Suprainguinal fascia iliaca block under ultrasound guidance for perioperative analgesia during bipolar hip arthroplasty in a patient with severe cardiovascular compromise

A case report

Hironobu Ueshima, MD, PhD*, Hiroshi Otake, MD, PhD

Abstract

Rationale: The relief of selective hip pain may be difficult to attain. Therefore, a deep nerve block such as epidural anesthesia or lumbar plexus nerve block is required. However, deep nerve blocks may not be possible in patients with complications, including severe cardiovascular disease.

Patients concerns: The patient in our report had coronary stents inserted previously and required continuous anticoagulant therapy owing to severe heart failure.

Diagnosis: Bipolar hip arthroplasty was required in our patient because of a fracture of the neck of femur on the left side.

Interventions: We decided to perform the surgery using a fascia iliaca block (block of the femoral and the lateral femoral cutaneous nerves) by the suprainguinal approach. The fascia iliaca nerve block was performed under ultrasound guidance, using 20 mL of levobupivacaine.

Outcomes: The surgery was performed successfully with adequate sensory block around the hip region.

Lessons: Ultrasound-guided fascia iliaca nerve block by the supra-inguinal approach may be an effective anesthetic technique for patients undergoing surgery for fracture of the neck of femur.

Keywords: case report, femoral nerve block, lateral femoral cutaneous nerve, supra-inguinal, ultrasound

1. Introduction

Optimal perioperative pain management of hip surgery improves the long-term quality of life.[1] Nerve blocks are reported to be more effective for perioperative pain management than other analgesic techniques.[2] Although epidural anesthesia and lumbar plexus nerve block for hip surgery were effective analgesic in the perioperative period, performing these nerve blocks was hesitated because of deep nerve blocks. Femoral nerve block and local infiltration analgesia are not ideal because they do not cover the full extent of analgesia required for hip surgery.[3,4] Fascia iliaca block involves block of the femoral and the lateral femoral cutaneous nerve (LFN), and has been reported to be an effective analgesic technique for hip surgery.[5] The conventional fascia iliaca block, with local anesthetic injection into the inguinal region, may not always block both the nerves because the LFN may branch proximally at the level of the anterior superior iliac spine.[6]

Ultrasound-guided fascia iliaca block by the supra-inguinal approach, with local anesthetic injection superficial to the iliacus muscle, superior to the inguinal ligament, will block both the femoral and the LFN completely. This is because the femoral and the LFNs are not branched off and have a more consistent course at this location.

Herein, we report a successful case in which ultrasound-guided fascia iliaca block by the supra-inguinal approach was effective for surgery for fracture of the neck of femur in a patient with severe cardiovascular compromise.

2. Case report

2.1. Patient characteristics

A 69-year-old female patient (148 cm; 45 kg; American Society of Anesthesiologists physical status III) was scheduled to undergo bipolar hip arthroplasty for a fracture of the neck of femur on the left side. She had undergone a left partial mastectomy at the age of 67 and was diagnosed to have metastatic disease of the lumbar spine owing to breast cancer at the age of 68. She was hypertensive and had severe heart failure with an ejection fraction of 33%.

We were reluctant to administer spinal anesthesia because of lumbar spine metastasis. Besides, optimal pain management was
required in the perioperative period because of severe heart failure. Therefore, we decided to administer a peripheral nerve block combined with sedation. The extent of analgesia required for the surgery involved block of the femoral and the LFNs. Therefore, we performed a fascia iliaca block. In contrast to the conventional approach (inguinal or infra-inguinal), we used the new supra-inguinal approach.

2.2. Ultrasound-guided fascia iliaca block by the supra-inguinal approach

The patient had a baseline blood pressure of 130/64 mmHg, heart rate of 66 beats/min, and oxygen saturation of 97% upon arrival in the operating room. She was positioned supine, followed by standard monitoring with electrocardiography, pulse oximetry, and noninvasive blood pressure. Supplemental oxygen was administered by face mask at 3 l/min. A high-frequency linear array transducer was placed horizontally at the left inguinal region and moved cranially by a few centimeters (Fig. 1). A 20-gauge, 8-cm nerve block needle was advanced superficial to the iliac muscle by ultrasound guidance (Fig. 2). A local anesthetic solution of 20 mL of 0.5% levobupivacaine was administered superficial to the iliac muscle after infiltration anesthesia (Fig. 3). After 20 minutes, analgesia was confirmed along the distribution of the femoral and the LFNs. We used an infusion of dexmedetomidine (0.2–0.7 μg/kg/h) for sedation during the procedure. No additional analgesia was used in the intraoperative period.

