A Robust Approach to Implementing Fascia Iliaca Compartment Nerve Blocks in Hip Fracture Patients

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BACKGROUND: A clear imperative exists to optimize the preoperative pain management of hip fracture patients. Increasingly, fascia iliaca compartment blocks (FICBs) are being effectively utilized as an adjunct to oral analgesia in the emergency department.

PURPOSE: We investigated the feasibility, safety, and delivery rate when junior doctors and specialist nurses are trained in FICBs delivery, alongside the introduction of a step-by-step proforma.

METHODS: We conducted a retrospective study of hip fractures patients presenting preinterventions (n = 138) between October and December 2014 and postinterventions (n = 246) between April and August 2015. Outcomes analyzed included delivery frequency, anesthetic dosages used, and procedure documentation.

RESULTS: Preintervention, FICB was performed in 40% (n = 51) of eligible patients, with an improvement to 72% (n = 160) postintervention. Postinterventions, 98% of FICBs were performed with the anesthetic dose recommended—a prescription between 75 and 100 mg of 0.25% levobupivacaine. No adverse patient outcomes, relating to the interventions implemented, were noted during the study period.

CONCLUSION: Delivery of FICB by junior doctors and specialist nurses in the emergency department is feasible, safe, and improves the proportion of patients receiving blocks.

Introduction

As a result of an aging population, according to epidemiologic projections, the global annual number of hip fractures will rise to 6.26 million by the year 2050 (Kannus et al., 1996). Currently, an estimated 65,000 hip fractures occur annually in the United Kingdom, with the incidence reported as 349 per 100,000 for females and 140 per 100,000 for males (Kanis, Odén, & McCloskey, 2012). Hip fracture patients have an average 8% mortality at 30 days and up to 30% mortality at 1 year (British Orthopaedic Association, 2012). In comparison, an estimated 340,000 hip fractures occur annually in the United States, with an incidence of 260 per 100,000 for females and 122 per 100,000 for males (Ettinger, Black, Dawson-Hughes, Pressman, & Melton, 2010). However, the US age-adjusted incidence in those older than 65 years was 793.5 per 100,000 for women and 369.0 per 100,000 for men. Although age-adjusted mortality and hip fracture incidence declined in the United States from 1995 to 2005, patients are more likely to have comorbidities such as congestive heart failure, chronic pulmonary disease, and diabetes (Brauer, Coca-Perraillon, Cutler, & Rosen, 2009). Patients with more comorbidities have higher rates of postoperative complications associated with an increased healthcare burden (Menzies, Mendelson, Kates, & Friedman, 2012). Prior to surgical fixation, hip fracture patients often experience high levels of pain and distress. Achieving effective analgesia preoperatively while avoiding adverse effects of drugs can be challenging, particularly in this increasingly frail and comorbid population.

A fascia iliaca compartment block (FICB) is an established regional anesthetic technique that can be reliably performed using anatomical landmarks, resulting in a block of the femoral, lateral cutaneous, and obturator nerves. The FICB utilizes a high-volume, low-concentration bolus to provide cutaneous anesthesia for up to 10 hours. The delivery approach avoids the femoral artery and the vein (see Figure 1), hence its suitability for acutely diagnosed hip fractures in the emergency department (ED). It provides
effective pain relief, costs little, is minimally invasive, and can have an opioid sparing effect (Elkhodair, Mortazavi, Chester, & Pereira, 2011; Godoy Monzon, Iserson, & Vavquez, 2007). In addition, FICBs have a rapid onset and are as effective as parenteral non-steroidal anti-inflammatory drugs, which can be hazardous in the elderly (Godoy Monzón, Vazquez, Jauregui, & Iserson, 2010). A particular benefit of FICB delivery is that it is protective for patients with an intermediate risk of developing postoperative delirium (Mouzopoulos et al., 2009).

Traditionally, regional anesthesia has been performed by the anesthetic team. However, in recent years, delivery by emergency physicians has been advocated (Elkhodair et al., 2011; Mittal & Vermani, 2014). The authors suggest extending this to include junior clerking doctors (resident doctors) and emergency and anesthetic nurse practitioners.

Although the benefits of regional anesthesia are well recognized, receipt is not universally assured for hip fracture patients. Indeed, a survey of 230 U.K. EDs found that only 55% gave femoral nerve blocks regularly and 16% occasionally by any technique (Mittal & Vermani, 2014). An examination of practice at the Royal Devon and Exeter Hospital demonstrated a suboptimal frequency of FICB delivery and significant inconsistencies in delivery practices.

The aim of this study was to outline measures taken to standardize, promote, and improve FICB delivery in hip fracture patients at our institution.

Methods
To obtain a baseline, we conducted a retrospective chart review of 138 consecutive patients presenting to the ED with hip fractures, between October and December 2014. Interventions aiming to improve practice were implemented including training of personnel on the technique, updating guidelines, and ensuring that guidelines were easily accessible to clinicians.

Junior doctors of all levels (n = 10) consulting in the ED, emergency nurse practitioners (ENPs; n = 3), and anesthetic nurse practitioners (n = 3) received group or individual tutorials in performing FICB. Prior to the study, junior doctors and ENPs were not delivering FICB, and no formalized training in FICB delivery had been provided for this group. Following training, individuals delivering FICB were directly supervised until they were deemed competent (typically fewer than three procedures).

As a quality aid, a concise proforma was introduced with preprocedure, procedure, and postprocedure sections. This serves as an aide-memoire to the landmark technique, ensuring clear documentation of the procedure and absence of contraindications, as shown in Figure 2.

