Using Local Injections for TKA Pain Management

Mary Ann Porucznik

Recently, AAOS Now received two separate reports from surgeons who are using a local injection of liposomal bupivacaine to control pain after total knee arthroplasty (TKA). In both cases, the surgeons report improved pain management, shorter hospital stays, and reduced costs.

“Compared to the vast surgical advances in TKA, the evolution of approaches to postoperative pain management has been slow,” said Roger H. Emerson Jr, MD, of the Texas Center for Joint Replacement, who will be presenting the results of his study, “Comparison of Infiltration with Long-acting Bupivacaine to a Femoral Nerve Catheter for Total Knee Replacement” as a scientific poster at the 2014 AAOS Annual Meeting.

Dr. Emerson noted that the role of orthopaedic surgeons in pain management is shifting as healthcare reforms hold hospitals fiscally accountable for patient satisfaction with regard to pain scores. “In the long term,” he said, “better pain management has a host of benefits, including increased range of motion in the operated joint, a lower likelihood of chronic pain, and higher patient satisfaction.”

His study of 72 TKA patients was powered to observe statistically significant differences in pain scores and opioid consumption between liposomal bupivacaine and continuous femoral nerve block. In the randomized trial, half of the patients received liposomal bupivacaine and the other half received a continuous femoral nerve block. Using a 10-point visual analog scale, Dr. Emerson compared average pain scores and average total narcotic consumption (expressed in hydrocodone equivalents) between the groups.

“The patients treated with liposomal bupivacaine reported an average pain score of 1.8 compared to a score of 2.3 reported by patients treated with the continuous femoral nerve block,” reported Dr. Emerson. “The difference in pain scores was not statistically significant, which reinforced that liposomal bupivacaine infiltration provides equivalent postoperative analgesia compared to a highly effective method such as femoral nerve block.”

In addition, Dr. Emerson noted that patients in the bupivacaine group consumed significantly
fewer opioids compared to patients in the femoral nerve block group.

"Since incorporating liposomal bupivacaine into our analgesic regimen, we no longer use pain pumps, epidural catheters, nerve blocks, patient-controlled analgesics, or knee immobilizers," he said. “For the past two quarters, we haven’t had any patient falls in the hospital. Our patients consistently report that they ‘appreciate being more alert,’ have a ‘sense of safety when up,’ and ‘can control the leg better.’ We’ve cut the number of ambulation support staff for each patient in half, and most patients are discharged a day earlier than before, which greatly cuts costs.”

$1,000,000 in savings
It was that “value-added” aspect of a local injection that C. Brandon Broome, MD, of the El Paso Orthopaedic Surgery Group, and Brian G. Burnikel, MD, Steadman-Hawkins Clinic of the Carolinas, investigated in their drug utilization review. They compared results between 100 TKA patients who received the liposomal bupivacaine to a retrospective cohort of 100 TKA patients who received a femoral nerve catheter. All patients received the same preoperative regimen and a single preoperative shot of spinal anesthetic, unless contraindicated.

“Liposomal bupivacaine is approved for local soft-tissue injections, but has not been proven safe when injected around healthy articular cartilage. It is, however, great for total joint arthroplasty,” said Dr. Broome. “We found that resting pain scores improved slightly with the local infiltration compared to the femoral nerve catheter on postoperative days 1 and 2. Oral opiate use was unchanged, but intravenous rescue medications decreased 19 percent. Patients’ ability to ambulate also improved. All went from maximum contact guard assistance with two physical therapists to one therapist with minimal assistance.”

The study also showed that patients who received the local injection had greater range of motion at 3 weeks and 9 weeks after surgery (mean 109° and 121°, respectively, compared to 100° and 105° in the femoral nerve block group).

The greatest value, however, came from substantially lowered costs. “The cost of the liposomal bupivacaine was $285 per patient, compared to approximately $620 of costs associated with the femoral nerve catheter,” he noted. Labor costs saved by eliminating an anesthesia assistant and reducing the number of therapists per session totaled $140 per patient.

“Total cost savings per patient were approximately $600,” said Dr. Broome. “At our institution, where more than 1,600 TKAs are performed per year, this translates to $1 million in savings. With more than 650,000 TKAs performed in the United States each year, a $600 per patient savings would approach $500 million in savings for the healthcare system as a whole.”

Dr. Emerson also found that use of the liposomal bupivacaine enhanced quality care and reduced costs. “Most patients did not require postoperative oxygen, male patients went home without Foley catheters, and the emergency department hasn’t had any visits by TKA patients for constipation in
According to Dr. Broome, “In the current healthcare environment, we must increasingly focus on providing high-quality care at a lower cost. Outpatient total joint arthroplasty and rapid recovery protocols are increasing, and these long-acting local injections are helping us to meet the demands. This appears to be a very promising tool in our quest to add value to patient care.”

Disclosure information: Dr. Emerson—Medtronic; Biomet; Pacira. Dr. Broome—Pacira. Dr. Burnikel—no information available.

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Bottom Line

- Using a local injection of liposomal bupivacaine during TKA may provide better pain relief than using a femoral nerve block.
- Two separate studies found that the use of liposomal bupivacaine reduced patient falls, shortened hospital stays, and lowered costs, compared to femoral nerve blocks.
- Although liposomal bupivacaine should not be injected around healthy articular cartilage, it is proving beneficial in pain management for TKA.

Infiltration technique for TKA

Dr. Emerson provided the following description of the technique he uses in delivering the injection:

To accommodate the surgical site, a 20 mL vial of liposomal bupivacaine is diluted with 40 mL of preservative-free normal sterile saline, for a total volume of 60 mL. After the bone cuts have been made and the knee is ready for joint component placement, I inject 20 mL of the anesthetic, using a 1½ inch, 22-gauge needle inserted all the way, from deep to superficial into the medial and lateral sides of the posterior capsule, being careful to avoid the midline. I then inject the collaterals, into the periosteum around the cut surface of the femur and tibia, into the synovium and suprapatellar pouch, and finally into the cruciate ligament area.

I inject the other soft-tissue layers after the joint components have been inserted and the cement is curing, with the knee immobilized. The medial and lateral capsules each get 10 mL, with 20 mL for the quadriceps area. The final 20 mL are reserved for the subcutaneous layers, where the needle should be inserted all the way and the analgesic placed away from the skin edge using the moving needle technique. Any remaining analgesic can be injected into the quadriceps area or around the drain tube to make its removal more comfortable.

References


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