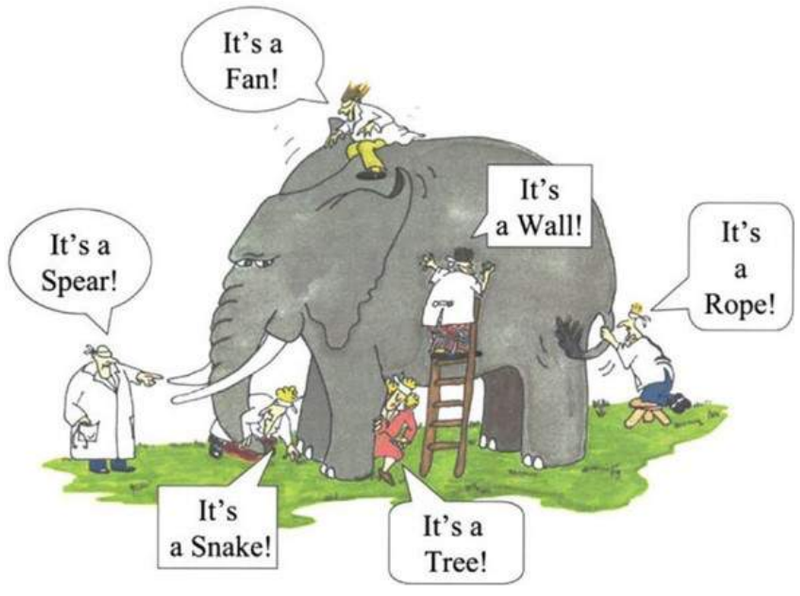
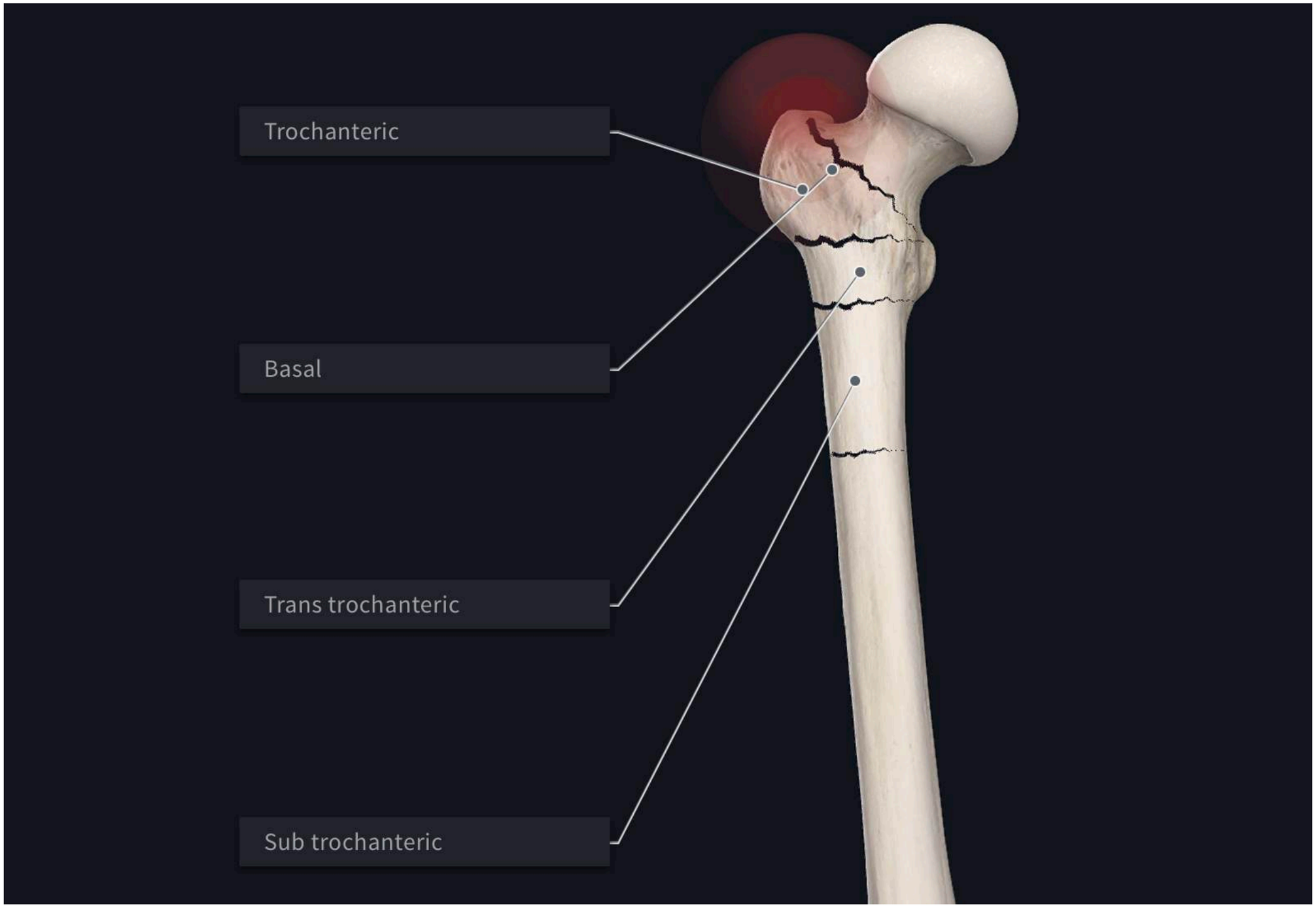
Evidence based treatment of Trochanteric fractures



Kishore Puthezhath
MS Ortho, D Ortho, FACS(USA), FRCS Orth & Tr (Eng)

What should I do for this patient?

Terminology (Parker)



A Few facts

- Most frequently operated fracture type
- Have the highest postoperative fatality rate of surgically treated fractures

Should I operate at all?

Conservative versus operative treatment for hip fractures in adults (Review)

Handoll HHG, Parker MJ

THE COCHRANE COLLABORATION®

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2008, Issue 3

http://www.thecochranelibrary.com

Authors conclusions

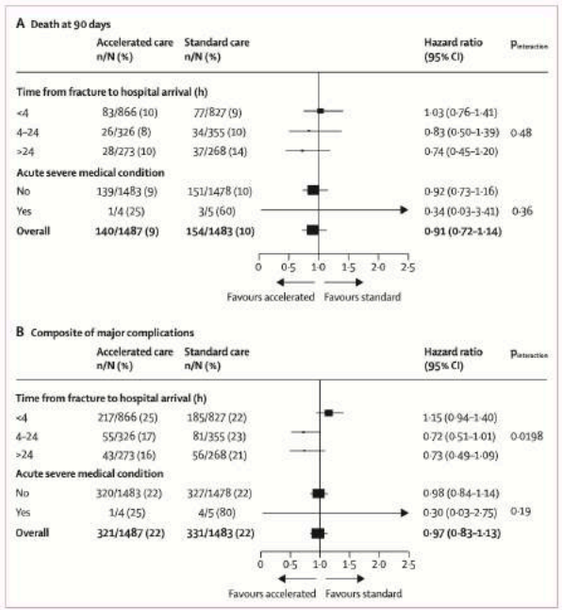
Implications for practice

The introduction of operative treatment preceded the first evaluation by randomised trial, and the subsequent randomised trials have been few. The limited evidence from one small randomised trial on undisplaced intracapsular fractures suggests conservative treatment is associated with an increased risk of fracture displacement and later replacement of the femoral head with an arthroplasty. For extracapsular fractures, conservative treatment appears to be associated with a prolonged hospital stay and a greater proportion of patients losing their independence.

Conservative treatment associated with loss of independence

When to operate?

Hip fracture accelerated surgical treatment and care track trial



Accelerated surgery versus standard care in hip fracture (HIP ATTACK): an international, randomised, controlled trial

*The HIP ATTACK Investigators**

Summary

Background Observational studies have suggested that accelerated surgery is associated with improved outcomes in patients with a hip fracture. The HIP ATTACK trial assessed whether accelerated surgery could reduce mortality and major complications.

