

Anaesthetic Management of Geriatric Hip Fracture Patients

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Pope John Paul II
walked with
President Ronald
Reagan in 1987



1911 - 2004

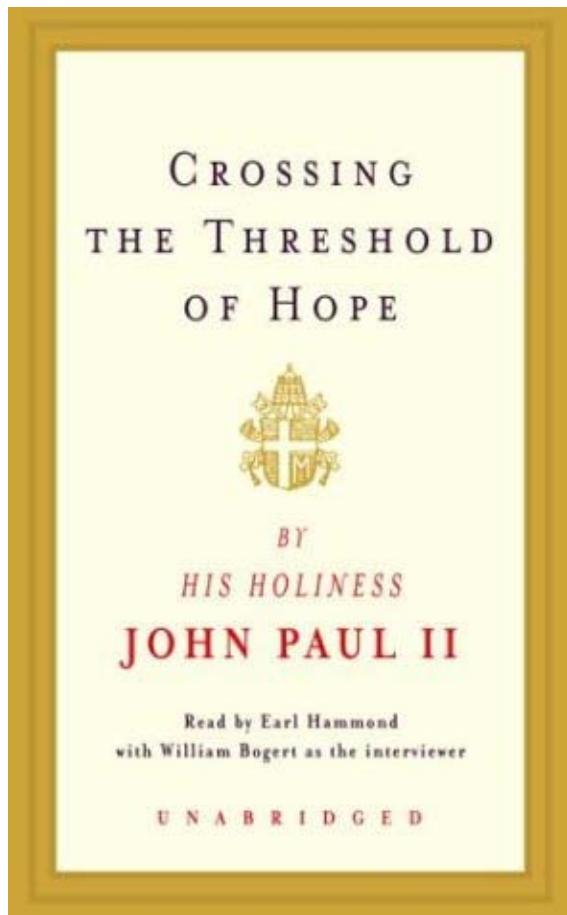
Alzheimer's disease: 1994
Hip fracture 2001



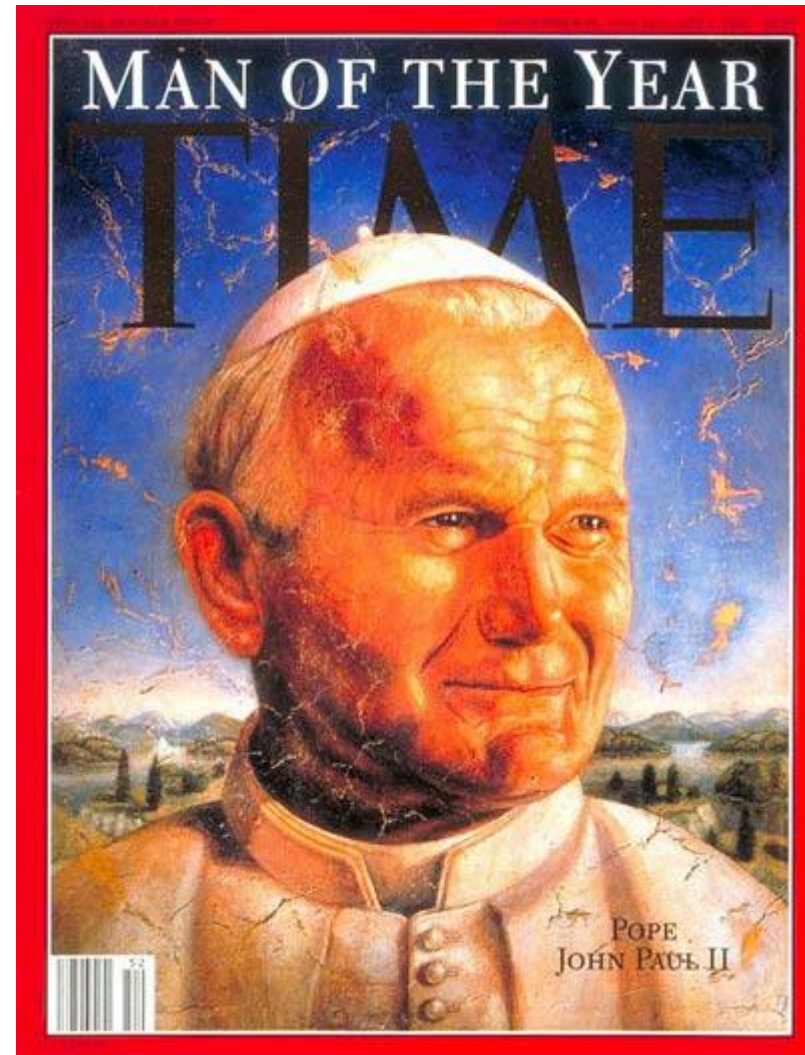
1920 - 2005

Hip fracture: 29 April 1994
Discharged: 27 May 1994

October 1994



December 1994



Anaesthetic Management of Hip Fracture Patients

- Timing of Surgery
- Preop optimization of medical conditions
 - chronic, acute
- Peri-op pain management
- Prevention of complications
 - UTI, chest infection, dehydration, pressure sores, DVT
- Anaesthetic techniques
 - SA, Combined Spinal-Epidural
- Postop pain management
 - rehabilitation

Management of Hip Fracture



Timing of surgical repair:
Double-blinding NOT feasible

Timing of Surgery

- prospective cohort study of 1206 matching cases
- early (<24 hr) vs late (>24 hr) surgery
 - not associated with improved function or mortality at 6 months
 - associated fewer days of severe pain (–0.22 days)
 - shorter LOS (–1.94 days)
 - probably major complications
- patients with hip fracture who are medically stable should receive early surgery when possible.

Orosz GM, et al. Association of timing of surgery for hip fracture and patient outcomes. *JAMA*. 2004;291:1738–43.



Benefits of early surgery vs optimization of underlying medical conditions

Health Status



Accident

Non-Accident

Preoperative status and risk of complications in patients with hip fracture.

McLaughlin MA, Orosz GM, Magaziner J, Hannan EL, McGinn T, Morrison RS, Hochman T, Koval K, Gilbert M, Siu AL.

J Gen Intern Med. 2006 Mar;21(3):219-25.

