Nerve Block for Hip Fracture,

Should it Become Routine Practice?

Dr Alistair Innes

Word Count: 3011

I declare this clinical topic review to be my own work.
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Introduction & Background

An estimated 75000 hip fractures present to Emergency Departments across the UK each year\(^1\). Health service costs are around £12000 for each broken hip\(^2\), with 1.5 million hospital bed days\(^3\), so NHS resource implications are considerable. In addition, with a 30 day mortality of 10\%, a 1 year mortality of 30\% and an additional £1 billion in costs to the social sector and families in after care\(^1\), there are significant personal implications for each individual who presents with such an injury.

There is a large body of work in the medical literature relevant to the care of hip fracture patients, which has helped form opinion during the development of guidance from NICE\(^1\), SIGN\(^2\) and the AAGBI\(^3\). It is the Emergency Department management, and in particular analgesic strategies which I wish to explore in this Clinical Topic Review.

Standard practice in the UK is to use IV opiates for analgesia in patients with hip fracture – recommended by both NICE\(^1\) and SIGN\(^2\). However with an average age of 83 and a high prevalence of co-morbidity\(^1\), the use of IV opiates in this patient group is not without its problems. The AAGBI guidance indicates that approximately 40\% will have a degree of renal impairment (GFR <60)\(^3\).

Therefore IV opiates need to be used with due caution, and consequently there is the risk of oligoanalgesia - pain being undertreated. The renal implications also add a relative contra-indication to the use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), which are explicitly not recommended in the NICE guidance\(^1\).

Paracetamol offers an alternative strategy for pain relief; although it would be anticipated that it alone would be insufficient analgesia for hip fracture. However both NICE\(^1\) and AAGBI\(^3\) recommend regular paracetamol as part of an analgesic strategy.
The evidence for paracetamol use in hip fracture is sparse, but one interesting study does highlight an opioid sparing effect of IV versus PO paracetamol in pre-operative patients.

The final modality of pain relief I would like to consider would be that of regional anaesthesia. Since Winnie in 1973, Finlayson in 1988 and Dalens in 1989 considered the Femoral block and the Fascia Iliaca Block (FIB), there have been many studies comparing approaches, techniques, timings and different controls.

Many of these were meta-analysed in the 2002 Cochrane review, reviewed and assessed as up to date in October 2008, which itself was used to inform opinion in the NICE, SIGN and AAGBI guidelines. The review concluded that nerve block for hip fracture reduced pain and the need for supplemental parenteral analgesia. However due to flaws in the studies analysed, no conclusion could be drawn as to which approach was best, or whether medical complications of parenteral medication or length of stay were affected.

This is reflected in the above guidelines recommending consideration of nerve blocks for analgesia in hip fracture, but none recommending the use of regional anaesthesia as a routine part of analgesic strategy. Indeed one Systematic Review interprets the NICE guidance as advising that nerve block should only be used where paracetamol and opiate use resulted in inadequate analgesia.
The Clinical Setting

The setting in which I work, at the MacKinnon Memorial Hospital in Broadford on the Isle of Skye, is remote and rural. I work as part of a 9 doctor team in a community hospital with an annual ED census of around 9000, each year we will admit around 18 patients with fractured neck of femur. Our local District General Hospital is Raigmore in Inverness, where our Orthopaedic department is located – a 90 mile, 2 hour trip in the back of an ambulance.

With a background of 2 years as an anaesthetics trainee earlier in my career, I am an enthusiast of regional anaesthesia; however it appears that I am in the minority amongst my colleagues. A straw poll I conducted revealed that only 3 of us would routinely perform a nerve block for our hip fracture patients. This compares with a national rate of 44% according to a recent survey\textsuperscript{10}.

Considering the distance our patients have to travel to get to definitive surgical management, and the low use of nerve blocks amongst my colleagues, it occurred that there may be scope for improving our management and ensuring better patient care. To that end, I wondered whether any new literature had been published since the update of the Cochrane Review in 2008, which would give an evidence base for altering practice to include the routine use of regional anaesthetia for all hip fracture patients presenting at our hospital.
The clinical question was defined using the three part PICO method:

Patient - Hip fracture patients

Intervention - Regional nerve block

Control - Standard care

Outcome - Better pain control

‘In (hip fracture patients), does (regional nerve block) compared to (standard care) result in (better pain control)?’

During the literature search a secondary question occurred:

Patient - Hip fracture patients

Intervention - Fascia iliaca block

Control - Femoral nerve block

Outcome - Better pain control

‘In (hip fracture patients), does (fascia iliaca block) compared to (femoral nerve block) result in (better pain control)?’
NHS Scotland’s Knowledge Network online library was used – resources include Medline, Embase, Cinahl and the Cochrane Library. Multiple searches were completed to ensure no relevant papers were overlooked. The search terms used were:


In addition to my searches, our medical librarian repeated the process - Table 1. These papers were reviewed by me for suitability for critical appraisal, identifying further papers from references. Google Scholar provided a final resource for literature search.

