

Paulina Mysliwy¹
Waldemar Hładki²

¹The Queen Elizabeth Hospital NHS Trust,
King's Lynn, UK
Department of Anaesthetics
and Department of Orthopaedic Surgery

²Emergency Medicine and Multiple Trauma
Department
IInd Chair of General Surgery
Collegium Medicum, Jagiellonian University,
Cracow Poland

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Responsible for correspondence:

Adres do korespondencji:

Dr Paulina Mysliwy
The Queen Elizabeth Hospital NHS Trust
King's Lynn, UK
e-mail: paumys@yahoo.com

Fascia iliaca compartment block

Blok przedziału powięzi biodrowej

Fascia iliaca compartment block was first described as a single injection procedure for blocking the femoral, lateral cutaneous and obturator nerves. It was made by Australian ER physician who was looking for help with hip fracture patients. The block is easy to learn, free of complications and effective. It also does not require ultrasound guidance to perform. The block is recommended for pre- and post-operative pain treatment in patients with femur fractures. This block is also useful for pain relief for procedures and injuries involving the hip, anterior thigh and knee. It is similar to "3 in 1" block but provides more reliable method of reaching the lumbar plexus.

Blok przedziału powięzi biodrowej został po raz pierwszy opisany przez australijskiego lekarza specjalizującego się w medycynie ratunkowej chcącego usmierzyć ból u pacjenta ze złamaniem szyjki kości udowej. Początkowo został opisany jako pojedyncza procedura służąca do blokady nerwu udowego, skórniego boczno-uda oraz nerwu zasłonowego. Blok jest bezpieczny, łatwy do wykonania oraz skuteczny. Nie wymaga też użycia USG. Jest polecany u pacjentów ze złamaniem kości udowej zarówno w okresie przedoperacyjnym jak i pooperacyjnym celem zniesienia bólu. Stosowany jest także w przypadku obrażeń okolicy biodra, uda oraz kolana. Ponadto ułatwia także przyjęcie przez pacjenta pozycji siedzącej celem wykonania znieczulenia podpajęczynówkowego. Jest podobny do bloku „3 w 1”, ale znacznie lepiej penetruje do splotu lędźwiowego.

Introduction

The fascia iliaca is located anterior to the iliacus muscle within the pelvis. It is bounded supero-laterally by the iliac crest and medially merges with the fascia overlying psoas muscle.

The femoral nerve (arising from L2, L3, L4 roots) and the lateral cutaneous nerve (arising from L2, L3 roots) lies under the iliacus fascia. The obturator anterior and posterior nerves (arising from L2, L3, L4 roots) innervate a portion of the distal and medial thigh and cross deep the iliacus muscle. They are not always involved in the FICB and are not very important in pain relief of the hip and the knee. All these nerves belong to the lumbar plexus, which is made up of the nerve roots from Th12 to L5.

The local anaesthetics should spread between the iliacus muscle and the fascia iliaca. Because this is a compartment block the volume of the local anaesthetic has to be adequate for optimal distribution around the nerves.

The fascia iliaca compartment block is suitable for single shot injection or for catheter implantation.

Backgrounds and objectives

The pain in patients with hip fractures is very often treated by administering opioids and a huge doses of pain-killers like paracetamol and non-steroids. The opioids have lots of side-effects and especially in older patients are not always well tolerated. On the other hand non-steroids in the same group of patients are very often contraindicated. In October 2009 the anaesthetists from the Thomas Jefferson University of Philadelphia [1] showed the natural history of pain in patients undergoing elective arthroplasty [1]. For Total Hip Arthroplasty average pa-

tient age is 60.52 years and duration of pain is 45.76 months prior to surgery. For Total Knee Arthroplasty average patient age is 60 years and duration of pain is 130.57 months prior to surgery. The patients have prescribed pain-killers and opioids for a long time before the operation. There is a different situation in acute surgery. The patients are usually older and ASA stage is often 3 or more. The time for preparing the patients for operation is shorter. The performing the anaesthesia is more difficult because of the pain. The spinal anaesthesia seems to be more often performed and is more popular between anaesthetists. The block with local anaesthetics for the pain treatment seems to be the golden standard before positioning the patient in sitting position for spinal anaesthesia.

