

Three in one block for unilateral knee arthrotomy in an old lady

Tabadar S¹, Shrestha BR¹ and Maharjan SK¹

¹Lecturer Department of Anaesthesia Kathmandu medical college Teaching Hospital

An old lady having septic arthritis of right knee joint underwent arthrotomy under three in one block for femoral, obturator and lateral cutaneous nerve of thigh in inguinal region, with catheter in situ. She was a case of chronic obstructive airway disease with ischaemic heart disease, so operation and postoperative pain management was planned under regional block. Anaesthesia was started by giving regional block with 0.25% bupivacaine at first and maintained with intermittent injection of 0.125% bupivacaine. The patient was pain free and comfortable though out the perioperative period

Key words: Aesthesia, Regional Anaesthesia technique – 3 in 1 block, Surgery- U/L knee Arthrotomy

This technique was described by Winnie in 1973¹. It is supposed to provide a regional block of the femoral, femoral cutaneous, and obturator nerves by a single injection within the femoral nerve sheath.

The technique described was as follows:

“With patients in a supine position, the puncture site was located 1 cm below the inguinal ligament and 0.5 cm lateral to the femoral artery. After local disinfection, the block needle was inserted and advanced cephalad in a sagittal plane at a 30° angle to the skin. The local anaesthetic solution was injected over a 2-min period during which quadriceps femoris muscle twitches were elicited (i.e., cephalad knee cap movement) for 0.5-mA impulses delivered at a frequency of 1 Hz. A single injection of a sufficient volume of local anaesthetic just below the inguinal ligament blocks the lumbar plexus. This occurs through cephalad movement of the local anaesthetic via a fascial conduit containing the femoral, lateral cutaneous, and obturator nerves, and is enhanced by compression applied distal to the site of injection.”

The "3 in 1" block would therefore seem to be useful for those surgical operations requiring only a block of the femoral and femoral cutaneous nerves, i.e. those involving the anterior aspect of the thigh and knee, the femoral shaft, and the patella.

This type of block is easy to perform. It provides good post-operative analgesia and reduces post-operative analgesic requirements, especially if a continuous technique is performed.

Side effects of the 3-in-1 femoral nerve block such as haematoma, hypoaesthesia for more than 24 hours or signs of infection at the puncture site may result.

A case report

A 78 years old lady with chronic obstructive airway disease and ischemic heart disease presented in this hospital with septic arthritis of right knee. She was planned for right knee arthrotomy. Since last 5 years she was suffering from COPD. Six months back she had inferior wall myocardial infarction and recently arthritis of right knee joint. She was on oral medications i.e. Digoxin, deriphyllin and montrate. On clinical exam, she was febrile (temp 102⁰ F), dyspnoic, anaemic, cyanosed with SPO₂ 80-85 % on room air. Heart rate was 126/min irregularly irregular, BP- 80/50 mm of Hg. The chest was bilaterally full of crepitations and rhonchi. On CVS examination heart beat was irregular heart. Auscultation revealed systolic murmur over the left precordium. Airway assessment was evident of MPT II and with multiple loose teeth.

On laboratory investigations, Hb was 8 gm% WBC- 20,000/cmm; xray showed B/L hyper inflated lung fields with multiple infiltrates. ECG was suggestive of AF and ST depression with Q waves in inferior wall leads.

Correspondence:

Dr. Sushila Tabadar
Lecturer, Department of Anaesthesia
Kathmandu medical college Teaching Hospital
Sinamangal, Kathmandu

Regional anaesthesia under 3 in 1 block was planned for Surgery and postoperative pain relief.

Methods

After arrival in the operating room, patient was monitored continuously using an ECG and pulse oximeter, and arterial blood pressure was measured with an automatic non-invasive device. A 18-gauge IV cannula was inserted in the forearm and crystalloid infusion started.

