Subtrochanteric Fractures Current Conceps and Outcomes

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Learning Outcomes

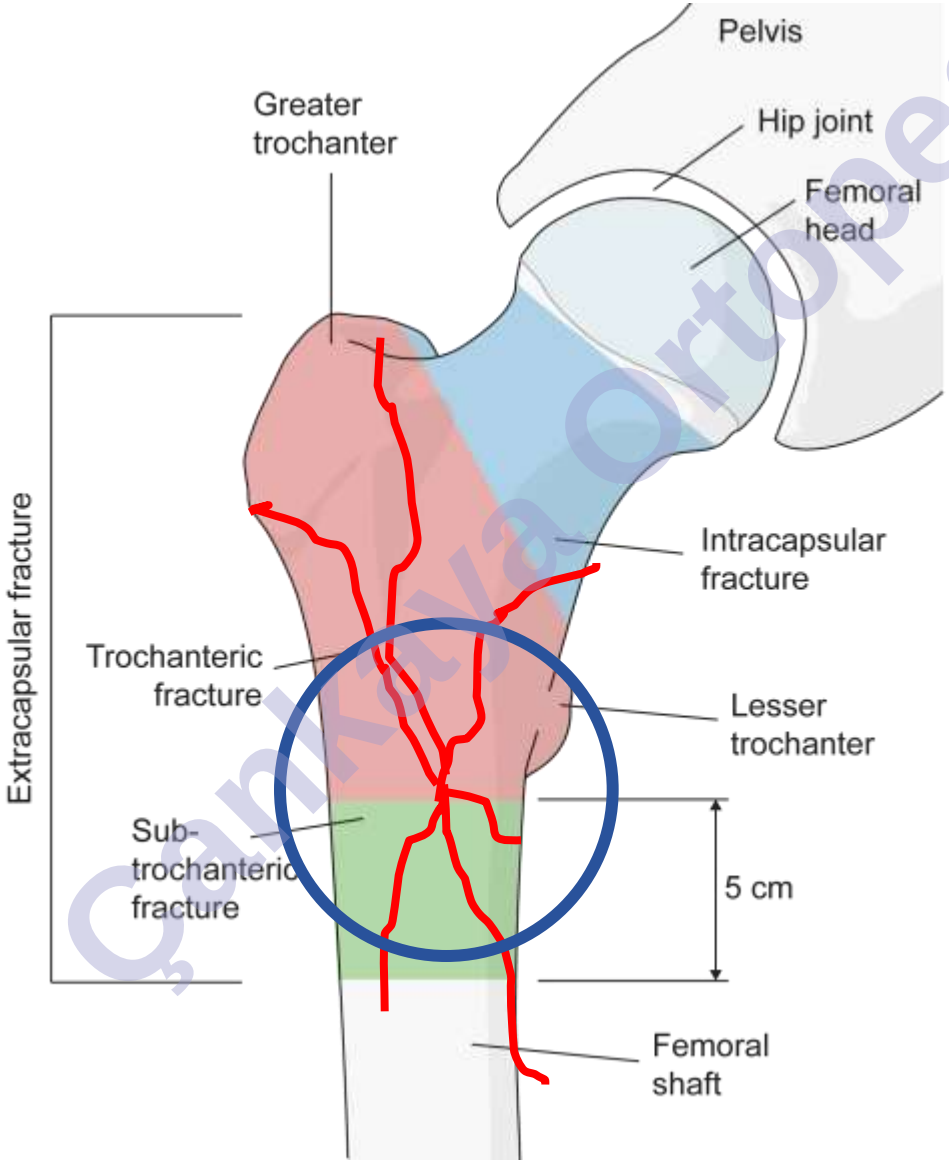
- **Definitions**
- **Fracture anatomy**
- **Proximal femur biomechanics**
- **Plating or nailing ?**
  - Scientific basis
  - Decision making

Classification Systems

Study	Proximal border	Distal border	No. of subdivisions
Boyd and Griffin (1949)	NS	NS	2
Watson, et al (1964)	DBLT	10 cm	> 10
Fielding (1966)	PBLT	5 cm	4
Cech and Sosa (1974)	NS	NS	4
Zickel (1976)	PBLT	10 cm	6
Seinsheimer (1978)	DBLT	5 cm	7
Pankovich, et al (1979)	DBLT	5 cm	4
Waddell (1979)	NS	NS	3
Harris (1980)	BLT	5 cm	6
Malkawi (1982)	NS	NS	5
Russell and Taylor (1987)	NS	NS	3
AO Müller (1990)	DBLT	3 cm	9
Wiss and Brien (1992)	DBLT	7.5 cm	3
Parker and Pryor (1994)	DBLT	5 cm	

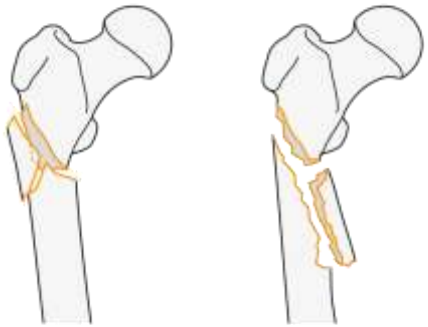
NS = Not stated**; PBLT** = proximal border of lesser trochanter**; DBLT** = distal border of lesser trochanter.

