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Combined Single-Shot Infiltration Between the Popliteal Artery and Capsule of the Knee and Adductor Canal Block with Bupivacaine, Dexmedetomidine, and Dexamethasone for Total Knee Arthroplasty: A Propensity-Matched Analysis

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Disclosures/ Conflict of Interest:

DF: Equity in ROMTech

Support received from DePuy and Conformis

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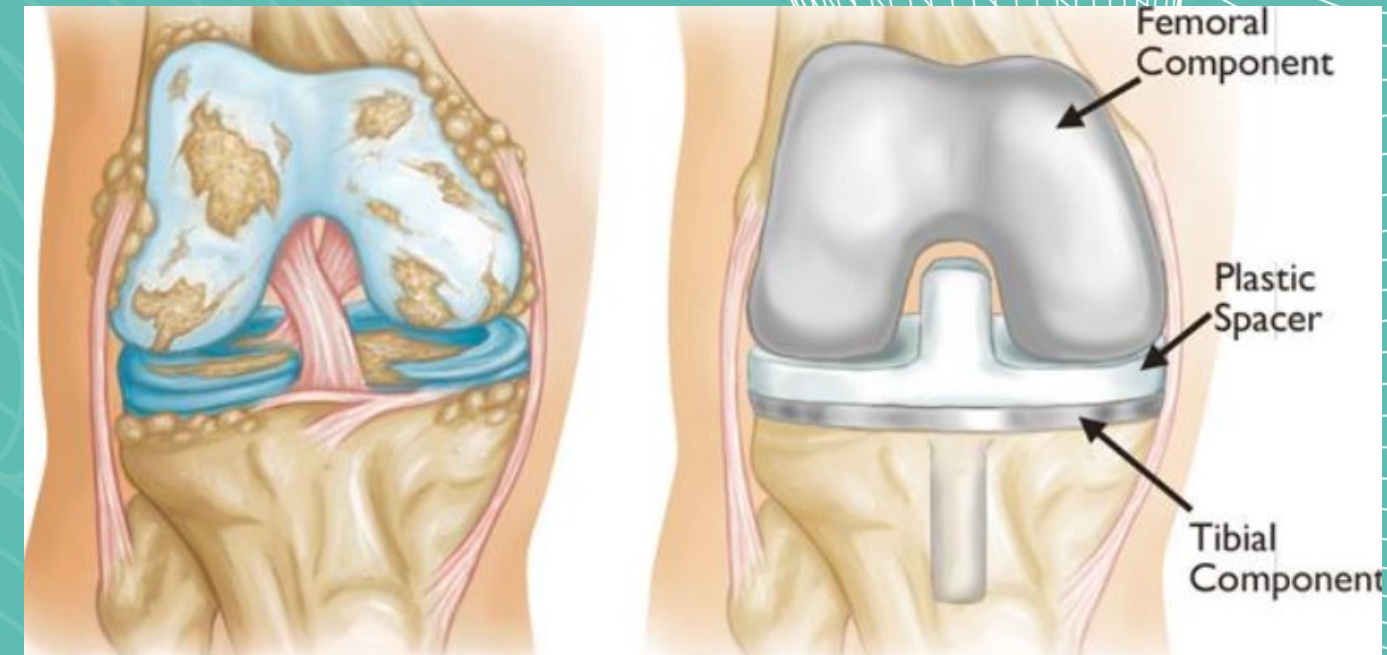
Adult Reconstruction Knee Program Committee

AS, SS: No financial conflicts to disclose



Background: Total Knee Arthroplasty

- Total Knee Arthroplasties (TKA) are commonly performed and may be associated with significant postop pain
- Postoperative pain may prevent
 - early mobilization
 - increase postoperative narcotic intake
 - Increase length of stay



Horan JRH, Fischer SJ. Total Knee Replacement - OrthoInfo - AAOS. Aaos.org. Published 2011. <https://orthoinfo.aaos.org/en/treatment/total-knee-replacement/>