Inclusion criteria were: Pre-operative, ED setting and English texts.

![Flowchart Diagram]
### Table 1 – Literature Search

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The 9 papers identified as relevant for critical appraisal are tabulated chronologically below.

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<td>11</td>
<td>Monzon, 2010, Buenos Aires, Argentina</td>
<td>154 patients, randomised to either IV NSAID or FIB</td>
<td>Randomised, double blind, controlled, prospective study</td>
<td>Primary: Reduction in pain scores on Visual Analogue Scale (VAS) Secondary: Effect on patient vital signs</td>
<td>Primary: Both groups achieved clinically significant pain reduction from initial mean VAS of 8.21 +/- 0.91. The FIB group from 15 minutes to 2.9 +/- 0.16; the NSAID group from 2 hours to 1.78 +/- 0.11. This was statistically significant for FIB at 15 minutes (P&lt;0.001) and no difference at 2 hours (p=0.764). The FIB analgesic effect was starting to wane at 8 hours, but there was no statistical difference (p=0.83). Secondary: HR in both groups achieved statistically significant reduction throughout; MAP and RR were largely unaffected.</td>
<td>Due to the randomisation used, the study groups were of different sizes, but were deemed statistically similar in terms of demographics. The treating nurses were not blind to treatment and may have introduced bias through either patient or treating clinician. NSAID dosing is not stated and the use of NSAID is counter to NICE guidance, hence external validity suffers.</td>
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<td>13</td>
<td>Elkhodair, 2011, London, UK</td>
<td>137 convenience sampled patients, over 2 sites, receiving FIB</td>
<td>Prospective cohort study.</td>
<td>Primary: Reduction in pain scores of 3 on VAS was considered a successful block. Secondary: A subgroup analysis of different pre-block analgesia.</td>
<td>Primary: Reduction in pain score of 3 or more was found in 77.4% of cases. The mean reduction was 3.2 at 30 minutes, and 5.1 at 60 minutes. Secondary: Pain scores were reduced from a median range of 7 - 8.3, to 3.9 - 5.2 at 30 minutes; and to 2.5 - 4 at 60 minutes. This was for all sub groups of differing pre-block analgesia and none.</td>
<td>The main weakness in this study is the potential for bias – the clinicians performing the blocks also recorded the effect of those blocks.</td>
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<td>14</td>
<td>Haines, 2012, New York, USA</td>
<td>20 convenience sampled patients, treated with US guided FIB.</td>
<td>Prospective cohort study.</td>
<td>Reduction in pain score on VAS.</td>
<td>Mean pain scores at triage were 7.9 before 0.1mg/kg Morphine and wait for x-ray. Mean score of 5.5 was recorded at the time of FIB, followed by continued reduction in mean pain scores to a nadir of 1.3 at 120 minutes. The pain score reductions are statistically significant for all time intervals (p=0.029 or lower).</td>
<td>There are a number of weaknesses: study size is small; there is no control; confounding factors are introduced at triage with IV morphine; and patient selection and pain scoring introduce a number of potential sources of bias. US use reduces generalisability.</td>
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<td>15</td>
<td>Leeper, 2012, Great Yarmouth, UK</td>
<td>286 patients with hip fracture.</td>
<td>Retrospective audit of prospectively collected data.</td>
<td>Primary: Percentage of patients receiving FIB over the time of the study (9 months). Secondary: Reduction in Morphine requirements.</td>
<td>Primary: 50.3% of patients received FIB over 9 months; however first quartile percentage was only 28%, compared to 72% in last quartile (p&lt;0.0001). Secondary: The mean ED Morphine requirements of the FIB group was 1.84mg +/- 0.31 and 3.11 +/- 0.43 in the no block group (p=0.027). Pre-hospital and total Morphine doses were similar.</td>
<td>This is a retrospective audit of prospectively collected data. There is a risk of multiple bias and Hawthorne effect.</td>
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<td>16</td>
<td>Beaudoin, 2013, Rhode Island, USA</td>
<td>36 convenience samples patients, randomised to US guided Femoral Nerve Block or Standard Care.</td>
<td>Randomised, blinded, controlled, prospective study.</td>
<td>Primary: Reduction in pain scores on Numerical Rating Scale (NRS). Secondary: Rescue Morphine use.</td>
<td>Primary: Mean pain score reduced in the Femoral Block group from 8.3 to 4.0, compared to no reduction in the Standard Care group (p&lt;0.001). Secondary: Mean rescue Morphine for the block group was 0mg compared with 5mg in the Standard Care group (p=0.028).</td>
<td>The use of a smaller volume for the ‘Sham Block’ compared with the Femoral Block means the treating clinician cannot have been blinded. Bias may have therefore been introduced. Patients with only mild pain were excluded.</td>
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<td>Newman, 2013, Poole, UK</td>
<td>107 patients, randomised to 'Two Pop' FIB or Nerve Stimulator guided Femoral Block</td>
<td>Block randomised, non blinded, controlled, prospective study.</td>
<td>Primary: Reduction in pain scores on VAS. Secondary: Post block opiate requirements.</td>
<td>Primary: Both groups achieved clinically significant pain reduction. Mean FIB pain scores were 8.2 pre-block and 5.4 post block; Mean Femoral block pain scores were 8.1 pre-block and 4.4 post block. Hence 0.9 greater pain score reduction in Femoral group. ( p=0.047 ) 95 CI 0-1.8. Secondary: Post-block opiate use was less in Femoral group ( p=0.041 ).</td>
<td>The main weakness in this study is generalisability – the use of nerve stimulators is a specialised technique which may not be available in many areas, compared to the low-tech 'Two Pop' FIB technique. The statistical analysis is also open to debate – confidence intervals for femoral block superiority range from 0–1.8 therefore touch the line of no difference, hence there is no certainty to the statistical significance.</td>
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<td>19</td>
<td>Fujihara, 2013, Hyogo, Japan</td>
<td>56 patients, pseudo-randomised to FIB or 25mg PR Diclofenac.</td>
<td>Prospective cohort study.</td>
<td>Primary: Pain score reduction on a 100 point VAS. Secondary: Rescue NSAID requirements.</td>
<td>Primary: The FIB group achieved pain score reductions from 92 pre-block, to 31 at 10 minutes, and 36 at 720 minutes. The NSAID group scores were 92, 92 and 81 for the same time intervals. ( p&lt;0.05 ). Secondary: 21% of the FIB group versus 82% of the NSAID group requested further NSAID analgesia – no statistical analysis of this difference is made.</td>
<td>There are numerous weaknesses in this study. Allocation was only pseudo-randomised; there was no blinding; the control group received only 25mg of Diclofenac PR – it may be argued that this is insufficient and hence the study could be considered un-controlled. The time points for patient assessment also appear unduly wide. Hence better considered a prospective cohort study.</td>
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### Nerve Block for Hip Fracture, Should it Become Routine Practice? Dr Alistair Innes