Definition

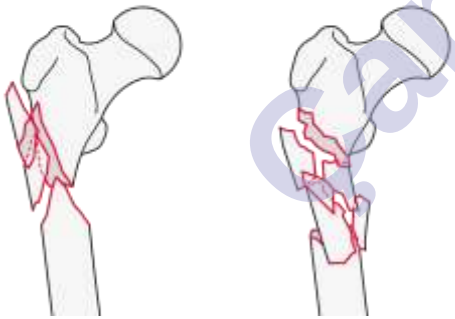


Comprehensive Classification

32 A



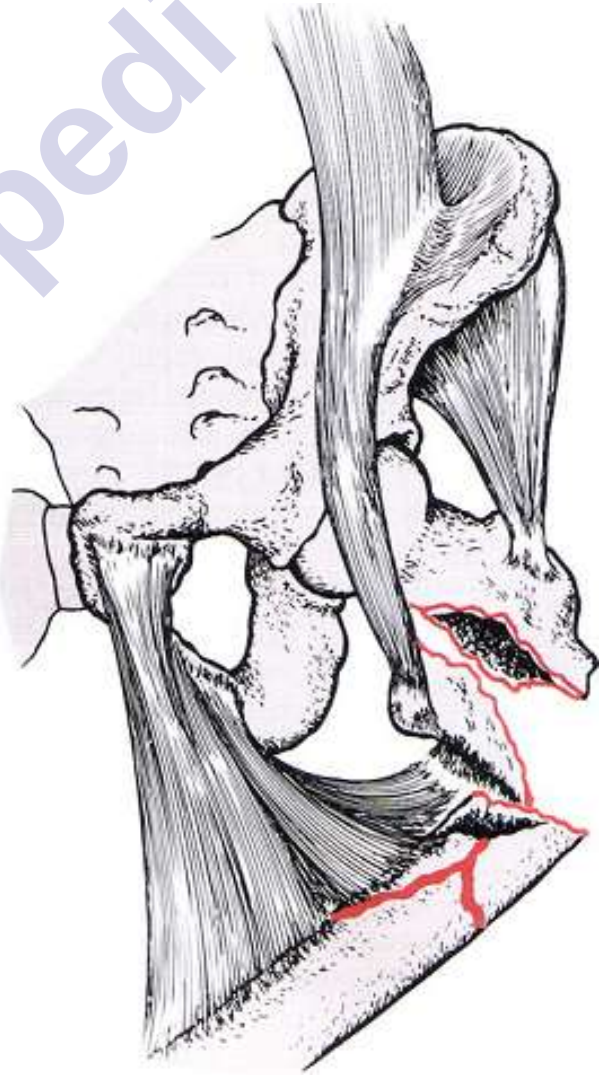
32 B



32 C ➡ ***Difficult to restore medial support***

Fracture Anatomy

- **Proximal fragment**
  - Iliopsoas → flexion
  - Hip abductors → varus
  - Ext. rotators → ext. rotation
- **Distal fragment**
  - Adductors → adduction
    shortening

