

Orthopedic Analgesia

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What is currently special about Orthopedic Surgery?

- Waiting list and mandate to reduce it
- One of the most painful of surgeries
- Need for early ambulation +/- CPM
- **40-70% of orthopedic patients perceive severe to excruciating pain after surgery in the ambulatory setting (F.Chung)**
- **Concept of perioperative care and missing links**
 - **Conditioning**
 - **Chronic narcotic use for pain**
 - **Obesity and multiple comorbidities**

Pain in the Bone=Pain in the B

- **Lost productivity due to pain costs 61.2 billion dollars/year in the US¹**
- **More orthopedics are done as ambulatory procedures: TSA, ACL, HTO**
- **One day THA and TKJA**
- **Persistent chronic pain in 66% if acute pain is poorly managed²**
- **Improved to 33% with good APM³**

1. Stuart WF et al. *Jama* 2003;290:2443-54

2. *Anesthesiology* March 2006:403,601 and editorial 397.

3. Katz J et al *Clin J of Pain*96;12:50-5

Obvious

- Major economic implications#
- Prolonged waiting list
- Bed occupancy
- Cancelled ORs: AGHHHHHHH
 - #Mitchell C et al J Eval Clin Pract 2005;3:283-92
 - #Dohnke B et al Arthritis Rheumat 2005;4:585-92



Concept of Perioperative care

- **Spinal cord wind up with surgical trauma**
- **Preventive and preemptive analgesic adjuvants**
- **Transition to extended adequate analgesia**
- **Progress to ADL ASAP**
- **Neuropathic component**

Ascending afferent sensory pathways and descending modulatory pathways

6a. Neocortical perception (Localization)

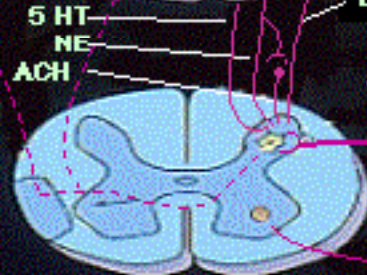
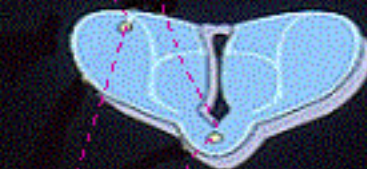
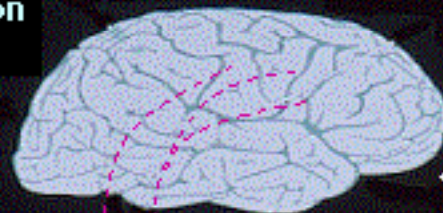
Cortex

Thalamus

Midbrain

Spino-thalamic tract

Spinal cord



6b. Paleocortical perception (Protopathic)

7. Supraspinal reaction

1. Transduction

2. Transmission

4. Modulation

3. Central facilitation

5. Spinal reaction

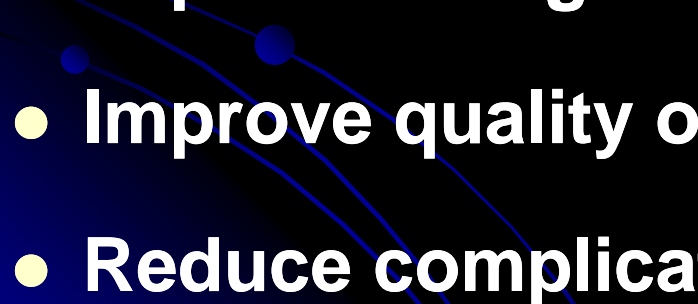
Peripheral nociceptor

Neural Blockade in Clinical Anesthesia and Management of Pain 3rd Edition 1998, Cousins and Bridenbaugh (eds); Lippincott-Raven, Philadelphia: 825

Effect of Pain

- **Lack of sleep/alteration in REM sleep**
 - Myocardial Ischemia, confusion, lost confidence
- **Stress response to surgery**
 - Increased cortisol and norepi, Ischemia, glucose intolerance, poor wound healing
- **Rigidity, spasm, lack of movement**
 - DVT, milestone delays
- **Alteration in coagulation**
 - DVT, Emboli, ischemia
- **Hypoventilation/atelectasis**
 - Hypoxia, ischemia, infections and delayed discharge
- **Wind up at every level of pain modulation**

Purpose

- Reduce Hospital Stay: **Better resource utilization**
 - Increase numbers done / day: **No Delays**
 - Improve analgesia: **Short and Long term**
 - Improve quality of life
 - Reduce complications
- 

What is available now for Anesthesia and Analgesia?

