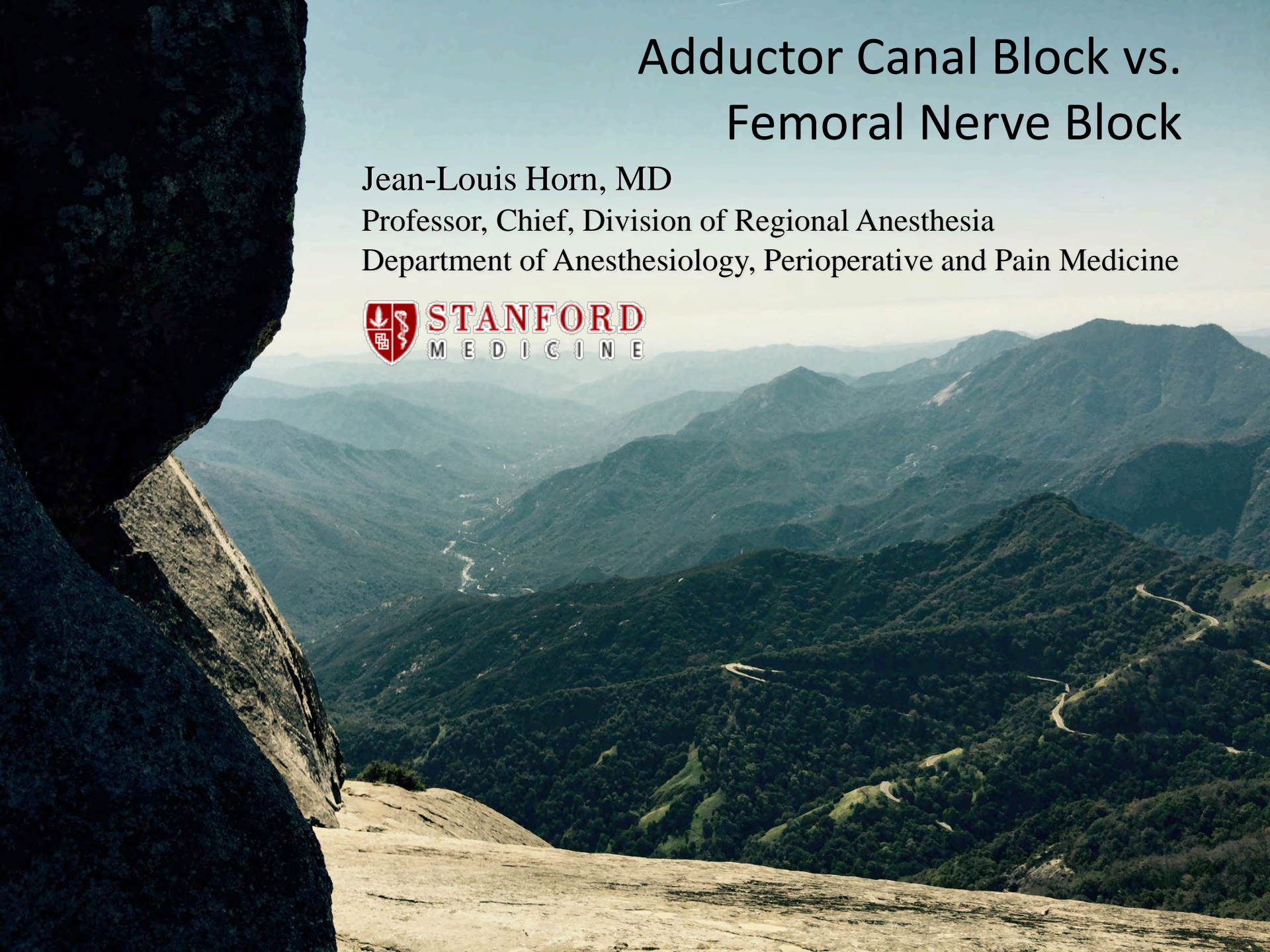


Adductor Canal Block vs. Femoral Nerve Block

Jean-Louis Horn, MD

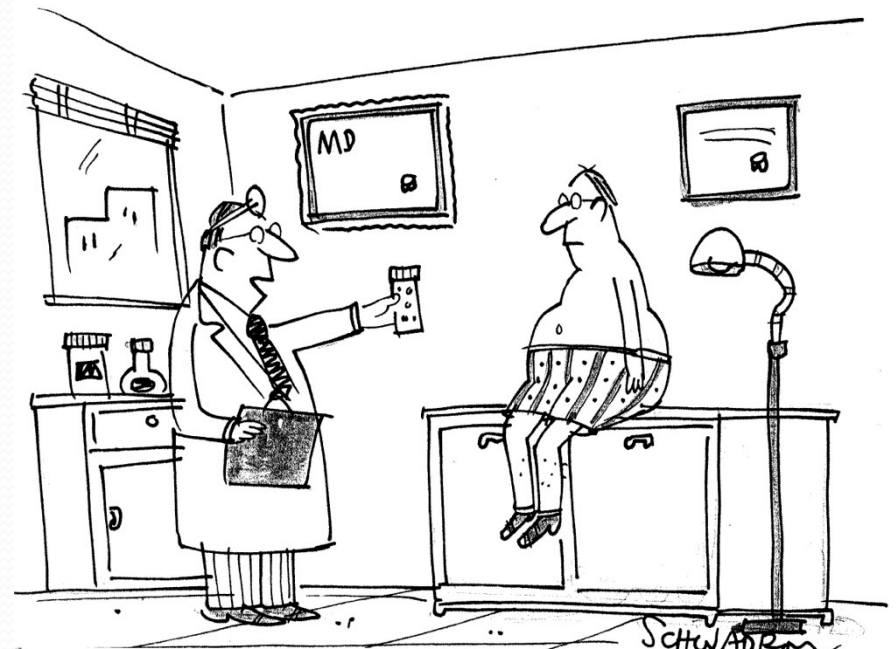
Professor, Chief, Division of Regional Anesthesia

