

Ultrasound Guided Longitudinal Supra-Inguinal Fascia Iliaca Block for Hip Surgeries- A Prospective Study

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ABSTRACT

BACKGROUND

Hip fractures are very common in geriatric population with incidence increasing every year because of increased life expectancy. Effective postoperative pain management can result in early ambulation and reduced hospital stay. Peripheral nerve block techniques have been widely used for providing postoperative analgesia because of their less systemic effects among which, fascia iliaca compartment block will provide complete analgesia in hip surgeries as it blocks both femoral and lateral femoral cutaneous nerves.

METHODS

We conducted this case series to evaluate the analgesic efficacy of ultrasound guided suprainguinal fascia iliaca block with 30 ml of 0.25% bupivacaine with 0.5 µg/Kg dexmedetomidine. After obtaining institutional ethics committee and written informed consent, we included 50 patients belonging to ASA PS1, 2 posted for various hip surgeries. Patients who did not give consent and patients with history of coagulopathy were excluded from the study. All patients underwent the procedure under spinal anaesthesia. Once the procedure was over, patient was shifted to postoperative ICU, under sterile aseptic precautions, and ultrasound guided suprainguinal fascia iliaca block was given. Postoperative analgesia was assessed using VAS scale and patient's satisfaction using Likert's satisfaction score at 20 minutes, 6th hour, 12th hour, and 24th hour. Rescue analgesia was given with tramadol 0.5-1 mg/Kg when the VAS score was more than 4 and the total dose given in the 24 hours was noted.

RESULTS

We found that VAS score (ANOVA test) was less at 20 minutes, 6th hour and 12th hour ($p < 0.001$), which was statistically significant, and less rescue analgesic was required. Hence, we concluded that suprainguinal fascia iliaca block provides effective analgesia for hip procedures in elderly patients.

CONCLUSIONS

Suprainguinal fascia iliaca compartment block with 30 ml of 0.25% bupivacaine with 0.5 µg/Kg dexmedetomidine provides effective and prolonged analgesia with less rescue analgesic requirement and less systemic effects.

KEYWORDS

Fascia Iliaca Block, Hip Surgeries, Dexmedetomidine

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BACKGROUND

Hip fractures are very common in geriatric population with an incidence of 6 million osteoporotic hip fractures in India in 2013.^{1,2} This number might increase over the next decade because of the increasing life expectancy. A multidisciplinary approach to the geriatric patients aimed at providing effective postoperative analgesia will result in early ambulation and reduced hospital stay, thereby reducing the perioperative mortality and morbidity. But postoperative pain management in elderly patients is often poses a challenge to an anaesthesiologist. Several factors contribute to this difficulty in managing postoperative pain in geriatric patients because of their associated comorbidities like cardiac, renal, respiratory diseases and dementia.

Opioids in the postoperative period can result in excessive sedation, delirium, urinary retention, nausea, constipation, thereby increasing the hospital stay. Liberal use of NSAIDs cannot be recommended because of its adverse effect on renal system. Hence regional techniques like epidural infusion, femoral nerve block, fascia iliaca block, lumbar plexus block have been suggested with varying success.³⁻⁶ Epidural infusion can often result in motor block and hypotension, thereby affecting early mobility. So peripheral nerve block techniques are recommended in providing analgesia in the postoperative period, as they help in early ambulation with less systemic effects and less opioid requirement, thereby reducing the hospital stay.

Hip is innervated by femoral (L2-4), obturator (L2-4) and lateral femoral cutaneous nerves (L2-3). All these nerves transverse a compartment that spans the lower abdomen and anterior thigh and is confined anteriorly by fascia iliaca (fascia iliaca compartment). This lateral femoral cutaneous nerve, which provides sensory supply to the hip has variable course below the inguinal ligament. Whereas it has predictable course over suprainguinal ligament^{7,8} So depositing a sufficient volume of local anaesthetic deep to fascia iliaca can block the femoral and lateral femoral cutaneous nerves, thereby providing complete analgesia. In femoral nerve block, the lateral femoral cutaneous nerve can be missed, resulting in inadequate postoperative analgesia.

