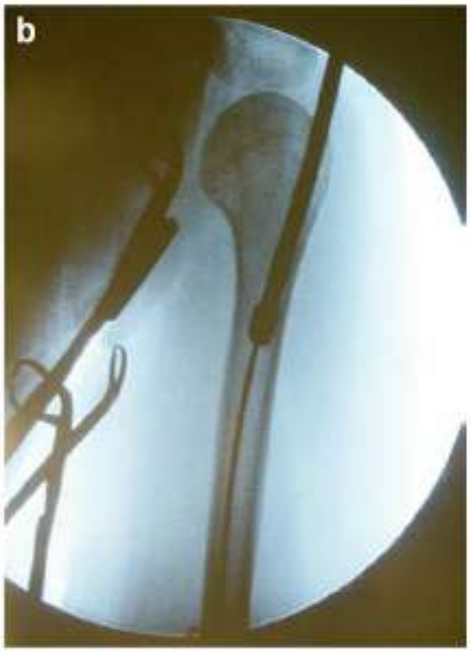
- 2 rigid nail types 7-8 mm: - UHN, Synthes and Russel-Taylor (34)
  - Smith & Nephew, Richards (30)
- 2 different techniques of proximal nail insertion: through the RC (27) or 1 cm below greater tuberosity (37)
- 2 cm incision at the fracture site: finger use reduction
- Reaming: - Minimal proximal (4 cm)
  - NO DISTAL (unreamed distal part)
- Proximal locking under fluoroscopy
- Mean operative time: 70 min