- prospective review of 804 patients with hip fracture in 1997-98
- in-hospital mortality 0.8%
- postop complications 7%
 - cardiopulmonary (5.8%), thromboembolic (1.8%), infectious (1.6%), misc (1.2%), and hematologic (0.4%)
- physical or lab findings on admission
 - minor abnormalities 34%
 - major abnormalities 23%

	Minor Abnormalities*	Major Abnormalities†
Blood pressure (BP) Rate and rhythm	Systolic BP ≥ 181 ; diastolic BP ≥ 111 Atrial fibrillation (AF) or supraventricular tachycardia (SVT) 101-120; sinus tachycardia ≥ 121 ; or heart rate (hr) 46-50 bpm	Systolic BP ≤ 90 AF or SVT ≥ 121 ; Ventricular tachycardia (VT); 3 rd degree heart block or hr ≤ 45 bpm
Infection/pneumonia	Temperature (T) ≥ 38.5 C; clinical diagnosis of pneumonia; or infiltrate on chest x-ray (CXR)	T < 35 C; T ≥ 38.5 C with clinical diagnosis of pneumonia or infiltrate on CXR
Chest pain	Chest pain but normal electrocardiogram (EKG)	Any new myocardial infarction (MI) on EKG; or chest pain with abnormal EKG
Congestive heart failure (CHF)	Dyspnea or pulmonary rales or S3 but a normal CXR; or CHF on CXR with a normal exam and no dyspnea	pulmonary edema on CXR; or CHF on CXR with dyspnea and/or abnormal exam
Respiratory failure	46 mmHg $<$ pCO ₂ $<$ 55 mmHg	Pulse oximetry $<$ 90 %; pO ₂ $<$ 60 mm Hg; or pCO ₂ ≥ 55 mm Hg
International normalized ratio (INR)	1.4-1.6	> 1.6
Electrolytes	Sodium (Na) = 126-128 or 151-155 mEq/L; Potassium (K) = 2.5-2.9 or 5.6-6.0 mEq/L; or Bicarbonate (HCO ₃) = 18-19 or 35-36 mEq/L	Na ≤ 125 or > 155 mEq/L; K < 2.5 or > 6.1 mEq/L; or HCO ₃ < 18 or > 36 mEq/L
Glucose	451-600 mg/dL	> 600 mg/dL
BUN/creatinine	BUN 41-50 mg/dL; or Creatinine 2.1-2.5 mg/dL without h/o ESRD	BUN > 50 mg/dL; or Creatinine ≥ 2.6 mg/dL without h/o ESRD
Anemia	Hemoglobin (Hgb) 7.6-8 g/dL	Hgb ≤ 7.5 g/dL

* Minor = mildly abnormal but less likely to require correction prior to surgery

† Major = markedly abnormal and more likely to require correction prior to surgery

|| Abnormal EKG defined as ST depressions or elevations

Postop Complications:
Odds (CI)

> 1 major abnormality: on admission	4.83 (1.89-12.35)
uncorrected before surgery	12.16 (3.85-38.40)
> 1 minor abnormality	0.96 (0.44-2.11)

In older adults with hip fracture:

- potentially reversible abnormalities in lab and physical exam occurred frequently and they significantly increased risks of postop complications
- major clinical abnormalities should be corrected prior to surgery
- patients with minor abnormalities may proceed to surgery with attention to these medical problems perioperatively.

McLaughlin MA, et al Preoperative status and risk of complications in patients with hip fracture. *J Gen Intern Med.* 2006 Mar;21(3):219-25.

Optimization of Medical Conditions

- Surgery can proceed with optimization in progress:
 - Anaemia: Hb < 10
 - Hypovolaemia
 - Uncontrolled hypertension
 - Unstable DM

Adapted from Parker MJ. New development in hip fracture treatment. *Trauma* 2003; 5:43-9

Optimization of Medical Conditions

- Surgery needs to be postponed until fully optimized:
 - severe electrolyte imbalance or acute renal failure
 - acute coronary syndrome
 - congestive cardiac failure
 - rapid AF or other correctable arrhythmia
 - severe chest infection / exacerbation of COAD

Adapted from Parker MJ. New development in hip fracture treatment. *Trauma* 2003; 5:43-9

Harmful Effects of Pain



Harmful Effects of Pain in Older Patients

- Immobility
 - resp complications, pressure sores, poor hydration and nutrition
- Stress Response
 - cardiovascular complications, protein breakdown, glucose intolerance, electrolyte disturbances
- Neuropsychiatric
 - sleep disturbances, delirium, depression, chronic pain



Pain 103 (2003) 303–311

PAIN

www.elsevier.com/locate/pain

The impact of post-operative pain on outcomes following hip fracture

R. Sean Morrison^{a,*}, Jay Magaziner^b, Mary Ann McLaughlin^c, Gretchen Orosz^a,
Stacey B. Silberzweig^a, Kenneth J. Koval^d, Albert L. Siu^c

... improved pain control may decrease length of stay, enhance functional recovery, and improve long-term functional outcomes.