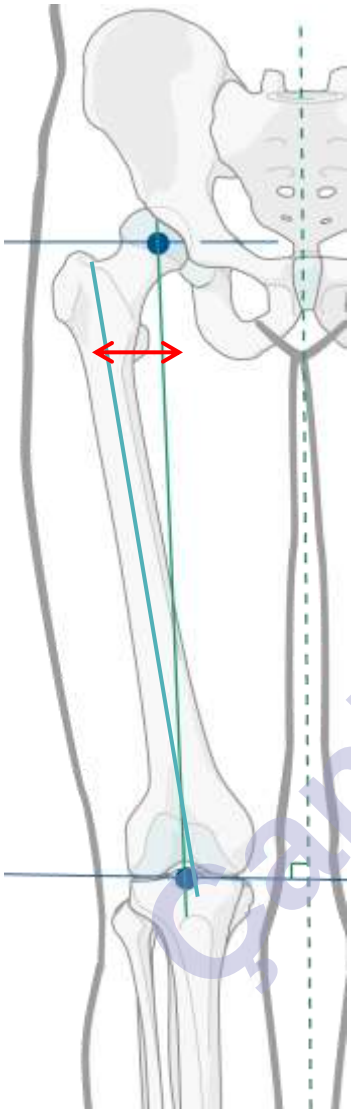


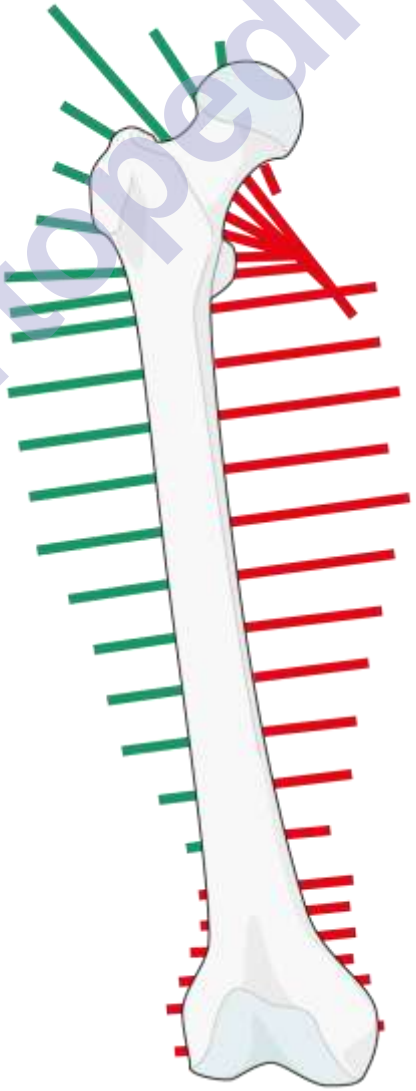
Fracture Anatomy

Understanding the fracture pattern and deformity

Counteract deforming forces during fracture reduction and fixation

Biomechanics

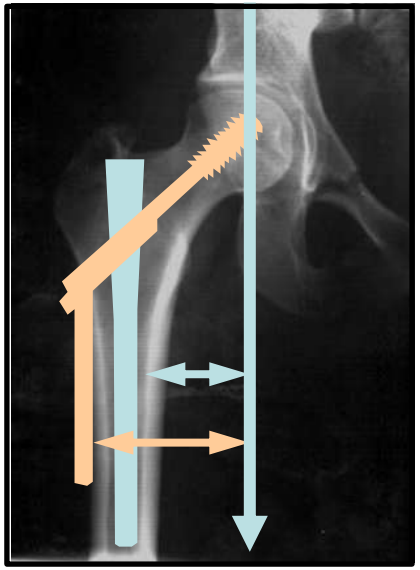




Tensile forces

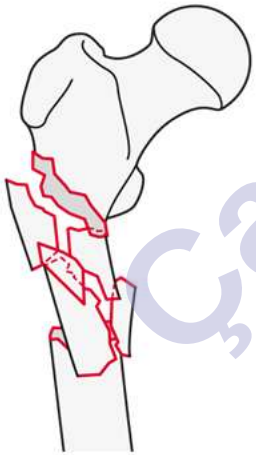
Compressive forces

Biomechanics



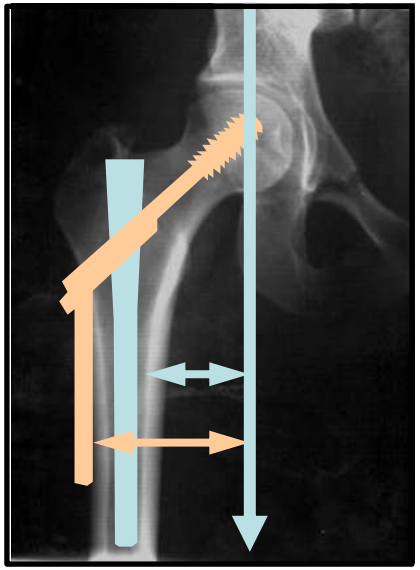
High bending loads

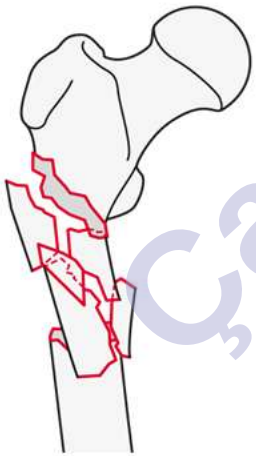
&



Lack of medial support

Biomechanics





Implications for upper femoral implants

Mechanically strong

Tolerate bending forces

Current Treatment Options

- Conservative / traction
- External fixation
- **Internal fixation**
  - Plates
  - IM nail

Plating

ELSEVIER

Injury Vol. 28. No. 2. pp. 91–95, 1997

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Subtrochanteric fractures of the femur

M. J. Parker, B. K. Dutta, C. Sivaji and G. A. Pryor
Peterborough District Hospital, Thorpe Road, Peterborough, UK

n = 337 sliding hip screws (SHS)

Overall failures: 8%

n = 111 dynamic condylar screws (DCS)