Published Online February 9, 2020 https://doi.org/10.1016/S0140-6736(20)30058-1

www.thelancet.com **Published online February 9, 2020 https://doi.org/10.1016/S0140-6736(20)30058-1**

- Earlier surgery (ie, within 72) was associated with a significantly lower risk of mortality
- Accelerated surgery (with in 6hr) did not lower the risk of mortality
- BOAST guideline suggests operation on the day of, or the day after, admission on a planned trauma list

Classifications are unreliable

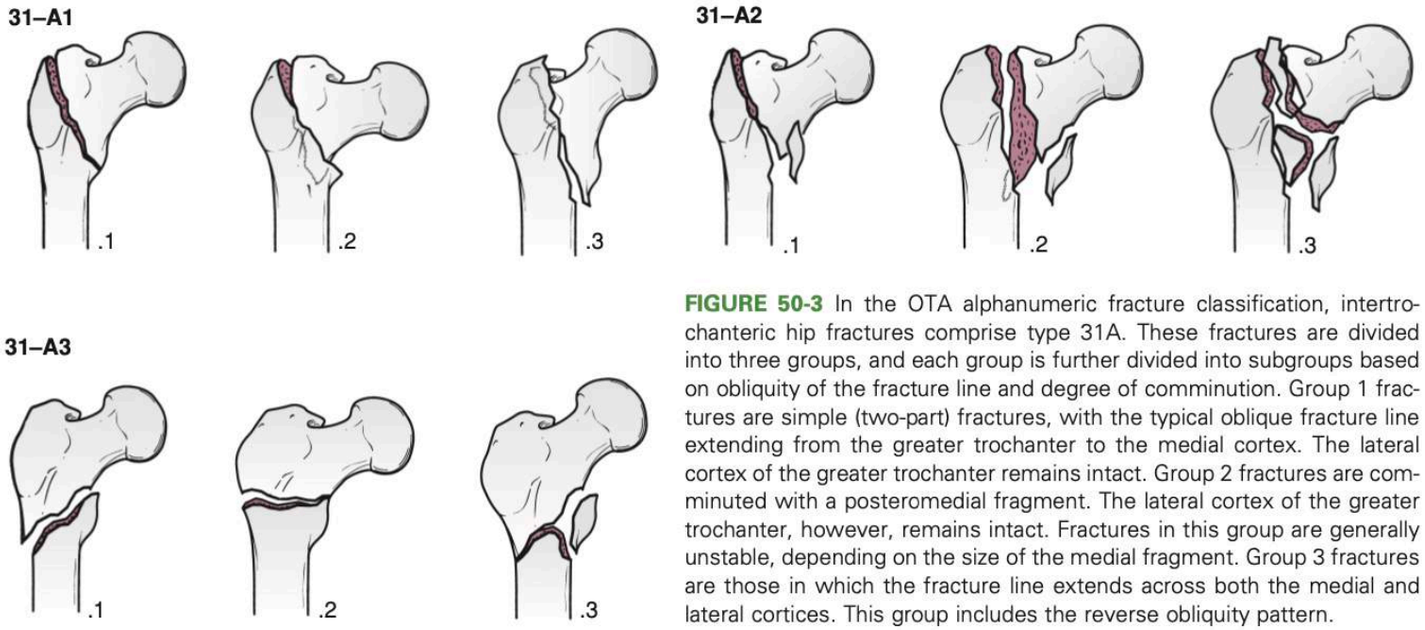


FIGURE 50-3 In the OTA alphanumeric fracture classification, intertrochanteric hip fractures comprise type 31A. These fractures are divided into three groups, and each group is further divided into subgroups based on obliquity of the fracture line and degree of comminution. Group 1 fractures are simple (two-part) fractures, with the typical oblique fracture line extending from the greater trochanter to the medial cortex. The lateral cortex of the greater trochanter remains intact. Group 2 fractures are comminuted with a posteromedial fragment. The lateral cortex of the greater trochanter, however, remains intact. Fractures in this group are generally unstable, depending on the size of the medial fragment. Group 3 fractures are those in which the fracture line extends across both the medial and lateral cortices. This group includes the reverse obliquity pattern.

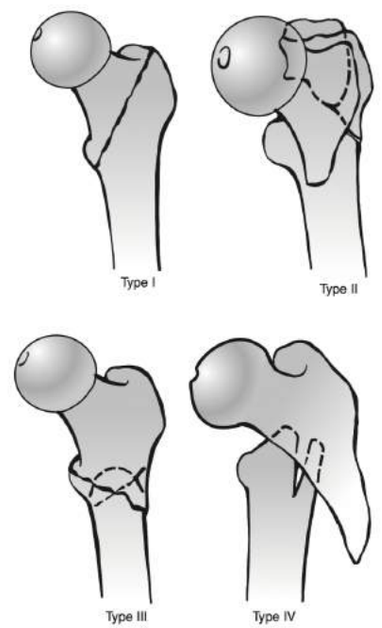


FIGURE 50-1 Boyd and Griffin classification. Type 1, stable (two-part); Type 2, unstable comminuted; Type 3, unstable reverse obliquity; Type 4, intertrochanteric–subtrochanteric with two planes of fracture.

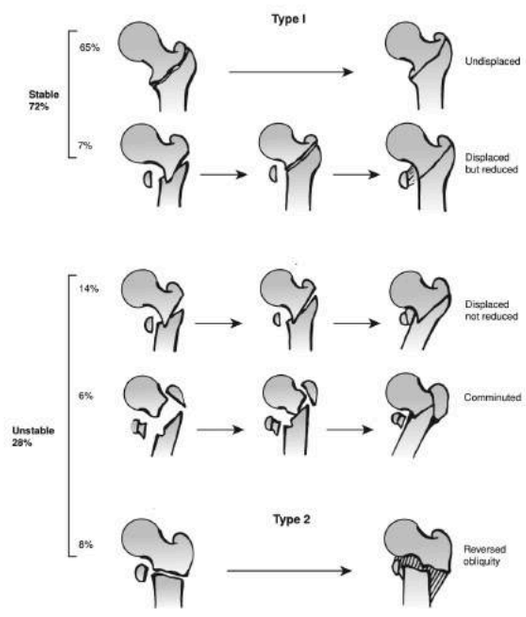


FIGURE 50-2 Evans classification of trochanteric fractures. Type 1, stable: Either undisplaced or displaced but anatomically reduced (intact medial cortex). Type 2, unstable: Implies displaced and fixed in an unreduced position, comminuted with destruction of the anteromedial cortex, or reverse obliquity.

Use of classifications

- There remains no validated classification system to dictate the surgical procedure of choice.
- The logical solution would be to make an implant selection after reduction of the fracture and provisional stabilization

.

Recommended Classification

A2; decided to operate, <24hrs post injury

Importance of lateral wall

Acta Orthop Scand 1996; 67 (4): 329–332

Trochanteric hip fractures

Fixation failure commoner with femoral medialization, a comparison of 101 cases

Martyn J Parker

The radiographic characteristics of 27 patients with a trochanteric fracture treated with a sliding hip screw in which fixation failure occurred, were compared with 74 cases having uneventful fracture union. Femoral medialization was commoner in specific fracture types, particularly if there was comminution of the lateral femoral cortex at the site of insertion of the lag screw. Femoral medialization was strongly associated with fixation failure, with a 7-fold increase in the risk of failure if medialization at more than one third occurred. These observations indicate that the value of implants preventing femoral medialization in specific types of trochanteric fracture merit further evaluation.

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Submitted 95-11-20. Accepted 96-04-28

Lateral wall thickness & DHS: 20.5mm (Level 3 evidence)

THE BONE & JOINT JOURNAL

■ TRAUMA

Lateral femoral wall thickness

A RELIABLE PREDICTOR OF POST-OPERATIVE LATERAL WALL FRACTURE IN INTERTROCHANTERIC FRACTURES

C-E. Hsu,
C-M. Shih,
C-C. Wang,
K-C. Huang

From Taichung Veterans General

Although the importance of lateral femoral wall integrity is increasingly being recognised in the treatment of intertrochanteric fracture, little attention has been put on the development of a secondary post-operative fracture of the lateral wall. Patients with post-operative fractures of the lateral wall were reported to have high rates of re-operation and complication. To date, no predictors of post-operative lateral wall fracture have been reported. In this study, we investigated the reliability of lateral wall thickness as a predictor of lateral wall fracture after dynamic hip screw (DHS) implantation.

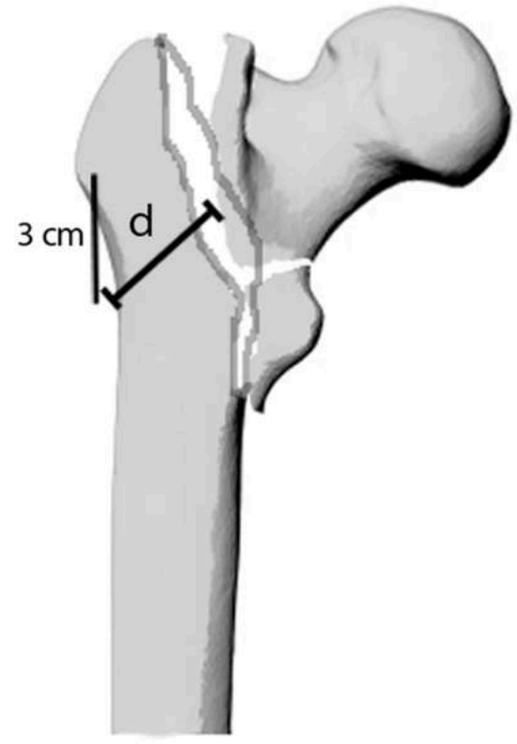


Fig. 1

Diagram showing the lateral wall thickness (d), defined as the distance in mm from a reference point 3 cm below the innominate tubercle of the greater trochanter, angled at 135° upward to the fracture line (the mid-line between the two cortex lines) on anteroposterior radiograph.