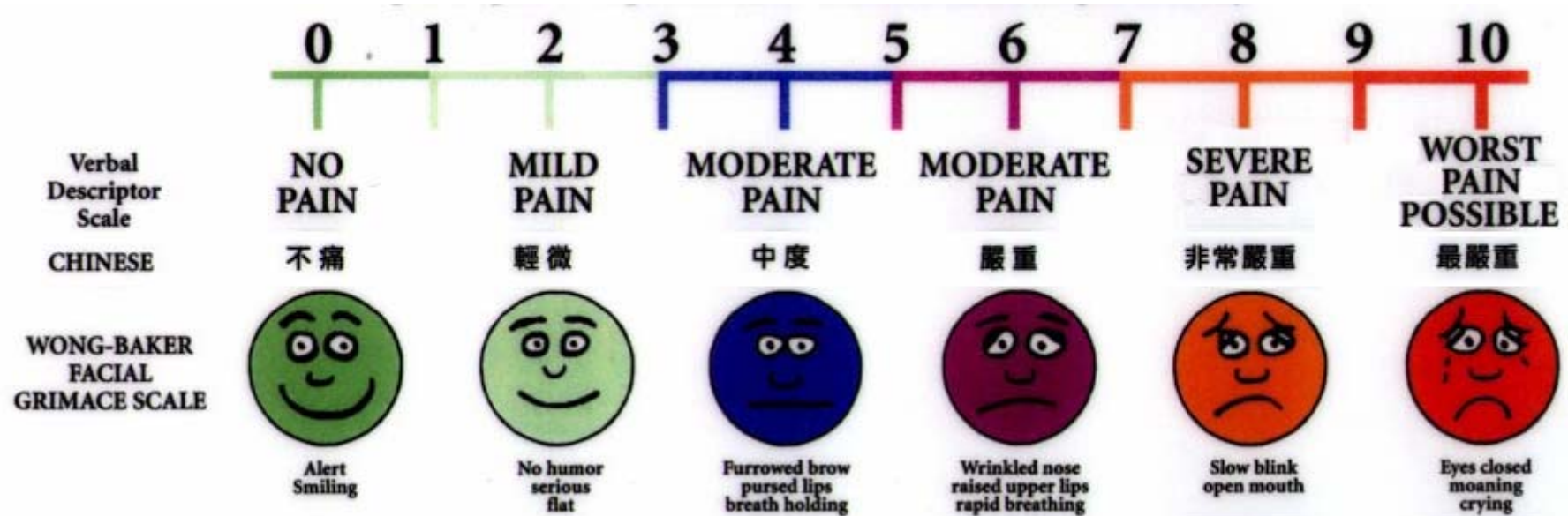
Periop Pain Management in Older Patients

- Pain assessment
- Multimodal analgesia
- Regional analgesic techniques



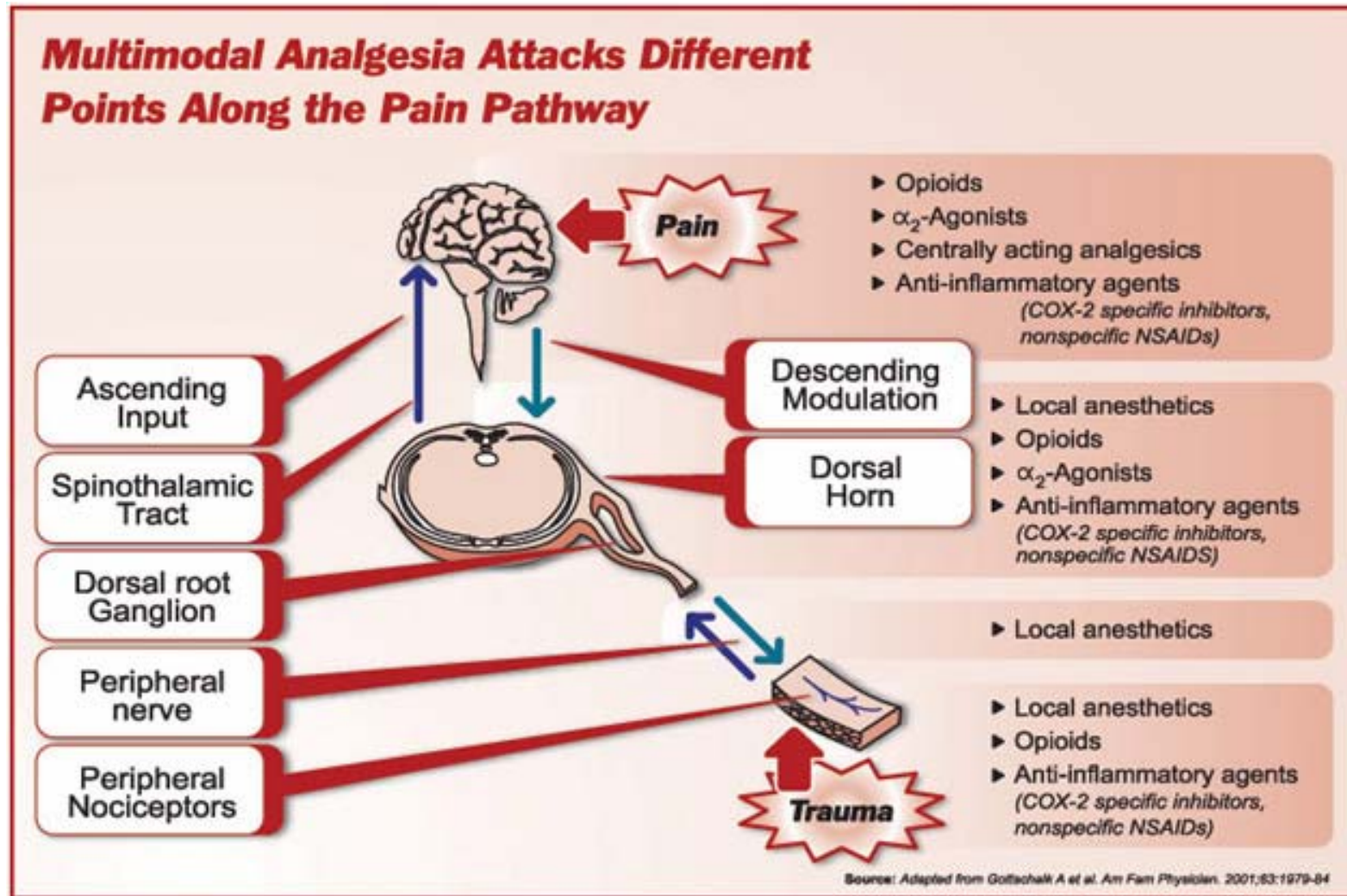
Pain Management

- Pain assessment tools
 - avoid undertreatment or overtreatment



Behavioural Pain Assessment Scale: score pain using facial appearance, muscle tone, restlessness, vocalization, consolability (scale 0-1-2 x 5 parameters)

Pain Management



Multiple analgesic modalities: \uparrow efficacy and \downarrow complications

Analgesic Ladder

- Paracetamol
 - effective and fewer side effects
- NSAIDs
 - side effects: GIB, renal failure
- Opioids
 - carefully titrated and supervised
 - pethidine and propoxyphene: may increase delirium