Our institute BIRRD (T) hospital is an exclusive orthopaedic institute, so we do get quite a number of elderly patients with hip fractures getting admitted for fracture fixation. So we decided to conduct this case series to evaluate the efficacy of ultrasound guided suprainguinal fascia iliaca block with 30 ml of 0.25% bupivacaine and 0.5 µg/Kg dexmedetomidine as a postoperative analgesic technique, as dexmedetomidine, an additive to local anaesthetics in peripheral nerve block has been well approved in many studies to prolong the duration of analgesia.^{9,10}

METHODS

After obtaining institutional ethics committee approval, fifty patients belonging to ASA physical status 1,2 posted for hip

surgeries like dynamic hip screw, posterior femoral nailing, intramedullary femur nailing were included in the study. Patient who did not give consent, history of any coagulopathy, allergy to local anaesthetics were excluded from the study. Standard nil per oral guidelines were followed, 6 hours for solids and 2 hours for liquids. Written informed consent was obtained. Procedures were completed under spinal anaesthesia with 12.5-15 mg bupivacaine. Once the patient was shifted to the postoperative period, standard monitors like NIBP, SpO₂, ECG were connected.

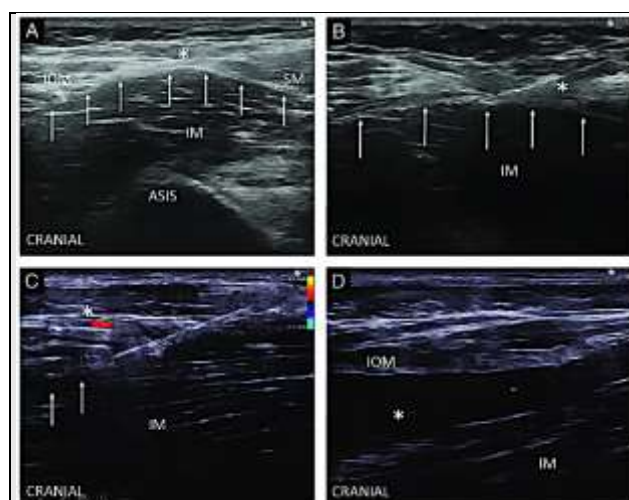


Figure 1. Ultrasound Image of Structures in Longitudinal Suprainguinal FICB

- A- Ultrasound image - Internal oblique muscle IOM, Sartorius muscle SM, iliacus muscle IM, anterior superior iliac spine ASIS.
- B- In-plane needle introduction in fascia iliaca, arrow marks indicate fascia iliaca.
- C- Start of injection, superficial artery is superficial to fascia iliaca.
- D- Ultrasound image after injection.

Under sterile aseptic precautions, patient in supine position, block site was cleaned with betadine; ultrasound with a 10-15-MHz linear transducer was used. A sterile cover was applied to the probe, and the anterior superior iliac spine was palpated. The probe is placed over the inguinal ligament, close to the anterior superior iliac spine, and orientated in the para-sagittal plane (Figure 1). In obese patients, an assistant retracted the abdominal wall. Initially, the thick white line of the ilium and then the more superficial, dark (echolucent) iliacus muscle with the fascia iliaca covering its surface were identified. The deep circumflex iliac artery was identified superficial to the fascia iliaca 1-2 cm superior to the inguinal ligament, as it forms a landmark for the needle placement. The needle was then introduced through the skin, parallel to the probe, in-plane (with respect to the ultrasound beam), approximately 2-4 cm inferior to the inguinal ligament, and is advanced through the fascia iliaca at the level of the inguinal ligament. A 'pop' was felt as the needle passes through the fascia iliaca and into the iliacus muscle. The needle was withdrawn to the fascia and the position confirmed by an injection of 1 ml of local anaesthetic, which, if correctly placed, forms a lens deep to the fascia. The needle was advanced into the lens and further local anaesthetic was injected. The injected drug

must spread freely across the surface of the muscle, separated from the deep circumflex iliac artery by the fascia iliaca. The end-point was reached when the local anaesthetic passes freely superiorly, over the iliacus muscle and into the iliac fossa.