Department of Anesthesiology, Perioperative and Pain Medicine



Disclosure

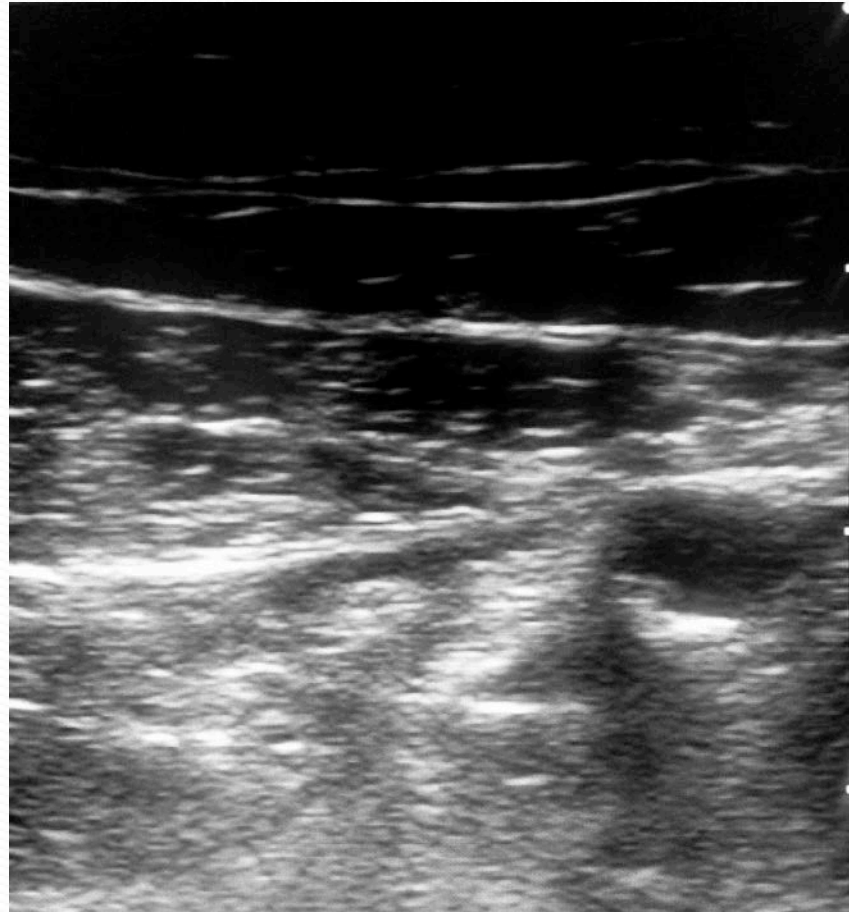
- Consultant for Teleflex Medical
- Consultant for Yalyard Health
- Consultant for Edan Medical
- Research support from Zyno Medical