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<td>20</td>
<td>Lees, 2014, North Tyneside, UK</td>
<td>434 patients with hip fracture.</td>
<td>Prospective three-cycle audit of FIB over two sites, with a 100 patient retrospective control group.</td>
<td>Primary: Reduction in pain scores on NRS and reduction in opiate use. Secondary: Length of stay and mortality rates.</td>
<td>Primary: The reduction in pain scores and opiate use for the FIB group and the control group are illustrated in graph format, raw data is not given. Both groups show pain score reductions from around 5 to around 1. This is given as significant (p&lt;0.001). Reduction in opiate requirements is also deemed significant (p&lt;0.001). Secondary: Length of stay reduced from 15 days to 10 days (no p given); and mortality reduced from 15% to 5.5% (p=0.0024).</td>
<td>In prospective audit, there is a risk of bias and Hawthorne effect. The results graphs look interesting, but without raw data, it is not possible to establish the veracity of the p values given. It is likely that confounding factors have a large role in the length of stay and mortality data.</td>
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<td>21</td>
<td>Reavley, 2014, Bristol, UK</td>
<td>162 patients randomised to FIB or Femoral Nerve Block.</td>
<td>Randomised, non blinded, controlled, prospective study.</td>
<td>Primary: Pain scores at 60 minutes on a 100 point VAS. Secondary: Pain scores at 30 minutes, additional analgesic requirements and length of hospital stay.</td>
<td>Primary: Pain scores at 60 minutes were 38 for FIB and 35 for Femoral block, hence no difference (p=0.44). No pre block pain scores are given. Secondary: Pain scores at 30 minutes were 44 for FIB and 45 for Femoral Block, hence no difference (p=0.85). There was no difference in additional analgesic requirements between the two groups. Length of stay was 13.5 days for FIB group and 10 in Femoral group (p=0.006) – the authors suspected this was due to confounders rather than the block technique itself.</td>
<td>There are potential sources of bias in the post-procedure data collection, with analgesic requirements being collected by non-blinded staff. A protocol change after the study had begun may also introduce bias – Femoral nerve blocks were performed with anatomical, US or nerve-stimulator guidance depending on operator preference. All FIBs were delivered using anatomical approach.</td>
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Critical Appraisal

Monzon et al\textsuperscript{11} performed a well designed study which demonstrated a clinically significant reduction in pain scores in the FIB group and the NSAID group. The study found no major adverse events, and opiates were not required in either group. However, there is no mention of NSAID dosing and external validity suffers with the use of NSAIDs which NICE specifically does not recommend. This study would appear to support the routine use of nerve blocks for hip fracture patients. This gives level 2 evidence, as per the Oxford Centre for Evidence Based Medicine\textsuperscript{12}.