Overall failures: 14%

n = 130 angular blade plates

Overall failures: 20%

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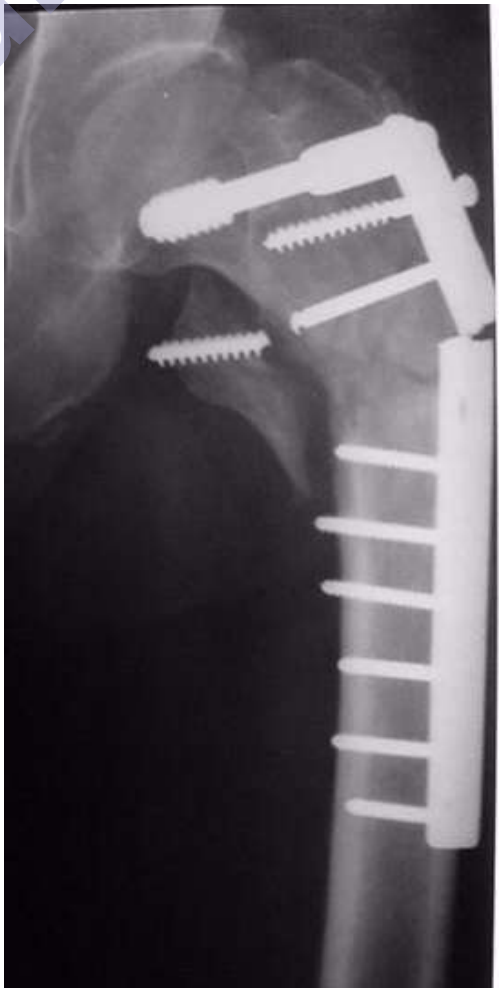
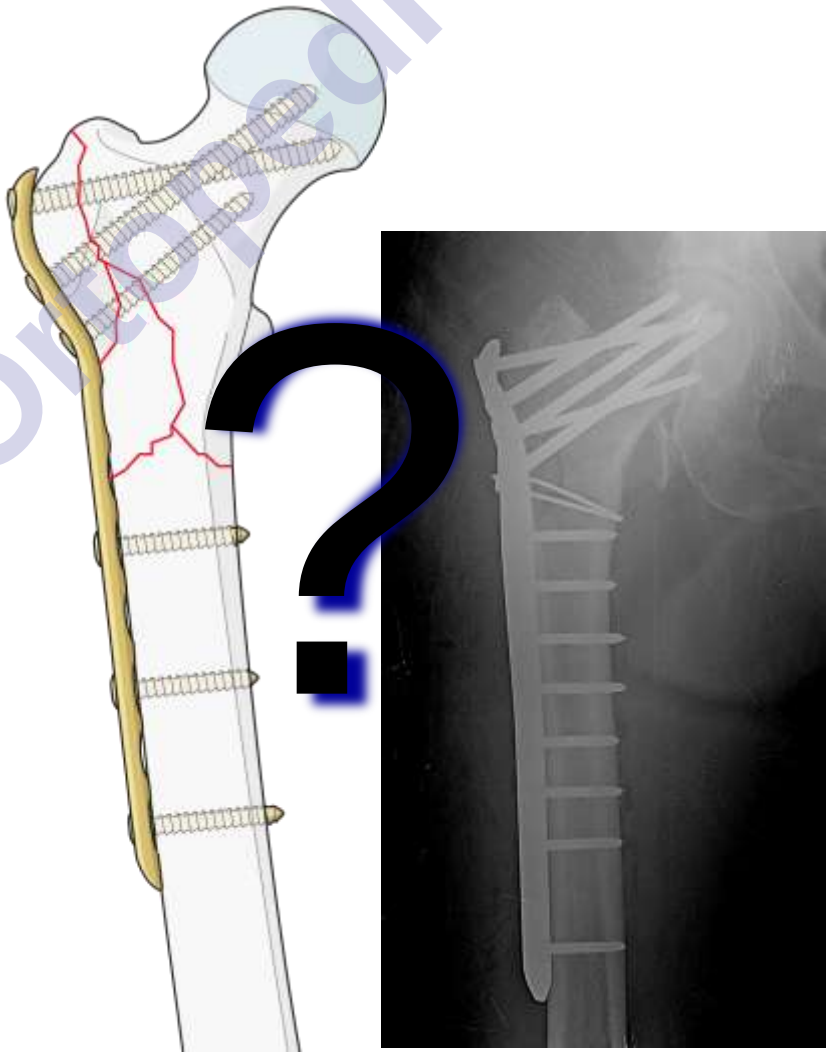
ORIF