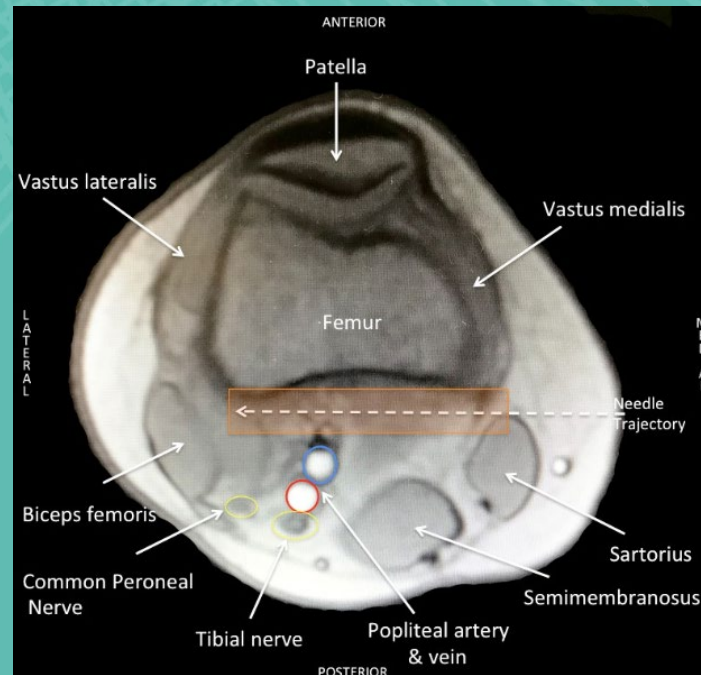
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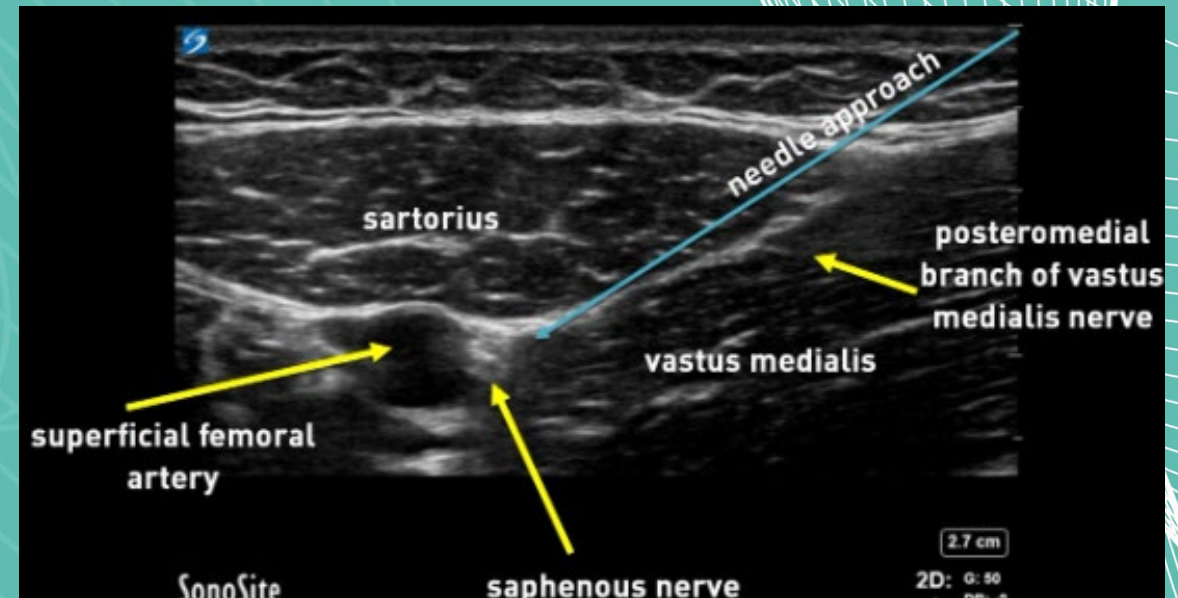
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Background: Anesthesia Modality for Knee Arthroplasties

- Infiltration between popliteal artery and capsule of the knee (**IPACK**)
 - Analgesia for posterior knee
 - Limited to no associated muscle weakness
- Adductor Canal Block (**ACB**)
 - Analgesia for anterior knee
 - Limited to no associated muscle weakness



Sinha S. How I Do It: Infiltration Between Popliteal Artery and Capsule of Knee (iPACK). May 3, 2020. <https://www.asra.com/news-publications/asra-newsletter/newsletter-item/asra-news/2020/05/03/how-i-do-it-infiltration-between-popliteal-artery-and-capsule-of-knee-%28ipack%29>



Shilling AM, DeMarco, P. How I Do It: Saphenous Nerve Block. May 1, 2020. <https://www.asra.com/news-publications/asra-newsletter/newsletter-item/asra-news/2020/05/02/how-i-do-it-saphenous-nerve-block2>