Did not give much importance to lateral wall thickness measurement

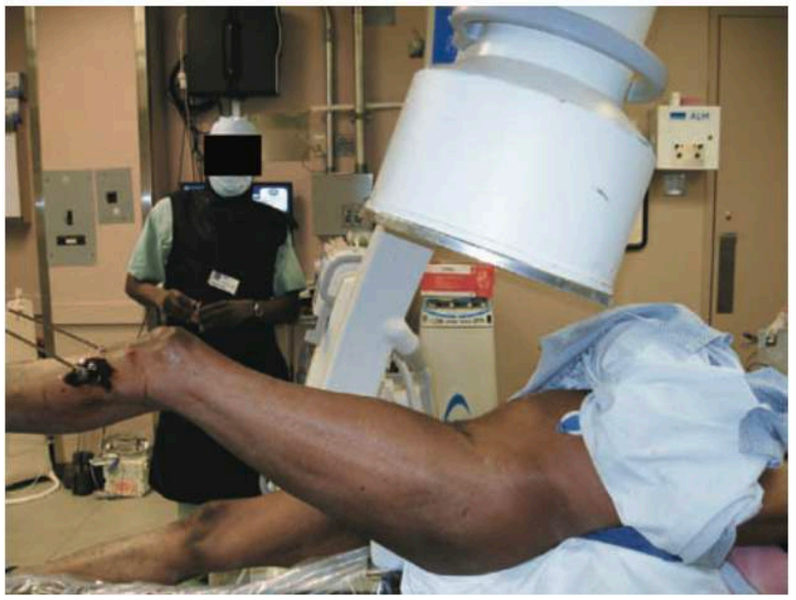
Surgical considerations

- **How to reduce fracture**
- Which implant to use
- **Surgical technique**

Fracture reduction

Positioning

A



B

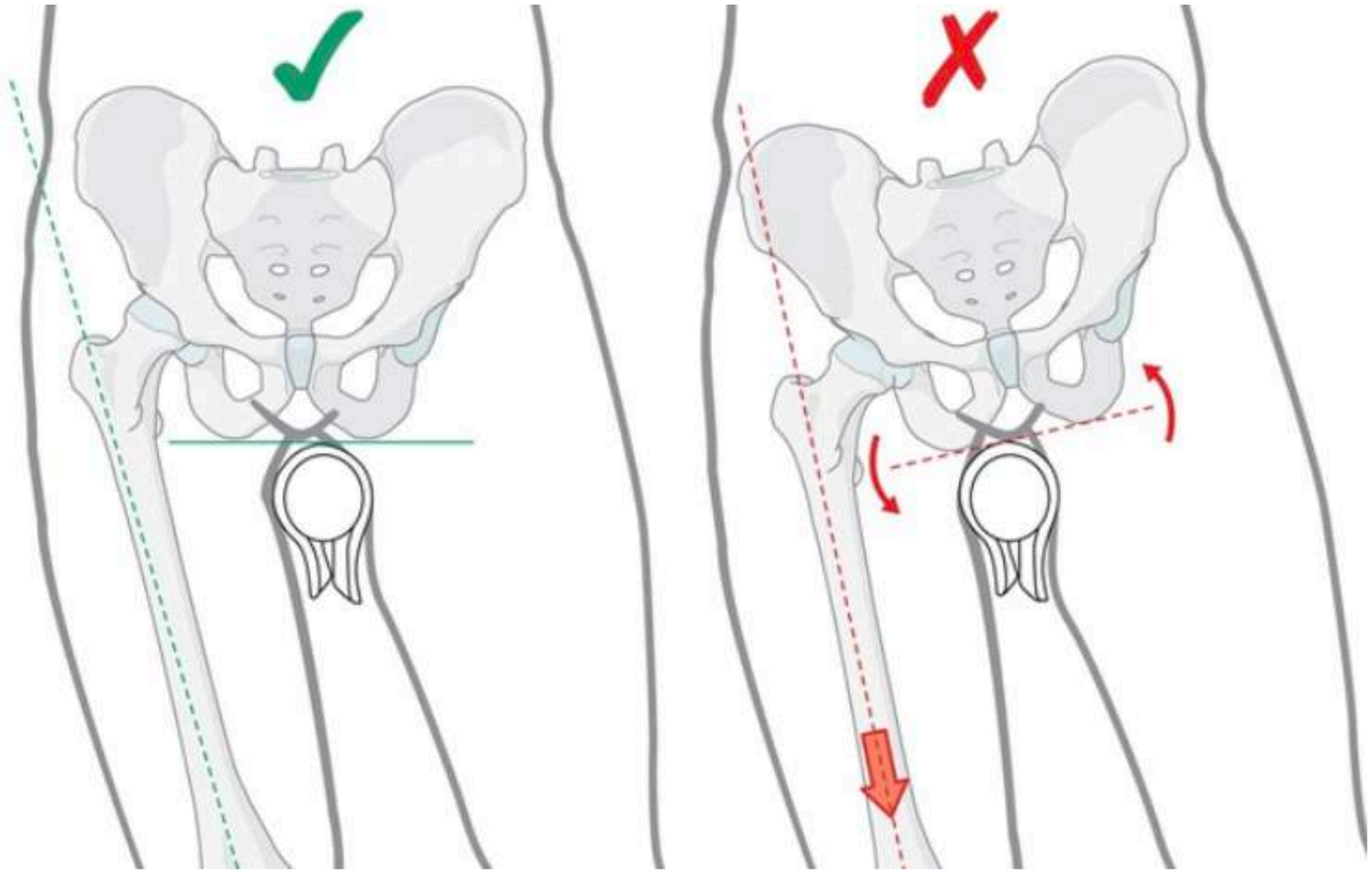
FIGURE 50-9 **A:** Conventional C-arm position will yield an oblique view. **B:** Correct C-arm position for flexion of the shaft. Make sure that C-arm axis is perpendicular to femoral axis.

C

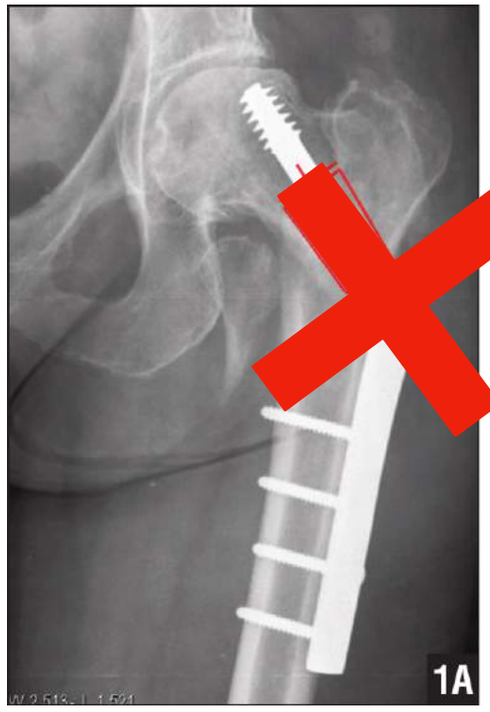
D

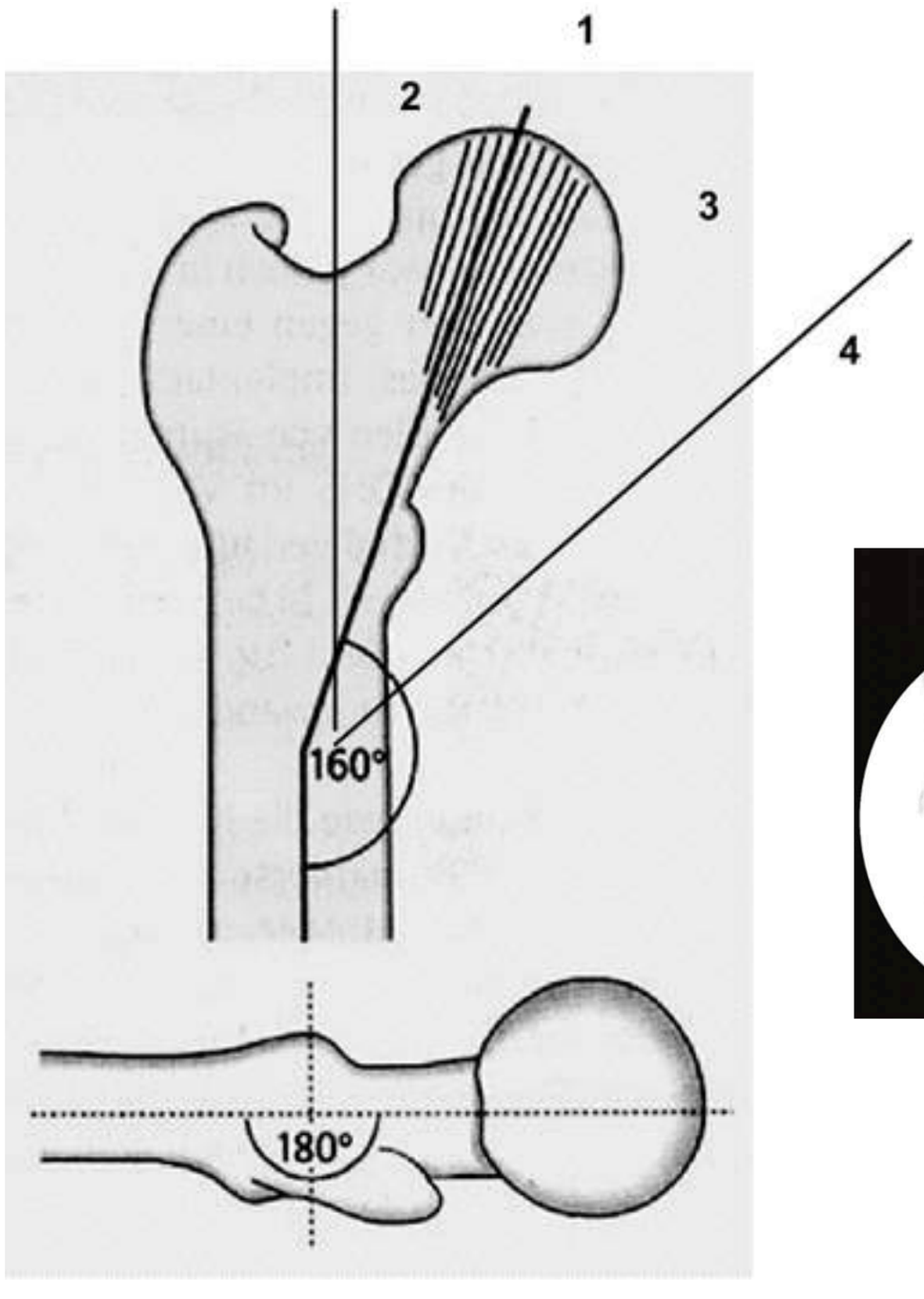
FIGURE 50-9 (*continued*) **C:** Correct C-arm position for anteversion. Tilt C-arm over leg at 10 to 15 degrees to get the maximum length of the femoral neck. **D:** Correct lateral C-arm to avoid excessive internal rotation. Obtain true lateral along neck anteversion without excessive internal rotation of leg.

