

Regional Anesthesia for Pediatric Knee Surgery Reduces Pain, Speeds Recovery

Teaser: Using a regional anesthesia technique called femoral nerve block reduces postoperative pain in pediatric knee surgery, allowing most procedures to be performed in an outpatient setting, study suggests.

As many as 98 percent of all pediatric knee surgeries performed at Nationwide Children's Hospital are done in an outpatient setting, thanks to an ultrasound-guided regional anesthesia technique that reduces postoperative pain and speeds recovery. A new study of the method, called femoral nerve block, suggests that it reduces the need for opioids, leads to fewer in-patient days for those who do require hospitalization and allows the majority of patients to go home within hours of surgery.

“It’s a safe procedure that’s markedly improved our ability to perform outpatient surgical services and in fact, it’s become very rare for us to have any overnight stay for knee reconstruction,” says Kevin E. Klingele, MD, chief of orthopedics at Nationwide Children’s and a co-author of the new study. “This technique decreases pain and stress for our patients, and allows many of them to begin recovering with physical therapy as soon as they wake up because they aren’t in pain.”

Ultrasound-guided regional anesthesia has been used in adult patients for more than a decade but is now being used more regularly in pediatric patients. There are different kinds of regional anesthesia, depending on the anatomy to be numbed. But in all cases, anesthesiologists use ultrasound to guide a needle to the specific surgical site and deliver local anesthetic to numb only the nerves in that region. The anesthetic blocks pain for up to 12 hours in some cases, significantly reducing post-operative pain.

Although most adult patients remain awake for procedures involving regional anesthesia, pediatric patients, especially young children, are usually under general anesthesia. The type of anesthetic used in regional anesthesia varies, but the most common are Bupivacaine and Ropivacaine, which are among the longest-acting anesthetics currently available.

For the study, which was published in June in the *Journal of Pediatric Orthopedics*, clinician-scientists wanted to compare pain levels, opioid use and hospital admission rates among children undergoing knee surgery who received either general anesthesia alone or a combination of general and regional anesthesia. The technique used in those patients, called femoral nerve block, numbs the femoral nerve, which runs close to the femoral artery and conducts signals running along the front of the thigh, the inner leg and the foot. By numbing this nerve, all feeling to those regions is blocked.

The researchers reviewed records of 376 patients age 7 to 18 years old who underwent arthroscopic knee surgery at Nationwide Children's between July 2008 and July 2011. Of these patients, 131 received a femoral nerve block in addition to general anesthesia, while 245 received general anesthesia alone. Patients who received the combined anesthesia reported less pain, required less pain medication after surgery and had shorter hospital stays when compared to patients who had general anesthesia alone.

The researchers noted the biggest decrease in pain and opioid use among patients who underwent ACL repair, which is considered to be one of the most painful of all procedures evaluated in the study. A more

recent review of patient cases at Nationwide Children's suggests that 98 percent of ACL repairs are now performed in an outpatient setting, which can be directly attributed to the use of regional anesthesia, says Tarun Bhalla, MD, director of Acute Pain and Regional Anesthesia at Nationwide Children's and a co-author of the study.

"Our primary goals with this technique are to reduce pain and minimize the need for opioids, which improves patient outcomes and patient satisfaction," he says. While this study looked specifically at arthroscopic knee surgery, regional anesthesia is also becoming more widely used in orthopedic procedures in the shoulder, elbow and wrist and in other surgical procedures in the abdomen. Regional anesthesia is also being used in cardiac and urological surgeries.

Regional anesthesia is also being used in younger and younger patients, Dr. Bhalla says. One of the most significant side effects of opioid use in infants is depressed respiratory function, which leads many infants to require intubation. Reducing the need for narcotics helps the infants come off ventilation more quickly.

Nationwide Children's is one of 13 medical centers nationwide participating in the Pediatric Regional Anesthesia Network, or PRAN, a collaboration designed to support the collection of highly audited data on practice patterns and complications and to facilitate collaborative research in regional anesthetic techniques in infants and children. Participating institutions, including such centers as Boston Children's Hospital and Lucile Packard Children's Hospital at Stanford University, report the number of regional anesthesia procedures they do each month.

"Since 2010, we have significantly increased the number of blocks we are doing and now perform 150 and 200 a month," says Dr. Bhalla, who travels around the country and the world teaching other medical centers how to do these procedures in pediatric patients. "The data we are reporting and new studies consistently demonstrate the safety and improved outcomes regional anesthesia offers. It really does seem to improve the experience for our patients."

Full citation:

Schloss B, Bhalla T, Klingele K, Phillips D, Prestwich B, Tobias JD. [A retrospective review of femoral nerve block for postoperative analgesia after knee surgery in the pediatric population](#). *Journal of Pediatric Orthopedics*. 2014 Jun;34(4):459-61.