Postoperative analgesia was assessed using visual analogue scores at 20 minutes, 6th hour, 12th hour, 24th hour. Rescue analgesia with inj. tramadol 0.5-1 mg/Kg I.V. was given when the VAS score was more than 5. Patient's satisfaction was assessed using Likert's satisfaction scale (5-point scale) from dissatisfied to extremely satisfied at 20 minutes, 6th hour, 12th hour, 24th hour. (Figure 2)

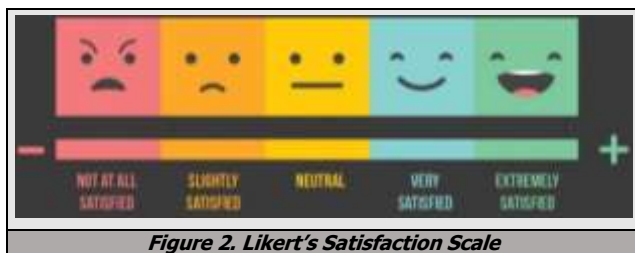


Figure 2. Likert's Satisfaction Scale

First analgesic requirement time and total tramadol used in the first 24 hours were noted. We also monitored for any adverse effects like bradycardia and hypotension and were treated accordingly.

RESULTS

Statistical analysis was done using SPSS Software version 15. Demographic data were compared using student's t test and normal distribution variables were presented as mean ± SD, patient's satisfaction scores with Fischer's exact test and VAS scale with ANOVA test. P value <0.01 was considered statistically significant.

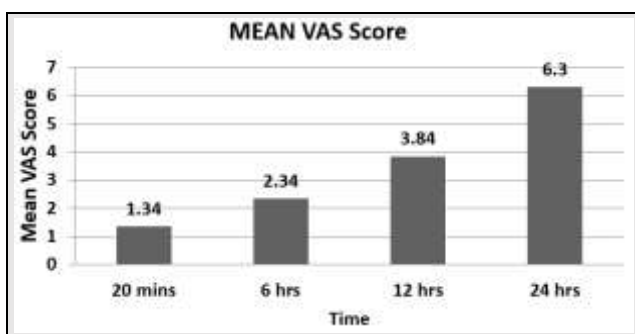


Table 1. VAS Scores at Various Intervals in the Post-Operative Period

Fifty patients were included in the study, out of which 27 were male and 23 were female. Mean age was 61.0 ± 14.5. Seven dynamic hip screw (DHS) fixation, seventeen PFN (posterior femoral nailing), seven bipolar hemiarthroplasty, nineteen hip replacement surgeries were included in this study. Mean duration of surgery was 1.7 ± 0.3 hours (mean ± SD). Average time request for the first analgesic was 497.4 ± 40.69 minutes (mean ± SD). Total tramadol used in the first 24 hours in the postoperative

period was 43.5 ± 18.77 mg (mean ± SD). VAS score was less at 20 minutes (1.34 ± 0.48), 6th hour (2.34 ± 0.74), 12th hour (3.84 ± 0.84) and 24th hour (6.30 ± 0.79), with p value of <0.01, which was statistically significant (table 1). Patient's satisfaction score was compared using Fischer exact test, with p value of >0.01, which was statistically insignificant.