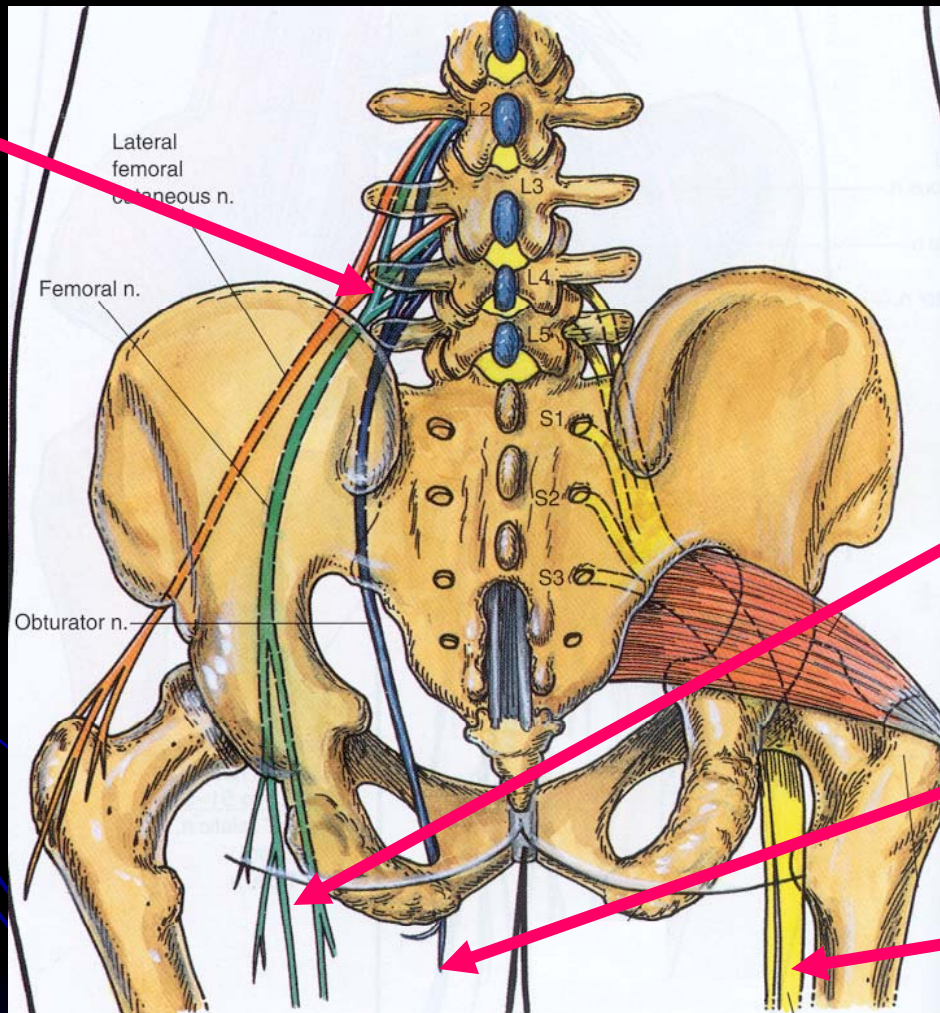
- GA with PCA
 - Fast but cannot send home with PCA
 - Opioids are poor in relieving pain during activity
- Spinal with IT morphine/dilaudid
 - Lasts 24 hours
 - Nausea
 - Urinary catheterization

Epidurals?

- Postural Hypotension
- Risk of hematoma with LMWH
 - 1 in 3600 in women and TKJA
 - Too devastating
- Contralateral block
- Intense monitoring
- Urinary Retention