Elkhodair et al\textsuperscript{13} assessed efficacy of FIB for analgesia in hip fracture as performed by non-anaesthetist emergency physicians in a busy UK ED, using the Loss of Resistance (LoR) or ‘Two-Pop’ technique. Results demonstrated a success rate of 77.4\% for the FIB over their study period, with no notable adverse events recorded. The generalisability of this study is one of the main strengths – blocks were performed by physicians of varying seniority; the two-pop technique keeps the procedure low tech by avoiding the use of ultrasound or nerve stimulators, both of which could become barriers to wider use; and the treatment doses were based on rough estimate of body size. It is also encouraging that nearly a quarter of the patients received a block prior to radiography – one of the aspects of assessment involving most movement and hence potential for pain. This study gives us level 3 evidence for FIB success.

Haines et al\textsuperscript{14} considered Ultrasound-guided FIB (UFIB) and demonstrated efficacy of UFIB in providing useful analgesia for hip fracture patients and that it could be safely performed in the Emergency Department.
Although it demonstrates an effect, and an absence of adverse events, the limitations are too numerous to allow this study to be included in the formation of opinion. Rather, as the authors suggest, it could be considered a feasibility study for a larger, prospective, randomised controlled trial. It could be considered a case-series and level 4 evidence.

Leeper et al\textsuperscript{15} looked at the proportion of patients receiving FIB in the ED before and after an education programme; and the additional morphine requirements in the ED for those who received an FIB compared to those who did not. There were no adverse events to FIB recorded. This study raises an interesting point about the potential of an educational programme to improve the delivery of FIB, and the reduced use of morphine that may be anticipated. However, a retrospective audit would be subject to multiple sources of bias and the Hawthorne Effect, the level of evidence for this study would be 4.

Beaudoin et al\textsuperscript{16} compared US guided Femoral block with IV opiates in a well constructed study as a follow up to the main author’s previous cohort\textsuperscript{17}. Results showed a statistically significant reduction in pain score in the nerve block group, with no clinically significant improvement in pain scores in the standard care group. There were no major adverse events recorded. This is a robust study and provides good evidence supporting routine use of nerve blocks in hip fracture. Overall this study gives level 2 evidence.

Newman et al\textsuperscript{18} compared FIB to nerve stimulator guided femoral nerve block to determine which method gave the best reduction in pain scores. Both groups had clinically significant reductions in mean pain scores. These results are taken as statistically significant for superiority of stimulator guided femoral block. No adverse events occurred in either group.
These results look good for femoral block, but I do not agree with the statistics - the confidence intervals for the pain score reduction range from 0 – 1.8, this reaches the line of no difference so there is no certainty to statistical significance. Also is the comparison fair? The study demonstrates superiority of nerve stimulator guidance over landmark based approaches, rather than comparing FIB and femoral blocks. The authors acknowledge nerve stimulators being a specialised skill and that FIB may be easier to roll out at an organisational level. With the statistical and comparative limitations, this gives level 3 evidence for generic use of nerve blocks, rather than better evidence for specific technique superiority.

Fujihara et al\textsuperscript{19} compared FIB versus NSAID, but the study design was not particularly robust. The results do define a reduction in pain scores following FIB, however the control group may have been undertreated and the time points for assessment are unduly wide. I think it is more appropriate to consider this a cohort rather than controlled trial. The limitations of study design and the control group treatment are commented upon by the authors in the discussion. With these in mind, I think this paper would best be considered as level 3 evidence for the use of FIB in hip fracture.

Lees et al\textsuperscript{20} chronicled the introduction of a new hip fracture protocol across two hospital sites to include routine FIB for pain control in their 3 cycle audit. They demonstrate an increased block uptake, an improvement in pain control and a reduction in opiate use. Interestingly they also found a reduction in length of stay and mortality throughout the study – it would be attractive to consider this due to the use of regional blockade and the consequent improvement in pain, reduction in opiate and hence side effects; but as they point out it is likely that a number of confounders contribute.
It is also likely that the use of a historical control group may have resulted in numerous opportunities for bias to creep in and the Hawthorne Effect would be apparent in a prospective audit process. Overall this would give us level 4 evidence for the use of regional anaesthesia in hip fracture.

Finally, Reavley et al\textsuperscript{21} investigated whether pain from hip fracture was better controlled by FIB or femoral nerve block. They found no difference to pain control achieved by either method. Further to this, sub group analysis also failed to demonstrate any difference in efficacy of femoral nerve block which may exist between techniques – anatomical approach, US guided or nerve stimulator guided. This gives us level 2 evidence that no difference exists between FIB or femoral nerve blockade in terms of hip fracture pain relief.
**Discussion**

The innervation of the hip is variable, but includes branches of the femoral nerve and branches of the sciatic nerve. Therefore the FIB and Femoral blocks should give useful analgesia for hip fractures, but not complete anaesthesia due to limited effect on the sciatic nerve. The CEM National Audit of NoF\textsuperscript{22} focuses 11 of its 14 points on analgesia, so the more strategies for improving pain control the better.