2.3. Postoperative period

No additional analgesia was required in the postoperative period. Rehabilitation was commenced from the day after surgery. The patient was discharged after 2 weeks.
3. Discussion

For perioperative pain management of hip surgery, block along the distribution of the femoral and the LFNs is required, which entails performing a fascia iliaca block. However, the conventional fascia iliaca block may not always block both the nerves.\(^7\) The LFN generally branches at the level of the anterior superior iliac spine (Fig. 4); hence, a conventional fascia iliaca block may not result in a complete block of the lateral femoral cutaneous nerve.\(^3,4\)

To achieve a complete block, the local anesthetic solution should be injected proximal to the branching of the LFN. In our patient, we could block both the femoral and LFNs completely using an ultrasound-guided fascia iliaca block by the supraguinal approach.

Using this approach, the fascia iliaca block provides more effective analgesia in the perioperative period during hip surgery, compared with other techniques of block.\(^8\)

There are some limitations to our case report. First, we did not perform a cadaver study using this approach. Second, no randomized studies have been performed using this technique so far. Finally, we are unsure about the adequate volume of local anesthetic required for this approach. In this case, a similar approach, reported by Hebbard et al\(^9\) was referred and local anesthetic solution of 20 mL of levobupivacaine was injected. Also, the duration of the analgesic was unclear. Some studies have reported that there has been an analgesic effect of 8 hours at least.\(^10,11\) Since 8 hours, additional analgesic should be added to provide an effective perioperative pain management. Future studies are warranted to evaluate this approach further.

In conclusion, ultrasound-guided fascia iliaca block by the supraguinal approach resulted in a complete block of the femoral and the fascia iliaca nerves in our patient. This technique

---

**Figure 3.** Ultrasound image at the probe scan for superior inguinal approach fascia iliaca block. IM=iliac muscle, TA=transversus abdominis muscle, white arrow=nerve needle, white circle=local anesthetic.

**Figure 4.** Anatomy of FN and LFN (application in Essential Anatomy 5). Black box=superior inguinal approach fascia iliaca block, FN=femoral nerve, LFN=lateral femoral cutaneous nerve.
was effective during bipolar hip arthroplasty for femoral neck fracture in a patient with severe cardiovascular compromise.

Informed written consent was obtained from the patient for publication of this case report and accompanying images.

**Author contributions**

**Investigation:** Hironobu Ueshima.

**Supervision:** Hiroshi Otake.

**Writing – original draft:** Hironobu Ueshima.

**Writing – review & editing:** Hironobu Ueshima, Hiroshi Otake.

**References**

[1] Young AC, Buvanendran A. Pain management for total hip arthroplasty. J Surg Orthop Adv 2014;23:13–21.

[2] Guay J, Johnson RL, Kopp S. Nerve blocks or no nerve blocks for pain control after elective hip replacement (arthroplasty) surgery in adults. Cochrane Database Syst Rev 2017;10:CD011608.

[3] Johnson RL, Amundson AW, Abdel MP, et al. Continuous posterior lumbar plexus nerve block versus periarticular injection with ropivacaine or liposomal bupivacaine for total hip arthroplasty: a three-arm randomized clinical trial. J Bone Joint Surg Am 2017;99:1836–45.

[4] Kuchálik J, Magnusson A, Lundin A, et al. Local infiltration analgesia or femoral nerve block for postoperative pain management in patients undergoing total hip arthroplasty. A randomized, double-blind study. Scand J Pain 2017;26:223–30.

[5] Steenberg J, Moller AM. Systematic review of the effect of fascia iliaca compartment block on hip fracture patients before operation. Br J Anaesth 2018;120:1368–80.

[6] White S, Stott P. Fascia iliaca block for primary hip arthroplasty. Anaesthesia 2017;72:409.

[7] Nielsen TD, Moriggl B, Barckman J, et al. The lateral femoral cutaneous nerve: description of the sensory territory and a novel ultrasound-guided nerve block technique. Reg Anesth Pain Med 2018;43:357–66.

[8] Shariat AN, Hadzic A, Xu D, et al. Fascia iliaca block for analgesia after hip arthroplasty: a randomized double-blind, placebo-controlled trial. Reg Anesth Pain Med 2013;38:201–5.

[9] Hebbard P, Ivanusic J, Sha S. Ultrasound-guided supra-inguinal fascia iliaca block: a cadaveric evaluation of a novel approach. Anaesthesia 2011;66:300–5.

[10] Hanna L, Gulati A, Graham A. The role of fascia iliaca blocks in hip fractures: a prospective case-control study and feasibility assessment of a junior-doctor-delivered service. ISRN orthop 2014;2014:191306.

[11] Fujihara Y, Fukumushi S, Nishio S, et al. Fascia iliaca compartment block: its efficacy in pain control for patients with proximal femoral fracture. J Orthop Sci 2013;18:793–7.