"Under disclosure rules, I'm required to tell you I own stock in the company whose drug I'm prescribing."

Overview

- *Adductor Canal blocks: the rationale*
- Precautions
- Conclusions



First the Femoral Nerve block

- **Femoral nerve block** *was* the gold standard

Paul, J.E., Arya et.al (2010) Femoral nerve block improves analgesia outcomes after total knee arthroplasty: a meta-analysis of randomized controlled trials. *Anesthesiology*, 2010;113 (5), 1144-1162

Less pain at rest and during PT
Less analgesic drug
Better ROM
Shorter LOS,
Less nausea
Less sedation
Less pruritus
Higher satisfaction



Femoral Nerve Block for Total Knee Replacement –a Word of Caution – (Surgeon Perspective)

Case series of 5 patients with a combined spinal/FNB for TKA

- 4 Wound disruption
- 1 peri-prosthetic fracture

*Kandasami M et al.
Knee 2009, 16(2):98-100*



Major Complications Associated with Femoral nerve Catheters for Knee Arthroplasty – a Word of Caution (Surgeon Perspective)

Case study of 1190 patients with a continuous CFNB for TKA

- First 469 patients received a 2-3 days infusion
- The next 721 patients had their infusion stopped 12 hrs after surgery

- 9 Femoral nerve palsies
(2 in group 1 and 7 in group 2)
- 8 major falls,
no differences between groups

Feibel RJ et al.

J of Arthr. 2009,24(6):132-7

The Association Between Lower Extremity Continuous Peripheral Nerve Blocks and Patient Falls after Knee and Hip Arthroplasty

Pooled data from 3 previous randomized, placebo-controlled, blinded studies of CPNB after knee and hip surgery

- 0/86 fall in saline group
- 7 falls in 6 patients/85 in ropivacaine group
- Although only 1 patient is attributing the fall to weakness
- No patient sustained an injury

Ilfeld BM. et al. JBJS 2007;120(3);551-563



Inpatient Falls after Total Knee Arthroplasty: The Role of Anesthesia Type and Peripheral Nerve Blocks

Review 190,000 TKA.
1.6% had in-hospital fall

- Risks:
 - Advanced age
 - Male sex
 - Increased co-morbidity
 - Use of GA without neuraxial
- Non-factors
 - Neuraxial with/without GA
 - Peripheral nerve block use



Then in 2014 Anesthesiology

- Femoral nerve block
and concern for fall

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Anesthesia, Analgesia, and the Risk of Falling after Total Joint Replacement

Volunteer Study

- Jaeger et al – 2012, compared with contra-lateral placebo
 - Volunteer study
 - AC block produces quadriceps strength reduction of 8%
 - Femoral nerve block produces quadriceps strength reduction of 49%
 - Significant difference
 - No surgery or tourniquet effect