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Background: Dexmedetomidine and Dexamethasone (dex-dex)

- Dexmedetomidine (Precedex): sympatholytic
- Dexamethasone: glucocorticoid
- Dex-dex may prolong duration of regional anesthetic



Cochrane Database of Systematic Reviews

Dexamethasone as an adjuvant to peripheral nerve block (Review)

Pehora C, Pearson AME, Kaushal A, Crawford MW, Johnston B



Dexamethasone with bupivacaine increases duration of analgesia in ultrasound-guided interscalene brachial plexus blockade

Peter A. Vieira, Istvan Pulai, George C. Tsao, Poornachandran Manikantan, Brunella Keller and Neil Roy Connelly



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Purpose/ Question

- Does the addition of IPACK to single-shot ACB, dexmedetomidine, and dexamethasone have better outcomes than ACB alone for patients undergoing unilateral TKA?



Methods

- Retrospective, propensity-matched study
 - Cohort #1, ACB: single-shot bupivacaine 0.25%
 - Cohort #2, IPACK + ACB + dex-dex: single-shot bupivacaine 0.25%, dexmedetomidine, dexamethasone 4mg
- Primary unilateral TKA
- January 2015 – February 2020
- Outcomes measured
 - Opioid consumption, Visual Analog Scale (VAS) pain score, ambulation distance
 - ED returns, hospital readmissions within 30 days of discharge



Results

Table 1. Visual Analog Scale and Morphine Milligram Equivalents by Anesthesia Method

| Characteristic | ACB alone (n=64) | | IPACK + ACB (n=64) | | P value |
|---------------------------------|---------------------|---------|-----------------------|---------|---------|
| | Mean | SD | Mean | SD | |
| MME (0-8 hours postop) | 54.17 | -46.29 | 23.68 | -23.63 | <0.001 |
| MME (8-16 hours postop) | 20.81 | -17.11 | 15.27 | -36.22 | 0.27 |
| MME (16-24 hours postop) | 25.83 | -26.03 | 14.25 | -15.99 | 0.003 |
| MME (24-48 hours postop) | 59.69 | -72.65 | 36.01 | -55.27 | 0.04 |
| MME (sum of 0-24 hours postop) | 100.81 | -70.94 | 53.2 | -58.19 | <0.001 |
| MME (sum of entire stay postop) | 268.77 | -215.25 | 160.11 | -164.05 | 0.002 |
| VAS (0-8 hours postop) | 5.51 | -2.36 | 4.34 | -2.2 | 0.005 |
| VAS (8-16 hours postop) | 5.69 | -2.4 | 4.62 | -2.12 | 0.009 |
| VAS (16-24 hours postop) | 5.35 | -1.89 | 5.05 | -1.71 | 0.362 |
| VAS (24-48 hours postop) | 5.38 | -1.64 | 5.26 | -1.51 | 0.734 |

ACB, adductor canal block; IPACK, infiltration between popliteal artery and capsule of the knee; MME, Morphine Milligram Equivalents; VAS, Visual Analog Scale.