A new guideline was introduced that promotes FICB delivery in the ED during the first 4 hours from arrival for all patients with acute, radiologically diagnosed hip fractures. We utilized the evidence presented in the American Academy of Orthopaedic Surgeons (AAOS) clinical guideline regarding preoperative regional anesthesia. We advocate the use of levobupivacaine—30 mL for patients weighing between 40 and 60 kg and 40 mL for those more than 60 kg (based on an estimated weight). Postdelivery, monitoring for signs of local anesthetic toxicity (such as tinnitus, blurred vision, drowsiness, seizure, cardiovascular compromise) is mandatory, with observations every 5 minutes for 20 minutes.

All hip fracture patients were included with exclusion criteria defined as patients with any of the following: international normalized ratio of more than 2.5; known sensitivity to local anesthetic; body mass index of more than 40, previous femoral bypass surgery, or unable to landmark the femoral artery. Furthermore, patients with capacity gave verbal consent for the procedure, with patients who refused being excluded from analysis.

Following the interventions outlined, a retrospective chart review of 236 patients presenting between April and August 2015 was performed. We detail FICB utilization rates, dosages of anesthetic used, and documented absence of complications pre- and postinterventions.

Results
Preintervention, FICB was performed in 40% (n = 51) of eligible patients (ineligible n = 11), with an improvement to 72% (n = 160) postintervention (ineligible n = 14), see Figures 3a and b. The dose of local anesthetic used preintervention was inconsistent, ranging from 25 to 125 mg of levobupivacaine. Postintervention, of those who recorded a dose, 98% (n = 217) followed departmental guidelines using between 75 and 100 mg of 0.25% levobupivacaine.

Incomplete procedure documentation occurred in all cases preintervention. Postintervention of the 160
procedures, the new proforma was used in 85% \((n = 136)\) with full completion in 36% \((n = 58)\). Subsequently, most areas of documentation significantly improved pre- versus postintervention, with clinicians recording aseptic technique in 62% \((n = 79)\) versus 65% \((n = 144)\), verbal consent in 9% \((n = 11)\) versus 37% \((n = 82)\), absence of generic complications in 46% \((n = 58)\) versus 64% \((n = 142)\), and absence of resistant to injection 4% \((n = 5)\) versus 31% \((n = 69);\) see Table 1).
No adverse patient outcomes, relating to the interventions implemented, were recorded during the study period. The new guidance was approved by the clinical governance department with no issues subsequently raised by clinicians. No difficulties were encountered in training of individuals to deliver FICB by the landmark technique. Close supervision of personnel until they were deemed competent ensured that FICBs were being delivered safely and with confidence.

### Discussion

Three priorities to improve practice were identified, namely, to increase the frequency of FICB delivery to meet the needs of our patients and service; ensure that correct anesthetic doses were used; and improve the procedure documentation. Achieving these aims required a systematic and multidisciplinary approach.

Although delivering regional anesthesia falls within an emergency physician’s remit, extending this training to others, such as the orthopaedic junior doctors and specialist nurse practitioners seemed prudent. Simply having more individuals able to perform FICB may partly account for the improved delivery frequency from 40% to 72%. Although we demonstrate significant improvements in delivery rates in the postintervention period, it cannot be assumed that this will be sustained unless ongoing training and support are provided.

One limitation to the study was that a landmark technique for FICB was taught, which may be inferior to ultrasound-guided regional anesthesia techniques. A meta-analysis of ultrasound-guided regional anesthesia concluded that it has a clinically significant higher success rate, faster onset, lasts longer, and has a lower risk of vascular puncture (Abrahms, Aziz, Fu, & Horn, 2009). Furthermore, advocates of ultrasound-guidance technique suggest that its use mitigates the complication of an intraneuronal injection, which is estimated to lead to permanent nerve damage in 1:5,000 to 1:10,000. (Auroy, Benhamou, & Bargues, 2002). Nevertheless, FICBs are simple to learn. Godoy Monzon et al. (2007) report that the technique can be learned and performed with less than 5 minutes of instruction. Although we dedicated longer teaching periods for the technique and ensured close supervision, all those trained readily gained competency. Given that FICB is an effective and safe means for achieving effective immediate pain control in hip fracture patients (Elkhodair et al., 2011; Fletcher, Rigby, & Heyes, 2003; Godoy Monzon et al., 2007) and the fact that the AAOS continues to advocate FICB as a feasible technique in this context (American Academy of Orthopaedic Surgery, 2014), training practitioners in safe administration may enhance pain management approaches for this population. The training, close supervision, and proforma promoted effective and safe practice, as well as encouraged comprehensive documentation. In addition, the proforma acted as an aide-memoire of the contraindications and correct local anesthetic dosage, which is particularly beneficial to doctors and nurses with less experience performing the procedure.

This study demonstrates that junior doctors, ENPs, and anesthetic nurse practitioners can feasibly deliver FICB in the ED setting. Translation to other environments, such as a ward, cannot be ensured, as the levels of supervision may differ. However, given FICB can feasibly be given by emergency medical service nurses in the prehospital setting, delivery by specialist orthopaedic nurses, as a means to improving patient care, needs to be addressed (Dochez et al., 2014). In this regard, further study of the delivery of FICB by specialist orthopaedic nurses is required.

### Conclusion

Delivery of FICBs by junior doctors, ENPs, and anesthetic nurse practitioners in the ED is feasible, safe, and improves the proportion of patients receiving blocks.

### REFERENCES


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