ACB vs Placebo

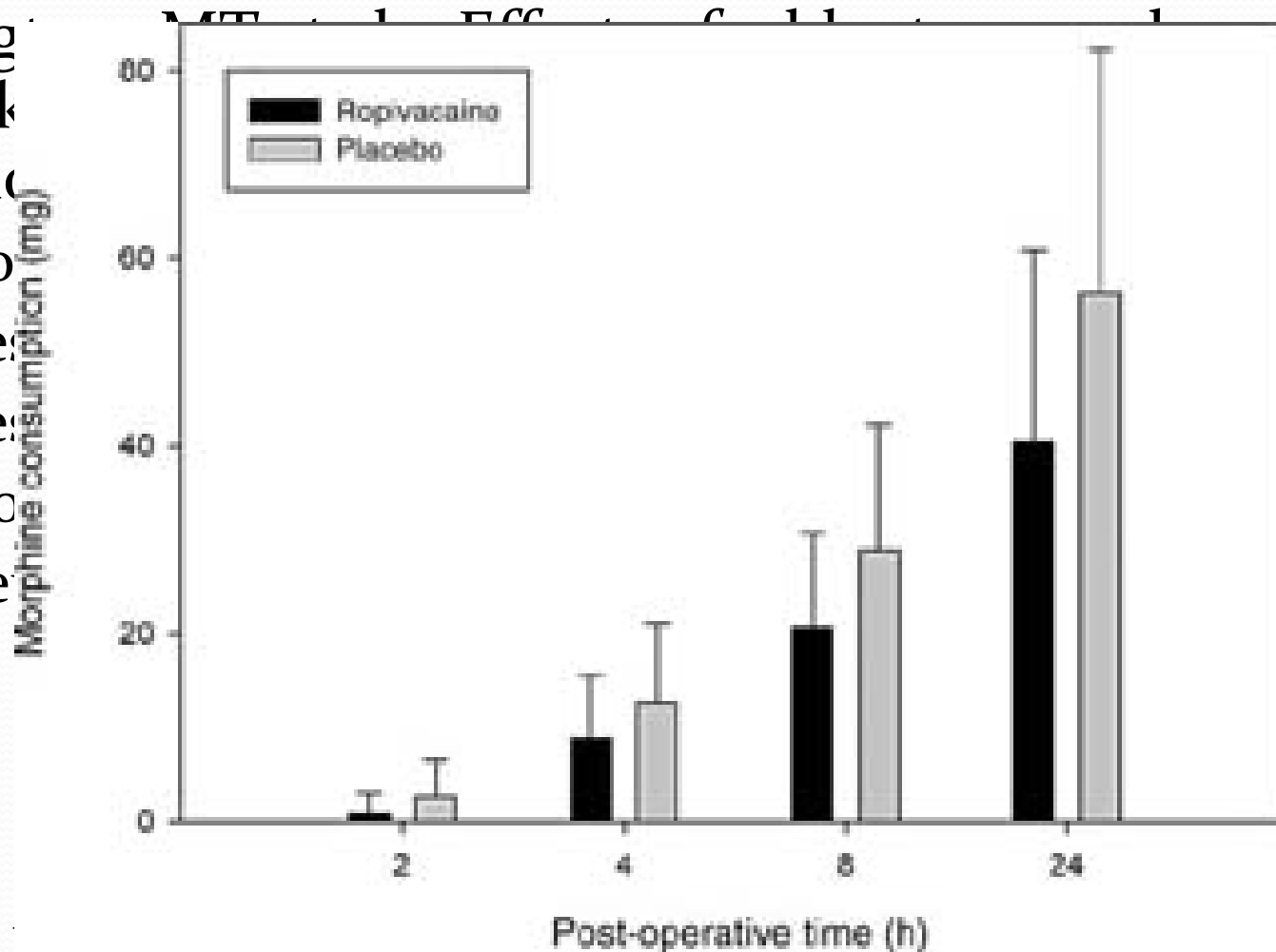
- Jensgtrup MT et al – Effects of adductor-canal-blockade on pain and ambulation after TKA: a randomized study
 - Ropi vs. placebo
 - Less opioid
 - Less pain during flexion
 - No diff for pain at rest
 - Better rehab

- Acta Anaesth Scan 2012;56(3):357-64

ACB vs Placebo

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block
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- No
- Be