DISCUSSION

Hip is innervated by nerve fibres from femoral (L2-4), obturator (L2-4) and posteriorly sciatic nerves. Cutaneous supply is by lateral femoral cutaneous nerve, which arises from anterior division of L2, 3. Then it emerges at the lateral edge of the psoas muscle group, below the ilioinguinal nerve, and then passes beneath the iliac fascia and the inguinal ligament. It divides into two branches - anterior and posterior - eight to ten centimetres below the spine, where it also emerges from the fascia lata. The anterior branch supplies the skin of the anterior and lateral regions of the thigh to the knee, while the posterior branch supplies the lateral portion of the thigh, from the greater trochanter in the hip, to mid-thigh, just above the knee.

This lateral femoral cutaneous nerve can be blocked through supra inguinal or infra inguinal approach. This nerve has an inconsistent course below the inguinal ligament with variable branches, can pass superficial or deep to the inguinal ligament, leading to increased failure rate when blocked at infrainguinal site. However, the nerve has a very predictable course above the inguinal ligament, superficial to the iliacus muscle, deep to the fascia iliaca.

Hebbard et al described an infrainguinal approach to suprainguinal needle placement.¹¹ But long needle path and difficulty in imaging the fascial plane, especially in obese patients make this approach difficult. Kris Vermeulen et al compared suprainguinal and infrainguinal injection for fascia iliaca compartment block in more consistent spread towards the lumbar plexus and have concluded that suprainguinal approach produces more consistent sensory block of the medial, anterior and lateral thigh, by blocking femoral, obturator and lateral femoral cutaneous nerves, which was confirmed through MRI.¹² We have used longitudinal suprainguinal approach in our study because of our familiarity with the technique, its ease in obese patients and also it leads to more proximal spread of local anaesthetic, thereby blocking all the targeted nerves, resulting in adequate postoperative analgesia with less VAS scores.

Michael bullock et al conducted a case series of five patients with ultrasound guided suprainguinal fascia iliaca block for total hip arthroplasty surgery.¹³ They have concluded that fascia iliac compartment block provides effective analgesia with less opioid consumption. Sivakumar et al compared fascia iliaca block (FICB) with 0.35 % ropivacaine and 50 µg dexmedetomidine vs no block (control group) in fifty patients, undergoing hip surgeries in elderly patients.¹⁴ They have concluded that FICB provides effective analgesia with less VAS scores and adding dexmedetomidine

increases the duration of analgesia by 18-24.3 hours with minimum haemodynamic instability and sedation.

Matthias Desmet et al compared large volume 40 mL of 0.5% ropivacaine in longitudinal suprainguinal fascia iliaca compartment block versus no block in 88 patients, undergoing total hip arthroplasty and have concluded that FICB reduces the morphine consumption in the postoperative period.¹⁵

In our study, we have used ultrasound guided longitudinal suprainguinal approach to fascia iliaca compartment block, with 30 ml of 0.25% bupivacaine and 0.5 µg/Kg of dexmedetomidine and our success rate was 100%. We have found that this technique provides effective analgesia with less VAS scores at 20 minutes, 6th hour, 12th hour and 24th hour. Mean time for first analgesic requirement in our study was 497.4 ± 40.69 minutes. Patients in our series required less tramadol in the first 24 hr period with mean dose of 43.5 ± 18.77 mg. Similar to Matthias Desmet et al, we also found that our patients required less tramadol in the first 24 hrs postoperatively.

Dexmedetomidine acts as an additive in peripheral nerve blocks have been concluded in many studies. So, we have added dexmedetomidine in the dose of 0.5 µg/Kg to 0.25% bupivacaine and we have found that it prolonged the duration of analgesia with first analgesic requirement was around 497.4 ± 40.69 minutes (mean ± SD). No adverse effects like bradycardia and hypotension due to dexmedetomidine was noted.

CONCLUSIONS

Suprainguinal fascia iliaca compartment block with 30 ml of 0.25% bupivacaine with 0.5 µg/Kg dexmedetomidine provides effective and prolonged analgesia with less rescue analgesic requirement and less systemic effects.

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