The papers reviewed above all point to beneficial analgesia using nerve blockade, and an absence of major adverse events. Add to this good quality RCTs such as Foss et al\textsuperscript{23} and many other papers previously meta-analysed which also show benefit and I believe the evidence is strong for the use of nerve blocks.

The finer points of which block to use and by which technique have never been settled, with some papers taking the opposite point of view to others\textsuperscript{7, 18, 21} but it seems the majority consensus would suggest the FIB. The ease of use, ease of teaching, reliability of block, lack of adverse events and lack of need for specialised equipment are all positive features. Indeed my own practice has been influenced during this review – previously I would use a femoral nerve block for hip fracture pain relief, since completing this review I am now very much more in favour of using the FIB.

The final point of consideration before adopting the FIB as routine practice would be a cost-benefit analysis. Of the papers reviewed only Newman et al\textsuperscript{18} consider cost; with an FIB costing less than £10 it seems this should not be a barrier to routine implementation, particularly where the analgesic benefits have been so well established.
Conclusion

The aim of this review was to examine the evidence, published since the Cochrane Review, which could inform opinion as to whether nerve blockade should become part of routine practice for all our hip fracture patients, rather than just a consideration. I believe the evidence for benefit, the absence of adverse events and the cost-benefit analysis all support the adoption of routine FIB for patients presenting to our department with hip fracture.

Additional Work

The preparation of this review has highlighted three areas which should now be addressed in the department in which I work.

Firstly an educational program can begin to enhance the skill set and confidence of my colleagues who do not yet regularly use FIB for hip fracture patients, so that the proportion of us offering them improves from 33%.

Secondly, a standardised protocol can be developed for analgesia of our hip fracture patients, including the modalities to use and the method for administration of FIB.

And thirdly, our department can improve its data recording for purposes of future audit of our practice. Although our numbers are small and sporadic, these three points should help improve the care our hip fracture patients receive.

Appendix 1 illustrates the protocol I have developed, combining the information required for performing an FIB with the data recording for future analysis.
On the first point we have seen rapid improvement for our hip fracture patients. Since the introduction of the protocol below, 13 out of 19 patients have received an FIB as part of their analgesic management. This represents an improvement in block rate to 68% of patients in our department.

Furthermore, a subsequent set of questions I posed to my colleagues reveals the reasons for this improved uptake. Prior to introducing this work amongst them, the most common reason for not using regional anaesthesia in hip fracture patients was lack of familiarity with the technique. Now none responded citing lack of familiarity, but a perception of patient comfort being the most likely reason for not using a block.

I also asked my colleagues to rate from 0 to 5 how they felt on 4 aspects of the introduced protocol:

- How confident they were providing blocks,
- How useful they had found blocks,
- How useful the protocol was, and
- How easy it was to follow.

Any further comments?

The response rate was only 50%, but it did provide encouraging data:

The mean for confidence in providing blocks was scored at 3.75; usefulness of blocks was 4; usefulness of protocol was 5; and ease of protocol was scored at 5. A couple of comments were also returned – ‘Very effective pain control’ and ‘Was quite hesitant, but tried and really like it!’.

On the second point, there has also been significant development. NHS Highland covers the largest geographical area of any board in the UK, 4 acute hospitals cover this area – Raigmore in Inverness being the largest at DGH level, Caithness General in Wick and the Belford in Fort William being Rural General Hospitals, and our Rural Community Hospital.
During the work on this CTR, it occurred that a pan-Highland protocol may be of use, rather than each site using separate documentation. This has lead to the involvement of the ‘Policies, Procedures and Guidelines Subgroup’ and consideration of amalgamating the protocols across the sites and including a data capture element to the paper work.

On the third point, there has been some modest progress. Of the 13 patients since protocol introduction, 4 have had completed paper work returned. It is encouraging to note that the mean pain scores we are seeing in our hip fracture patients is improving from a baseline of 8.25 to 2.5 with the use of FIB anaesthesia. The primary aim of sharing this piece of work with colleagues was to increase the block rate, the data capture element may be lagging behind, but one step at a time.