- Acta

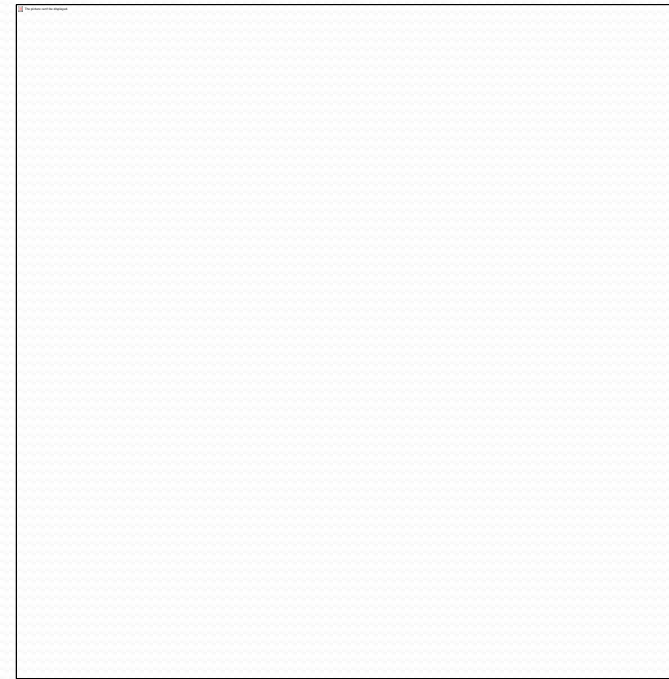
Continuous Ultrasound-Guided Adductor Canal Block for Total Knee Arthroplasty: A Randomized, Double-Blind Trial

Hanson, Neil A. MD^{*}; Allen, Cindy Jo RN^{*}; Hostetter, Lucy S. MD[†]; Nagy, Ryan MD^{*}; Derby, Ryan E. MD, MPH^{*}; Slee, April E. MS[‡]; Arslan, Alex BS[‡]; Auyong, David B. MD^{*}

FREE

The Effects of Ultrasound-Guided Adductor Canal Block Versus Femoral Nerve Block on Quadriceps Strength and Fall Risk

- Femoral nerve block reduces the quadriceps strength more than AC block 91% vs 11%, no difference in adductor strength
- Balance scores reduced from 56 to 37 with FNB. No reduction with ACB
- Kwofie et al RAPM 2013;38(4),321-5



AC vs Fem

- Jaeger P et al – Adductor Canal Block versus Femoral Nerve Block for Analgesia after TKA: a Randomized, Double-blind Study
 - Spinal anesthesia (n=48)
 - Continuous AC vs Fem catheter
 - 30 ml ropi 0.5% initial dose
 - 8ml/hr ropi 0.2%
 - Strength from baseline 52% vs. 18%
 - No difference for pain or opioid for the first 24 hrs
- RAPM 2013;38(6),526-32

AC vs Fem

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- RAPM 2013;38(6),526-32

Adductor Canal Block *versus* Femoral Nerve Block for Total Knee Arthroplasty: A Prospective, Randomized, Controlled Trial

- Kim DH et al – Adductor Canal Block versus Femoral Nerve Block for TKA
 - CSE anesthesia (n=93)
 - Single injection Fem vs AC (randomized, DB)
 - 30 ml bupivacaine 0.25% for Fem and 15 ml for AC
 - At 6-8hrs: Fem vs. AC
 - strength: significant decrease
 - pain or opioids: no difference
 - At 24-48hrs: no more strength difference
- Anesthesiology 2014;120,540-50