Locking Plates

- No enough studies
- Plate and screw breakage



Subtrochanteric Fractures of the Femur

Results of Treatment With the 95° Condylar Blade-Plate

C. KINAST, M.D.,* B. R. BOLHOFNER, M.D.,** J. W. MAST, M.D.,** AND R. GANZ, M.D.*

Clin Orthop, 238, 1989

n = 47

- **23 ORIF (pre 1981) → 17% nonunions**
- **24 indirect reduction → 0% nonunions**

Plates perform well with less invasive surgical technique

MIPO

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IM Nailing

- **Parmer MJ.** *Injury*. 28(2): 91-5, 1997
  - n = 180
  - Overall failures → **5 %**
- **Wıss DA.** *Clin Orthop Relat Res*. 283:231-6,1992
  - n = 95
  - Overall failures → **3 %**

IM Nails

Centromedullary

Cephalomedullary

Injury, Int. J. Care Injured (2007) 38, 1286–1293

ELSEVIER

INJURY
INTERNATIONAL JOURNAL OF THE CARE OF THE INJURED

www.elsevier.com/locate/injury

Outcome of traumatic subtrochanteric femoral fractures fixed using cephalo-medullary nails

Sourav Shukla [a,*], Phillip Johnston [b], M.A. Ahmad [c], Henry Wynn-Jones [d], A.D. Patel [b], N.P. Walton [b]

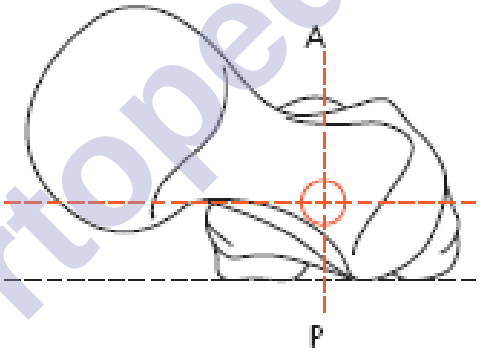
- n = 102 (1999-2005)
- FU 60/102 (%60)
- **19 fractures in varus > 10^0**
- **Complications**
  - 3 nonunions
  - 2 nail breakage
  - All in varus group (20% failure)

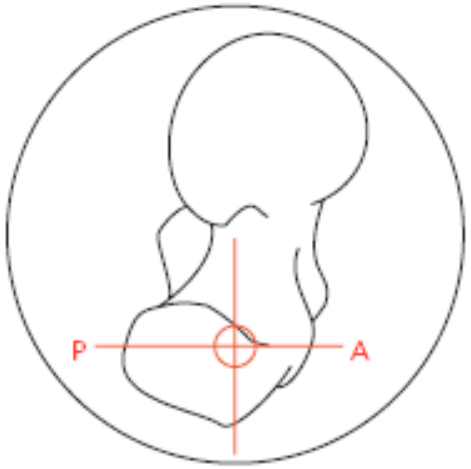
Varus Malreduction

Flexion Deformity

Entry Point

- **Piriformis entry**
- **Trochanteric entry**
  - Just medial to tip
  - 1/3 ant – 2/3 post
- **Lateral entry → varus**
- **Nail does not help reduction**

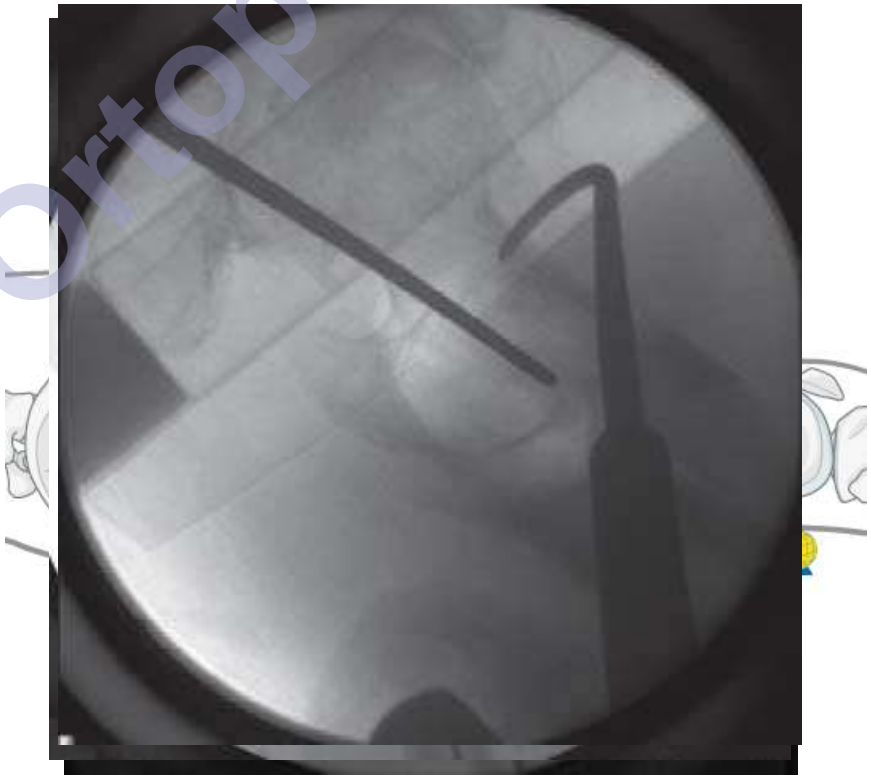




Reduction Tools

- **Mallet**
- **Bone hook**
- **Ball spike pusher**
- **Shanz screw**

Till the end of reaming !!!



