A SAFE AND NOVEL METHOD OF ARTHROPLASTY IN ANAESTHETICALLY HIGH-RISK PERSONS

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ABSTRACT

BACKGROUND

Total knee replacement is considered to be one of the most successful surgeries in modern day orthopaedics. Lot of people who were previously afraid of this procedure are undergoing this and are enjoying the benefits of this procedure. But there is a small group of patients who will definitely benefit from this surgery, but cannot undergo such a major procedure under general or spinal anaesthesia due to other severe comorbidities. Combined femoral and sciatic block turns out to be a safe and novel alternative to provide benefits of joint replacement surgery for such patients without any serious risk to life and survival.

KEYWORDS

Total Knee Replacement, Regional Block, Nerve Block.

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INTRODUCTION: Total Knee Replacement is one of the most successful surgeries in modern day Orthopaedics. Recently, it has gained lot of acceptance among the public and more and more people who were afraid to undergo surgery earlier are coming forward for this procedure. Total knee replacement has become one of the most major and most successful surgeries in modern day Orthopaedics. It has evolved in the last five decades and maximum developments have happened in the last two decades. Early mobilisation has evolved as an integral part of excellent outcome of this procedure. The fact that this surgery happens mostly in aged population makes these persons at risk for complications due to severe comorbidities. In some of such patients with severe anaesthesia risk, regional anaesthesia may prove to be a safer alternative. This particularly becomes important in such patients who are crippled due to the joint pain and stiffness and is at high risk to receive general or spinal anaesthesia, but still have a long expected life ahead. It also provides a way to start immediate and painless mobilisation.

We have done nine cases so far successfully through this technique. All the cases resulted in excellent intra-operative and postoperative analgesia and also immediate mobilisation and early discharge. For major lower limb surgeries, femoral peri-neural catheterisation has demonstrated efficacy in providing postoperative analgesia.(1) Peripheral neural blockade appears to provide effective analgesia with potentially less morbidity than central neuraxial techniques.(2)

Several factors, such as compromised cardiopulmonary function, anticoagulant therapy, or anatomical deformity in the elderly, prevent general anaesthesia and neuraxial blockade from being conducted for total knee replacement arthroplasty.(3) Continuous femoral nerve blocks has many advantages over epidural analgesia like lack of hypotension and epidural haematoma associated with the use of anticoagulants, effective pain relief and improved functional recovery.(4,5,6) It also avoids the necessity of urinary catheterisation in such patients.

METHODS: Study included nine patients at the age range of 62 to 80. Two had bilateral staged total knee replacement 1 week apart and the rest had unilateral total knee replacement. Five were females and four were men. All patients had severe cardiopulmonary complications. One patient had end-stage renal failure, but was stable since last 4 years. One patient had dissecting aneurism of abdominal aorta for which grafting was done 10 years back, but has developed aneurism at the edge of the graft which remains unchanged in size for the last 5 years. Patient assessed. Total body weight is measured. Local anaesthetic maximum dose is calculated. A 0.5% Bupivacaine at 3 mg/kg is taken mixed with 2% Lignocaine with adrenaline 7 mg/kg.

We sometimes add buprenorphine for prolongation of analgesia as an additive 1-2 mcg/kg. For a 50 kg patient, 0.5% Bupivacaine at 3 mg/kg will be 150 mg that is 30 mL; 2% Lignocaine with adrenaline 7 mg/kg will be 350 mg that is 15 mL. We mix both and make it 45 mL. 15 mL is used for sciatic nerve block. Sciatic nerve identified under ultra-sonogram guidance and peripheral nerve stimulator. The local anaesthetic is given circumferentially around the nerve and its effect lasts for 4 to 12 hours. The effect of sciatic nerve block lasts longer so the patient and relatives are

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explained about the anaesthetic effect of sciatic block beforehand.

Femoral nerve block uses another 15 mL of the mixture of local anaesthetic. Femoral nerve located under ultra-sonogram guidance and peripheral nerve stimulator. Local anaesthetic injected and circumferentially spread around the femoral nerve. Obturator nerve block anterior and posterior 5 mL each under ultrasound and peripheral nerve stimulator guidance is done. Lateral femoral cutaneous nerve is blocked with 5 mL for the tourniquet. Continuous nerve block catheter is inserted secured in lateral tunnel. Postoperatively, the catheter is used for postoperative analgesia; 0.1% Ropivacaine mixed with 100 mcg fentanyl in total 50 mL volume taken in a syringe loaded in an infusion pump and infused at a rate of 5 to 7 mL/hour. This is combined with Paracetamol 1 g IV 8th hourly for multimodal anaesthesia. Pain score every 1 hour after surgery; if pain score is 4 or more than 4, rescue analgesia with IV fentanyl 0.5-1 mcg/kg bolus is given. Postoperatively, if patient is having pain while rigorous physiotherapy that is for break through pain occasionally, 1% Lignocaine 5 to 6 mL bolus is given through femoral catheter or NSAIDs IV if not contraindicated.