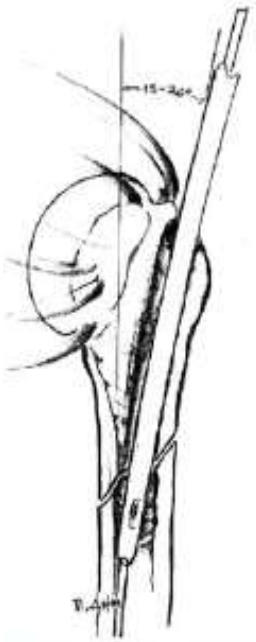


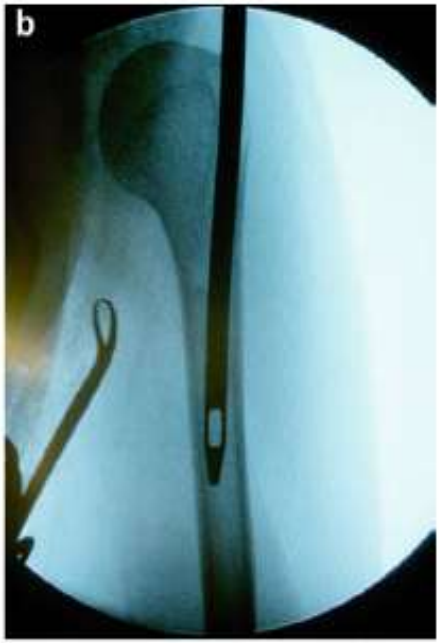
Important pitfalls

- Accurate measurement of nail length
- Unreamed insertion in the distal part



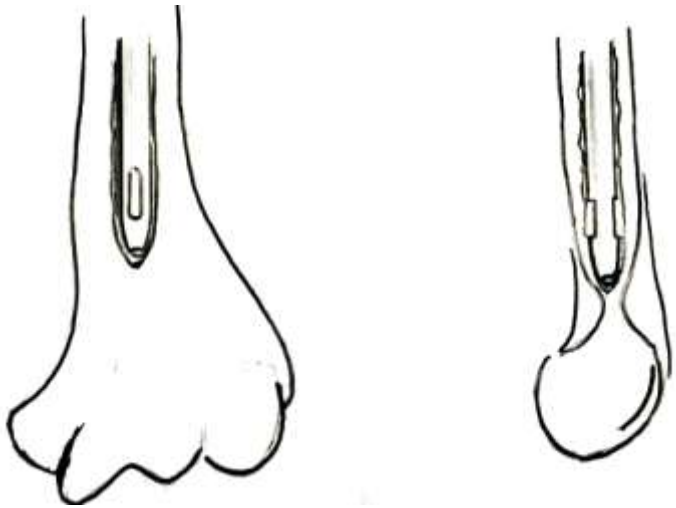


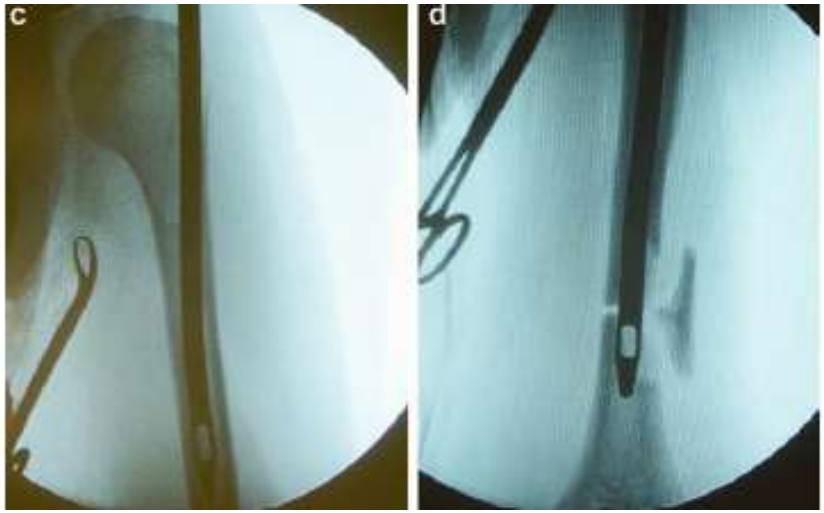




Important pitfalls

- As snuggly fitting as possible
- Slight impaction for 1-2 cm into triangular fossa





Postoperative protocol

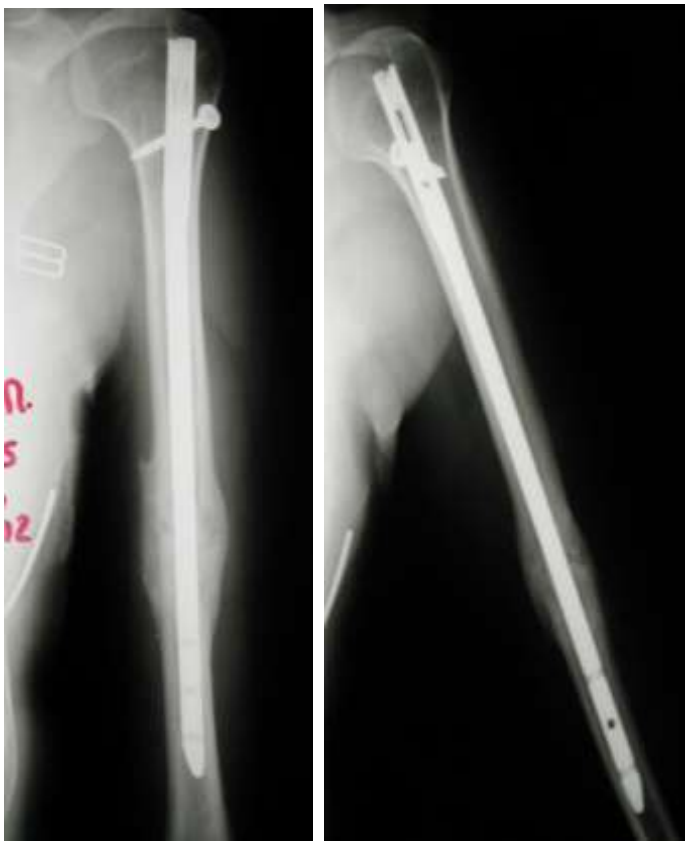
- Arm suspension in an envelope sling
- Strict advise: **no external rotation** for the first 4 weeks
- 1st postop day-4th week: - flexion to the ipsilateral elbow as many times as possible
  - assisted forward flexion
- 5th week-7th week: active external rotation, muscle strengthening exercises

Results

- No infection, no postop nerve palsies

- Inappropriate length in 4 cases:

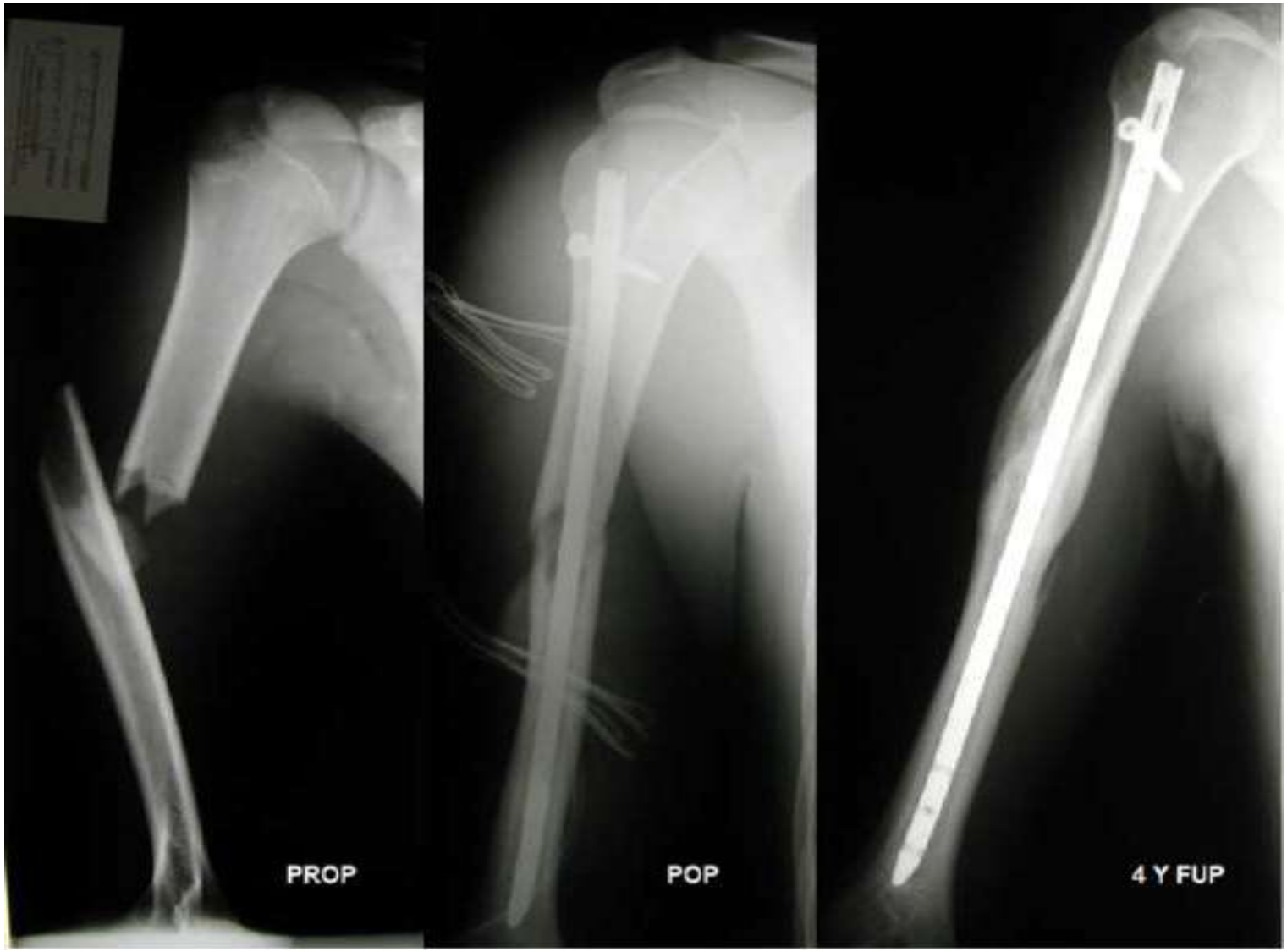
  - 1 too long: Revision by ORIF
  - 3 too short

