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 EVMS Journal Club

P- In patients presenting to the ED with acute hip fracture

I- Is the use of US-guided single-shot femoral nerve block (FNB)/ femoral iliaca compartment block (FICB)

C- Compared to IV/IM narcotics

O- Safe and effective in achieving pain relief?

Question:

In a patient presenting to the ED with suspected hip fracture, is the use of US-guided femoral nerve block/ fascia iliaca compartment block safe - and as effective or more effective in achieving pain relief compared to IV/IM narcotics?

Clinical Scenariio:

It is 12:30am, and you enter the room of an 80 year old diabetic male with COPD presenting with acute right hip pain s/p falling from standing height after getting up from sleep to use the bathroom. He has a shortened and externally rotated RLE. He has received 4 mg of morphine en route by EMS and continued to complain of 10/10 pain. He is asking for more pain medication. He is on 2L home O2 and his vitals are as follows: T98.1, BP 116/46, P98, R 20, SpO2 94% 4LNC. Glu 136.

Search Strategies

Ovid Medline 1966–11/20/2010: (exp femoral neck fractures OR femoral neck fractures.mp OR exp hip fractures OR exp hip fractures.mp) AND (exp analgesia or analgesia.mp) AND (exp nerve block OR nerve block.mp OR exp anesthesia, local OR anesthesia, local.mp OR exp anesthetics, local OR anesthetics, local.mp OR exp anesthesia, conduction OR anesthesia, conduction.mp).

Search outcome: 126 total articles. 10 Included.

Author, date, country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
1 Finlayson 1988 UK	36 patients (aged 31–95; M 78, 29 female) w/ fractured neck of femur in the "accident dept." Intracapsular (N=16) extracapsular (N=20) FNB (10 ml 0.5% bupivocaine) (excl AMS, groin inf., gross obesity)	Cohort study.	Subjective effects (worse, same, reduced, complete) Objective effects Complications	Pain abolished in 4 (all extracapsular), reduced in 26 (equal intra and extracapsular), no change in 6 (all intracapsular). Worse in 0. Obj block in all but 7 (6 w/o change and 1 w/ reduced). No complications	No control Statistical significance not assessed. Heterogenous group of patients (age 31-95, 1 with multiple injuries). Objective measure? 10mL sufficient?

<p>2 Haddad 1995 UK</p>	<p>50 consecutive pts with extracapsular fractured of the femoral neck (aged 68-89;M 77, 35 female). FNB (N=24) 0.3 ml/kg 0.25% bupivacaine) vs control (N=21) PO co-dydamol, IM voltarol, and IM pethidine. (excl dementia)</p>	<p>Prospective randomized-control trial w/ blinded assessors.</p>	<p>Mean pain score using VAS upon arrival and @ 15 minutes, two and eight hours after FNB Analgesic requirement. The number of parenteral analgesic drugs administered in the 24 hours from admission. Complications</p>	<p>Statistically significant difference in pain reduction at both 15 min (mean 4.8 vs 6.4, p<0.05) and 2h (mean 3.7 vs 5.9 p<0.01) after FNB. Significant reduction in the requirement for intramuscular opiates (12 vs 35 p<0.05) in the FNB group. Significant reduction in post-op respiratory compl. No complications of procedure</p>	<p>Only extracapsular fractures included. ?optimal control analgesia</p>
<p>3 Marhofer 1998 Austria</p>	<p>60 pts undergoing hip surgery following trauma. Group A: 3-in-1 US guidance w/ 20 mL 0.5% bupivacaine. Group B: NS guidance w/ 20 mL 0.5% bupivacaine. Group C: NS guidance w/ 30 mL 0.5% bupivacaine.</p>	<p>Prospective randomized-control trial w/ blinded assessors.</p>	<p>Overall success Onset time Quality of sensory block</p>	<p>Overall success for the FNB in group A was 95% and in groups B and C 80%. Onset time was significantly shorter in the US-guided group compared with both NS-guided groups (group A 13+/-6 minutes; group B 27+/-12 minutes; and group C 26+/-13 minutes; P < .01 to groups B and C). Quality of sensory block was significantly better in group A (4%+/-5% of initial value) compared w/ groups B and C (group B 21%+/-11% of initial value, P < .01 to A; group C 22%+/-19%, P < .01 to A).</p>	<p>(Abstract only) Demographics not stated Surgery pts Exclusions not stated</p>
<p>4 Fletcher 2003 UK</p>	<p>60 pts randomly assigned to 3-in-1 nerve block w/ 20 mL 0.5% bupivacaine plus IV morphine (N=26) or IV morphine alone (N=24). (excl 42 confusion, 1 refusing consent, 1 overlooked)</p>	<p>Prospective Randomized-control trial w/ blinded assessors.</p>	<p>Mean pain scores on arrival and @ intervals up to 24 hours after admission. Mean morphine consumption per hour in the first 24 hours</p>	<p>Patients w/ NB recorded a faster time to reach the lowest pain score: 2.88 NB vs. 5.81 hrs for control pts (mean difference -2.93 h; 95% CI -5.48 to -0.38 h). NB recipients required significantly less morphine per hr than control pts (mean of 0.49 mg/h vs. 1.17 mg/h; mean difference -0.68 mg/h; 95% CI -1.23 to -0.12 mg/h).</p>	<p>Method of randomization not stated. No US or NS guidance.</p>
<p>5 Kullenberg 2004 Sweden</p>	<p>80 consecutive patients with hip fracture received either 3-in-1 NB (30 ml of ropivacaine 7.5 mg/ml) OR pharmacological treatment only (Paracetamol and tramadol).</p>	<p>Prospective randomized-control trial.</p>	<p>Pain using a visual analog scale (VAS) duration of the block number of analgesics doses temporary confusion - Pfeiffer-test time for postoperative mobilization</p>	<p>Significant reduction of pain w/ NB (VAS 6 vs 2) The mean duration of the block was reported as 15.8 hours The need for extra analgesia and analgesic use was increased in the control group. Lower number of patients temporarily confused in the block group compared to the control group (not signif). Time for mobilization after surgery was significantly lower, 23 hours compared to 36 for the control group</p>	<p>(Abstract only) Blinding not stated Inclusion/ exclusion not stated</p>