Blocking Screw

- **Flexion**
  - Posterior
  - Lateral → medial
- **Varus**
  - Medial
  - Anterior → posterior

Open Reduction

- **Percutaneous**
  - Colinear clamps
- **Mini-open**
  - Bone calmps
- **Cerclage cables**
  - Long oblique-spiral fractures
  - Percutaneous passer

2007 The Journal of TRAUMA® Injury, Infection, and Critical Care

Biologic Plating Versus Intramedullary Nailing for Comminuted Subtrochanteric Fractures in Young Adults: A Prospective, Randomized Study of 66 Cases

Po-Cheng Lee, MD, Pang-Hsin Hsieh, MD, Shang-Won Yu, MD, Chih-Wen Shiao, MD, Hsuan-Kai Kao, MD, and Chi-Chuan Wu, MD

Complications of 66 patients with comminuted subtrochanteric fractures

Variables	RTRN Group (n = 34)	DCS Group (n = 32)
Superficial wound infection	1	2
Delayed union	0	1
Implant failure	1	0
Femoral neck	1	0

Intramedullary Versus Extramedullary Fixation for Subtrochanteric Femur Fractures

Paul R. T. Kuzyk, MASc, MD, FRCS(C), Mohit Bhandari, MSc, MD, FRCS(C),†*
Michael D. McKee, MD, FRCS(C), Thomas A. Russell, MD,‡ and Emil H. Schemitsch, MD, FRCS(C)**