Pain Management Plan

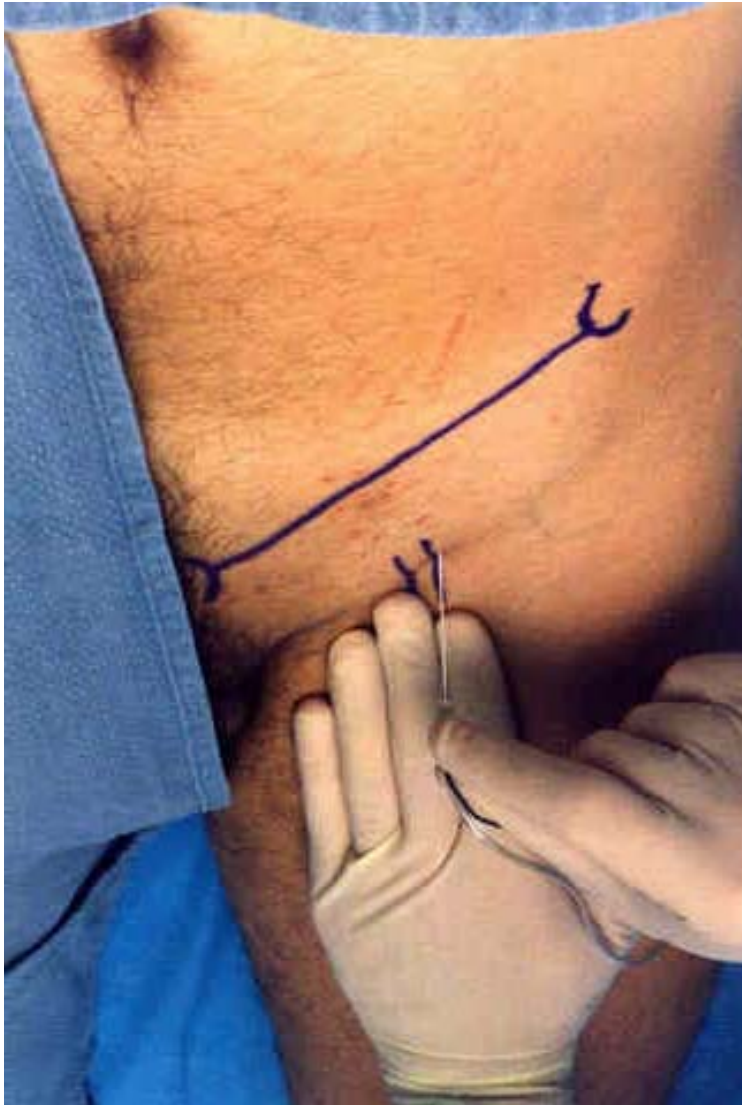
- Paracetamol 500 mg q6h PO
 - (unless liver disease or severe renal impairment with serum creatinine $>200 \mu\text{mol/L}$)
- Tramadol 50 mg q6h PO
- For breakthrough pain, morphine 5-10 mg q4h IM PRN
- Severe uncontrolled pain: femoral nerve block

Nerve Blocks for Hip Fractures

- reduced need for systemic analgesics
 - 40-80% reduction
- better pain relief
 - 95% vs 50%
- potential for
 - less postoperative confusion
 - earlier mobilisation
 - reduction of respiratory infection

Parker MJ, et al. Nerve blocks for hip fractures. In: The Cochrane Library, Issue 1, 2006.

Femoral Nerve Block



Short-bevel or Tuohy needle
inserted:

- lateral to femoral artery
- below inguinal ligament
(at level of groin crease)

“Loss of resistance” x2:

- fascia lata
- fascia iliacus

20-30 ml of LA

Three-in-One or Fascia Iliacus Compartment Block

Single injection

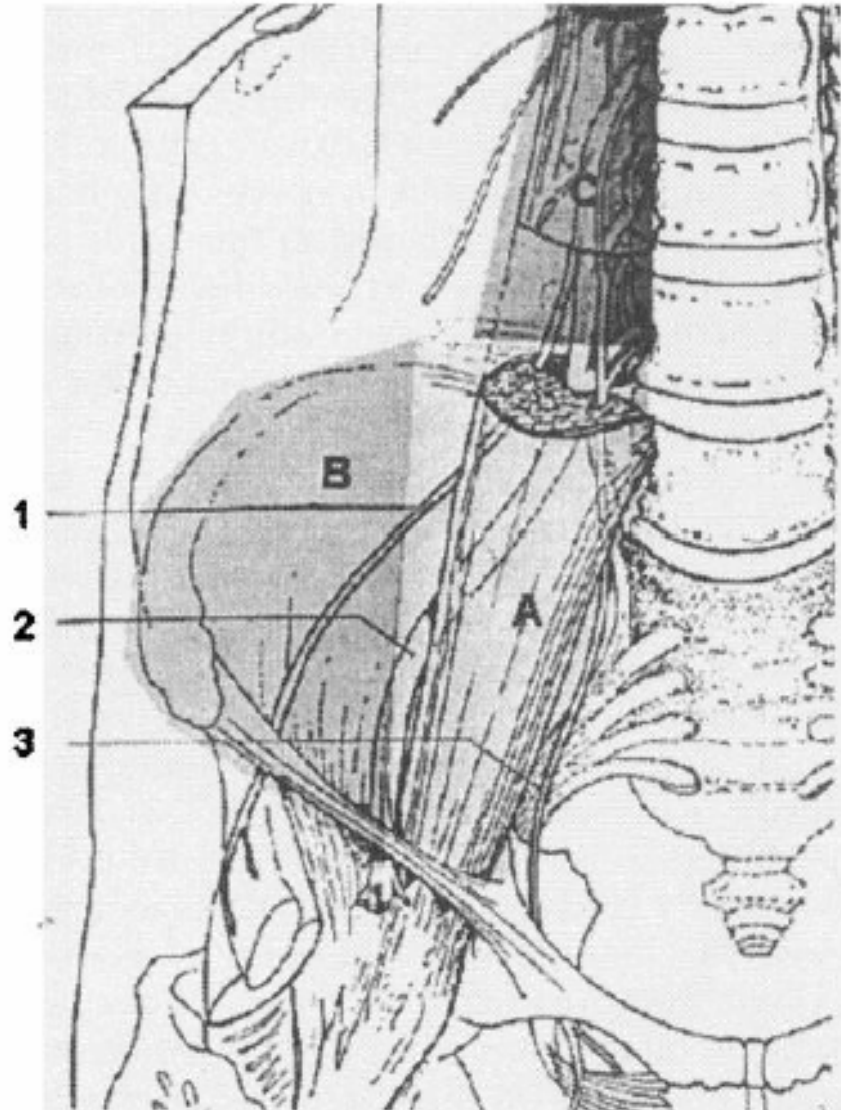
large vol (30-40 ml) of LA
with distal compression

will block all three major
branches of lumbar plexus:

1: lat cut n of thigh

2: femoral n

3: obturator n

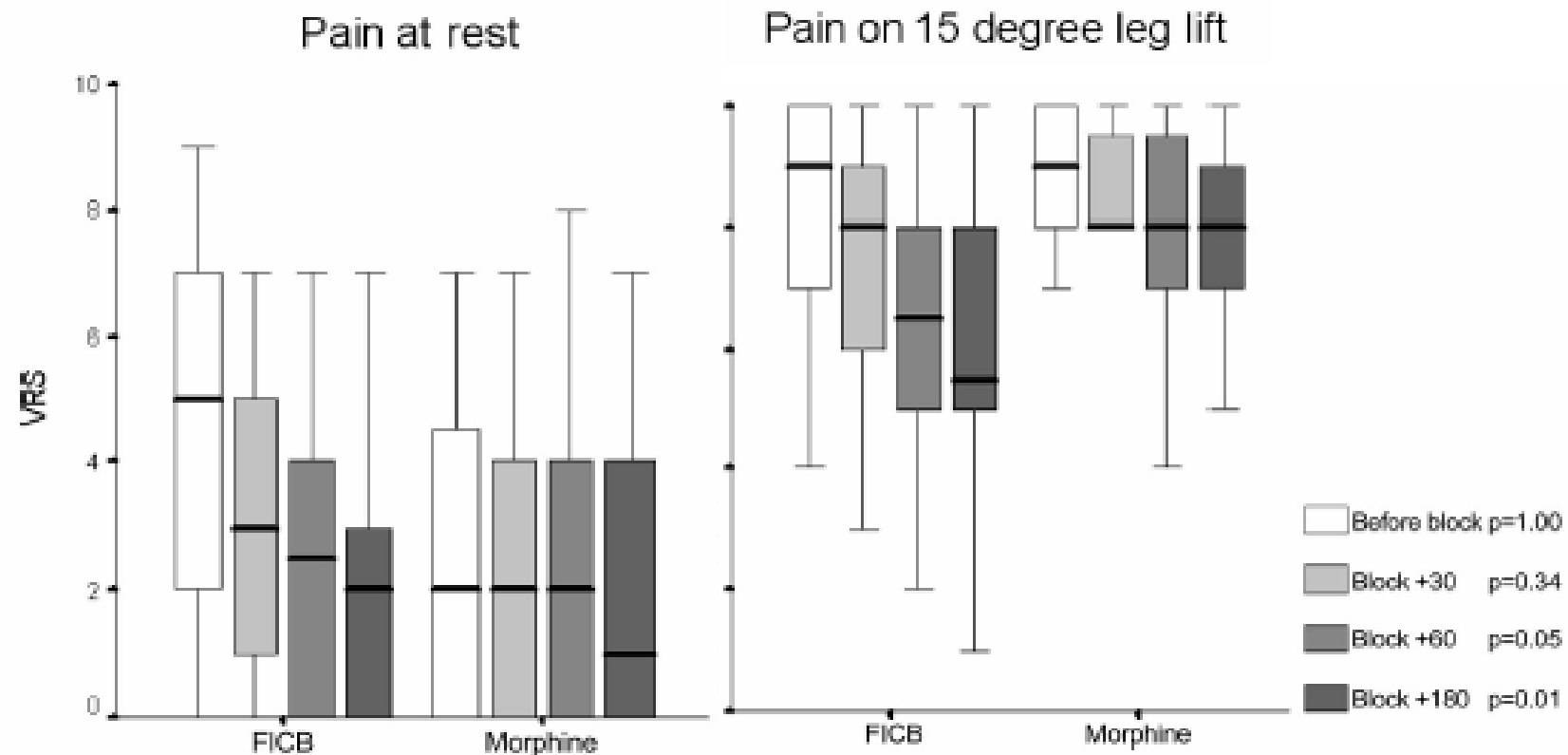


Fascia Iliaca Compartment Blockade for Acute Pain Control in Hip Fracture Patients

A Randomized, Placebo-controlled Trial

Nicolai B. Foss, M.D.,* Billy B. Kristensen, M.D.,† Morten Bundgaard, M.D.,‡ Mikkel Bak, M.D.,‡ Christian Heiring, M.D.,‡ Christina Virkelyst, M.D.,‡ Sine Hougaard, M.D.,‡ Henrik Kehlet, M.D., Ph.D.§

- double-blind, randomized, placebo-controlled trial
- 48 patients
- single shot
 - FICB 40 ml 1% mepivacaine with adren or morphine 0.1 mg/kg IMI
- rescue morphine 2.5 mg IV when pain score > 5



Conclusion: Pain relief was superior at all times and at all measurements in the FICB group. The study supports the use of FICB in acute management of hip fracture pain because it is an effective, easily learned procedure that also may reduce opioid side effects in this fragile, elderly group of patients.

3-in-1 Block for Hip Fracture

Fletcher AK, Rigby AS, Heyes FL.

Three-in-one femoral nerve block as analgesia for fractured neck of femur in the emergency department: a randomized, controlled trial.

Ann Emerg Med. 2003;41:227-33.

Monzon DG, Iseron KV, Vazquez JA.