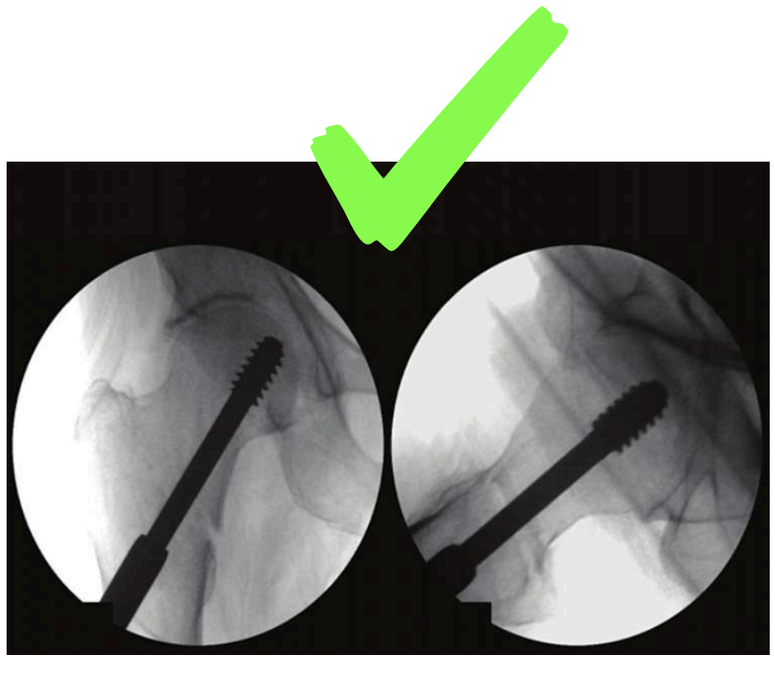
Traction and internal rotation



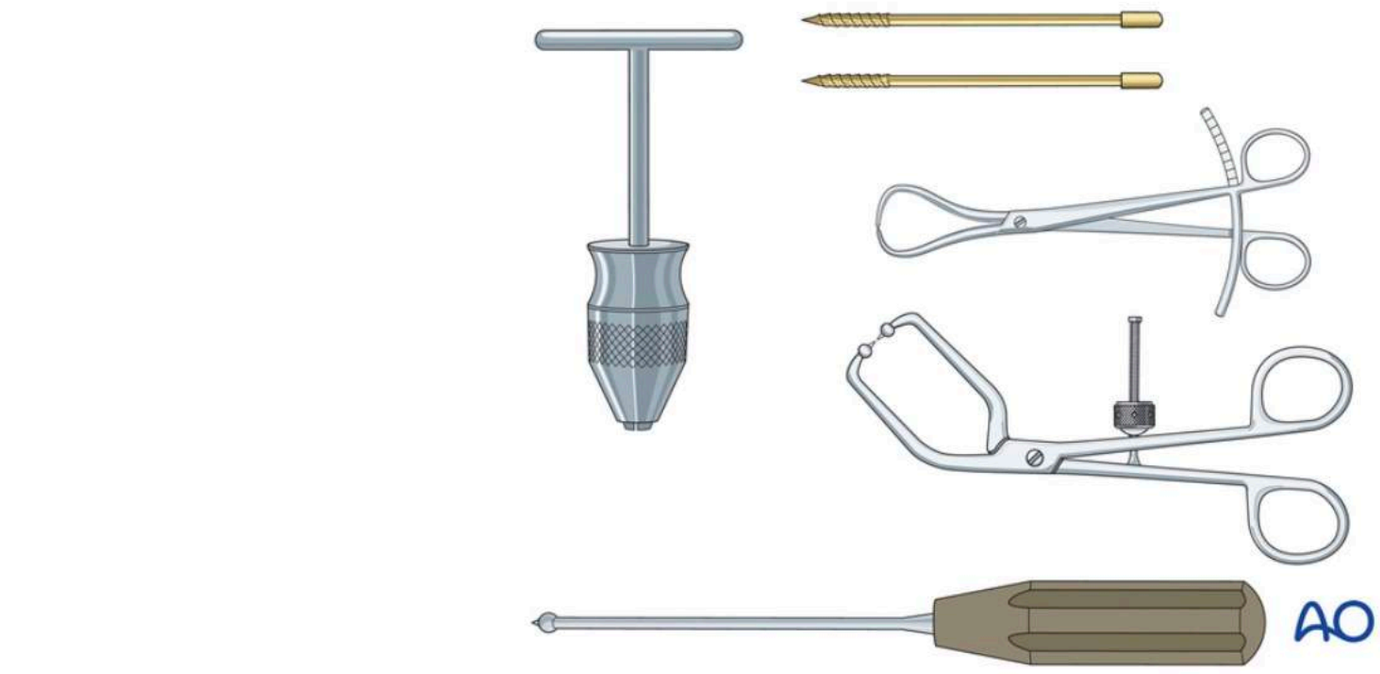
Garden’s alignment index

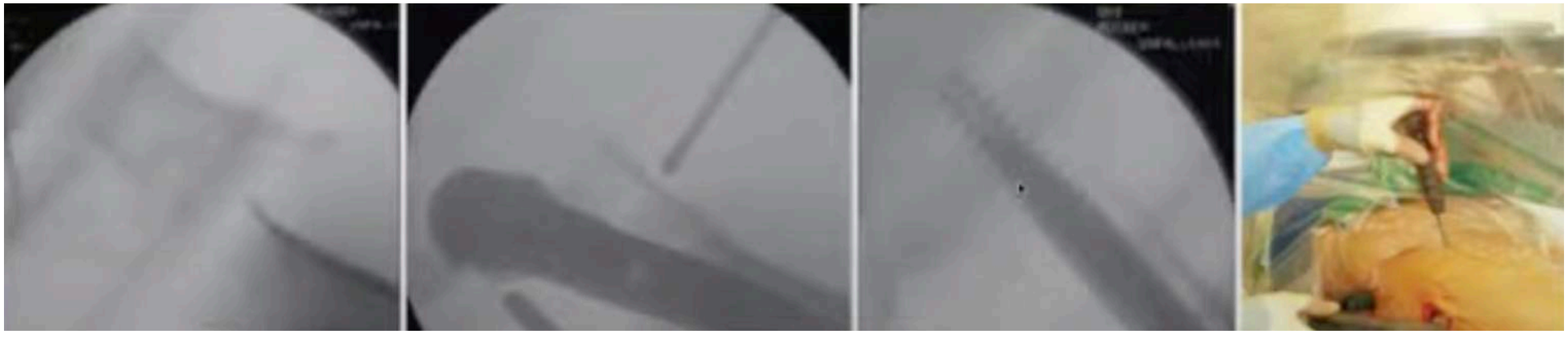






Limited open reduction

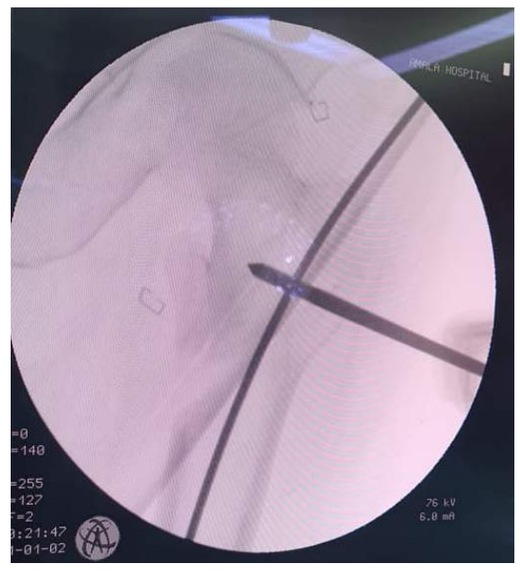




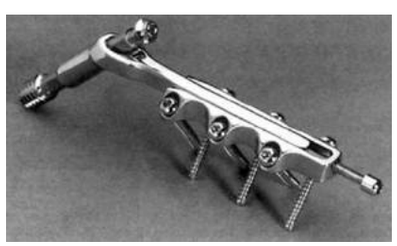

L
4cm
4cm
EI 2020
ATERAL
HILOMINA 69Y Female

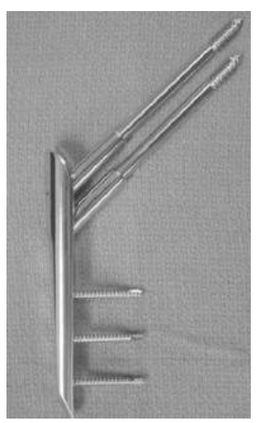
Reduction

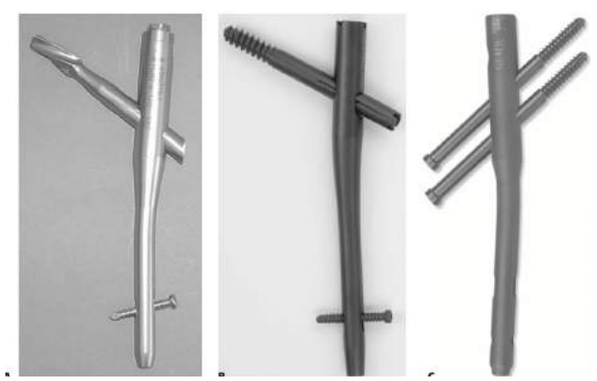

AMALA HOSPITAL
97 kV
5.0 mA


AMALA HOSPITAL
76 kV
6.0 mA

Choice of implants







Essentially the question is should I nail or plate?

Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults (Review)

Parker MJ, Handoll HHG

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2010, Issue 9

http://www.thecochranelibrary.com

Conclusions

In the management of trochanteric fractures (AO type **A1 or A2**),

RCTs show **no evidence of advantages** to patients **from the use of cephalocondylic intramedullary nails**

when compared with

extramedullary implants of the sliding hip screw (SHS) design.

What about A3?

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Nail or plate fixation for A3 trochanteric hip fractures: A systematic review of randomised controlled trials

Martyn Parker[a,*], Pradyumna Raval[a], Jan-Erik Gjertsen[b]

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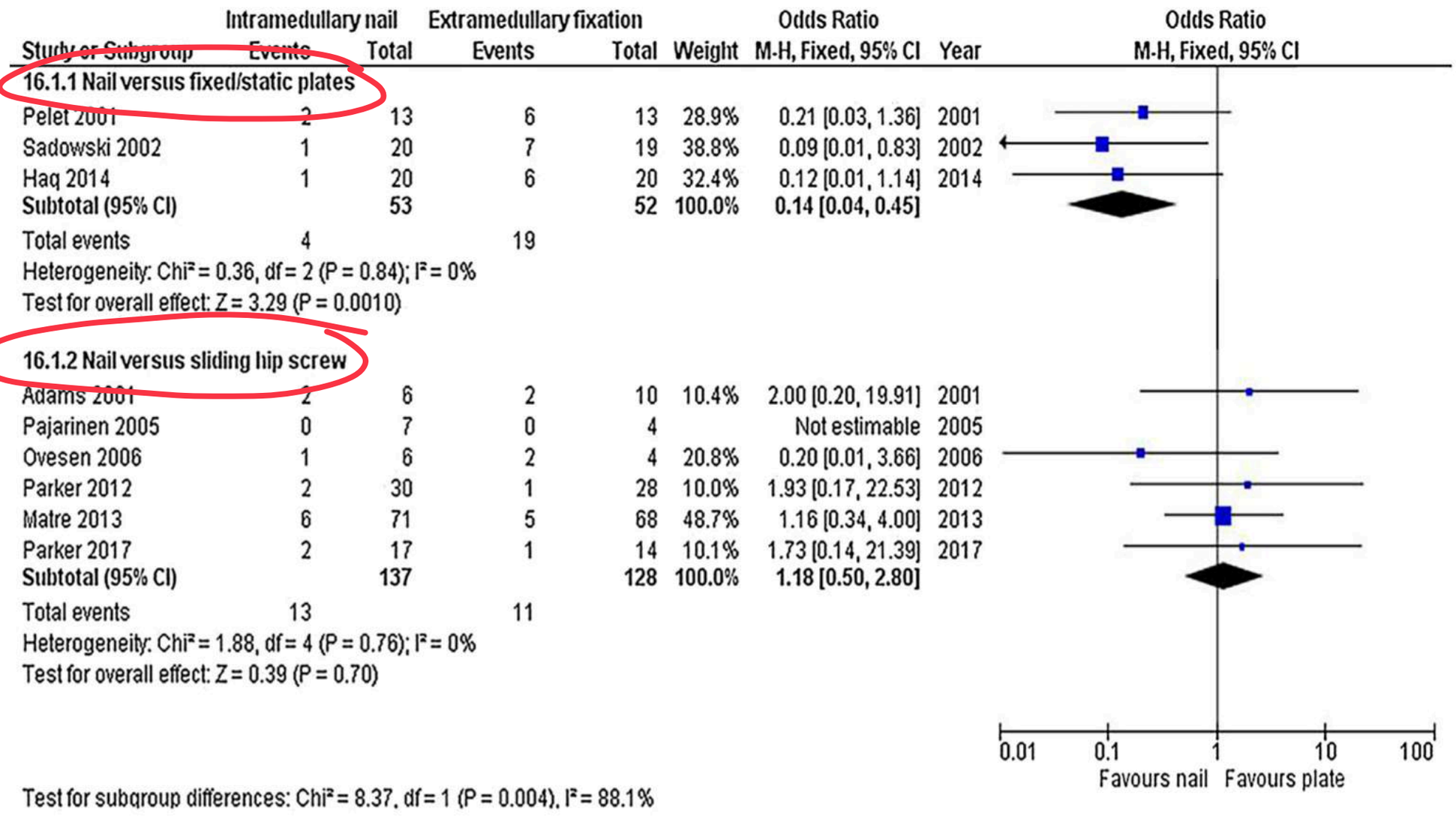
ABSTRACT

Continuing controversy exists for the choice of implant for treating A3 trochanteric hip fractures so we undertook a systematic review of randomised controlled trials from the year 2000 onwards that have compared an intramedullary nail with an extramedullary fixation implant for the treatment of these fractures. Data on the occurrence of any fracture healing complications was extracted and the results combined to calculate Peto odd ratio. Nine studies involving 370 fractures were identified. Three studies involving 105 fractures compared an intramedullary nail with a static fixation (condylar, blade or locking plate). Plate fixation was associated with a fivefold increase risk of fracture healing complications (19/52 (36.6%) versus 4/53(7.5%), odds ratio 0.14, 95% Confidence intervals 0.04–0.45). Six studies involving 265 fractures compared an intramedullary nail with a sliding hip screw. No statistically significant difference was found in the occurrence of facture healing complications between implants (13/137(9.5%) versus 11/128(8.6%) odds ratio 0.28, 95% Confidence intervals 0.50–2.80). Bases on the evidence to date from randomised trials, the use of fixed nail plates for surgical fixation of this type of fracture cannot be justified. Intramedullary nail fixation and the sliding hip screw have comparable fracture healing complication rates.

A3 fracture: No to static plate



Study or Subgroup	Intramedullary nail Events	Total	Extramedullary fixation Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
16.1.1 Nail versus fixed/static plates							
Pelet 2001	2	13	6	13	28.9%	0.21 [0.03, 1.36]	2001
Sadowski 2002	1	20	7	19	38.8%	0.09 [0.01, 0.83]	2002
Haq 2014	1	20	6	20	32.4%	0.12 [0.01, 1.14]	2014
Subtotal (95% CI)		53		52	100.0%	**0.14 [0.04, 0.45]**	
Total events	4		19				
Heterogeneity: Chi² = 0.36, df = 2 (P = 0.84); I² = 0%							
Test for overall effect: Z = 3.29 (P = 0.0010)							
16.1.2 Nail versus sliding hip screw							
Adams 2001	2	6	2	10	10.4%	2.00 [0.20, 19.91]	2001
Pajarinen 2005	0	7	0	4		Not estimable	2005
Ovesen 2006	1	6	2	4	20.8%	0.20 [0.01, 3.66]	2006
Parker 2012	2	30	1	28	10.0%	1.93 [0.17, 22.53]	2012
Matre 2013	6	71	5	68	48.7%	1.16 [0.34, 4.00]	2013
Parker 2017	2	17	1	14	10.1%	1.73 [0.14, 21.39]	2017
Subtotal (95% CI)		137		128	100.0%	**1.18 [0.50, 2.80]**	
Total events	13		11				
Heterogeneity: Chi² = 1.88, df = 4 (P = 0.76); I² = 0%							
Test for overall effect: Z = 0.39 (P = 0.70)							
Test for subgroup differences: Chi² = 8.37, df = 1 (P = 0.004), I² = 88.1%							

Odds Ratio M-H, Fixed, 95% CI

0.01 0.1 1 10 100

Favours nail Favours plate

Nail or plate fixation for A3 trochanteric hip fractures: A systematic review of randomised controlled trials

Martyn Parker[a,*], Pradyumna Raval[a], Jan-Erik Gjertsen[b]

- A3 fractures should not be treated using a fixed/static plate
- It is incorrect to state that intramedullary nail fixation is superior to a SHS.
- The proximal part of an intramedullary nail fixation may also play a part in reducing femoral medialisation by abutting against the femoral neck.
- Some of the randomised trials have suggested a tendency to slightly better regain of mobility for the nail
- The role of a trochanteric stabilising plate used in conjunction with a SHS fixation needs to be evaluated.

If nail, which nail?

Cochrane Library

Cochrane Database of Systematic Reviews

Intramedullary nails for extracapsular hip fractures in adults (Review)

Queally JM, Harris E, Handoll HHG, Parker MJ

- There was insufficient evidence from randomised trials

- Patient outcomes differed insignificantly between the different designs of proximal femoral intramedullary nail when used for the fixation of unstable, or stable, trochanteric fractures.