Finally, with consideration of pre hospital and nurse delivered FIB services\textsuperscript{24, 25, 26} it occurs that there may be scope for extending the boundaries of FIB delivery to include Paramedics in the field. NHS Highland covers a large area and a journey of an hour or more before reaching hospital is not uncommon. It would be quite an aspiration to have all clinical hip fractures receiving regional anaesthesia on their living room carpet before even beginning their journey to hospital. Preliminary discussion have been had with the lead Paramedic for education in the area, whether there is any progress to be made or whether red tape strangles this aspiration is yet to be seen.
Appendix 1 – Hip Fracture Analgesic Protocol

Patient Name:
Address:
DoB / CHI:
Date and Time:
Initial Pain Score:

1g IV Paracetamol QDS (500mg if <50kg)
Fascia Iliaca Block – max 2mg / kg Levobupivacaine
Time of block: (Date, Time & Dose on Dressing)
IV Morphine 0.1mg / kg if further analgesia required

Fascia Iliaca Block:
ASIS to Pubic Tubercle, divide into thirds, Chlorhexidine prep
Inject 1 to 2cm caudal to junction of mid and lateral thirds
Blunt needle; 1st Pop - Fascia Lata; 2nd Pop - Fascia Iliaca
Confirm negative aspiration, distal pressure during injection

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<th>Patient weight</th>
<th>Levobupivacaine 0.5% (5mg/ml)</th>
<th>Water for injections</th>
<th>Total volume</th>
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<td>&lt; 40 kg</td>
<td>0.5ml / kg</td>
<td>0.5ml/kg</td>
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<td>20ml</td>
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<td>60-80 kg</td>
<td>30ml</td>
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<tr>
<td>&gt;80 kg</td>
<td>30ml</td>
<td>20ml</td>
<td>50ml</td>
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</table>

Pain Scores:
Pre-block: 60 minutes:
15 minutes: 120 minutes:
30 minutes: 240 minutes:

Considerations:
Record obs; consents to block?; bleeding disorder?
Ensure no allergy to planned analgesics, record medications
Ensure no infection at injection site, caution if previous surgery
Ultrasound guidance can help if confident using equipment
But landmark approach better than no block if unsure with US

Local Anaesthetic Toxicity:
Circum-oral tingling; tinnitus, dizziness, metallic taste
Confusion, agitation, seizures, collapse
Bradycardia, conduction blocks, asystole
Stop injection, supportive management
Consider Benzodiazepines and Intralipid
**List of Abbreviations**

UK - United Kingdom

NHS - National Health Service

NICE - National Institute for Health and Care Excellence

SIGN - Scottish Intercollegiate Guidelines Network

AAGBI - Association of Anaesthetists of Great Britain and Ireland

IV - Intra venous

GFR - Glomerular Filtration Rate

NSAID - Non Steroidal Anti Inflammatory Drugs

PO - Per Oral

FIB - Fascia Iliaca Block

ED - Emergency Department

PICO - Patient, Intervention, Control, Outcome

VAS - Visual Analogue Scale

HR - Heart Rate

MAP - Mean Arterial Pressure

RR - Respiratory Rate

USA - United States of America
US - Ultrasound
NRS - Numerical Rating Scale
CI - Confidence Interval
PR - Per Rectum
LoR - Loss of Resistance
UFIB - Ultrasound Guided Fascia Iliaca Block
CEM - College of Emergency Medicine
NoF - Neck of Femur
RCT - Randomised Controlled Trial
DGH - District General Hospital
CTR - Clinical Topic Review
DoB - Date of Birth
CHi - Community Health Index (unique identifier number)
FIC - Fascia Iliaca Compartment
Fem - Femoral Nerve Block
ASIS - Anterior Superior Iliac Spine
References

1. The National Institute for Health and Care Excellence
   The Management of Hip Fracture in Adults
   Clinical Guideline 124 2011
   https://www.nice.org.uk/guidance/cg124

2. Scottish Intercollegiate Guidelines Network
   Management of Hip Fracture in Older People
   National Clinical Guideline 111 2009
   http://www.sign.ac.uk/pdf/sign111.pdf

3. Griffiths R; Alper J; Beckingsale A et al
   Management of Proximal Femoral Fractures 2011
   Association of Anaesthetists of Great Britain and Ireland
   Anaesthesia 2012; 67; 85-98

4. Tsang KS; Page J; Mackenney P
   Can Intravenous Paracetamol Reduce Opioid use in Preoperative Hip Fracture Patients?
   Orthopedics 2013; 36; (2 Suppl); 20 - 24

5. Winnie AP; Ramamurthy S; Durrani Z
   The Inguinal Paravascular Technic of Lumbar Plexus Anesthesia
   Anesthesia and Analgesia 1973; 52; 6; 989 – 996

6. Finlayson BJ; Underhill TJ
   Femoral Nerve Block for Analgesia in Fractures of the Femoral Neck
   Archives of Emergency Medicine 1988; 5; 173 – 176

7. Dalens B; Vanneuville G; Tanguy A
   Comparison of the Fascia Iliaca Compartment Block with the 3 in 1 Block in Children
   Anesthesia and Analgesia 1988; 69; 705 – 713

8. Parker MJ; Griffiths R; Appadu BN
   Nerve Blocks (subcostal, lateral cutaneous, femoral, triple, psoas) for Hip Fractures (Review)
   Cochrane Database of Systematic Reviews 2002