Figure 1: Mean Morphine Milligram Equivalents (MME) during Postoperative Stay

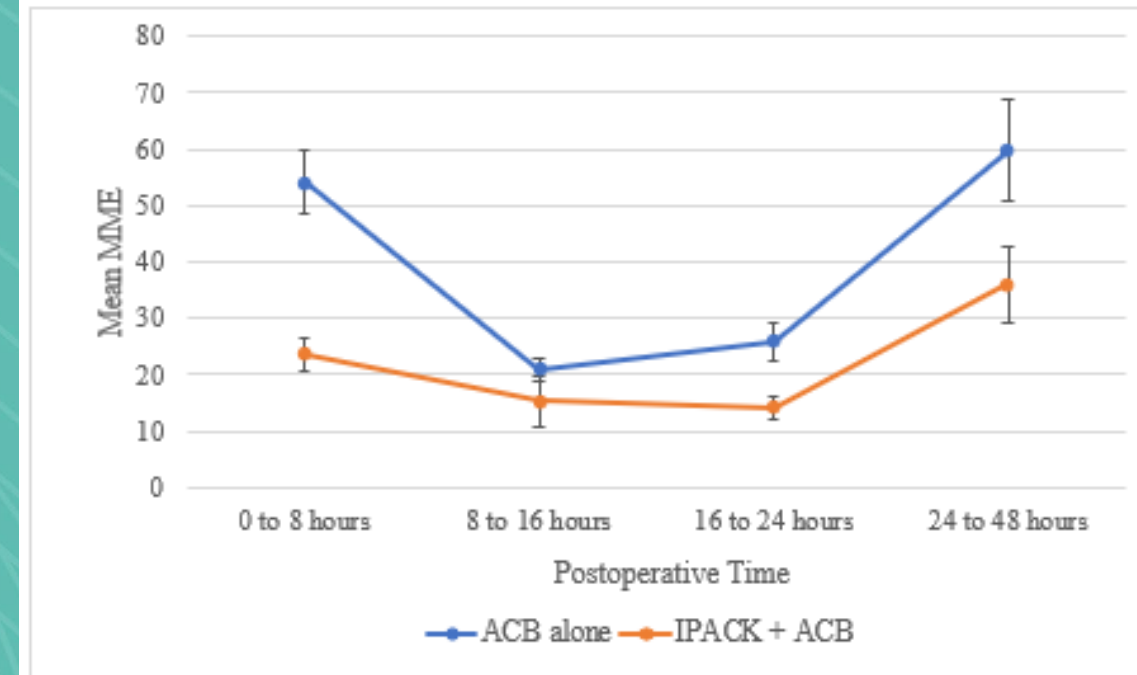
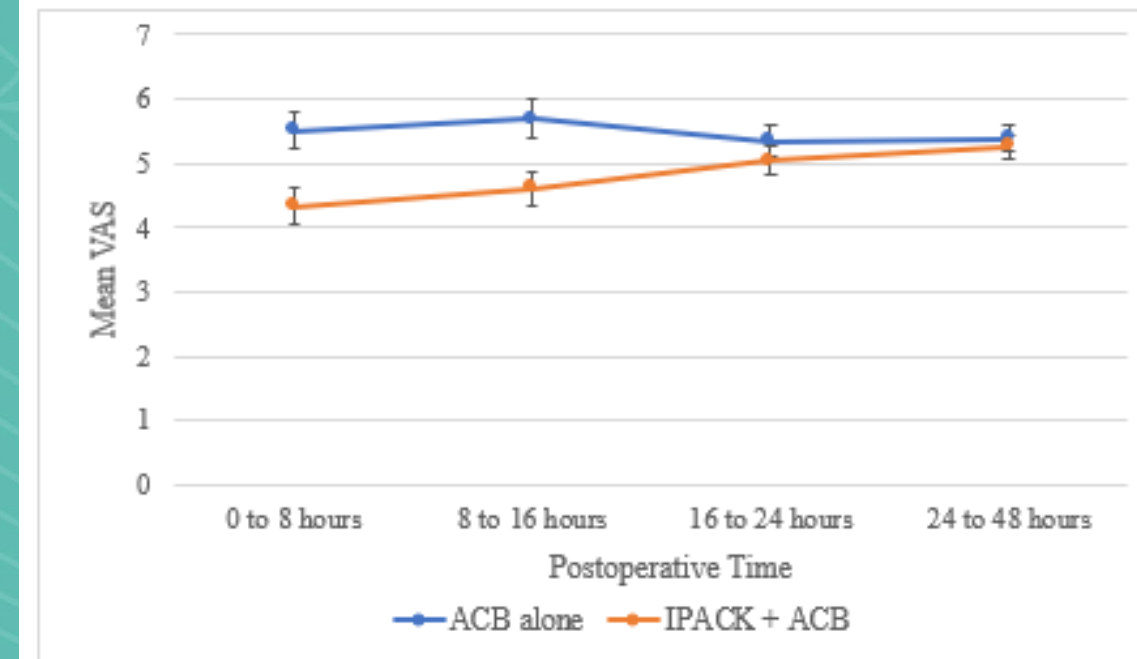


Figure 2: Mean Visual Analog Scale (VAS) during Postoperative Stay



Results

- No statistically significant differences between IPACK+ACB+dex-dex vs ACB cohorts in
 - preop characteristics (age, ASA, use of opioid within 3 months before surgery)
 - anesthesia-related or surgical complications
 - length of hospital stay, returns to Emergency Department, hospital readmission, or ambulation distance



Conclusion

- Combined single-shot IPACK+ACB+dex-dex associated with
 - lower total narcotic intake
 - lower mean VAS scores during immediate postop period



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