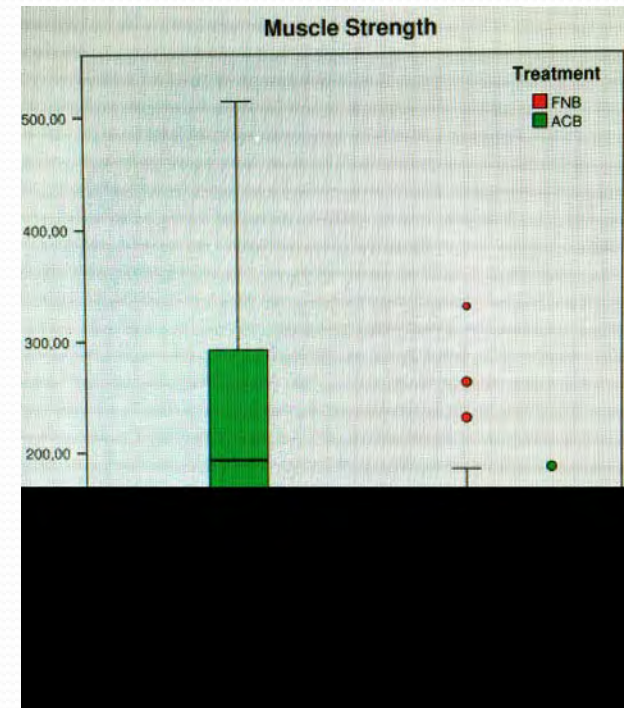
Effect of Adductor Canal Block Versus Femoral Nerve Block on Quadriceps Strength, Mobilization, and Pain After Total Knee Arthroplasty A Randomized, Blinded Study

Ulrik Grevstad, MD, et al.

50 TKA pt with severe movement-related pain
DB RDMZ 0.2% ropi ACC vs fem

- 1 strength
- 2 ambu
- 3 pain

Adductor canal block provides a clinically relevant and statistically significant increase in quadriceps muscle strength for patients in severe pain after TKA



Adductor canal block for knee surgical procedures: review article ☆, ☆ ☆, ☆

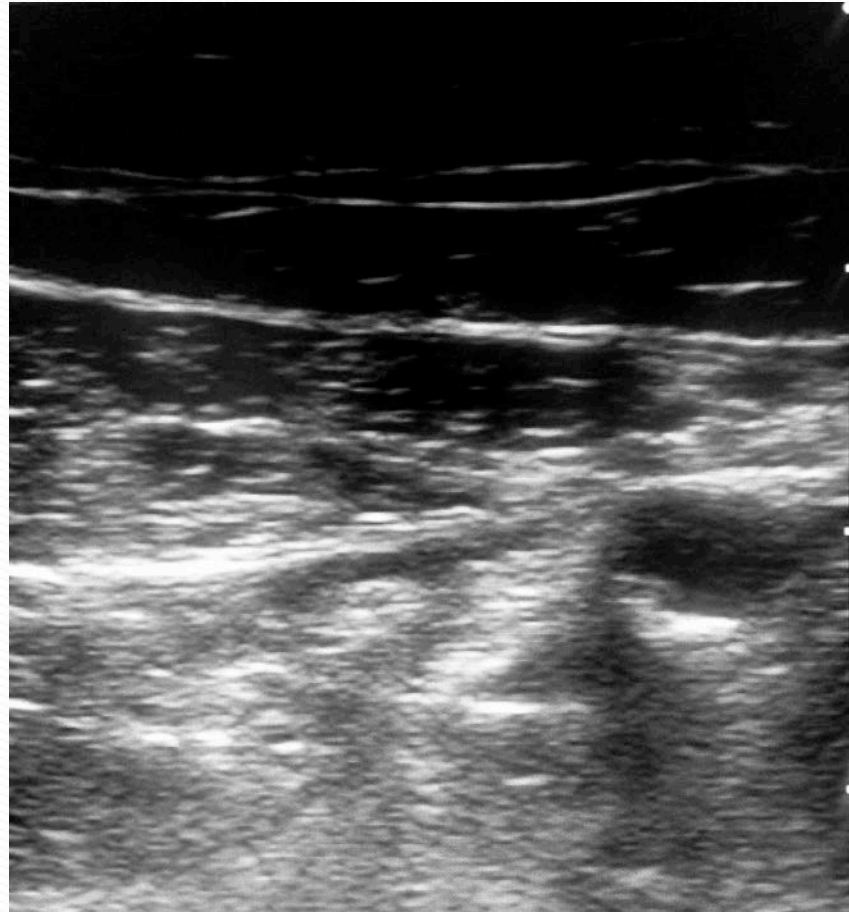
Maulin U. Vora MBBS (Resident)^{a,*}, Thomas A. Nicholas MD
Cale A. Kassel MD (Instructor)^a, Stuart A. Grant MB, CHB (Professor)^b