Short or standard?

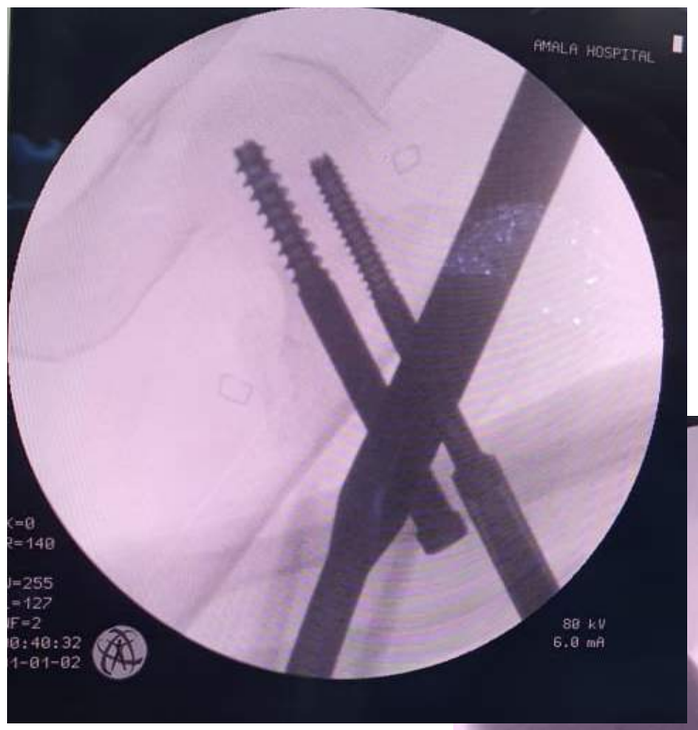
■ TRAUMA

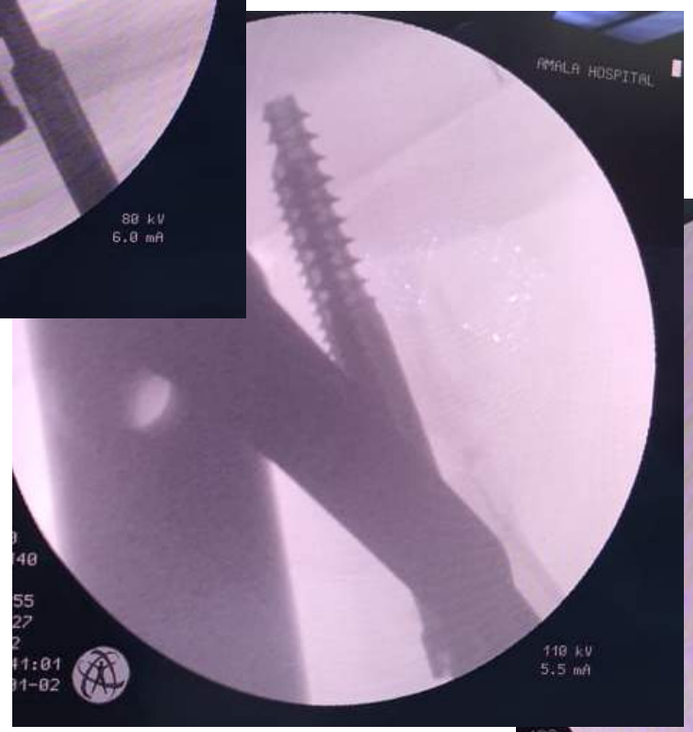
Short (175 mm) versus standard (220 mm) length intramedullary nail for trochanteric hip fractures: a randomized trial of 229 patients

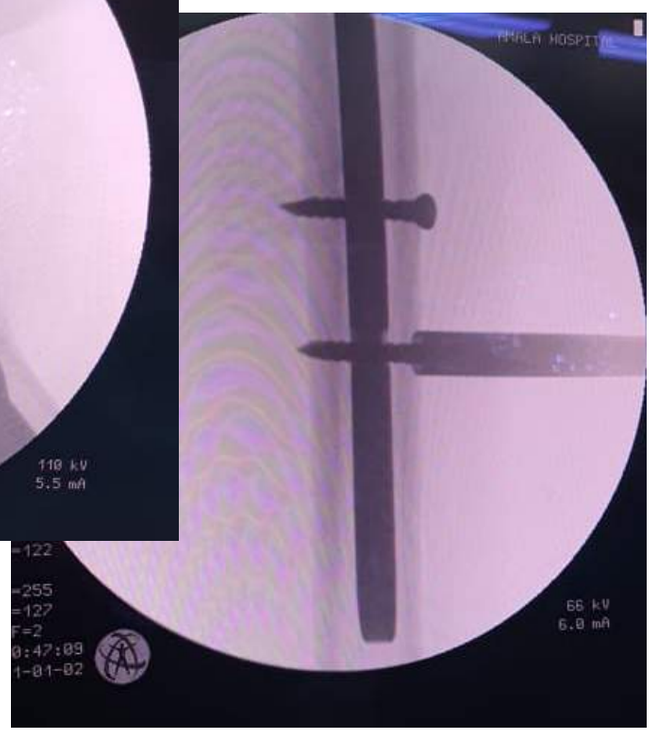
M. J. Parker,
S. Cawley

- Shorter and thinner nail was quicker to insert and resulted in less intraoperative blood loss. (no need to ream)
- The clinical outcomes favoured the longer 220 mm length nail which was associated with a better regain of mobility.
- There was also a tendency towards less residual pain with the longer nail
- These results suggest that the increasing use of this very short intramedullary nail with its design modification may not be appropriate.