Nerve supply to hips and Knees

Psoas
compartment
block



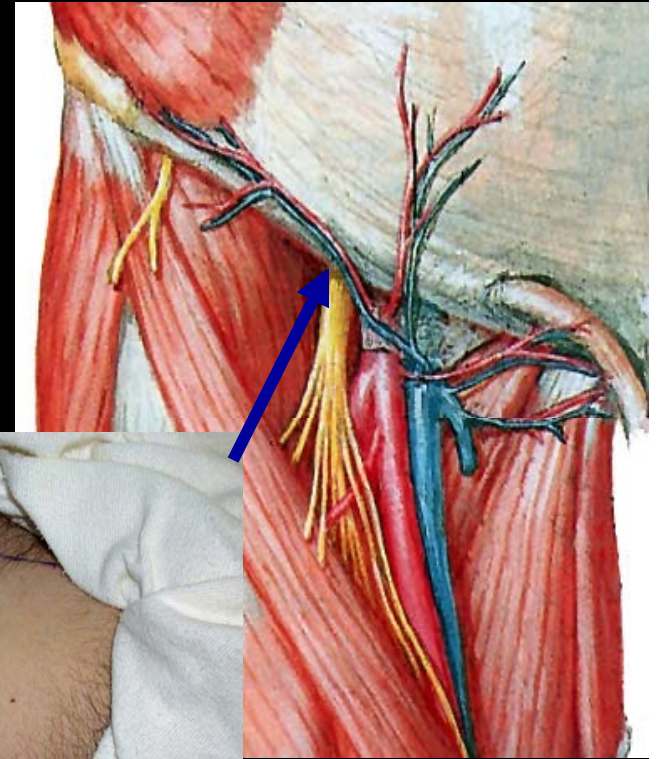
Femoral nerve
block

Obturator

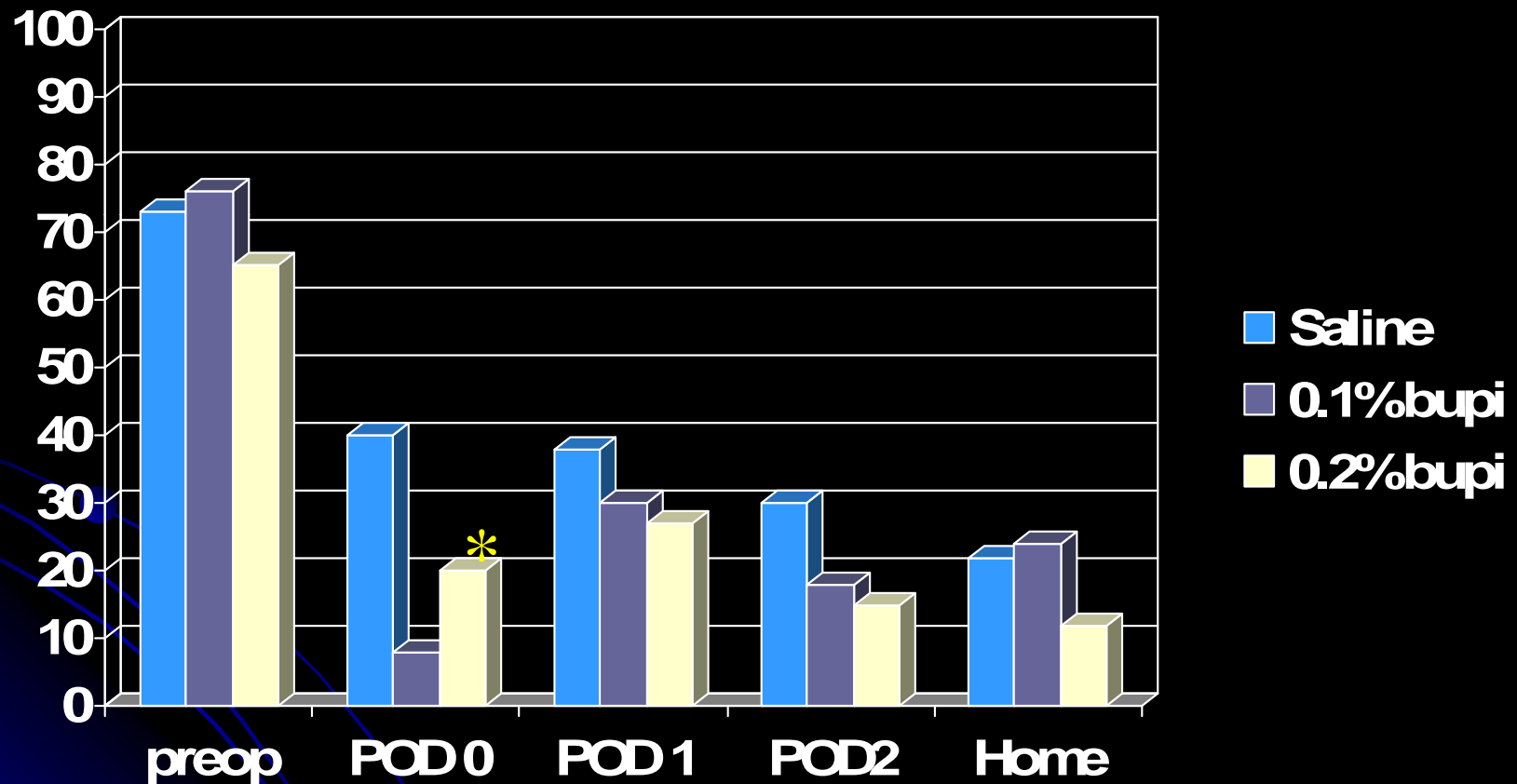
Sciatic

Continuous Femoral Nerve Blocks

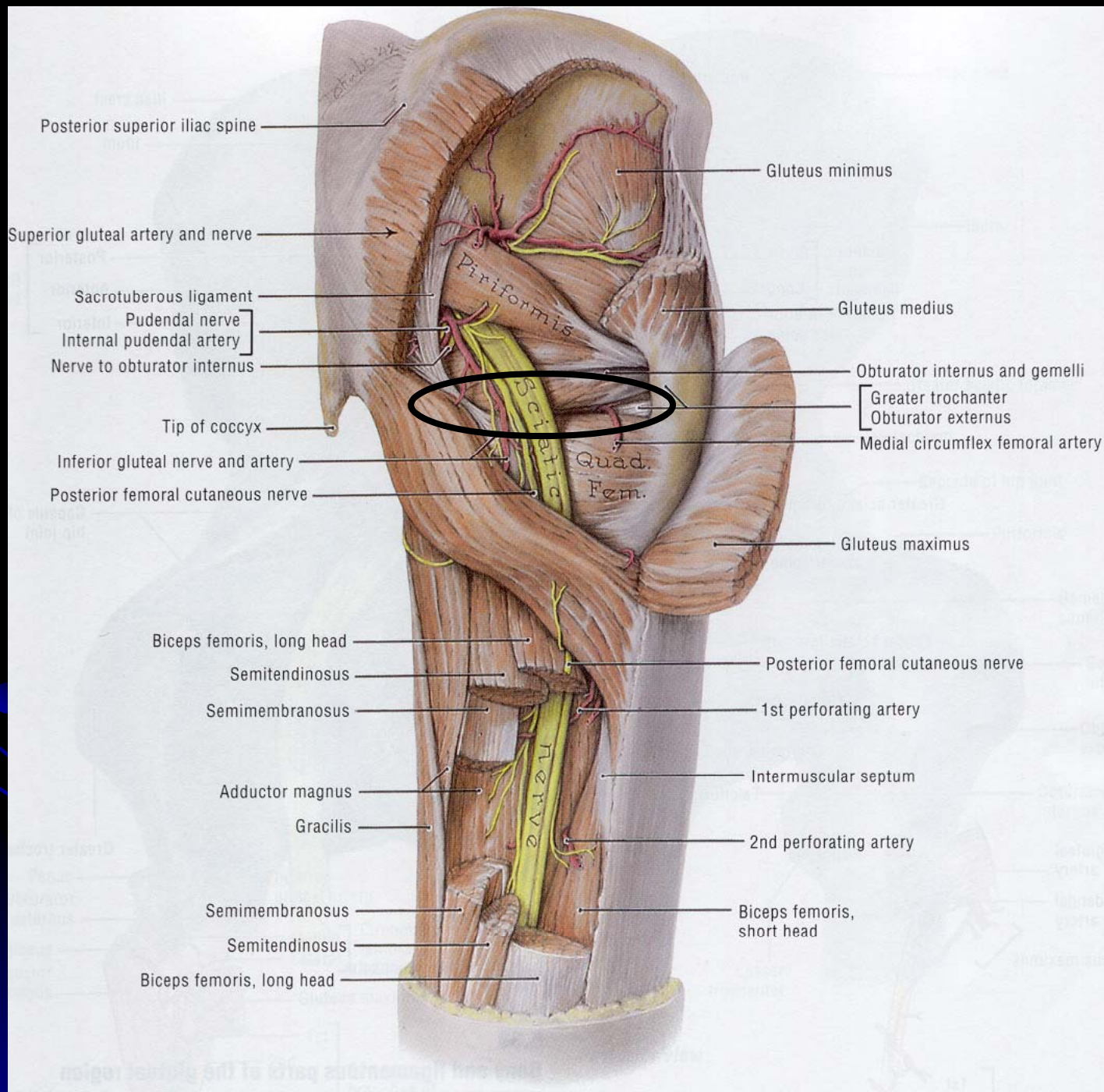
- Technical problems
 - kinking
 - dislodgement