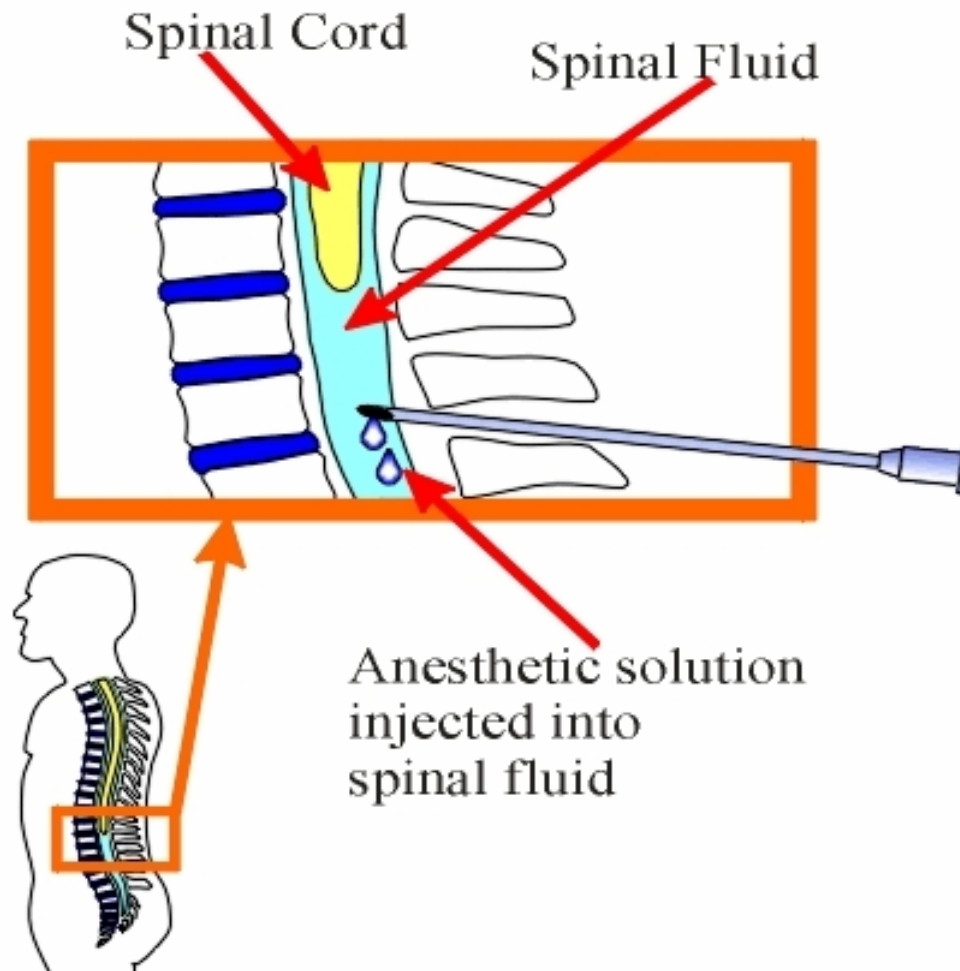
Single fascia iliaca compartment block for post-hip fracture pain relief.

J Emerg Med. 2007;32:257-62.

Which Anaesthetic Technique ?



Spinal Anaesthesia





Anaesthesia for Hip Fracture Surgery: Summary of Evidence

Outcome	SA vs GA	RR/Difference	95% CI
1 mo mortality	SA	0.69	0.5-0.95
3 mo mortality	Same	0.92	0.71-1.21
DVT	SA	0.64	0.48-0.96
Blood loss	SA	85 ml	9-162 ml
Postop Confusion	SA	0.5	0.26-0.95

Parker MJ, Handoll HH, Griffiths R. Anaesthesia for hip fracture surgery in adults. Cochrane Database Syst Rev 2004;4:CD000521.

Contra-Indications for SA

- Absolute
 - raised ICP: medulla coning
 - coagulopathy: epidural haematoma
 - local infection at puncture site: meningitis
 - fixed cardiac output state (eg severe mitral or aortic stenosis): CVS collapse

Contra-Indications for SA

- Relative
 - systemic sepsis
 - hypovolaemia
 - neurologic diseases
 - uncooperative patient

SA and Anticoagulants

Drugs:

Aspirin and NSAIDs

Unfractionated heparin

LMW heparin

Warfarin

Clopidogrel

Abciximab

How long to wait:

not contraindicated

2-4 hr

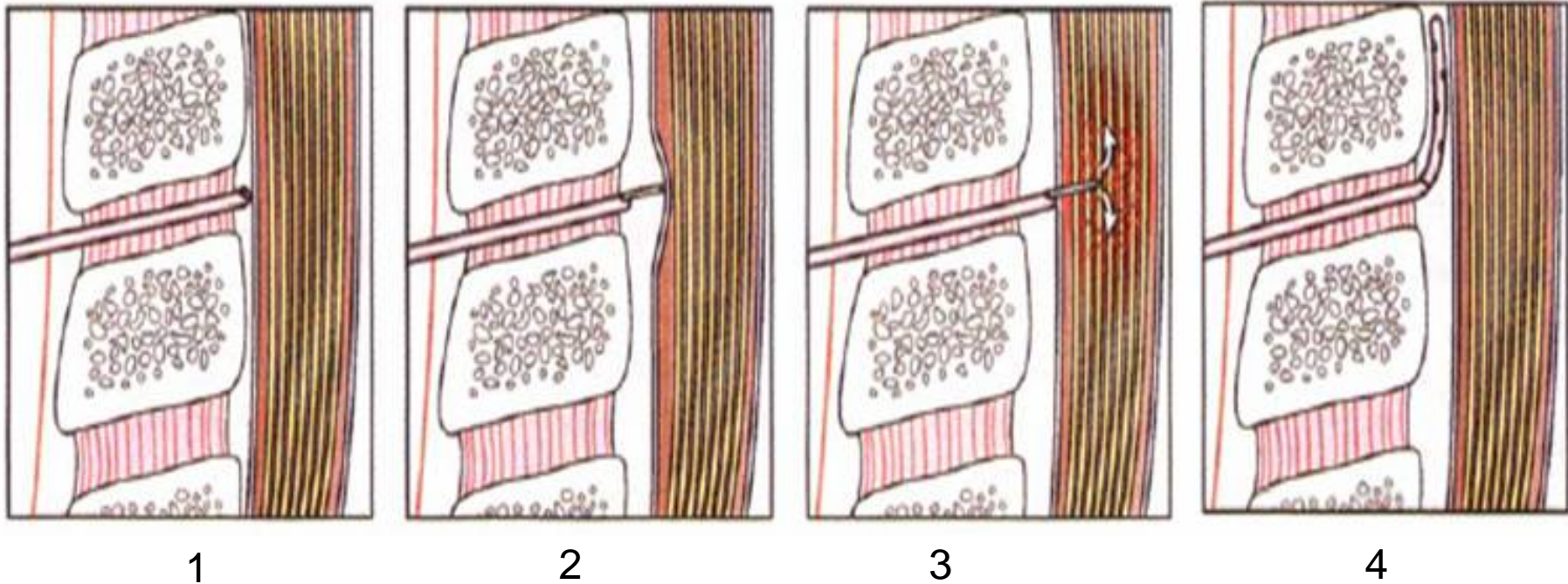
12 hr

INR < 1.5

7 days

2 days

Combined Spinal-Epidural Anaesthesia



Single Space Combined Spinal Epidural Technique:
dural puncture with long spinal needle after locating
epidural space

SA Vs CSE

Spinal Anaesthesia

Single Shot

Duration: 2 hr

High spinal: unavoidable

Postop analgesia: +

Technical complexity +

Combined Spinal-Epidural

Single shot then continuous

Duration: indefinite

High spinal: avoidable

Postop analgesia: ++++

Technical complexity +++

**? postop
epidural
analgesia**



■ PAIN AND REGIONAL ANESTHESIA

Anesthesiology 2005; 102:1197-1204

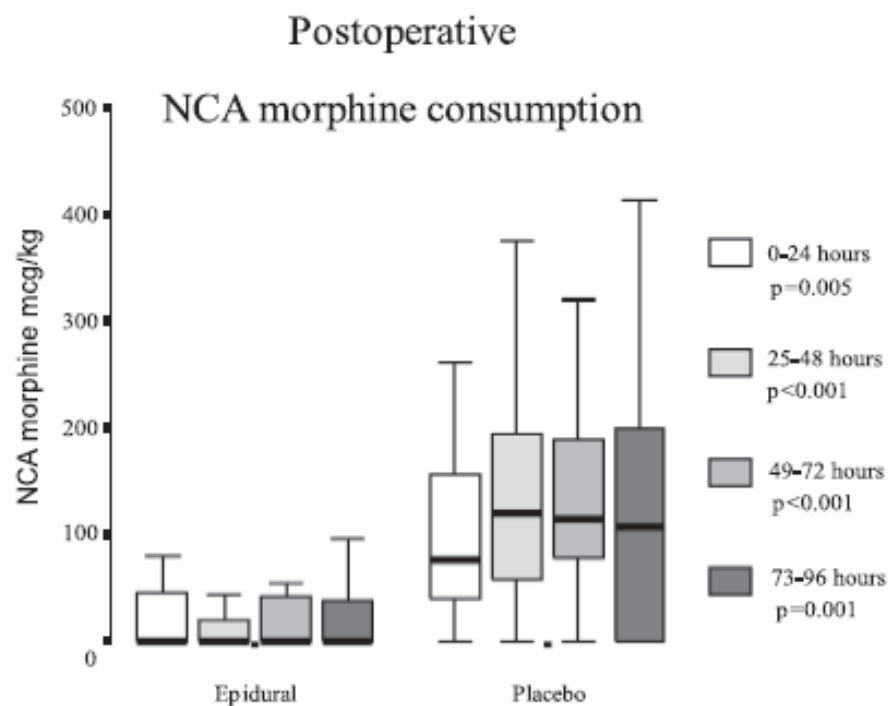
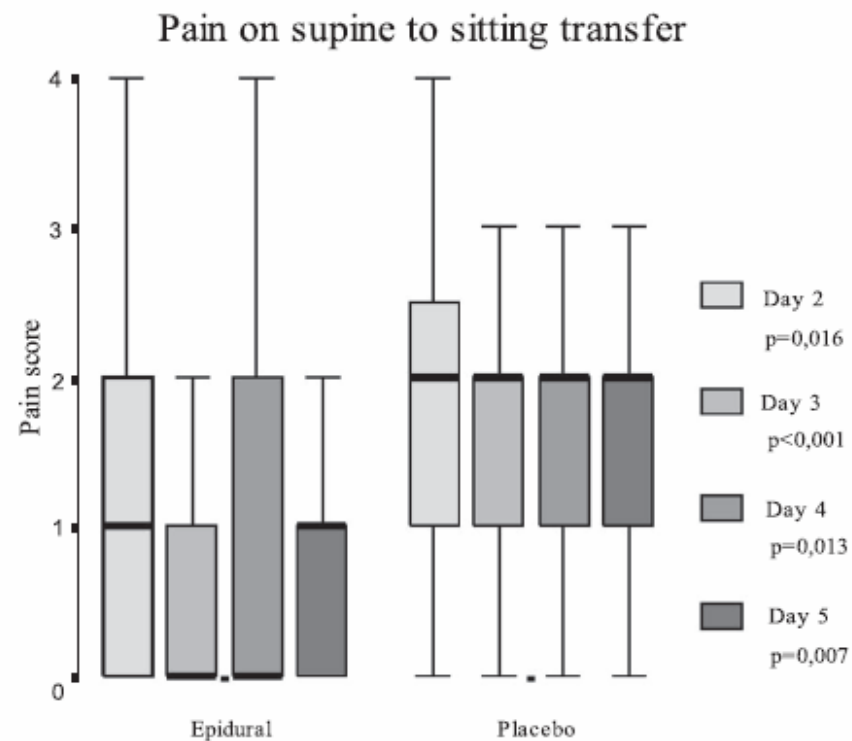
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Effect of Postoperative Epidural Analgesia on Rehabilitation and Pain after Hip Fracture Surgery