9. Kearns RJ; Moss L; Kinsella J
   A Comparison of Clinical Practice Guideline for Proximal Femoral Fracture
   Anaesthesia 2013; 68; 159 – 166
<table>
<thead>
<tr>
<th>Number</th>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Rashid A; Beswick E; Fitton L; Galitzine S</td>
<td>Regional Analgesia in the Emergency Department for Hip Fractures: Survey of Current UK Practice and its Impact on Developing the Service in a Teaching Hospital</td>
<td>European Journal of Anaesthesiology 2012; 29; 125</td>
<td>2012</td>
</tr>
<tr>
<td>12</td>
<td>OCEBM Levels of Evidence Working Group</td>
<td>The Oxford Levels of Evidence 2</td>
<td>Oxford Centre for Evidence Based Medicine</td>
<td>2004</td>
</tr>
<tr>
<td>13</td>
<td>Elkhodair S; Mortazavi J; Chester A; Pereira M</td>
<td>Single Fascia Iliaca Compartment Block for Pain Relief in Fractured Neck of Femur in the Emergency Department: a Pilot Study</td>
<td>European Journal of Emergency Medicine 2011; 18; 340 – 343</td>
<td>2011</td>
</tr>
<tr>
<td>14</td>
<td>Haines L; Dickman E; Ayvazyan S et al</td>
<td>Ultrasound-guided Fascia Iliaca Compartment Block for Hip Fractures in the Emergency Department</td>
<td>The Journal of Emergency Medicine 2012; 43; 4; 692 – 697</td>
<td>2012</td>
</tr>
<tr>
<td>15</td>
<td>Leeper AD; Brandon PT; Morgan AVM et al</td>
<td>Fascia Iliac Compartment Block Reduces Morphine Requirement Pre-operatively for Patients with Fractured Neck of Femur</td>
<td>European Journal of Trauma and Emergency Surgery 2012; 38; 673 – 677</td>
<td>2012</td>
</tr>
<tr>
<td>16</td>
<td>Beaudoin FL; Haran JP; Liebmenn O</td>
<td>A Comparison of Ultrasound Guided 3-in-1 Femoral Nerve Block versus Opioids Alone for Analgesia in Emergency Department Patients with Hip Fractures: A Randomised Controlled Trial</td>
<td>Academic Emergency Medicine 2013; 20; 6; 584 – 591</td>
<td>2013</td>
</tr>
<tr>
<td>17</td>
<td>Beaudoin FL; Nagdev A; Merchant RC; Becker BM</td>
<td>Ultrasound Guided Femoral Nerve Blocks in Elderly Patients with Hip Fractures</td>
<td>American Journal of Emergency Medicine 2010; 28; 76 – 81</td>
<td>2010</td>
</tr>
<tr>
<td>18</td>
<td>Newman B; McCarthy L; Thomas PW et al</td>
<td>A Comparison of Pre-operative Nerve Stimulator-Guided Femoral Nerve Block and Fascia Iliaca Compartment Block in Patients with a Femoral Neck Fracture</td>
<td>Anaesthesia 2013; 68; 899 – 903</td>
<td>2013</td>
</tr>
</tbody>
</table>
Nerve Block for Hip Fracture, Should it Become Routine Practice? Dr Alistair Innes

19 Fujihara Y; Fukunishi S; Nishio S et al
Fascia Iliaca Compartment Block: its Efficacy in Pain Control for Patients with
Proximal Femoral Fracture
Journal of Orthopaedic Science 2013; 18; (5); 793 – 797

20 Lees D; Harrison W; Ankers T et al
Fascia Iliaca Compartment Block for Hip Fractures: Experience of Integrating a
New Protocol Across Two Hospital Sites
European Journal of Emergency Medicine 2014; 00: 000 – 000

21 Reavley P; Montgomery A; Smith J et al
Randomised Trial of the Fascia Iliaca Block versus the ‘3-in-1’ Block for Femoral
Neck Fractures in the Emergency Department
Emergency Medicine Journal 2014; 0: 1 - 5

22 The College of Emergency Medicine
2012 CEM Audits: #NoF
http://www.collemergencymed.ac.uk

23 Foss NB; Kristensen BB; Bundgaard M et al
Fascia Iliaca Compartment Blockade for Acute Pain Control in Hip Fracture Patients
Anesthesiology 2007; 106; 773 – 778

24 Lopez S; Gros T; Bernard N
Fascia Iliaca Compartment Block for Femoral Bone Fractures in Prehospital Care
Regional Anesthesia and Pain Medicine 2003; 28; 203 – 207

25 Obideyi A; Srikantharajah I; Grigg L; Randall A
Nurse Administered Fascia Iliaca Compartment Block for Pre-operative Pain Relief
in Adult Fractured Neck of Femur
Acute Pain 2008; 10; 145 – 149

26 Dochez E; van Geffen G; Bruhn J et al
Pre-hospital Administered Fascia Iliaca Compartment Block by Emergency Medical
Services Nurses, a Feasibility Study
Further Reading