Continuous Modified Femoral Nerve Block



Ganapathy A&A 1999



Probe position Subgluteal sciatic

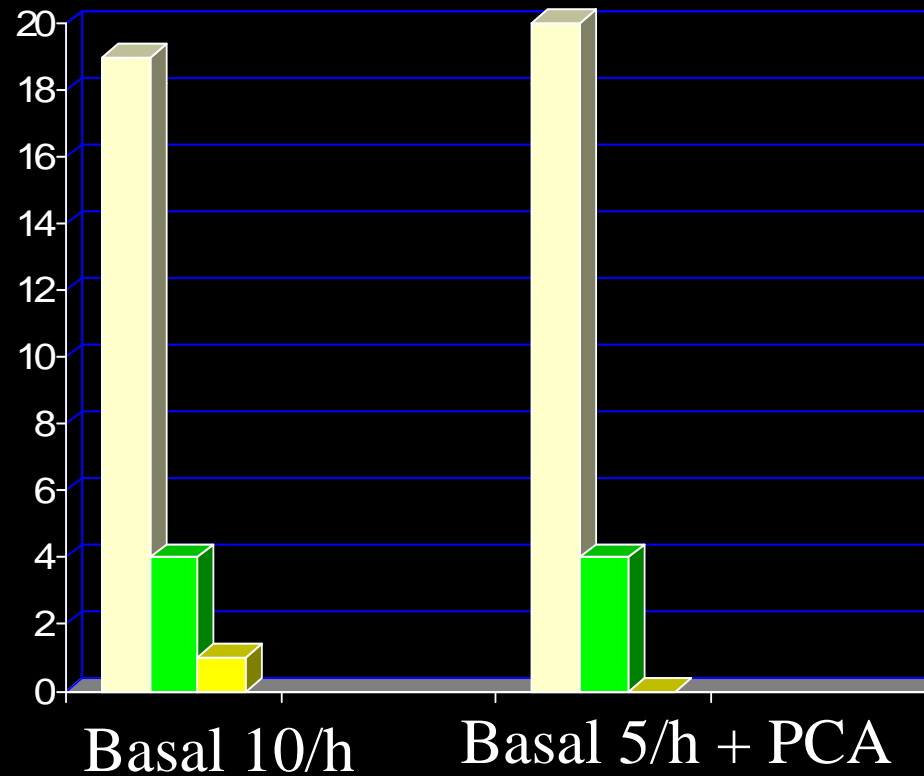


Subgluteal Approach

Patient rating of

Analgesia

Excellent Good Insufficient



Patients

Di Benedetto RAPM
2002

Problems with Peripheral Nerve Blocks

- Femoral and sciatic blocks

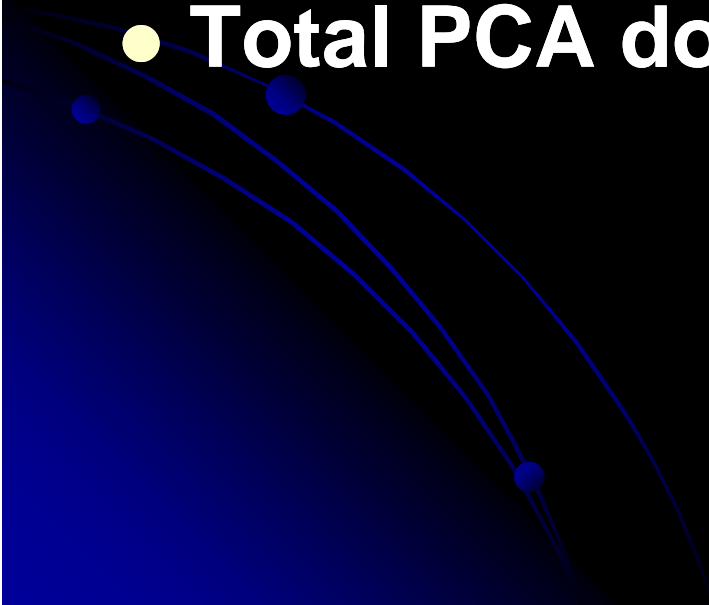
- Takes time and expertise
- Need analgesia on both sides of knee: Double cath
- Variable Motor weakness in blocked leg,
- Quads with femoral and Hamstrings with sciatic
- May be reduced with low dose infusions
- Physio using the board, non weight bearing
- Potential fall
- Intensity of follow up, Double pump
- Missed obturator pain
- Foot drop and Heel blisters with sciatic

- *May Not be safe to send home with a weak leg*

Wound infiltration

- **Infiltration of periarticular area**
- **Mixture of ropivacaine 0.35% with morphine 10mg, toradol 30 mg and epinephrine 2.5 mcg/ml**
 - **Increased PG and opioid receptors at site of injury**
- **30cc behind knee and 70 anteriorly in layers and for hips in layers**
- **Prospective randomized trial with and without infiltration**
 - **J of Bone and Joint surgery 2006 May**

For THA morphine use

- **Statistically significant differences were seen at**
 - **0-6hrs $p < 0.002$**
 - **Total PCA dose $p < 0.009$**
- 

Knee results

- **VAS 4h PO Rest – p=0.015**
- **VAS 4h PO Activity – p=0.007**
- **VAS 4h PO Satisfaction – p=0.020**
- **VAS POD2 AM Rest – p=0.030**
- **PCA 0-6h – p<0.001**
- **PCA 7-12h – p=0.016**
- **Total PCA dose/24 – p<0.001**