RESULTS: Nine cases of total knee replacements are done so far using this technique. All had severe comorbidities making general or spinal anaesthesia a very high risk procedure. At the same time, all were restricted to bed or chair due to severe pain and deformity of knee. All had excellent pain relief and muscle relaxation intraoperatively so that total knee replacement could be carried out without any difficulty. Also all had excellent pain relief in the immediate postoperative period and throughout the hospitalisation they were subjected to immediate mobilisation and physiotherapy. All regained zero to 100 degrees of movements by fourth postoperative day. Postoperatively, the dose or Ropivacaine is titrated to maintain analgesia without motor blockade. So we could mobilise the patients from the day of surgery itself. Two patients complained of pain in the hip on impaction of femoral prosthesis and needed supplementation with IV analgesia during surgery. But later on, we depended on light impact followed by straightening of the leg to adequately fix the prosthesis. Also we included posterior capsular infiltration of Sensorcaine intraoperatively which resulted in excellent postoperative pain relief.

OUR EXPERIENCE: Seven cases of total knee replacements are done so far using this technique. All had excellent pain relief intraoperatively and postoperative period. Postoperatively, the dose or Ropivacaine is titrated to maintain analgesia without motor blockade. So we could mobilise the patients from the day of surgery itself. Two patients complained of pain in the hip on impaction of femoral prosthesis and needed supplementation with IV analgesia. But later on, we depended on light impact followed by straightening of the leg to adequately fix the prosthesis.

Also we included posterior capsular infiltration of Sensorcaine intraoperatively which resulted in excellent postoperative pain relief.

CONCLUSION: In the past, lower extremity peripheral nerve block was seldom the anaesthetic procedure of choice for patients undergoing total joint replacement, primarily because of anaesthesiologists' lack of experience in performing these procedures. These regional blocks are an excellent anaesthetic option for patients who are not candidates for spinal or epidural anaesthesia, because diabetic or anticoagulated patients may safely receive peripheral blocks. Additionally, patients with disease processes that make haemodynamically significant sympathectomy seen with neuraxial anaesthesia unsafe can undergo a lower extremity nerve block without significant risk of haemodynamic instability.

Further, severe neurological complications (Spinal Haematoma, Cauda Equina Syndrome) after central neural blockade are rare events, but should be considered when choosing a safe method for surgical anaesthesia or postoperative analgesia. Peripheral nerve damage can occur after a peripheral nerve block, but the consequences are not as grave. These benefits of lower extremity peripheral nerve block justify the use as an alternative anaesthesia in patients undergoing TKR. There was significantly reduced use of antihypertensives, analgesics, and sedatives in the Femoral Nerve Block patients. There were no significant differences of perioperative side effects, duration and remaining amount of intravenous patient-controlled analgesia, rate of satisfaction with the surgical anaesthesia and postoperative analgesia, willingness to recommend the same surgical anaesthesia and postoperative analgesia to others, and postoperative visual analogue scale scores in comparison to patients with epidural analgesia.

However, femoral nerve blocks are performed frequently but have suggested disadvantages, such as motor weakness. In our case series, we have used only 0.1% ropivacaine postoperatively for postoperative analgesia in infusion pumps and we haven't come across motor weakness at this dose. Serious complications reported in literature include compartment syndrome, periprosthetic fracture, and vascular injury. The use of femoral catheter must be used with appropriate precautions taken to reduce risk of patient falls, vascular injury, and wrong-site surgery.[7,8]

The time taken to undertake the regional block is an important consideration owing to financial and theatre efficiency implications. There is a common perception among many Anaesthetists and Orthopaedic surgeons that lower-extremity peripheral blockade is slow to perform and is less complete and less reliable than a central neuraxial blockade. In patients with cardiac disease with failure, if epidural boluses had been given instead of femoral, the resulting hypotension and tachycardia will complicate the picture.[9] This study suggests that the combined blocks offer a practical alternative to epidural analgesia for knee replacements. They provided acceptable postoperative

analgesia and patient satisfaction was consistently high. Common surgical perceptions of their being slower and technically more difficult were not confirmed. There was also little difference in measured rehabilitation indices.[10]

In short, combined femoral and sciatic nerve block offers a beneficial alternative anaesthesia and postoperative analgesia to the patients undergoing TKR.

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