27 Abou-Setta AM; Beaupre LA; Rashiq S et al
Comparative Effectiveness of Pain Management Interventions for Hip Fracture: A Systematic Review
Annals of Internal Medicine 2011; 155; 234 – 245

28 Rashiq S; Vandermeer B; Abou-Setta AM et al
Efficacy of Supplemental Peripheral Nerve Blockade for Hip Fracture Surgery: Multiple Treatment Comparison
Canadian Journal of Anaesthesia 2013; 60; 230 – 243

29 Chesters A; Atkinson P
Fascia Iliaca Block for Pain Relief from Proximal Femoral Fracture in the Emergency Department: a Review of the Literature
Emergency Medicine Journal 2014; 0; 1 – 4

30 Haddad FS; Williams RL
Femoral Nerve Block in Extracapsular Femoral Neck Fractures
Journal of Bone and Joint Surgery 1995; 77-B; 922 – 923

31 Capdevila X; Biboulet P; Bouregba M et al
Comparison of the Three-in-1 and Fascia Iliaca Compartment Blocks in Adults: Clinical and Radiographic Analysis
Anesthesia and Analgesia 1998; 86; 1039 – 1044

32 Fletcher AK; Rigby AS; Heyes FLP
Three-in-1 Femoral Nerve Block as Analgesia for Fractured Neck of Femur in the Emergency Department: A Randomized, Controlled Trial
Annals of Emergency Medicine 2003; 41:2; 227 – 233

33 Candal-Couto JJ; McVie JL; Haslam N et al
Pre-operative Analgesia for Patients with Femoral Neck Fractures using a Modified Fascia Iliaca Block Technique
Injury 2005; 36; 505 – 510

34 Monzon DG; Iserson KV; Vazquez JA
Single Fascia Iliaca Compartment Block for Post-Hip Fracture Pain Relief
The Journal of Emergency Medicine 2007; 32; 257 – 262

35 Schiferer A; Gore C; Gorove L et al
A Randomized Controlled Trial of Femoral Nerve Blockade Administered Preclinically for Pain Relief in Femoral Trauma
Anesthesia and Analgesia 2007; 105 (6); 1852 – 185
Nerve Block for Hip Fracture, Should it Become Routine Practice? Dr Alistair Innes

36. Hogh A; Dremstrup L; Jensen SS; Lindholt J
Fascia Iliaca Compartment Block Performed by Junior Registrars as a Supplement to Pre-operative Analgesia for Patients with Hip Fracture
Strategies in Trauma Limb Reconstruction 2008; 3; 65 – 70

37. Graham CA; Baird K; McGuffie AC
A Pilot Randomised Clinical Trial of 3-in-1 Femoral Block and Intravenous Morphine as Primary Analgesia for Patients Presenting to the Emergency Department with Fractured Hip
Hong Kong Journal of Emergency Medicine 2008; 15 (4); 205 – 211

38. Dolan J; Williams A; Murney E et al
Ultrasound Guided Fascia Iliaca Block: A Comparison with Loss of Resistance Technique
Regional Anesthesia and Pain Medicine 2008; 33 (6); 526 – 531

39. Mouzopoulos G; Vasiliadis G; Lasanianos N et al
Fascia Iliaca Block Prophylaxis for Hip Fracture Patients at Risk for Delirium: a Randomized Placebo-controlled Study
Journal of Orthopaedics and Traumatology 2009; 10; 127 - 133

40. Watson MJ; Walker E; Rowell S et al
Femoral Nerve Block for Pain Relief in Hip Fracture: A Dose Finding Study
Anaesthesia 2014; 69; 683 – 686

41. Majeed MA; Yeo D
Fascia Iliaca Block for Fractured Femur in Emergency Departments

42. Shahzad H; Majeed M; Yeo D; Gupta V; Salanke U
FIB the Fractured Femur
Critical Care 2013; 17 (S2); 263

43. Chesters A; Atkinson PR
Block First, Opiates Later? The Use of the Fascia Iliaca Block for Patients with Hip Fractures in the Emergency Department: A Systematic Review
Canadian Journal of Emergency Medicine 2013; 15 (S1); S47

44. Jadad AR; Moore RA; Carroll D et al
Assessing the Quality of Reports of Randomized Clinical Trials: Is Blinding Necessary?
Controlled Clinical Trials 1996; 17; 1 - 12

45. Chesters A; Atkinson PR
Block First, Opiates Later? The Use of the Fascia Iliaca Block for Patients with Hip Fractures in the Emergency Department: A Systematic Review
Canadian Journal of Emergency Medicine 2013; 15 (S1); S47

46. Jadad AR; Moore RA; Carroll D et al
Assessing the Quality of Reports of Randomized Clinical Trials: Is Blinding Necessary?
Controlled Clinical Trials 1996; 17; 1 - 12