The fascia iliaca compartment block can be made by anaesthetists before the operation as well as physicians working in Emergency Department for pre-op pain treatment.

Under aseptic conditions the 50mm, 21G intramuscular needle is inserted perpendicular to the skin 1cm below the juncture of the lateral and medial two-thirds of the line which joins the anterior superior iliac spine and the pubic tubercle. The needle is inserted until a loss of resistance, which has to be felt twice. Once because of fascia lata and the other one because of fascia iliaca. The local anaesthetic then is injected, usually about 0.3 ml/kg of 0.25% Levobupivacaine. The Lignocaine and Ropivacaine are also used for the block, depends on the preference. This block can be also performed under ultrasound, which is very easy to learn. The spread of the local anaesthetics is perfectly visualised between the anatomical structures.

Material and Method

The patients undergoing elective and emergency hip and knee joint operations under spinal single shot anaesthesia have performed the fascia iliaca compartment block in the anaesthetic room. In supine position the 20-40 ml (depends on weight) of 0.25% Levobupivacaine is injected. The block is made without nerve stimulator, using the loss resistance method - two clicks (the first-fascia lata and the second fascia iliaca). After 10-20 min the sitting position is well tolerated and spinal single shot anaesthesia with 0.5% Marcaine is performed.

Post operation paracetamol 1g every 6 hour is administered. If there are not contraindications non-steroids are prescribed (diclofenac) and tramadol/codeine/morphine depends on pain.

Discussion

The fascia iliaca compartment block (FICB) is very often performed for pain control in adult and children patients. In 2003 Lopez S, Gros T. et al. described the FICB in 27 patients with femur fracture arrived to Trauma Centre [2]. The block was performed with 20 ml of 1.5% lidocaine with epinephrine. The pain was measured using the Simplified Verbal Scale (SVS) from 0 (no pain) to 4 (extreme pain) The pain score was done prior to block, 10 minutes after the block and on admission to the Trauma Centre. The SVS was 3-4 before the block, 0-2 10 minutes post block and 0 when arriving to Trauma Center. The sensory blockade was evaluated using cold perception in the lateral, medial and internal part of the thigh 10 minutes after the block and on arrival to Trauma Centre. The SVS was lower when the internal part of the thigh was blocked, which is an early predictive sign of optimal pain relief. Only one patient required supplemental analgesia. There were not any adverse complications. The authors concluded that the FICB is faster and more consistent simultaneous blockade of the femoral and lateral cutaneous nerves compared with "3 in 1" block.

Capdevila X et al. compared the "3 in 1" block and FICB [3]. They studied pain control, sensory and motor blockades and radiographically visualised spread of local anaesthetic. The analysis was performed in 100 adults after lower limb surgery with 30 ml of 2% lidocaine with 1:200,000 epinephrine and 0.5% bupivacaine and 5 ml of contrast media (iopamodol). Complete lumbar plexus blockade was achieved in 38% "3 in 1" and 34% FICB patients. Sensory block of the femoral and genitofemoral nerves were similar, but sensory block of the obturator and lateral femoral cutaneous nerves was obtained in 52% and 38%, and 62% and 90% compared patients with "3 in 1" and FICB. Concurrent internal and external spread of the local anaesthetic solution under the fascia iliaca and between the iliacus and psoas muscles was noted in 62 of the 92 block procedures analyzed radiographically. The local anaesthetic solution reached the lumbar plexus in only five radiographs. The authors concluded that in adults the two anterior approaches "3 in 1" and FICB provide effective postoperative analgesia. The FICB provides faster and more consistent simultaneous blockade of the lateral femoral cutaneous nerve and femoral nerve. In their opinion the sensory block is caused by the spread of local anaesthetic solution under the fascia iliaca and only

rarely to the lumbar plexus.