I used an “old gen” PFN 9mm x 250mm







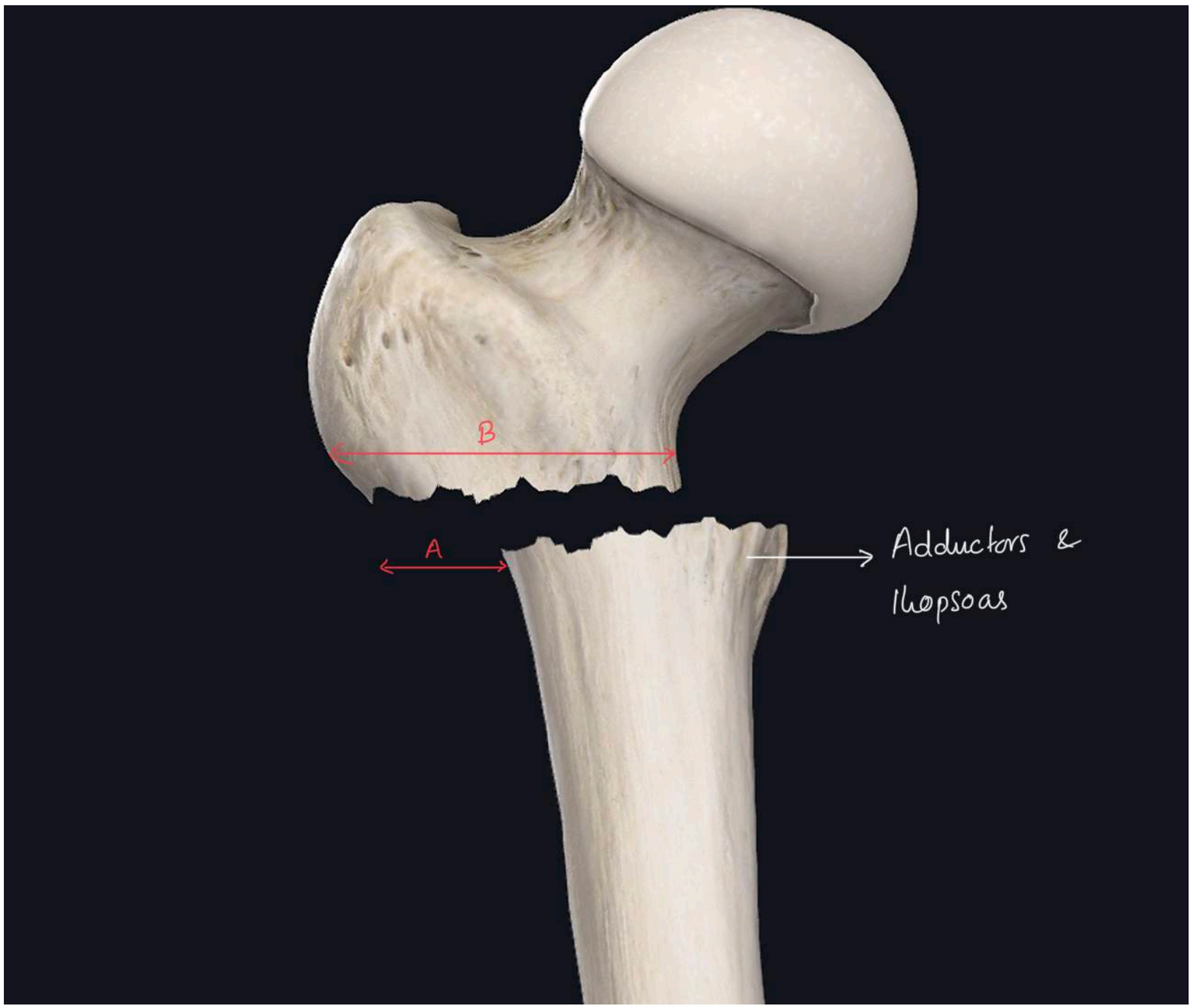
Difficult fracture patterns

Reverse

Transverse

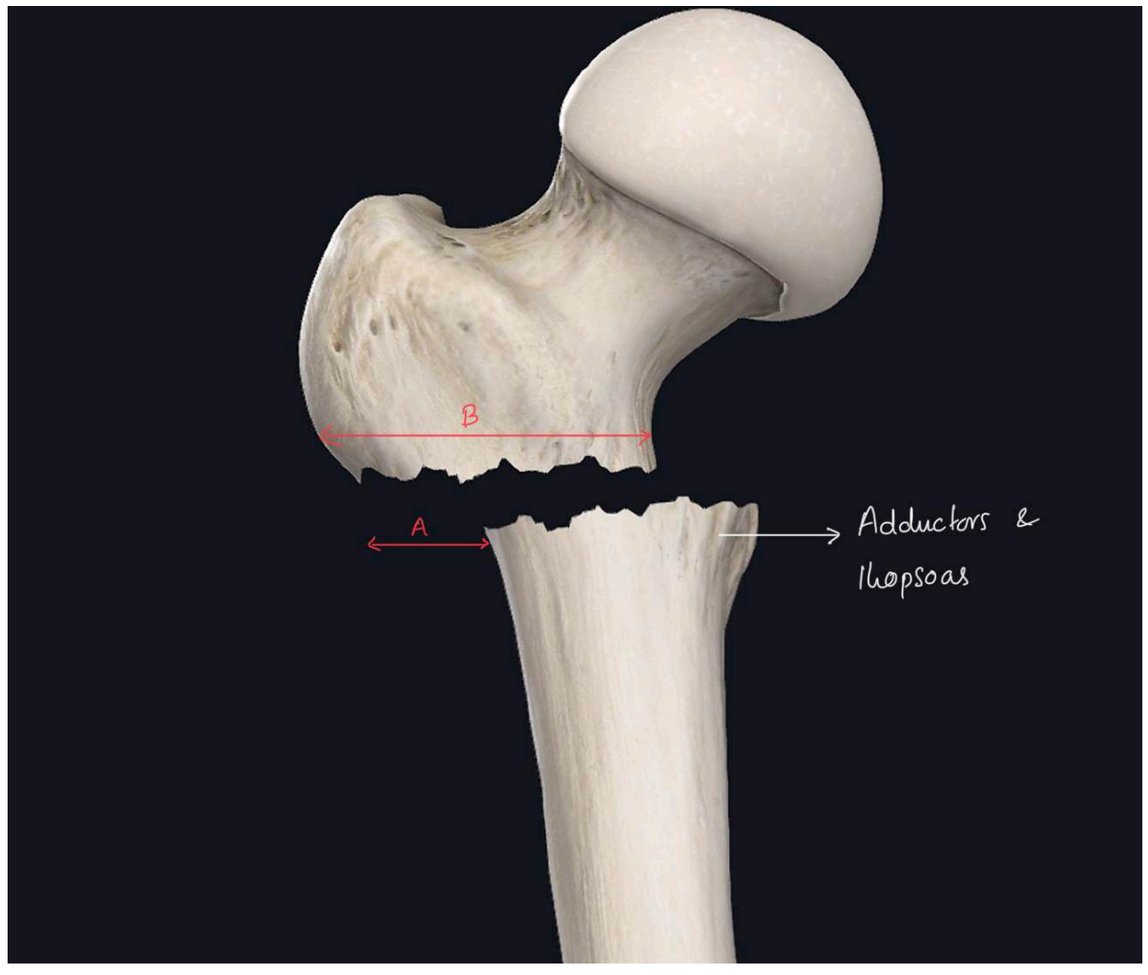
Total

The patterns allow femur to be displaced medially

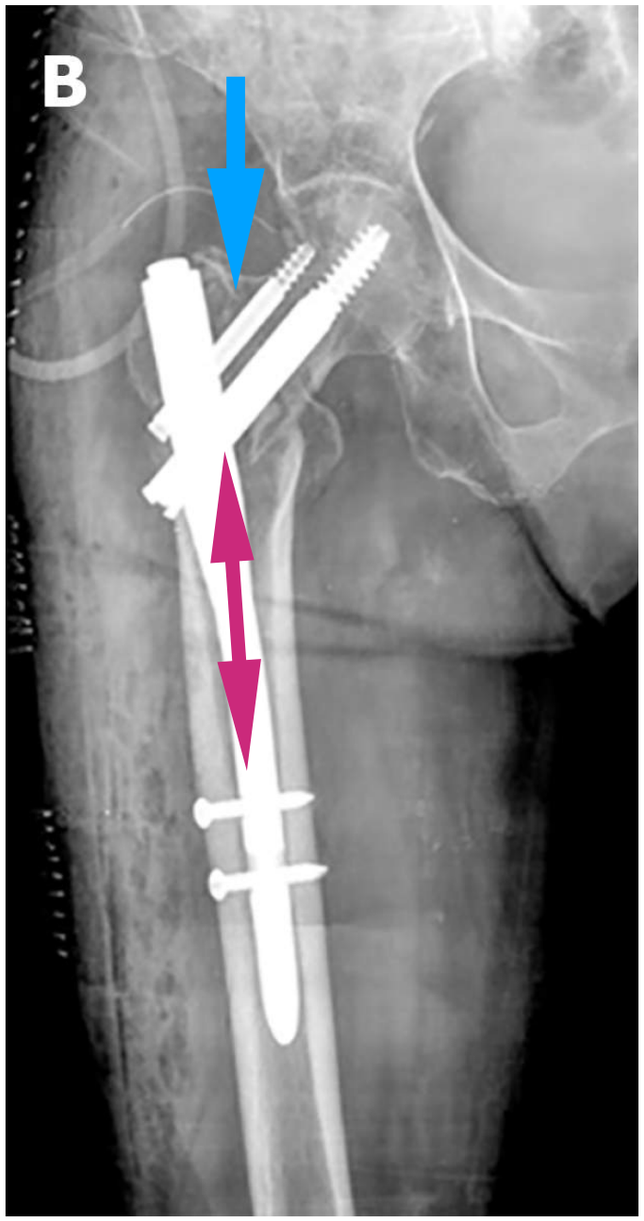


Risk of failure

More the ratio A/B, more the risk of failure



Potential advantage of nail: allow sliding along the line of femur and resist medialisation

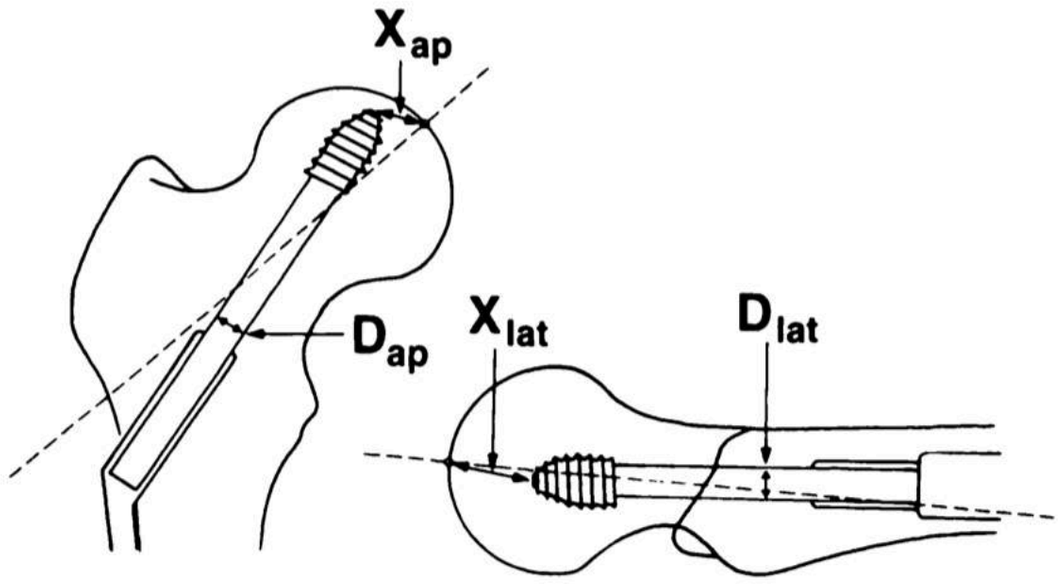


Assessment of fixation: TAD Baumgaertner, <20mm

The Value of the Tip-Apex Distance in Predicting Failure of Fixation of Peritrochanteric Fractures of the Hip*

BY MICHAEL R. BAUMGAERTNER, M.D.†, STEPHEN L. CURTIN, M.D.†, DIETER M. LINDSKOG, B.A.†, AND JOHN M. KEGGI, M.D.‡, NEW HAVEN, CONNECTICUT

Investigation performed at the Department of Orthopaedics and Rehabilitation, Yale University School of Medicine, New Haven



$$TAD = \left(X_{ap} \times \frac{D_{true}}{D_{ap}}\right) + \left(X_{lat} \times \frac{D_{true}}{D_{lat}}\right)$$

FIG. 1

Technique for calculating the tip-apex distance (TAD). For clarity, a peripherally placed screw is depicted in the anteroposterior (ap) view and a shallowly placed screw is depicted in the lateral (lat) view. (D_{true} = known diameter of the lag screw) (see text).