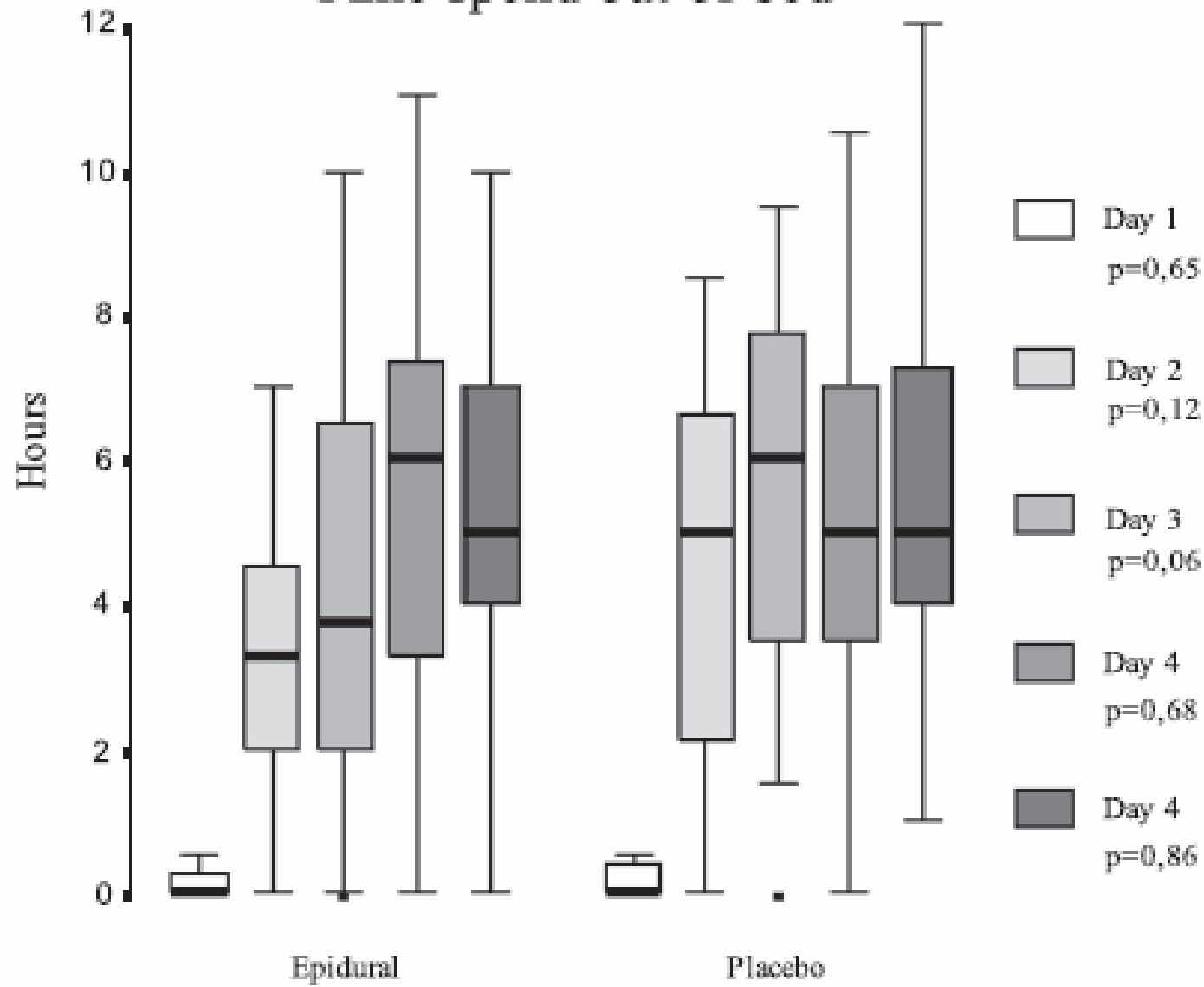
A Randomized, Double-blind, Placebo-controlled Trial

Nicolai Bang Foss, M.D.,* Morten Tange Kristensen, P.T.,† Billy Bjarne Kristensen, M.D.,‡ Pia Sørensen, R.N.,§
Henrik Kehlet, M.D., Ph.D.||

- double-blind randomized placebo controlled trial
- 55 elderly patients with hip fractures
- surgery under epidural anaesthesia
- postop epidural infusion: 2 groups
 - 4 ml/hr 0.125% bupivacaine with morphine 50 μ g/ml or saline
- nurse-controlled analgesia: iv morphine
- oral paracetamol 1 g 6 hourly and rofecoxib 25 mg once daily
- postop multimodal fast-track rehabilitation regimen



Time spend out of bed



Epidural Analgesia (Group A) or Placebo (Group B)

	Group A	Group B	<i>P</i> Value
n	28	27	
Time in PACU, min	85 (33.8)	120 (97.5)	0.007
Postoperative transfusions, n	1 (2)	2 (3)	0.15
Postoperative colloids	0 (500)	0 (200)	0.09
Pneumonia	3	3	0.96
Deep venous thrombosis	0	2	0.14
Pulmonary embolus	1	0	0.33
Cardiac complication	1	1	0.98
S-creatinine > 200, mm	1	1	0.98
Surgical wound infection	0	2	0.14
Patients with at least one major medical complication	6	8	0.49
Maximum decrease in MMSE score	0.5 (3.75)	1.0 (3.25)	0.85
Total duration of hospital stay (preoperative and postoperative)	11 (12)	13 (13)	0.78
30-Day mortality	1	1	0.98

- postop epidural analgesia after hip fracture provides superior pain control during dynamic exercise
- however, superior analgesia did not translate into enhanced rehabilitation (unlike patients after elective joint replacement surgery)
- ? postop pain NOT a limiting factor on rehabilitation in frail elderly patients after acute surgery for hip fracture

Foss NB, et al. Effect of postoperative epidural analgesia on rehabilitation and pain after hip fracture surgery. *Anesthesiology* 2005; 102:1197–1204



Any thoughts?

Summary and Thoughts

Older patients with hip fracture

- Preoperative assessment and workup
 - surgery as early as possible
 - optimization of medical conditions
- Pain management
 - pain assessment, multimodal analgesics, nerve blocks: particularly before surgery
 - decreases complications of immobility, stress response and neuropsychiatric
- Anaesthetic technique
 - SA offers advantages: short term mortality, DVT, blood loss, mental changes