JOT, 2009

Nails *versus* ***Plates***

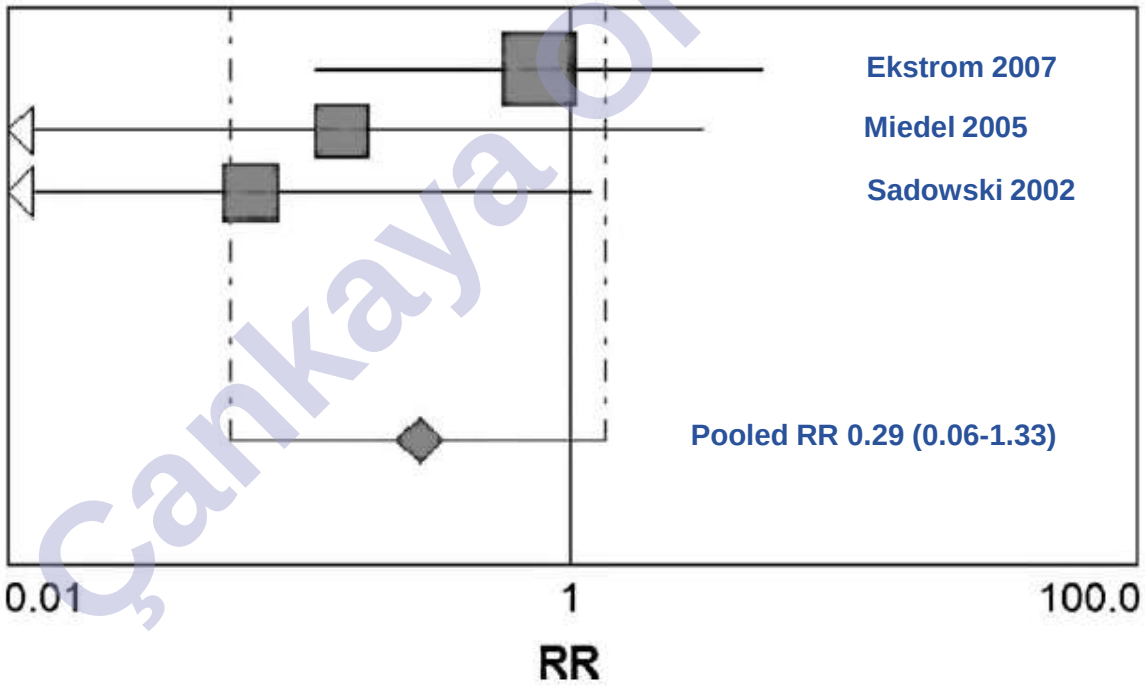
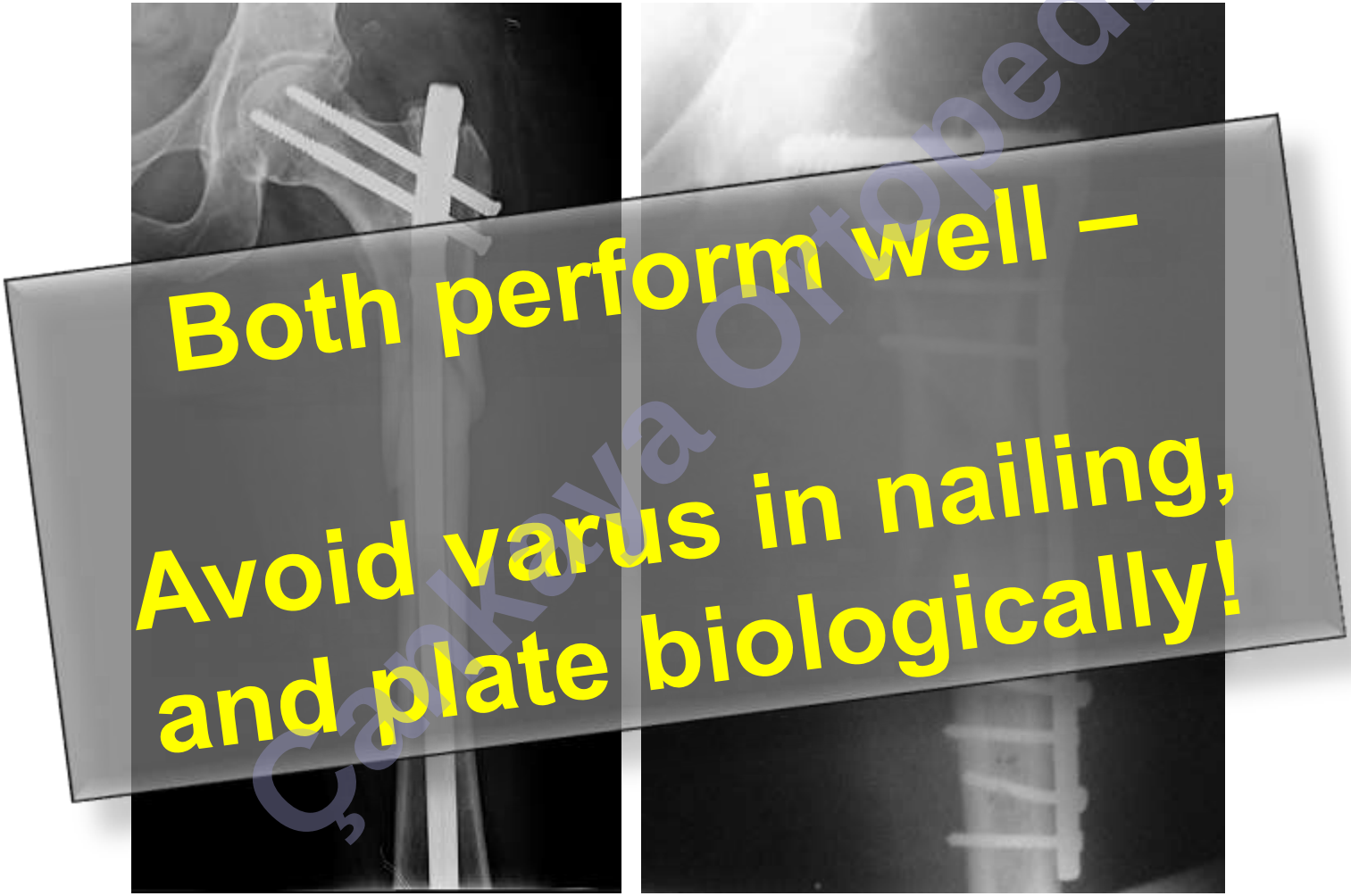


Plate or IM Nail ?



Type of Implant ?

Choice of implant - general considerations

Plates

- **Strong and long enough**
  - No medial hinge integrity
- **Biologic plating technique**

Choice of implant - general considerations

Nails

- **Long nails**
- **Locking options**
  - Standart locking → intact lesser
  - Reconstruction options