New Kid On the Block

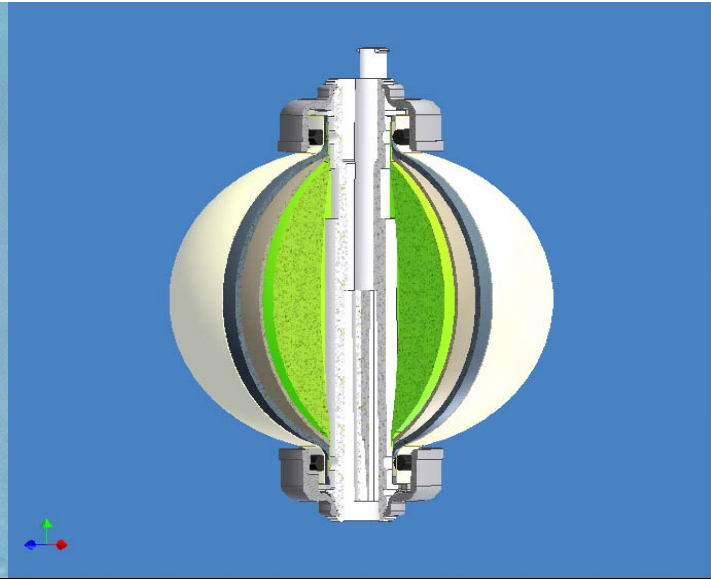
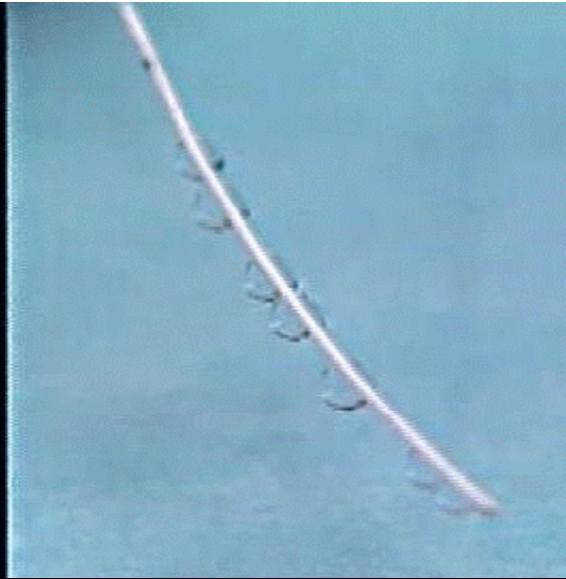
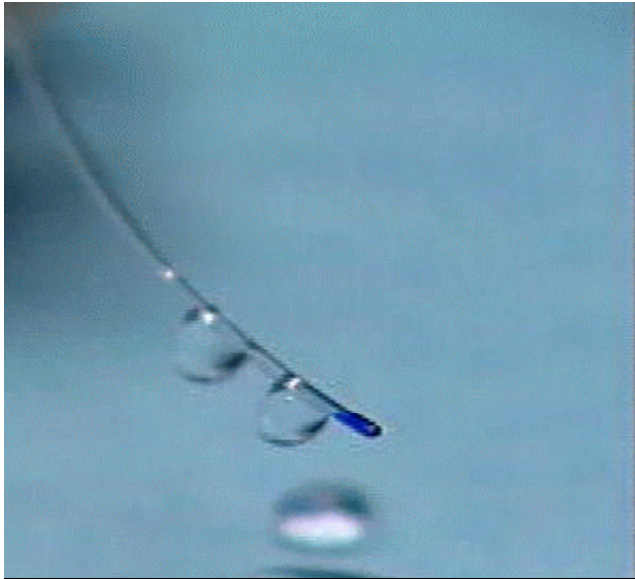
- Periarticular infiltration of a mixture of local anesthetic, Morphine, Ketorolac and Epinephrine
- Unfortunately effect is gone by 20 Hours
- Can be Extended with infusion of local anesthetic periarticularly
- Elastomeric Disposable infusion pumps
- *Worry about wound infection, Chondrolysis*