Table 2 Meta-analysis comparing ACB vs FNB in TKA

Study outcome	Dong et al [47]	Hussain et al ^b [48]	Kuang et al [46]	Li et al [49]
VAS at rest 0-8 h	No difference MD = 5.22 95% CI = -0.93, 11.37	No difference MD = -0.07 95% CI = -2.59, 2.45	No difference MD = -0.03, 95% CI = -0.18, 0.12	ACB better MD = -0.17 95% CI = -0.27 to -0.07
VAS at rest 24 h	No difference MD = 1.34 95% CI -2.35, 5.04	No difference MD = -0.04 95% CI = -0.73, 0.65	<u>ACB better</u> MD = -0.39 95% CI = -0.5, -0.27	<u>ACB better</u> MD = -0.41 95% CI = -0.53, -0.29
VAS at rest 48 h	No difference MD = -0.62 95% CI = -1.50, 0.25	No difference MD = -0.06 95% CI = -0.33, 0.21	No difference MD = -0.06 95% CI = -0.15, 0.03	No difference MD = -0.06 95% CI = -0.15, 0.03
VAS with activity 0-8 h	No difference MD = 3.68 95% CI = -2.88, 10.24	NA	No difference MD = 0.07 95% CI = -0.14, 0.27	No difference MD = 0.00 95% CI = -0.09, 0.09
VAS with activity 24 h	No difference MD = -0.66 95% CI = -1.67, 0.35	NA	No difference MD = 0.02 95% CI = -0.14, 0.17	No difference MD = 0.04 95% CI = -0.11, 0.20
VAS with activity 48 h	No difference MD = -0.85 95% CI = -1.95, 0.23	NA	No difference MD = -0.08 95% CI = -0.18, 0.03	No difference MD = -0.08 95% CI = -0.18 to 0.03
Opioid consumption	No difference MD = -1.1 95% CI = -5.13, 7.50	NA	No difference 48 h MD = -1.90 95% CI = -10.42, 6.62	<u>No difference</u> MD = -1.42 95% CI = - 8.41, 5.58
Quadriceps strength ^a	No difference MD = 96.27 95% CI = -42.69, 235.24	NA	NA	<u>ACB better</u> (<60 y) MD = 37.46 95% CI = 12.27, 62.24 (>60 y) MD = 32.63 95% CI = 6.72, 58.99
Adductor strength ^a	No difference MD = 17.82 95% CI = -6.46, 42.09	NA	NA	<u>No difference</u> (<60 y) MD = 1.51 95% CI = -0.12, 3.15 (>60 y) MD = -4.87 95% CI = -16.13, 6.38
TUG test	NA	NA	ACB better MD = -0.40 95% CI = -0.73, -0.08	ACB better (<60 y) MD = -5.1 95% CI = -6.65, -3.35

Overview

- Adductor Canal blocks: the rationale
- *Precautions*
- Conclusions



Delayed Motor Block

- AC block can easily spread proximal to affect motor branches of the femoral nerve

Veal, C., et al., *Delayed quadriceps weakness after continuous adductor canal block for total knee arthroplasty: a case report.* Acta Anaesthesiol Scand, 2013.

Day of surgery: ambulation without assistance
20 hr after an 8ml/hr ropi 0.2% produced profound quad weakness
2 ml dye spread to the fem nerve

Immediate Motor Block

- AC block can easily spread proximal to affect motor branches of the femoral nerve

Chen J., L.J.B., Hadzic A., Reiss W., Resta-Flarer F., *Adductor canal block can result in motor block of the quadriceps muscle.* Regional Anesthesia and Pain Medicine, 2014. **39**(2): p. 170-171.