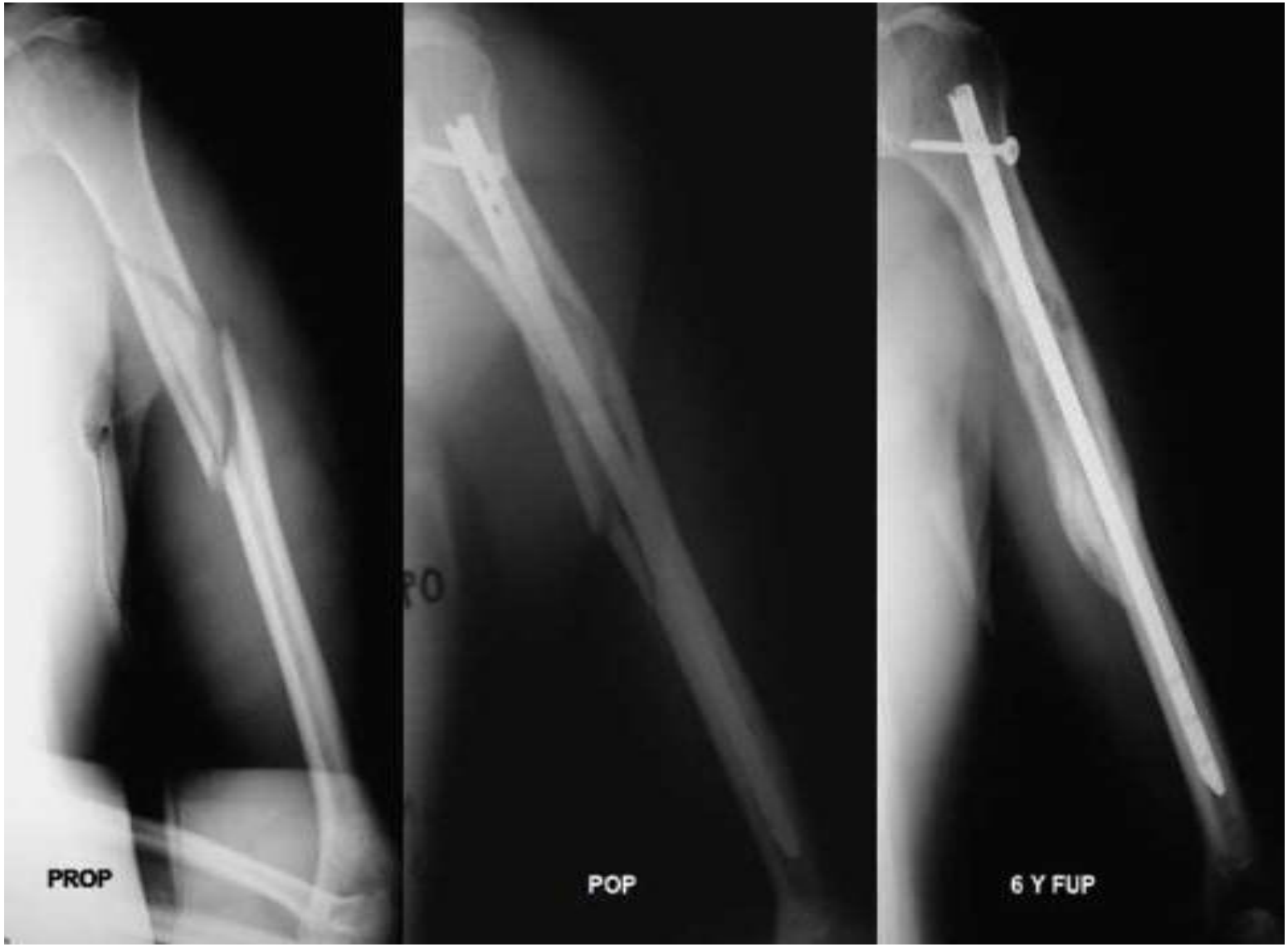


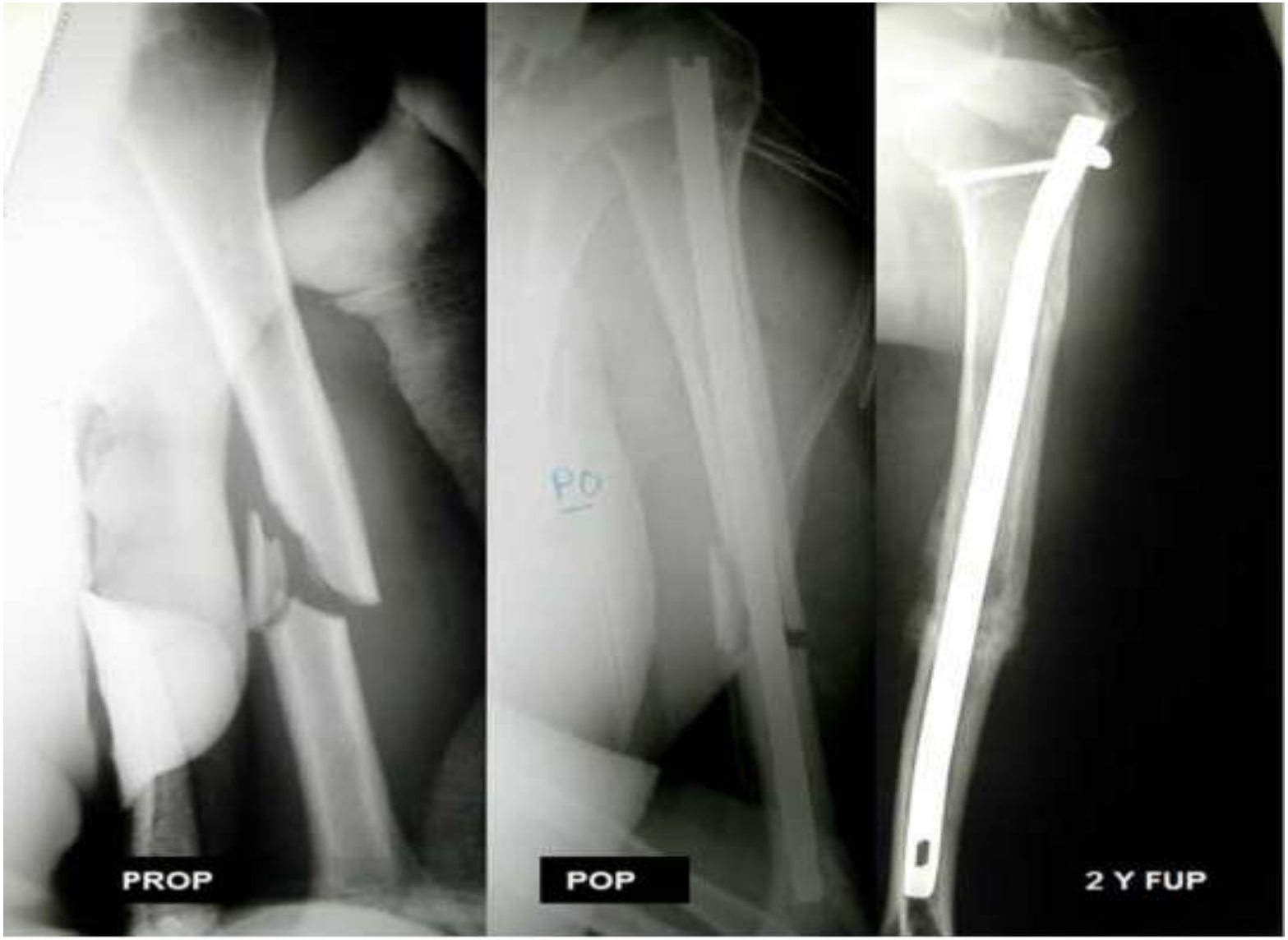
Results

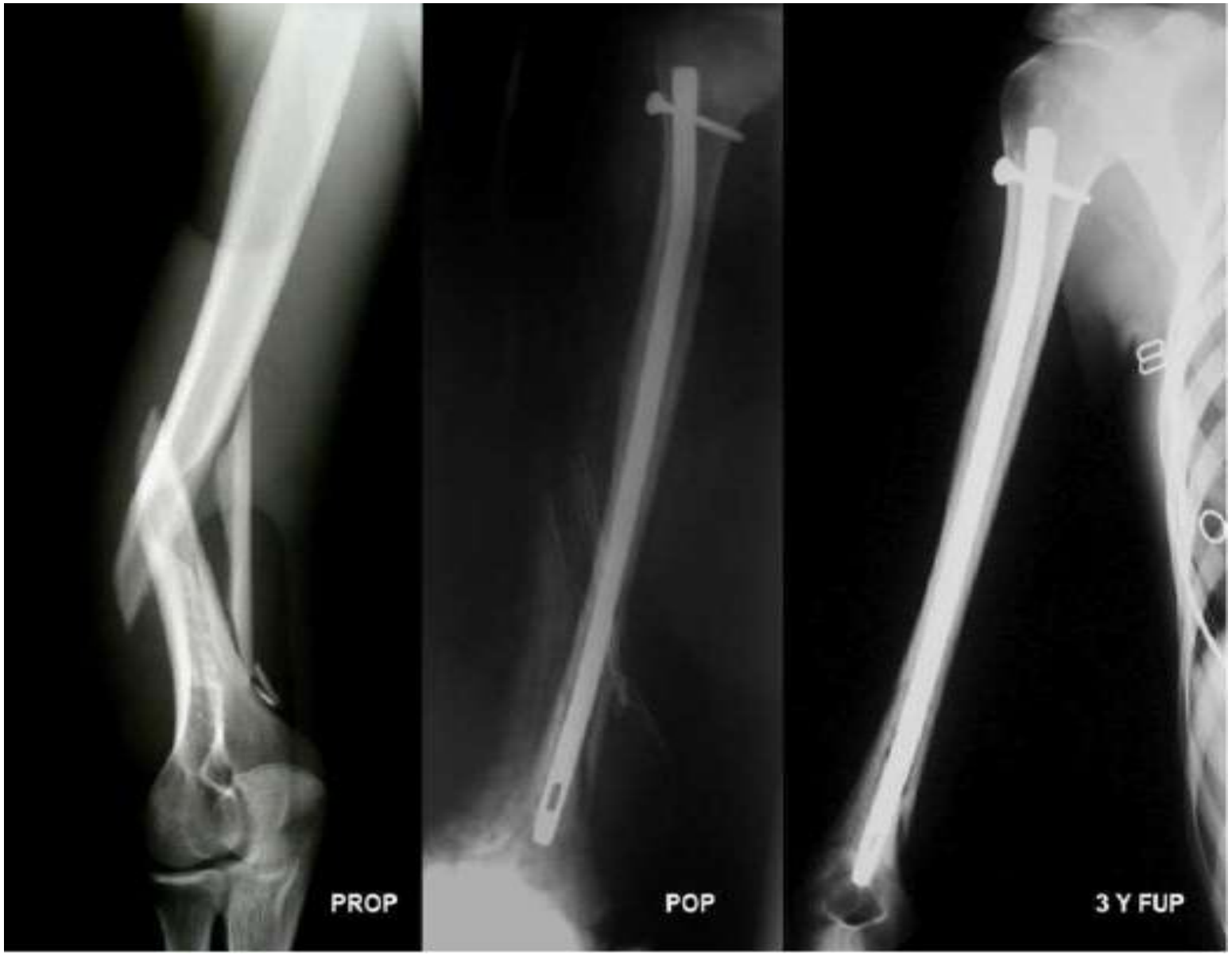
- All fractures except one united by 4-5 months
- Regain preoperative range of motion
- No additional physiotherapy required

- Constant score:
  - 52 excellent (81,2%)
  - 8 very good (12.5%
  - 2 poor (3.1%)


PROP
POP
4 Y FUP


PROP
POP
6 Y FUP


PROP
POP
2 Y FUP


PROP
POP
3 Y FUP

Discussion

Locking Nailing
Locking Plating
} Comparative methods of treatment of proximal and middle third humeral shaft fractures

Main problems of antegrade IM

1. Violation of the rotator cuff
2. Soft tissue injury around the shoulder
3. Distal interlocking

Without distal locking technique

1. Avoid radiation - nerve palsies
2. Solid union and excellent clinical follow-up
3. Ongoing research: embiomechanical testing to ensure rotational stability and CT reconstruction humeral model


THANK YOU