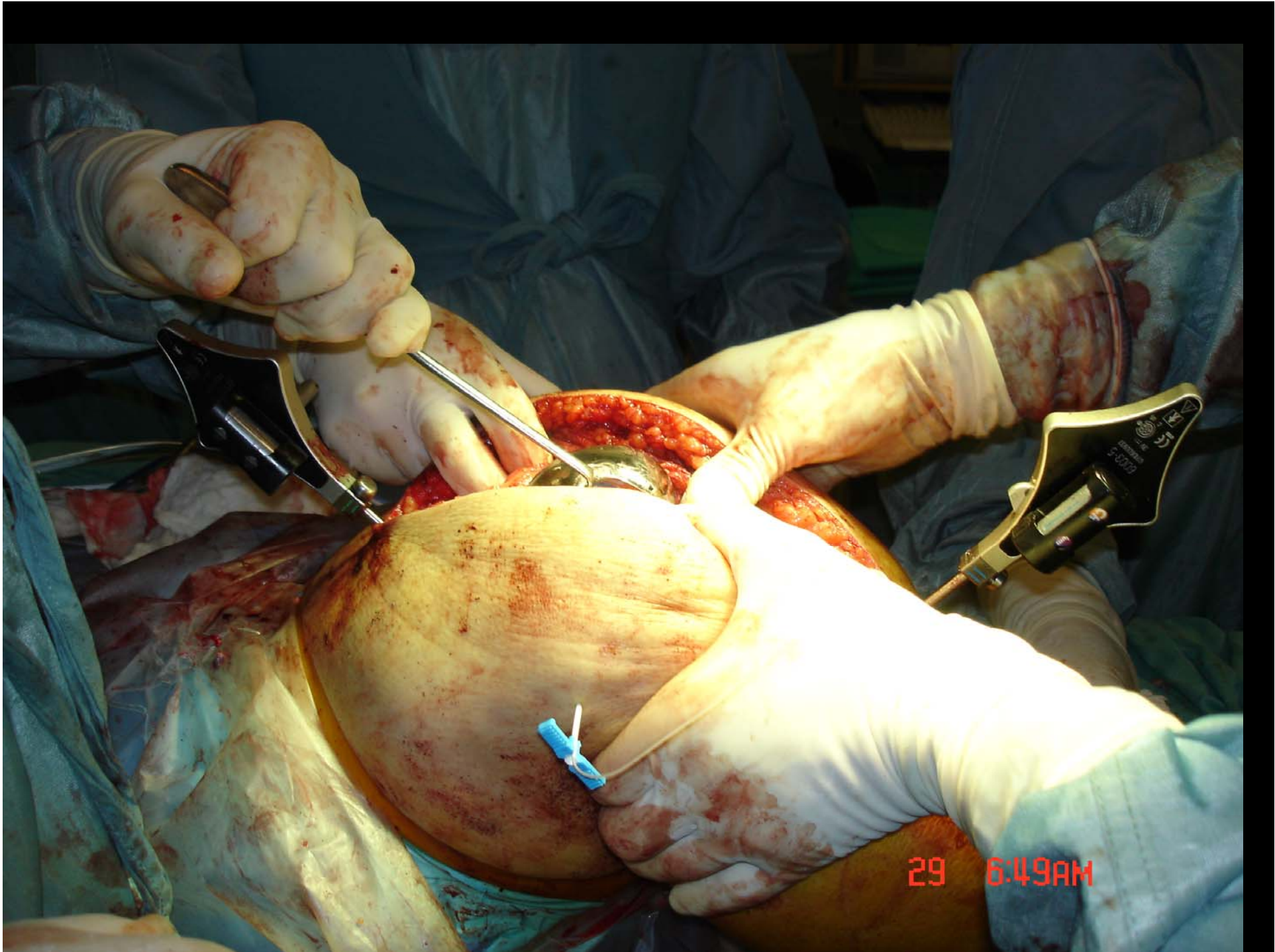
This is a Team Effort

- Preoperative education: Arthritis Society
- Quad strengthening, medical optimization
- Identify and Preselect patients: Relatively Healthy
- Multimodal analgesia starting preoperatively
- Early ambulation : 4 hours after surgery
- Faster progression with Physio/Occupational Therapy
- Early Discharge C/O CCAC

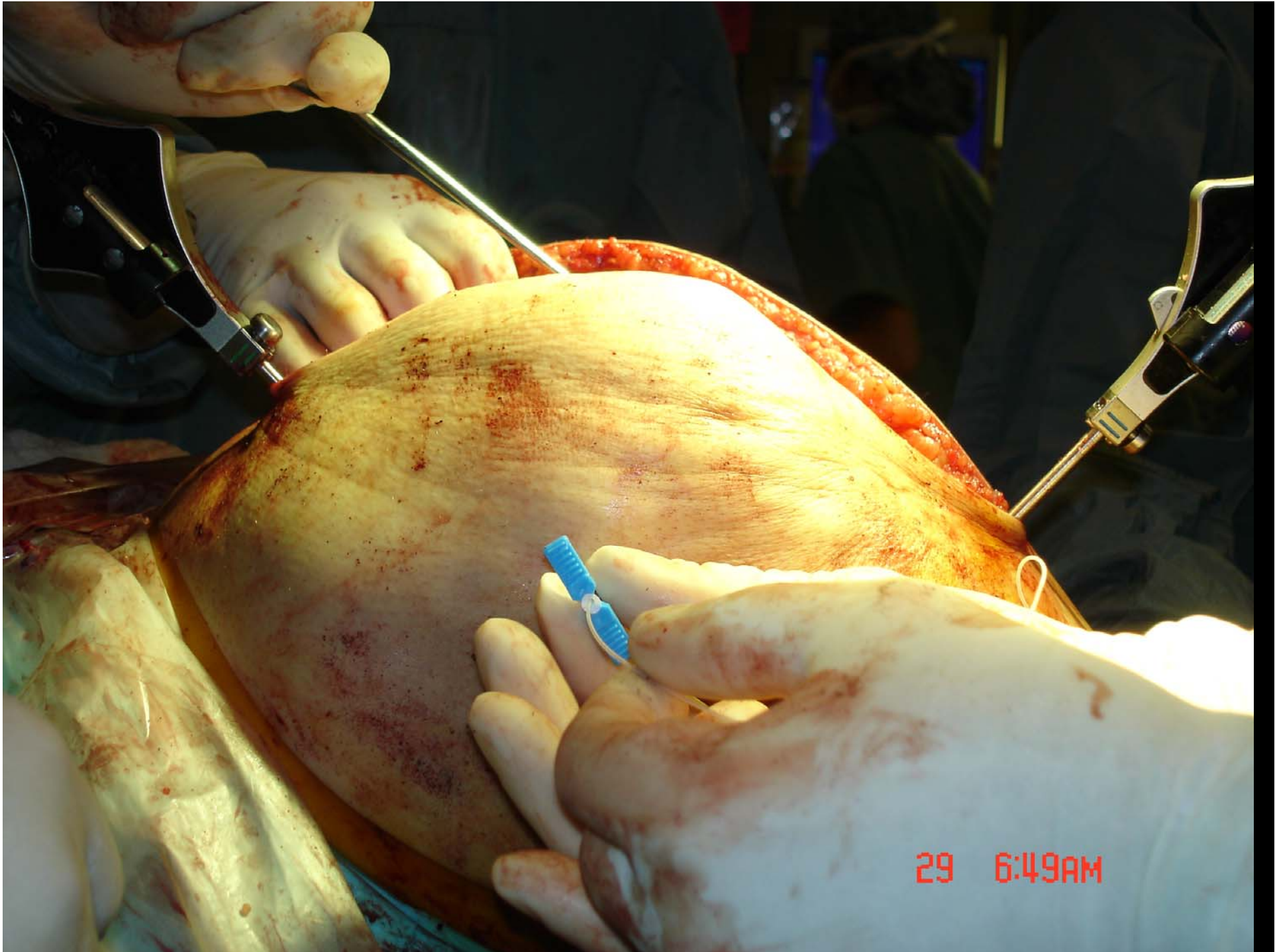
What is special about these catheters and Pumps?

