Clinical Case Report

Medicine®

OPEN

Quadratus lumborum block for femoral–femoral bypass graft placement

A case report

Kunitaro Watanabe, MD[a], Shingo Mitsuda, MD[a], Joho Tokumine, MD, PhD[a,*], Alan Kawarai Lefor, MD, MPH, PhD[b], Kumi Moriyama, MD, PhD[a], Tomoko Yorozu, MD, PhD[a]

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

Editor: Kazuo Hanaoka.

The written informed consent for the case report was obtained from the patient.

The authors have no conflicts of interest to disclose.

[a] Department of Anesthesiology, Kyorin University School of Medicine, Shinkawa, Mitaka-shi, Tokyo, [b] Department of Surgery, Jichi Medical University, Yakushiji, Shimotsuke-shi, Tochigi-ken, Japan.

[*] Correspondence: Joho Tokumine, Department of Anesthesiology, Kyorin University School of Medicine, 6–20–2 Sinkawa, Mitaka, Tokyo, 181–8611, Japan (e-mail: ii36469@wa2.so-net.ne.jp).

Medicine (2016) 95:35(e4437)

Received: 4 May 2016 / Received in final form: 14 June 2016 / Accepted: 20 June 2016

http://dx.doi.org/10.1097/MD.0000000000004437

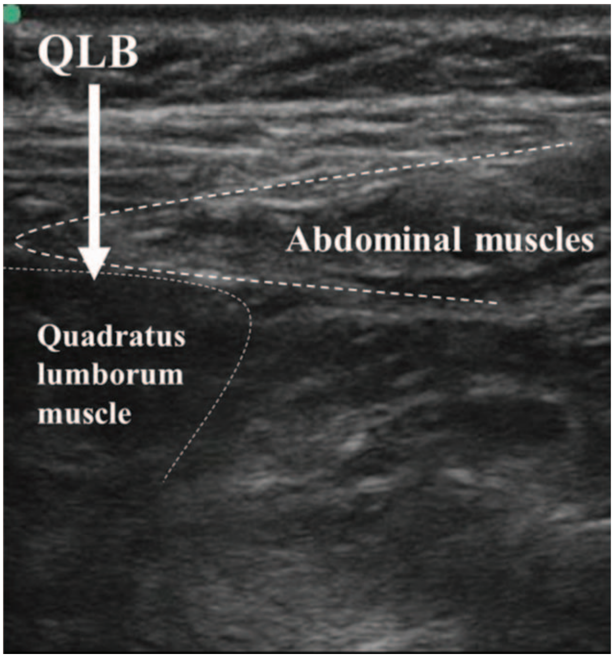

Figure 1. Ultrasound view of the quadratus lumborum muscle. Abdominal muscles seen may include the transversus abdominis and internal oblique muscles. The arrow indicates the direction of the quadratus lumborum block. The injection point for the quadratus lumborum block is on the posterior aspect of the quadratus lumborum muscle.

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 (15 ml 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 15 ml 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 (7 ml for the femoral nerve, 3 ml for lateral femoral cutaneous nerve, 8 ml for the obturator nerve, and 10 ml for the sciatic nerve) for all nerve blocks. The total amount of local anesthetic used for all peripheral nerve blocks was 86 ml. 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

Figure 2. Fluoroscopic view of the quadratus lumborum block. Fluoroscopy may be helpful to identify the quadratus lumborum muscle. Contrast medium spreads from the iliac crest to the inferior costal margin. This triangular image suggests that the quadratus lumborum block was performed by sub-fascial injection of the local anesthetic agent. This technique was reported by Murouchi et al.[5]

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 80/60 mm Hg, and the heart rate increased from 90 to 140 bpm, with intermittent intravenous administration of 4 mg of ephedrine and/or 0.1 mg of phenylephrine, and continuous infusion of 0.01 mg of noradrenaline. The surgery began 10 minutes after inducing general anesthesia. We decided to stop general anesthesia about 10 minutes 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 3 hours 11 minutes.

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.

Acknowledgments

The authors would like to thank Dr. Yasuyuki Shibata (Department of Anesthesiology, Nagoya University Hospital), Dr. Yasuhiro Morimoto (Department of Anesthesia, Ube Industries Central Hospital), and Dr. Takeshi Murouchi (Department of Anesthesia, Japanese Red Cross Kitami Hospital).

References

[1] Rafi AN. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia 2001;56:1024–6.

[2] Kadam VR. Ultrasound-guided quadratus lumborum block as a postoperative analgesic technique for laparotomy. J Anaesthesiol Clin Pharmacol 2013;29:550–2.

[3] Blanco R, Ansari T, Girgis E. Quadratus lumborum block for postoperative pain after caesarean section: a randomised controlled trial. Eur J Anaesthesiol 2015;32:812–8.

[4] Ghilardi G, Bortolani EM, D'Armini A. The femorofemoral bypass graft. Report of a 11-year experience. Panminerva Med 1990;32: 71–6.

[5] Murouchi T, Iwasaki S, Yamakage M. Quadratus lumborum block: Analgesic effects and chronological ropivacaine concentrations after laparoscopic surgery. Reg Anesth Pain Med 2016;41:146–50.

[6] Singh N, Sidawy AN, Dezee K, et al. The effects of the type of anesthesia on outcomes of lower extremity infrainguinal bypass. J Vasc Surg 2006;44:964–8.

[7] Kim M, Lee JY, Bang YS, et al. Monitored anesthesia care with remifentanil for femoro-femoral bypass graft patients. Korean J Anesthesiol 2011;61:169–70.

[8] Parras T, Blanco R. Randomised trial comparing the transversus abdominis plane block posterior approach or quadratus lumborum block type I with femoral block for postoperative analgesia in femoral neck fracture, both ultrasound-guided. Rev Esp Anestesiol Reanim 2016;63:141–8.

[9] Baidya DK, Maitra S, Arora MK, et al. Quadratus lumborum block: an effective method of perioperative analgesia in children undergoing pyeloplasty. J Clin Anesth 2015;27:694–6.

[10] Kadam VR. Ultrasound guided quadratus lumborum block or posterior transversus abdominis plane block catheter infusion as a postoperative analgesic technique for abdominal surgery. J Anaesthesiol Clin Pharmacol 2015;31:130–1.

[11] Chakraborty A, Goswami J, Patro V. Ultrasound-guided continuous quadratus lumborum block for postoperative analgesia in a pediatric patient. A A Case Rep 2015;4:34–6.

[12] Shaaban M, Esa WA, Maheshwari K, et al. Bilateral continuous quadratus lumborum block for acute postoperative abdominal pain as a rescue after opioid-induced respiratory depression. A A Case Rep 2015;5:107–11.

[13] Visoiu M, Yakovleva N. Continuous postoperative analgesia via quadratus lumborum block—an alternative to transversus abdominis plane block. Paediatr Anaesth 2013;23:959–61.