CalTAD-monoaxial system

A. KASHIGAR, A. VINCENT, M. J. GUNTON, D. BACKSTEIN, O. SAFIR, P. R. T. KUZYK

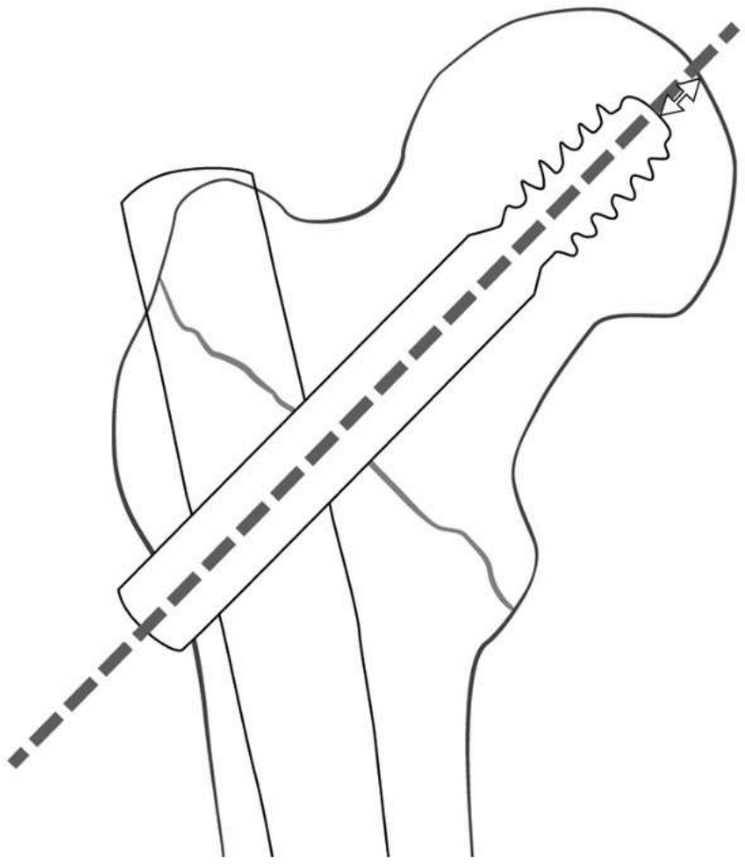


Fig. 1a

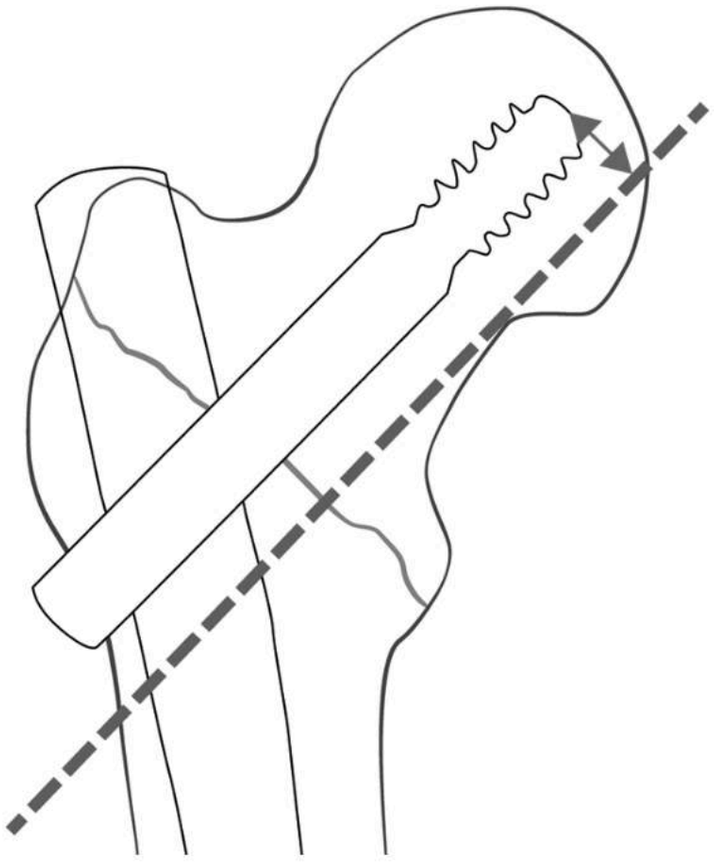


Fig. 1b

The calcar referenced tip-apex distance (CalTAD) is a novel measurement tool that uses the same measurement technique as the tip-apex distance (TAD) in the lateral view, but differs in the anteroposterior (AP) view. Figure 1a - TAD in the AP view (TAD_{AP}) is measured by determining the apex of the femoral head using a guideline through the midline of the femoral head (in mm). Figure 1b - CalTAD in the AP view ($CalTAD_{AP}$) is measured (in mm) by moving this guideline to be adjacent to the medial cortex of the femoral neck. TAD in the lateral view (TAD_{LAT}) is added to both these measurements to obtain TAD and CalTAD respectively.

CalTAD:Biaxial system

Article

Journal of Orthopaedic Surgery

Is calcar referenced tip-apex distance a better predicting factor for cutting out in biaxial cephalomedullary nails than tip-apex distance?

Kishore Puthezhath and Chundarathil Jayaprakash

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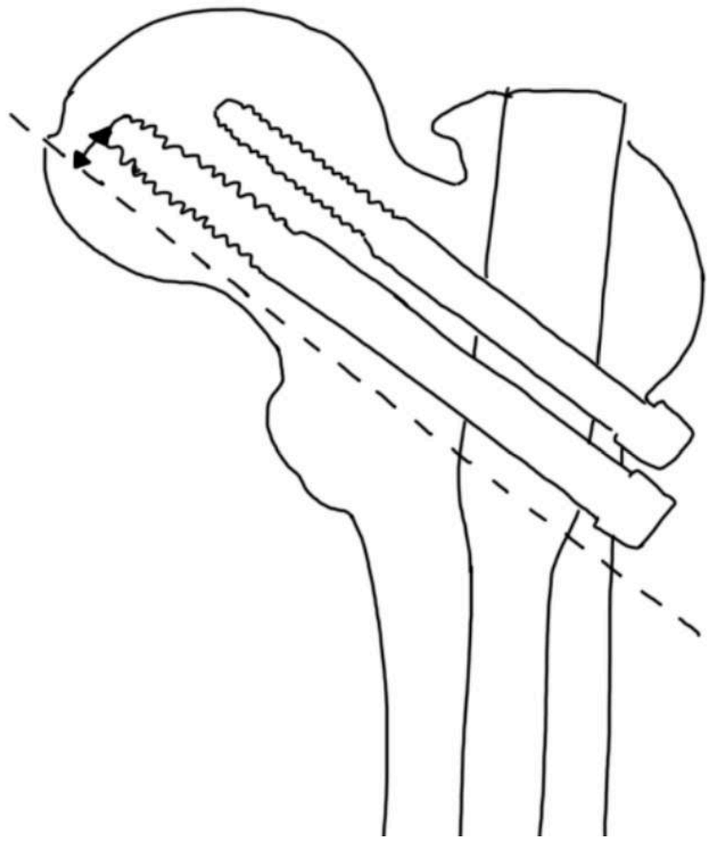

Trochanteric stabilisation plate

- Theoretical advantage in some difficult fracture pattern
- Plate clips to the side of the femur and prevent medialisation
- Not clinically proven

Condylar plate/Blade plate

A big NO

Failure rate: ~17% in reported series for condylar plate

~21% for blade plate

~7% for DHS and IM nails

External fixator

- 3 RCTs available

- Suggest results similar to DHS

Arthroplasty

- ~2 RCTs available

- Insufficient evidence to support its use

Summary of choice of implant

- “DHS remains a standard method of treatment of trochanteric fractures
- Nails have equivalent or potentially better results with potential to improve
- Future of trochanteric fracture treatment is more likely to be nails”-Parker Martyn

No significant improvement in mortality or functional recovery has happened over the past 50 years of surgical treatment

Postop care

- Full weight bearing

- Ortho-geriatric care

Identify a reliable physician to address all the medical problems

- Most patients with ITF will have multiple comorbidities.
- Most of them are admitted to ICU pre or post operatively.
    - They are hooked on to various Machines
    - Probed through various HOLES
    - Assaulted with multiple drugs

"Usually a pantheon of specialists: medical intensivists, nephrologists, gastroenterologists…. with their many voices are brought together to help….CACAPHONY RESULTS!

...this is known as WICOS problem: Who Is The Caption Of The Ship?"

When Breath Becomes Air, page 188, Paul Kalanithi

Follow-up of my own 87 cases (data collected as on 2016)

Status of patients	Number
Died	24(27.6%)
Bedsore	1(0.1%)
Dependent	26(30%)
Independent	22(25%)
Did not respond	14(16%)

Despite fracture fixation, hospital based super-specialty care and all the whistles in the wind……, around one third die in first year and one third become dependant

Take home message

- Correct treatment of trochanteric fracture is early surgical fixation with contemporary implant

- Ensure proper fracture reduction

- Ensure correct implant positioning

- Practice Immediate and unrestricted postoperative mobilisation

- Above all treat the total musculoskeletal need of the patient , rather than fixing it and forgetting it.

Please scan this qrcode and provide valuable feedback

“Fools, dwelling in darkness, but wise in their own conceit and puffed up with vain scholarship, wander about, being afflicted by many ills, like blind men led by the blind” -Mundaka Upanishad