ABSTRACT
Locoregional anesthetic techniques in hip fracture are significant in order to control pain, reduce postoperative opioid use, and perioperative adverse events. Pericapsular nerve group (PENG) block has been described and proved as an effective analgesic method for hip surgery as an alternative to other regional nerve blocks. The association of PENG and lateral femoral cutaneous nerve (LFCN) block can be performed to achieve skin and subcutaneous tissues analgesia or anesthesia. Direct anterior approach PENG block is considered a safe and effective anesthesia technique for total hip arthroplasty surgery. In this paper, we aim to describe a case report of a PENG and LFCN block successful association for anesthesia in a major trauma patient who undergone surgical percutaneous fixation of femoral neck fracture.

Key words: Anesthesia, femoral neck surgery, ultrasound

Introduction
Perioperative locoregional anesthetic techniques in hip fracture surgery aim to manage pain control, reduce both opioid consumption and postoperative adverse events. Recently, a new locoregional technique was described for hip fracture analgesia: the pericapsular nerve group (PENG) block. This interfascial plane block can reach hip joint articular branches of femoral, obturator, and accessory obturator nerves. Sandri et al. reported PENG block associated with local infiltration analgesia as an anesthesia technique for the total hip arthroplasty with a direct anterior approach. This technique can be associated with lateral femoral cutaneous nerve (LFCN) block to obtain an analgesia/anesthesia of the skin and subcutaneous tissues.

The objective of this report is to describe combined PENG and LFCN block as an anesthetic technique in a major trauma patient who undergone a femoral neck fracture percutaneous fixation. Written consent for publication of this report was provided.

Case History
A 55-year-old man (175 cm, 75 kg), with medical history of hypertension, ASA status 2, was admitted to the intensive care unit with multiple injuries and polytrauma. On admission, the patient was classically unstable with multiple injuries, including a femoral neck fracture. The patient underwent surgical percutaneous fixation of the femoral neck fracture. During the surgery, a combined PENG and LFCN block was performed, providing effective analgesia and anesthesia to the surgical site.
Spinal surgery was not indicated and limited mobilization with cervical collar was prescribed.

During the ICU stay, patient was in spontaneous breathing with normal oxygen saturation and hemodynamical stability. First 48 h, the subject reported chest pain due to rib fractures. Numeric rating scale (NRS) score was 3 at rest and 6 in movement. Acetaminophen 8 mg/kg every 8 h and oral oxycodone 5 mg every 6–8 h for 48 h were administered with adequate pain control. Percutaneous fixation of the previous mentioned fracture was scheduled in 72 h from ICU admission.

The patient signed informed consent for intraoperative sedation and PENG with LFCN anesthetic blocks. The ultrasound (US) curvilinear probe (2–5 MHz) was positioned on a transverse plane over the anterior superior iliac spine with patient placed in supine position. The probe was rotated clockwise in order to be placed in parallel to the inguinal crease and to visualize all the following structures: femoral artery, iliopsoas muscle, and anterior inferior iliac spine (AIIS), with the iliopubic eminence and the psoas tendon deeply. A 22-gauge needle (Ultraplex 360, 30°, 80 mm BBraun) was inserted in-plane from the lateral side of the probe. Under US guidance, needle was moved forward until tip touched iliopubic eminence and, after negative aspiration, 15 mL of levobupivacaine 0.5% was carefully injected between the psoas tendon and the pubic ramus [Figure 1]. Successful injection was confirmed by anechoic fluid spreading between the bone and iliopsoas muscle.

LFCN block was performed using linear US probe (6–15 MHz) maintaining the patient in supine position. The probe was directed caudally to AIIS in order to visualize the LFCN between sartorius muscle and tensor fascia latae muscle. A 22-gauge needle (Ultraplex 360, 30°, 50 mm BBraun) was inserted “in plain,” and 5 mL levobupivacaine 0.5% was carefully injected [Figure 2].

The patient was sedated with target-controlled infusion of propofol (Schnieder model) with a target plasma concentration of 0.6–0.8 µg/mL and remifentanil (Minto model) with target plasma concentration of 0.7–0.8 ng/mL in order to reach a Richmond agitation-sedation scale score between 0/−1. After positioning the subject on a traction bed, three cannulated cancellous screws were placed in an inverted triangle, with the inferior screw along the calcar on the posterior-inferior neck to prevent inferior fracture displacement. During the procedure, the patient was spontaneously breathing with stable oxygen saturation values and hemodynamic parameters. In the postoperative period, patient did not receive additional analgesics apart from acetaminophen 8 mg/kg every 8 h as per indication. At 24 h after surgery, NRS score at rest was 2; at 48 h, NRS score at rest was 0 and NRS score at movement was 3.

**Discussion**

The case report showed clinical association of PENG and LFCN block for anesthesia in closed reduction percutaneous fixation in nondisplaced femoral neck fracture. In patients undergoing hip fracture surgery, regional blocks are often performed in order to control pain and favor a postoperative opioid sparing analgesia. PENG block was recently described and provides a spread of local anesthetic (LA) in the bursal space between the iliopsoas and anterior hip joint capsule where nociceptive nerve fibers pass. Thus, a pericapsular block that involves articular branches of femoral, obturator, and accessory obturator nerves was defined. Spinal anesthesia (SA) was excluded to limit chest and vertebral mobilization. In addition, general anesthesia (GA) was avoided because the use of mechanical ventilation with positive airway pressure could worsen the respiratory condition. PENG and LFCN block anesthesia technique is still not quite common, but it may reveal helpful in those conditions when GA or SA might be avoided. After PENG block, quadriceps muscle weakness
may occur secondary to femoral nerve blockade, but the motor function should be spared.\[7\] It has to be remarked that PENG block does not involve the sciatic hip joint branch. Furthermore, the LFCN covers the pin insertion sites but in case of larger incisions, LFCN block would be inadequate.\[8\] Therefore, to favor the positioning of the patient on traction bed, we opted for combining the two blocks with intraoperative sedation.

There is no specific recommendation about optimal LA dosage in using PENG block anesthesia.\[9\] We used a 20 mL single shot of LA (levobupivacaine 0.5%) to achieve a wide distribution and enhance anesthetic efficacy.

In our knowledge, this case report is the first clinical experience description of combined block (PENG and LFCN blocks) for anesthesia in a trauma patient with a femoral neck fracture.\[10\] Although more evidence is needed in effectiveness of this combined block anesthesia, our experience can suggest that this locoregional technique may be a feasible effective choice.

### Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest
There are no conflicts of interest.

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