- *Inserted by the surgeon in the OR not by anesthesia*
- Multiorificial in the distal 12.5cm
- Disposable Elastomeric Infusion Pump
- Fixed rate of infusion
- No hourly monitoring of sedation, pump data, RR etc
- Less urinary retention

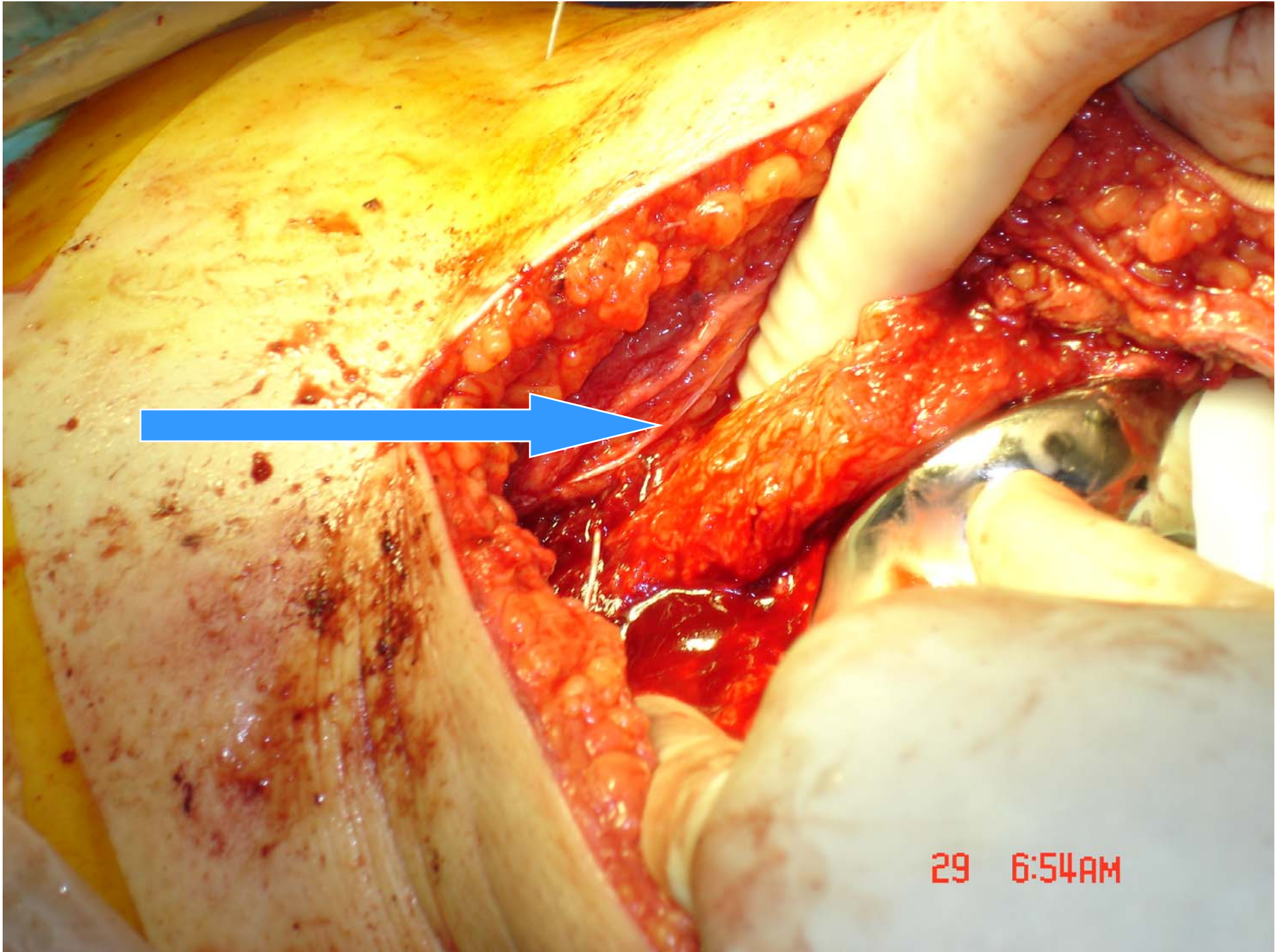




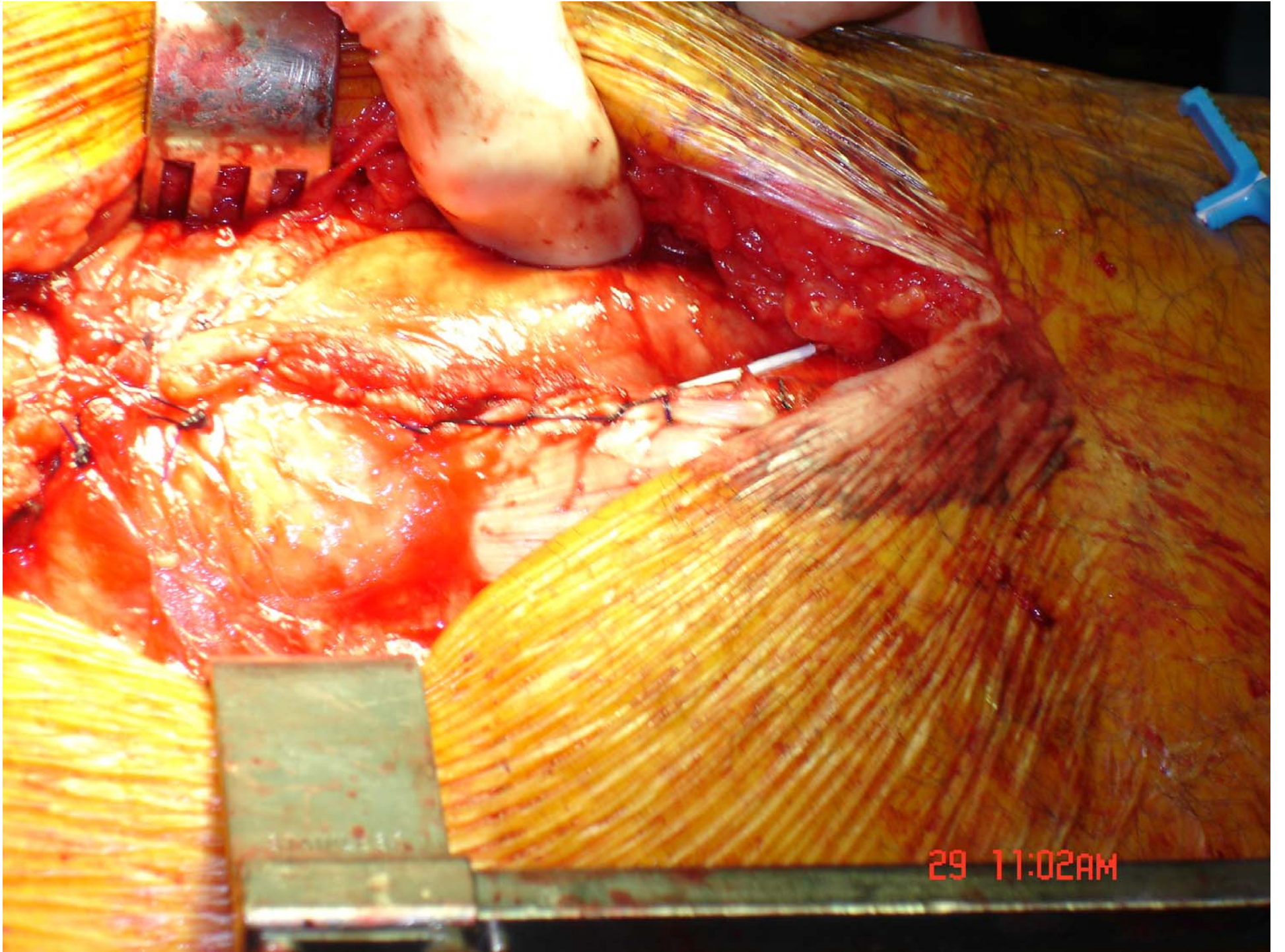
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Periarticular catheter insertion

- 3 for knees
 - Prepatellar pouch, subcutaneous anteriorly to 1 bulb (2ml/cath/hr)
 - Behind knee one bulb(2ml/cath/hour)
- 2 for hips
 - Subcapsular and subcutaneous to one bulb
 - 2ml/cath/h
- Dermabond at skin entry site
- Tegaderm with a loop of catheter under



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OPS-067-310

Advantages

- Almost eliminates opiates
- Less nausea
- NO MOTOR BLOCK
- Less pain at 30 days
- Less intensive monitoring
- Not an option for palliative arthroplasty
- ***Ensure contralateral limb has enough muscle to ambulate***



Preliminary data

- Recruited 44 so far for fast track (>100 screened)
- 18 THA and 26 TKJA
- All except 2 walked at 4 hours
- 36 successfully fast tracked and 8 failed (4 Knees and 4 Hips)
- 38/44 did stairs POD1
- LOS in hours 28.5+/-5.2 hours for successful FTA
- LOS in hours 78.4+/- 40 for failed FTA
- Satisfaction scores 3-10, median is 8 and mean is 7.6/10

Pain scores

VAS R POD1	2.1+/-1.2
VAS A POD1	2.3+/- 1.8
VAS R POD2	3.5 +/- 2.1
VAS A POD2	3 +/- 1.9
VAS R POD 3	2.2+/-1.6
VAS A POD 3	3+/-1.9
VAS A @1m	0,7+/- 1.7
VASA 3 m	0

Values are Mean +/- SD