6 Antonis 2006 USA	20 ED pts comparing US guided 3-in-1 NB using 20 mL bupivacaine w/ IV morphine (N=10, aged 53-82 mean 74, 6 female) vs IV morphine alone (N=10, aged 49-94 M 76, 8 female) matched for fracture.	Prospective pseudo-randomized control trial	Mean pain score utilizing a VAS @ baseline and @ 15min, 30 min and every 30min up to 4 hours. Mean supplemental morphine use	The mean baseline VAS score in the nerve block group was 84, and a mean score @ 15 min was 33.8; @ 240 min was 13.8. The mean 4 hour morphine use was 5.5mg FNB vs 15.5mg in the comparison group (p<0.0001).	(Abstract only) Only 20 pts Possible selection bias. Not blinded; observer bias
7 Foss 2007 Denmark	48 pts comparing FICB to IM morphine. In the FICB group (N=24: aged 75-88 M 83, 14 female), the patients received a FICB with 1.0% mepivacaine and a placebo IM injection of 0.9% saline. In the morphine group (N=24, aged 69-88 M77, 21 female), the patients received a placebo FICB with 0.9% saline and an IM injection of 0.1 mg/kg morphine. (excl. refusal, prev sg in hip, regular opioid/ GC therapy, EtOH/subst abuse, infection, morphine intol, previous opioid admin).	Double-blinded randomized control trial	Degree of pain at rest Pain on lifting leg Overall pain relief Level of maximum pain at rest Max pain on mvmt Total morphine use Sedation/ O2 sats -assessments @ 30, 60, 180m Complications	No statistically sign. diff. b/w groups for the degree of pain at rest. There was less pain on lifting the leg w/ FICB (p= 0.04). The overall pain relief was better w/ FICB (p= 0.09, not significant) as was the level of maximum pain at rest (p< 0.01) and the level of maximum pain on moving the leg (p= 0.02). Total morphine use was less w/ FICB (p< 0.01). More patients were sedated in the morphine group and had a tendency toward lower oxygen saturation as compared with the FICB group (p= 0.05). No complications.	Assessments only up to 3 hours after admin. Only 48 pts. Sign diff in M:F b/w groups.
8 Wathen 2007 USA	FICB on 55 children aged 16 months to 15 years (median 5.7yrs) w/ acute femur fractures. Patients were randomized to receive IV morphine (N=29) or FICB using 0.5% ropivacaine. (<20kg: .75mL/kg) (>20mg: .5mL/kg) (N=26) (excl if AMS, neurovasc injury, abn anatomy, frx reduction, distracting injury, social concerns).	Prospective randomized unblinded controlled trial	Pain scores were recorded at initial analgesic administration (baseline), at 5, 10, 15, 30, and 60 minutes, and then hourly up to 6 hours from baseline by trained nursing observers and research assistants. Mean duration of action Additional meds Complications	FICB provided clinically superior pain management compared with intravenous morphine sulfate at 30 minutes from baseline (5.87 vs 7.54) and throughout the initial 6 hours of medical treatment of children 16 months to 15 years who had isolated acute femur fractures. DOA: 313m v 60m Fewer additional meds No complications	Children Femur frx Non-blinded No comparison b/w those enrolled and those not enrolled (N329, Enr55?) FP technique (No US or NS guidance)
9 Reid 2009 Australia	67 pts to compare the accuracy of ultrasound-assisted FNB (N=34) with the fascial pop (FP, N=33) technique.	Prospective unblinded pseudo-randomized controlled trial	Nerve block stratified to level of blockade (intact, partial or complete) with FNB assessed by skin sensation. Participants were assessed at 15 and 60 min post nerve block. Complications	At 15 min, FNB using US was intact, partial or complete for 9, 15, and 10 patients, respectively - compared with 14, 17, and 2 patients, respectively (P = 0.038). Complete block at 15 min was achieved in 10/34 patients (29% [95% CI 14.1-44.7]) in the US group and 2/33 patients (6% [95% CI -2.1-14.2]) in the FP group (P = 0.029); No difference was seen at 60 min. No complications were recorded in either group	(Abstract only) Demographics not stated Exclusion criteria not stated. F/u only to 1 hour

