Post Total Knee Arthroplasty Analgesia Controversies

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Predicting dissatisfaction following total knee replacement

A PROSPECTIVE STUDY OF 1217 PATIENTS

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J Bone Joint Surg Br September 2010 vol. 92-B no. 9 1253-1258

Patient expectations were highly correlated with satisfaction. Satisfaction following TKR is multifactorial. Managing the expectations and mental health of the patients may reduce dissatisfaction. However, the most significant predictor of dissatisfaction is a painful total knee replacement.
Zero controversy:
systemic opioids vs regional techniques
Controversy no. 1:
Epidural analgesia -
Gold standard?
Central Neuraxial Block

- Epidural
  - ?? gold standard for pain relief
The number of indications for the use of epidural analgesia seems to be decreasing for a variety of reasons. The decision about whether to continue using epidural techniques should be guided by regular institutional audits and careful risk-benefit assessment rather than by tradition. For routine postoperative analgesia, epidural analgesia may no longer be considered the gold standard.
Why move away from Epidural analgesia?

• Enhanced recovery after surgery (ERAS)
• Side effects of Epidural -
  • hypotension
  • urinary retention
  • opioid related -
    • PONV
    • pruritus
• non-operated limb numbness
• epidural hematoma
One step away from neuraxis

• Femoral nerve block
• PNB with a FNB provides postoperative analgesia, which is comparable to epidural technique but with an improved side-effect profile and is less likely to cause a severe neuraxial complication.
Controversy no. 2: Peripheral NB & early mobilisation
Enhanced Recovery post TKR:

Analgesia

Least systemic side effects

nausea, vomiting, itching, urine retention, sedation

Motor sparing = early mobilisation
Postoperative fall after the use of the 3-in-1 femoral nerve block for knee surgery: a report of four cases.
Atkinson HD, Hamid I, Gupte CM, Russell RC, Handy JM.

Reducing Costly Falls of Total Knee Replacement Patients
Quanjun Cui, Laura H. Schapiro, Matthew C. Kinney, Peter Simon, Andrew Poole, Wendy M. Novicoff
Quadriceps femoris

Rectus femoris
Vastus intermedius
Vastus lateralis
Vastus medialis

N supply - Femoral N
Nerve supply to knee

- Saphenous
- Obturator - posterior div
- N to V medialis
- Tibial
- Common peroneal
- N to V lateralis
- N to V intermedius
Adductor canal

middle third of thigh

roof - sartorius
lateral - v medialis
medial - add longus

contents -
N to V medialis
Saphenous N
Post div of Obturator
Superf femoral A & V
Sono-anatomy

Adductor longus

Adductor canal

Medial

Sartorius

Vastus medialis

Lateral
Evidence:

The Effects of Ultrasound-Guided Adductor Canal Block Versus Femoral Nerve Block on Quadriceps Strength and Fall Risk
A Blinded, Randomized Trial of Volunteers

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Daquan Xu, MB, MPH,‡ and Emine A. Salviz, MD‡


Results: Quadriceps strength and balance scores were similar to baseline following ACB. Following FNB, there was a significant reduction in quadriceps strength (95.1% ± 17.1% vs 11.1% ± 14.0%; P < 0.0001) and balance scores (56 ± 0 vs 37 ± 17.2; P = 0.02) compared with baseline. There was no difference in hip adductor strength (97.0% ± 10.8% vs 91.8% ± 9.6%; P = 0.17).

Conclusions: Compared with FNB, ACB results in significant quadriceps motor sparing and significantly preserved balance.
Evidence:

Continuous Adductor Canal Blocks Are Superior to Continuous Femoral Nerve Blocks in Promoting Early Ambulation After TKA

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Controversy no. 3:
Is saphenous nerve block an indirect approach to femoral nerve block?
Controversy no. 4: sciatic nerve block vs tibial nerve block
Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study
Sanjay K. Sinha, MB, BS,* Jonathan H. Abrams, MD,* Sivasenthil Arumugam, MB, BS,* John D’Alessio, MD,* David G. Freitas, MD,* John T. Barnett, MD,* and Robert S. Weller, MD†

CONCLUSIONS: Tibial nerve block performed in the popliteal fossa in close proximity to the popliteal crease
1. avoided complete peroneal motor block and
2. provided similar postoperative analgesia compared to sciatic nerve block when combined with femoral nerve block for patients undergoing total knee arthroplasty.
Controversy no. 4: Role of LIA?
HVLIA

• a systematic infiltration of a mixture of ropivacaine, ketorolac and adrenaline into the tissues around the surgical field

• simple?