A very interesting comparison of the FICB with "3 in 1" in children was made in 1989 by Dalens B. et al. [4]. They performed FICB and "3 in 1" block in two groups of 60 pediatric patients both aged 7 months to 17 years undergoing surgery of the lower limb. In the FICB authors were injected local anaesthetics immediately behind the fascia iliaca at the union of the lateral with the two medial thirds of the inguinal ligament, and forcing it upward by finger compression. The adequate analgesia was obtained in 20% "3 in 1 patients" and more than 90% "FICB patients". They concluded that FICB is easier, much more effective and free of complications. The authors think that such a high failure rate in "3 in 1 patients" compared with "FICB patients" is connected with easier spread of local anaesthetics around the femoral, lateral cutaneous and obturator nerves using FICB. This research was performed in 1989 and was one of the first comparisons of those two blocks, recommended in pediatric surgery. Twenty years later anaesthetists can use nerve stimulators and ultrasound technique to perform the blocks and this twenty years seem to have been ages in anaesthesia.

In 2001 Paut O. et al. described the continuous FICB for pain relief post operation of femoral shaft fracture in 20 children [5]. A bolus dose of 0.25% bupivacaine with epinephrine (0.3 mg/kg) was followed by a continuous administration of 0.1% bupivacaine (0.03mg/kg/h) for 48 hours. The heart rate, arterial blood pressure, respiratory rate and pain score were measured every 4 hours during 48 hours. Plasma bupivacaine levels were determined at 24 and 48 hours using gas liquid chromatography. No significant differences were found between mean plasma bupivacaine levels at 24 hours and 48 hours. The FICB provided adequate analgesia in most cases. No severe adverse effects were noted, which means that continuous FICB is well tolerated and safe in children.

In 2004 Candal-Couto J. et al. described 30 patients with Neck Of Femur (NOF) fracture including those with dementia (12 patients) and mean age 77 years [6]. Patients with significant coagulopathy, allergy to local anaesthetics or other concomitant lower limb injuries were excluded. Each procedure took 10-15 min and only required one attempt. The authors performed the fascia iliaca blocks using a modified technique avoiding the need for nerve stimulation or parathesiae. They used a standard polyamide plexus catheter set (Pajunk perilong). Under local anaesthetics (lignocaine 1%) of insertion point, 2cm lateral to the femoral artery and 1cm inferior to the inguinal ligament, the plastic introducing cannula over a blunt needle was inserted subcutaneously once the correct plane was found. This plane was identified by passing the needle through 2 clicks (fascia lata and fascia iliaca). If resistance to injection or paresthesiae were encountered the cannula was repositioned. The 15ml of 0.5% levo-bupivacaine was injected. Depends on weight of patient the authors injected via catheter 30ml (patients more than 70kg), 25ml (patient between 50kg-70kg) and 20ml (patients less than 50kg). Then the introducing cannula was removed and the catheter was left in situ for top-up injections. The measurements were done pre- and 1 hour post block. The Sitting Scale, Pain-free passive flexion of the hip and Visual Analogue Scale was used.

Post block 24 patients managed a Sitting Score of >2 (semirecumbant using >2 pillows) as compared to none prior to block. Flexion improved by mean 44 degree post block and Visual Analogue Scale (VAS) improved from 7.2 to 4.6 post block.

In 2006 Monzon et al. tested the efficacy of using FICB administered by physicians working in the Emergency Department [7]. The block was performed to 63 adults, mean age 73.5 with NOF fracture. The pain was measured on Visual Analogue Scale (VAS) before, and at 15 minutes, 2 hours, 8 hours post block. Post block pain was reduced in all patients. Using VAS before the block the pain ranged from 2 to 10, at 15 minutes after the block VAS ranged from 1 to 7, at 2 hours post injection the pain ranged from 2 to 6 and 8 hours post it ranged from 4 to 7. The 0.25% bupivacaine was used to perform the block, 0.3 ml/kg. There were no systemic complications, but there were 2 local hematomas. Physicians who were injecting the local anaesthetics were successfully learning in less than 5 minutes the technique of the block. The conclusion made after this study describes this block as rapid, effective, safe and easy to learn.

The continuous FICB is also successfully used for pain treatment in burn patients undergoing skin grafting procedures [8].

Conclusion

1. The fascia iliaca compartment block is a simple, low risk and easy to learn block for pain relief.
2. The block is useful for procedures involving the hip, anterior thigh and knee.
3. The block does not need an expensive equipment.
4. Can be performed pre- and post-operation by anesthetist as well as physician working in the emergency department.

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