10 Beaudoin 2010 USA	13 patients with hip Fractures (aged 67-94 median 82). US-guided 3-in-1 NB (25 mL 0.5% bupivacaine). (excl if >1 parenteral analgesic admin or if unable to consent).	Prospective observational cohort study	Effectiveness of pain control, numerical rating scores @ baseline and @ 15 minutes, 30 minutes, and hourly after the procedure for 4 hours. Time to perform the procedure # of attempts Complications	After the procedure, there were 44% and 67% relative decreases in pain scores at 15 minutes ($P \leq .002$) and at 30 minutes ($P \leq .001$), respectively. Pain scores were unchanged from 30 minutes to 4 hours after the procedure ($P \leq .77$). Median time to perform the procedure was 8 minutes (range, 7-11 minutes). All procedures required only one attempt No complications.	Small sample size No control group
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Clinical Bottom Line: Femoral nerve block appears to be an effective approach to analgesic therapy in patients with evidence of acute hip fracture. There appear to be no evidence of significant complications and the procedure appears to be well tolerated. Ultrasound guidance appears offer an additional layer of safety particularly in regards to being able to directly visualize vascular structures and avoid intravascular injection of anesthetic drugs. It may also offer the advantage of decreasing the amount of parenteral rescue anesthesia commonly required. Overall, study sizes were small and patient populations were skewed towards elderly female patients.

Bibliography:

1. Finlayson BJ, Underhill TJ. Femoral nerve block for analgesia in fractures of the femoral neck. *Arch of Emerg Med.* 1988; 5: 173–6.
2. Haddad FS, Williams RL. Femoral nerve block in extracapsular femoral neck fractures. *Journal of Bone and Joint Surgery - Brit.* 1995; 77(6): 922–3.
3. Marhofer P. Ultrasonographic guidance reduces the amount of local anesthetic for 3-in-1 blocks. *Reg Anesth Pain Med.* 1998; 23(6): 584-8.
4. Fletcher AK, Rigby AS, Hayes FL. 3-in-1 femoral nerve block for fractured neck of femur in the emergency department: a randomized-controlled trial. *Ann of Emerg Med.* 2003; 41: 227-33.
5. Kullenberg B, Ysberg B, Heilman M, Resch S. Femoral nerve block as pain relief in hip fracture. A good alternative in perioperative treatment proved by a prospective study. *Lakartidningen.* 2004; 101(24): 2104–7.
6. Antonis, M, Chandwani, D, McQuillen, K. Ultrasound Guided 3-in-1 Femoral Nerve Block in the Emergency Room for Femoral Neck Fractures. *Acad Emerg Med.* May 2006; 13(5): S122.
7. Foss NB, Kristensen BB, Bundgaard M, et al. Fascia iliaca compartment blockade for acute pain control in hip fracture patients: A randomized, placebo-controlled trial. *Anesthesiology.* 2007;106(4): 773–8.
8. Wathen JE, Gao D, Merritt G, et al. A randomized controlled trial comparing fascia iliaca compartment nerve block to a traditional systemic analgesic for femur fractures in a pediatric emergency department. *Ann Emerg Med.* 2007;50:162-71.
9. Reid N. Use of ultrasound to facilitate accurate femoral nerve block in the emergency department. - *Emerg Med Austral.* 2009; 21(2): 124-30.
10. Beaudoin FL, Nagdev A, Merchant RC, Becker BM. Ultrasound-guided femoral nerve blocks in elderly patients with hip fractures. *Am J Emerg Med.* 2010; 28(1): 76-81.