In the theatre, she received O₂ inhalation via nasal mask after which her SPO₂ rose up to 95%. Midazolam 2mg was given IV and 3 in 1 block was performed by Winnie's technique using 18G cannula to which the extension line was connected, approximately 1 cm lateral to femoral artery just below the inguinal ligament. After confirming parasthesia and negative aspiration of blood, 0.25% Bupivacaine 40ml was pushed and distal pressure was maintained for sometime. Incision was given 30 minutes after LA injection. There after, analgesia was maintained with 0.125% bupivacaine 10 ml every 3-4 hourly in the post operative period. In the whole operative period she was comfortable, pain free without much alteration in aerodynamics and respiratory parameters. Postoperatively also she was pain free and comfortable as long as local anaesthetic was injected. On 2nd post operative day LA was stopped and catheter removed.

Discussion

Spinal and epidural anaesthesia are widely employed for a variety of lower extremity surgical procedures, however regional nerve block can also provide excellent anaesthesia in such circumstances. The whole lower limb is innervated by somatic branch of lumbar plexus and sciatic nerve which can be blocked either at hip, knee or ankle. Commonly used blocks are femoral nerve block, lateral cutaneous nerve block, obturator nerve block, sciatic nerve block, 3 in 1 block and ankle block. 3 in 1 block can be used in various surgical procedures in the region of hip and the knee. This is the perivascular approach to the psoas compartment which blocks femoral nerve, obturator nerve and lateral cutaneous nerve of thigh with a single injection of 30 -40ml of local anaesthetic agent. The key anatomic assumption is that the fascial sheath surrounding the lumbar root extends into the femoral canal and acts as a closed conduit for the spread of Local anaesthetic (2).

Winnie and Colleagues was first to describe this block in 1973. Later continuous 3 in 1 block was explained by Singelyn and Colleagues. Commonly

used agents for single shot technique are lidocaine 1.5-2% with adrenaline 1:2,00,000 where anaesthesia lasts for 1-3 hours and bupivacaine 0.25 to 0.5% where anaesthetic the effect lasts for 4 to 24 hours. In a study conducted by Huey Ping Ng and his friends a single shot 3 in 1 block with 30 ml Ropivacaine 0.25% provided analgesia for 48 hours after total knee replacement in the post operative period (3).

In the next study by Edward Neal D, continuous infusion of 0.125% Bupivacaine at the rate of 6ml/hr after single shot of 30 ml 0.5% bupivacaine in femoral sheath, could maintain analgesia for 24 hours in the post operative period (4). Patel NJ and colleagues concluded in their study that a regional anaesthetic technique for outpatient knee arthroscopy was better than general Anaesthesia (5). Singelyn et al demonstrated that after total knee arthroplasty, loco-regional analgesic techniques (epidural analgesia or continuous 3-in-1 block) provide better pain relief and faster postoperative knee rehabilitation than IV patient-controlled analgesia with morphine. Because it causes fewer side effects than epidural analgesia, continuous 3-in-1 block is the technique of choice (6).

The advantages of this procedure are that it is safe, lacks complete sympathectomy and provides post operative analgesia too which makes it ideal for selected patients. The disadvantages encountered are that it is a technically difficult procedure resulting in high failure rate, mostly sparing Obturator nerve and accumulation of local anaesthetic after persistent block leading to difficulty in ambulation post operatively.

For different open knee procedures Hugh and Colleagues (7) suggested 3 in 1 block along with sciatic nerve block though latter supplied only minor portion of the knee, where as Hirst and Colleagues (8) suggested alone 3 in 1 block for effective analgesia after total knee replacement.

In our patient who had multiple systemic problems, 3 in 1 block for right knee arthrotomy provided excellent perioperative analgesia for more than 24hours.

On the contrary, the results of studies, investigating the efficacy of 3-in-1 nerve block for hip surgery are incomplete and inconclusive.1 :(10,11

Conclusion

3 in 1 block is an ideal procedure for lower limb surgeries as well as post operative pain

management in the region of anterior thigh and knee joint as an alternative to other techniques.

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Dr. Sushila Tabadar; Dr. Babu Raja Shrestha and Dr. Shyam. K. Maharjan
Dr. Sushila Tabadar
Lecturer, Department of Anaesthesia
Kathmandu medical college Teaching Hospital
Sinamangal, Kathmandu