Rescue single injection AC with 20 ml of ropi 0.5%
Motor block last for 20 hrs and the sensory for 48 hrs

Impairment of Sciatic Nerve Function During Adductor Canal Block

AC block can spread distal to affect motor branches of the sciatic nerve

Gautier P et al.
RAPM 2015 40(1);85-6

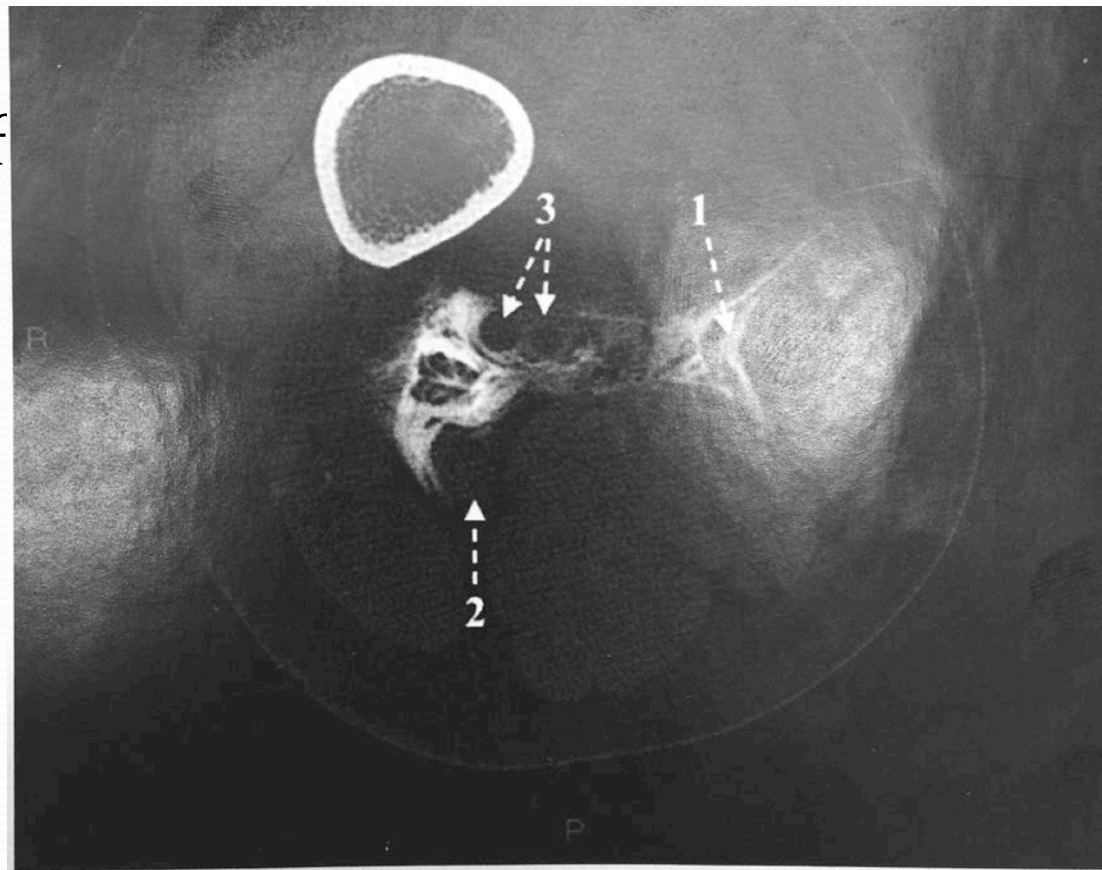


FIGURE 1. Computed tomography scan cross-sectional view of the lower limb. Shown is subsartorial spread of contrast (1), sciatic nerve (2), and popliteal vessels (3).

Conclusions

FALL RISK

- ACB vs FNB with post knee injection
 - Less motor blockade with better rehab condition
 - Similar analgesia after major knee surgery
- Possible delayed quadriceps weakness
- Add multimodal analgesia
- Potential problems:
 - Femoral artery injury?
 - Saphenous neuropathy?
- No block asleep or under spinal !!!



Thank you

