Quadratus lumborum block for femoral–femoral bypass graft placement

A case report

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Abstract

Introduction: Atherosclerosis has a complex etiology that leads to arterial obstruction and often results in inadequate perfusion of the distal limbs. Patients with atherosclerosis can have severe complications of this condition, with widespread systemic manifestations, and the operations undertaken are often challenging for anesthesiologists.

Case report: A 79-year-old woman with chronic heart failure and respiratory dysfunction presented with bilateral gangrene of the distal lower extremities with obstruction of the left common iliac artery due to atherosclerosis. Femoral–femoral bypass graft and bilateral foot amputations were planned. Spinal anesthesia failed due to severe scoliosis and deformed vertebrae. General anesthesia was induced after performing multiple nerve blocks including quadratus lumborum, sciatic nerve, femoral nerve, lateral femoral cutaneous nerve, and obturator nerve blocks. However, general anesthesia was abandoned because of deterioration in systemic perfusion. The surgery was completed; the patient remained comfortable and awake without the need for further analgesics.

Conclusion: Quadratus lumborum block may be a useful anesthetic technique to perform femoral–femoral bypass.

Abbreviation: QLB = quadratus lumborum block.

Keywords: amputation, femoral–femoral bypass, local anesthesia, quadratus lumborum block

1. Introduction

The quadratus lumborum block (QLB) was first reported as anesthesia for abdominal wall surgery.1 The QLB was performed using the anatomical landmark technique. Recently, ultrasound-guided QLB has been reported for postoperative analgesia following abdominal surgery.2 The QLB is recognized to be a modification of the transverse abdominis plane block.2 However, it was reported that the analgesia region of the QLB is broader than that of the transverse abdominis plane block, and the QLB additionally has some splanchnodynia.3

Atherosclerosis is a systemic disease which can affect blood vessels, resulting in tissue ischemia, often with devastating clinical consequences. Patients with atherosclerosis commonly have widespread systemic manifestations such as ischemic heart disease, brain infarction, aortic aneurysm, and aortic dissection.4 These conditions often lead to significant challenges for anesthesiologists involved in their care.

2. Case report

A 79-year-old woman had obstruction of the left common iliac artery due to atherosclerosis and consequently developed gangrenous necrosis affecting both distal lower extremities. She had respiratory insufficiency because of a deformed chest and severe scoliosis. The past medical history included a left thoracoplasty for pulmonary tuberculosis, and refractory congestive heart failure with atrial fibrillation. Echocardiography showed cardiomegaly with mild aortic valve regurgitation, mild mitral valve regurgitation, and moderate tricuspid valve regurgitation.

She was initially planned to undergo extensive debridement of both feet to limit progression of infection. However, the surgery was canceled because spinal anesthesia failed due to severe scoliosis and the vertebral deformity. Two weeks later, she had a fever of 38.5°C, and laboratory data revealed a white blood cell count of 20,700/μL and a C-Reactive protein level of 5.3 mg/dL, consistent with systemic inflammation. The surgeons in charge of her care decided to perform emergency amputation of both feet due to more extensive necrosis, and a femoral–femoral bypass graft to allow her to keep as much of her lower extremities as possible to facilitate future rehabilitation.

General anesthesia was considered for the planned procedure; however, the patient was critically ill. She had a large right pleural effusion due to congestive heart failure. Her respiratory condition worsened and the percutaneous oxygen saturation (by pulse oximetry) decreased to 93% while receiving 3 L/min of oxygen by
nasal prongs. We then planned to perform peripheral nerve blocks with light general anesthesia. These nerve blocks included the QLB for the femoral–femoral bypass and a lumbar plexus block and sciatic nerve block for the bilateral foot amputations.

The patient was in the prone position and the QLB was performed under ultrasound guidance with a 6 to 13-Hz high-frequency linear probe and a 22-gauge peripheral nerve block needle. The probe was placed over the lateral abdomen to identify the abdominal muscles, and then moved dorsally to confirm the location of the quadratus lumborum muscle (Fig. 1). However, the edge of the quadratus lumborum muscle was blurred. Fluoroscopy was then used to identify the quadratus lumborum muscle. We inserted the nerve block needle and injected radiocontrast (15ml of 0.08% iotrolan) (Fig. 2). The contrast material spread from the iliac crest to the inferior costal margin, which indicated correct position of the tip of the needle. The QLB was then performed by injecting 15ml of 0.125% levobupivacaine.

A lumbar plexus block was attempted for the foot amputations, but failed. The lumbar plexus could not be successfully identified using the nerve stimulator or ultrasound guidance due to the severe deformity of the vertebrae. Instead of a lumbar plexus block, we performed a combination of nerve blocks including a femoral nerve block, a lateral femoral cutaneous nerve block, and an obturator nerve block. A sciatic nerve block was performed using the parasacral approach.

Local anesthetic, 0.125% levobupivacaine was used (7ml for the femoral nerve, 3ml for lateral femoral cutaneous nerve, 8ml for the obturator nerve, and 10ml for the sciatic nerve) for all nerve blocks. The total amount of local anesthetic used for all peripheral nerve blocks was 86ml. The analgesic area was confirmed using the needle-prick test.

General anesthesia was induced using 1% sevoflurane with 6L/min of 50% oxygen administered by facemask, and without muscle relaxants to maintain spontaneous ventilation. The patient’s circulatory dynamics became unstable after inducing general anesthesia. The blood pressure decreased from 100/70 to 80/60mm Hg, and the heart rate increased from 90 to 140bpm, with intermittent intravenous administration of 4mg of ephedrine and/or 0.1mg of phenylephrine, and continuous infusion of 0.01mg of noradrenaline. The surgery began 10minutes after inducing general anesthesia. We decided to stop general anesthesia about 10minutes after starting the procedure because of continuing deterioration in hemodynamics. At that time, the surgeons were exposing the right femoral artery, and had not yet started the left side. After stopping sevoflurane inhalation, the patient awakened quickly, and her hemodynamics recovered gradually. The femoral–femoral bypass was completed about 85 minutes later. The foot amputations were then performed. The patient did not complain of any pain during the entire procedure. The total operation time was 3hours 11minutes.

3. Discussion

The anesthesia used for performing a femoral–femoral bypass graft is usually general anesthesia, spinal anesthesia, or epidural anesthesia.[6] General anesthesia is the most popular approach for this procedure, but it is also associated with higher morbidity compared to regional anesthesia.[6] In the case of a critically ill
patient, femoral–femoral bypass can be performed with local anesthesia alone. However, some additional analgesics are generally needed.[7]

Peripheral nerves derived from the lumbar plexus are widely distributed in the inguinal region, the area involved with a femoral–femoral bypass, and explains why local anesthetic infiltration may be insufficient to relieve surgical pain during a femoral–femoral bypass. The QLB is reported to induce analgesia from T10 to L1.[8] We expected that a QLB would be useful for performing a femoral–femoral bypass.

The mechanism of a QLB is still not completely known. One hypothesis is that local anesthetic spreads from the quadratus lumborum muscle to the neighboring paravertebral space, and acts at several nerve roots.[3] The QLB has been reportedly used for postoperative analgesia of various abdominal procedures including cesarean section, laparoscopy, colostomy, and pyeloplasty.[5,9–13]

This is the first report of using a QLB to perform a femoral–femoral bypass. The QLB has some questions remaining regarding its mechanism of action. Further study of this technique is needed.

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