Surgical Desicion Making

Bone quality

Fracture pattern

Bone Quality

- **Poor bone quality favors IM nails**

Fracture Pattern

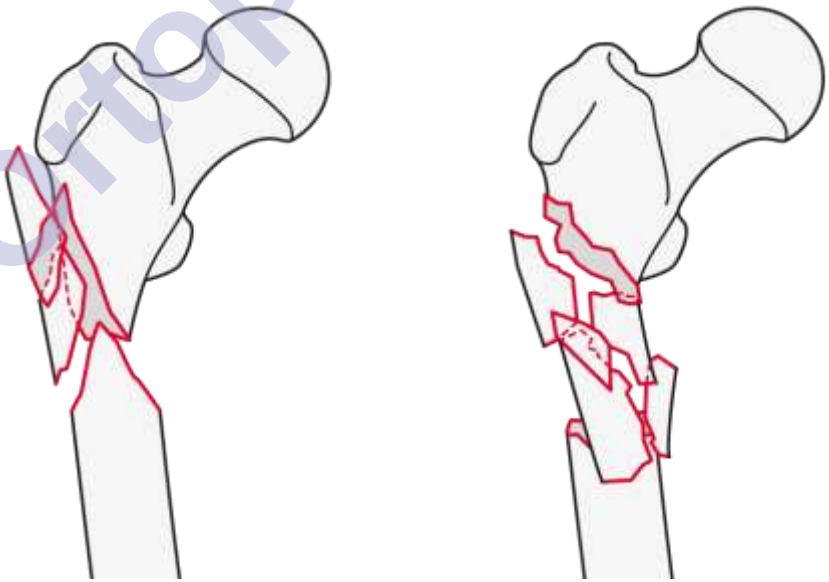
"Simple" fractures

- Plates and nails are both good options
- Trochanteric extension may favor plating

Fracture Pattern

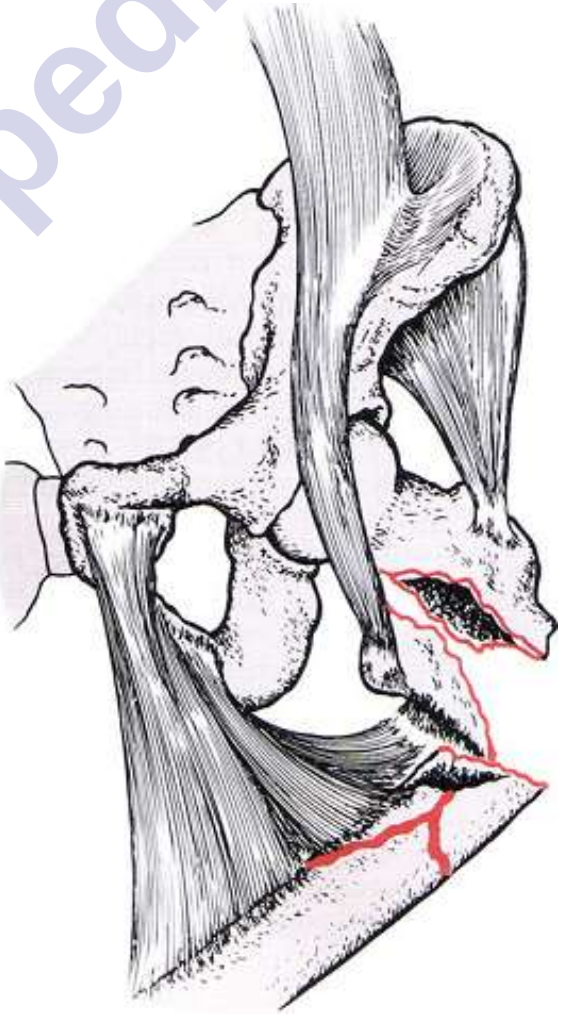
"Complex" fractures

- **Favor nailing**
- **Plating**
  - Strong plate
  - "Biological" techniques



Take home messages

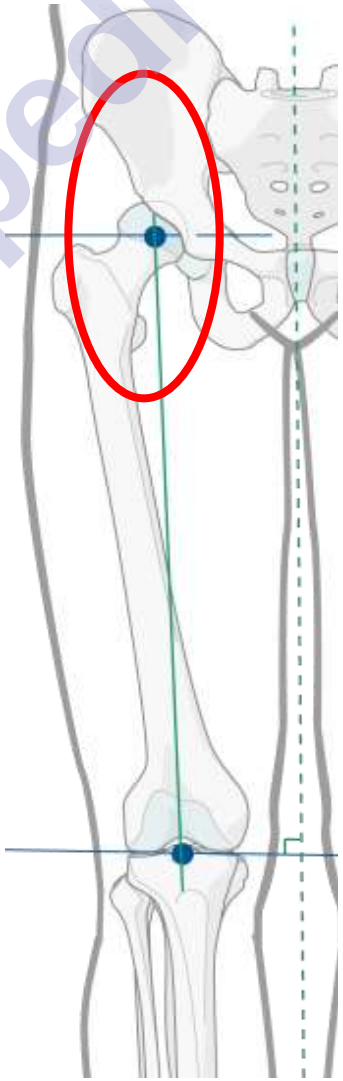
Understanding the fracture anatomy and inherent deformity is key to success in fracture reduction and fixation



Take home messages

Eccentric mechanical loading of the upper femur

Strong implants



Take home messages

- **IM nailing**
  - Long nail is a safe option
  - Avoid malreduction
- **Plating**
  - Perform less invasive techniques