• safe?

• effective?
Simple?

• Simple:
  • Anybody can do it -
    ✫ even the orthopaedic surgeons!
Safe?

Continuous intra-articular infusion of ropivacaine after unilateral total knee arthroplasty

M Reeves, MW Skinner
Anaesthesia and Intensive care, 2009, Volume 37, Issue 6

Intra-articular infusion of local anaesthetic after joint arthroplasty is attractive in that it is simple and will not cause motor block. 66 patients for U/L TKR under GA with Femoral + Sciatic blocks. All patients had an intra-articular Painbuster™ device sited at the end of the procedure. The catheters were infused continuously for 48 hours and then removed. There were two cases of infection, both in the treatment groups.

No positive benefit of intra-articular infusion of local anaesthetic after total knee arthroplasty could be identified. On the contrary there may be negative effects in terms of expense, pain and possibly infection risks.
A Prospective, Randomized, Blinded Study of Continuous Ropivacaine Infusion in the Median Sternotomy Incision Following Cardiac Surgery

Agarwal, Shvetank; Nuttall, Gregory A.; Johnson, Michael E.

Regional Anesthesia and Pain Medicine March/April 2013 - Volume 38 - Issue 2

The data safety monitoring board stopped the study after enrolling 85 patients because of excessive sternal wound infections (9%, n = 44) in the ropivacaine group.
Effective?

High-volume infiltration analgesia in total knee arthroplasty: a randomized, double-blind, placebo-controlled trial.

Effective for 6 - 12 h
High volume local infiltration analgesia compared to peripheral nerve block for hip and knee arthroplasty—what is the evidence?

SJ Fowler, N Christelis
Anaesthesia and Intensive Care, Volume 41, Issue 4 July 2013, p 458-462

Summary:

1. Despite the popularity of HVLIA, supporting evidence for its use is currently limited.

2. HVLIA certainly provides postoperative analgesia, but it is not clear whether it is equivalent to contemporary peripheral nerve block techniques in terms of either analgesia or early or later functional outcome.

3. Nor is it possible to state whether HVLIA provides benefits in terms of persistent postsurgical pain or cost and process efficiency.
Better alternative:

Continuous Saphenous Nerve Block as Supplement to Single-Dose Local Infiltration Analgesia for Postoperative Pain Management After Total Knee Arthroplasty
Henning Lykke Andersen, Jens Gyrn, Lars Møller, Bodil Christensen and Dusanka Zaric
Reg Anesth Pain Med 2013;38: 106-111

40 subjects for TKR
SAB and intraoperative single dose LIA
Adductor canal catheter with 15ml 0.75% Ropivacaine or Saline q12H

Pain at rest and during movement
Ability to ambulate on day 1
Quality of sleep on first night
Breakthrough pain

Conclusions: The combination of a saphenous nerve block with single dose LIA offered better pain relief on the day of surgery than LIA alone.
Controversy no. 5: Liposomal Bupivacaine - where does it fit?
Bupivacaine encapsulated in multivesicular liposomes - slow release preparation

FDA approved for local infiltration only

Extended duration - more than 2X

Concerns:

- toxicity
- prolonged motor block
- inadvertent sensory block (popliteal instead of tibial)
- can’t top-up in case of inadequate block
Controversy no. 6: Role of pre-operative education?
Does pre-operative education improve post TKR outcome with respect to pain, etc.?

Factors:

method - consent / info booklet / interactive AV

depressed / anxious patients

patients with unrealistic expectation