Score of 10 the highest

Ropivacaine levels, percocet equivalents and Culture results

- PACU 536+/-430, POD 1: 1206+/- 520
- Percocet equivalent POD 1,2 and 3= 2.3+/- 0.9
- Day 7 = 1.5+/- 1
- Day 30 =0.5+/- 0.7
- 6/37 cath tip cultures positive with <15 CFU (??skin contaminants) NO INFECTIONS SO FAR
 - **(Similar to Colonization data femoral catheters)**
 - **Many caths removed without sterile technique and returned in unsterile fashion to lab**

Complications

- 1 heel blister : below knee sciatic numbness
- 1 pneumonia (failed FTA, elderly lady)
- 1 redness in skin entry site of catheter resolved in 24 hours
- One broken catheter during removal
- 3 catheter removals labeled as difficult
- 5 hypotension and fainting due to blood loss after LMWH (failed FTA)
- 2 Sciatic numbness resolved with holding posterior infusion

Failures

- 1 Elderly weak wife at home* (1st pt at LHSCUH)
- 1 Pneumonia* following GA
- 1 major acetabular surgery with BG, catheters fell out DOS, preop oxycontin 40mg bid*
- 5 Hypovolemia, Hypotension and fainting (2 THA, 2 TKJA)
- 1 excessive bleeding postop requiring transfusion TKJA
- 2 C/O severe pain (scores were 2-4 per nursing staff) TKJA, pt did not want to go
- 2 THA with severe nausea
 - * *inappropriate recruits*

Common Causes of Failure

- Hypotension and fainting
- Anemia due to bleeding
- Preop chronic narcotic use, poor pain control
- Lack of appropriate home support and fear
- Nausea
- “Lack of drug plan unwillingness to pay for drugs”



Way to painless Bliss

Thank you