Essving P, Axelsson K, et al. Local infiltration analgesia versus intrathecal morphine for postoperative pain management after total knee arthroplasty: a randomized controlled trial. Anesth Analg. 2011 Oct;113(4):926-33.

Design: randomized clinical trial

Study question: In patients undergoing TKA, are there differences in postoperative pain relief between intrathecal morphine and local infiltration analgesia?

Population/sample size/setting:

- 50 patients (31 women, 19 men, mean age 71) undergoing TKA for knee osteoarthritis at a university orthopedic surgery department in Sweden
- Inclusion criteria were age 40 to 85 and American Society of Anesthesiologists (ASA) category I to III (excludes patients with poorly controlled severe disease imposing an immediate threat to life but includes severe disease which is controlled well enough to not pose an immediate threat to life)
- Exclusion criteria were allergy to study drugs, severe liver, heart, or renal disease, inflammatory joint disease, chronic pain requiring opioid treatment, bleeding disorder, and any contraindication to spinal anesthesia

Interventions:

- All patients had identical preoperative medication and all operations were done under spinal anesthesia using a 27 gauge needle at either L3-4 or at L2-3, and all patients had intrathecal bupivacaine 17.5 mg
- Computer-generated random numbers assigned patients to either morphine (M, n=25) or local infiltration (L, n=25) during the operation; the surgeon was not blinded, but played no role in the evaluation of postoperative outcomes, and all other persons assessing outcomes (patients and hospital staff) were blinded
    - Group M received 0.1 mg morphine (0.25 ml) and group L received an equal volume of saline
        - Group L received 300 mg ropivacaine, 30 mg ketorolac, and 0.5 mg epinephrine (total volume 116 ml) into the soft tissues periarticularly during the operation, with 40 to 50 ml injected into the posterior capsule and the collateral ligaments before insertion of the prosthesis and an additional 50 to 70 ml into the quadriceps tendon, the infrapatellar ligament, and around the posterior cruciate ligament after insertion of the prosthesis
        - Group L received an additional 50 ml of ropivacaine into the subcutaneous tissue before skin closure

        - On the first and second postoperative mornings, at 21 and 45 hours after the operations, group L also received additional ropivacaine, ketorolac, and epinephrine via catheter
        - For all of the above anesthetic injections received by group L, group M received saline injection by catheter
        - Both groups received antibiotics until the catheters were removed at the end of 45 hours, at which time the catheter tips were sent for culture
    - If sensory block was insufficient, the patient was given general anesthesia and excluded from the study

Outcomes:

- Primary outcome was morphine consumption in the first 48 hours after the operation
- Additional outcomes were
    - Pain relief at 6, 12, 21, 22, 24, 45, and 46 hours postoperatively, assessed both at rest and on flexion of the knee to 60°
    - Patient satisfaction on the first two postoperative days and on day 7
    - Functional recovery assessed by ability to climb stairs and other activities at day 3, at discharge, and at 2 weeks and 3 months postoperatively
    - Home readiness and hospital stay
    - Adverse events such as sedation, pruritus, nausea, and vomiting on the first two postop days
- Mean morphine consumption was significantly less in group L (mean of 26 mg) than in Group M (mean of 54 mg) in the first 48 hours
- Pain relief was greater in group L than group M both at rest and with flexion for the first 48 hours, with the median VAS scores on a 100 point scale
    - At rest, group L had a median VAS of 5 and group M had a median VAS of 20
    - With knee flexion, group L had a median VAS of 30 versus a median of 59 for group M
    - With ambulation, group L had a median VAS of 19 versus a median VAS of 58 for group M
- Patient satisfaction was greater in group L on the first postoperative day but not on later days
- Most knee functional scores did not differ between groups, except that more patients in group L were able to climb stairs at 24 hours; the Oxford Knee Score and the EG-5D quality of life score did not differ
- Median hospital length of stay was shorter for group L (3 days) than for group M (4 days)

- Incidence of adverse effects such as nausea, vomiting, pruritus, and sedation did not differ between groups
- There were 7 positive catheter tip cultures (3 in group L and 4 in group M), all with coagulase-negative *Staph*, but no antibiotics were given and no signs of infection were observed

Authors' conclusions:

- Local infiltration analgesia (LIA) is an effective intervention to control postoperative pain in patients undergoing TKA and has several advantages over intrathecal morphine, including less postoperative consumption of morphine, better pain relief at rest and with activity, and greater patient satisfaction on the first postop day when pain is at its most severe
- These advantages are not observed at 3 months or later
- Side effects commonly associated with intrathecal morphine, such as urinary retention, pruritus, and sedation, were not observed to be different between groups; this could be due to the small number of patients

Comments:

- As the authors point out, the dose of morphine was fairly small, but also was chosen to minimize side effects, and the comparison between it and LIA is likely to be relevant to hospital practice
- Because the intensity of postoperative pain is at its most intense soon after the operation, the equal outcomes at 3 months and later are of marginal relevance and should not be expected to be observed in a study this size
- The experimental intervention, LIA, was administered over a period of three days, while the comparison, intrathecal morphine, was only administered on the day of the procedure

Assessment: adequate for some evidence that local infiltration analgesia with ropivacaine and ketorolac during and for the first two days after TKA has relevant advantages over intrathecal morphine on the day of the procedure, including lower postoperative consumption of morphine, less postoperative pain, and earlier return to activity