Effectiveness of Local Anesthetic Injection in Geriatric Patients Following Operative Management of Proximal and Diaphyseal Femur Fractures

Brian M. Fisher, MD¹; Alexander Titus, PhD^{2,3}, Ida Leah Gitajn, MD¹

¹Department of Orthopaedic Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH

²Department of Epidemiology, Dartmouth College , Hanover, NH; ³Quantitative Biomedical Science, Darmouth College, Hanover, NH

Introduction

- Geriatric fracture patients are at risk for poorly controlled pain and side effects of opioid pain medications
- Arthroplasty literature has demonstrated that infiltration of local anesthetic or anesthetic cocktails improves pain control and reduces narcotic consumption
- Despite higher risk for adverse events, such as delirium or medication overdose, there is limited data on use of intra-operative local anesthetic in geriatric hip fractures.

Hypothesis

- We hypothesized that geriatric patients with proximal and diaphyseal femur fractures would benefit from intra-operative injection of local anesthetic around the surgical field.

Methods

- Retrospective review of patients age ≥ 65 years old who sustained femur fractures that underwent operative intervention from Jan 2014 to Jun 2017.
- Excluded for pathologic fracture, periprosthetic fracture, return to OR within 48 hours post-operatively, admission to ICU with narcotic infusion for sedation/analgesia, spinal anesthesia, pre-operative regional block, or multiple fractures.
- Local anesthetic infiltration:
 - Hemiarthroplasty- injected into joint capsule, IT band, subcutaneous tissue, and dermis
 - SHS, IMN, CRPP- injected into periosteum, IT band, subcutaneous tissue, dermis
- Primary outcome measure narcotic medication required first 48 hours post-operatively measured in milligram morphine equivalents (MME).
- MME divided into four hour increments to better assess timing of narcotic consumption between groups.

Demographics, Injury characteristics

	Intraoperative injection (n=118)	No injection (n=359)	P-value
Age, mean (SD)	83.75 (8.74)	82.80 (8.78)	0.31
Sex Male (%)	38 (32.2)	104 (29.0)	0.59
Fracture type			0.99
Femoral neck, n (%)	51 (43.2)	155 (43.2)	
Intertroch, n (%)	56 (47.5)	172 (47.9)	
Subtroch, n (%)	8 (6.8)	22 (6.1)	
Femoral shaft, n (%)	3 (2.5)	10 (2.8)	
Procedure			0.84
Hemi, n (%)	36 (30.5)	105 (29.2)	
CRPP, n (%)	19 (16.1)	49 (13.6)	
SHS, n (%)	26 (22.0)	72 (20.1)	
CMN, n (%)	30 (25.4)	110 (30.6)	
IMN, n (%)	7 (5.9)	23 (6.4)	
Hospital Service			0.92
Hospital medicine, n (%)	102 (86.2)	310 (86.4)	
Orthopaedics, n (%)	10 (8.5)	26 (7.2)	
General surgery, n (%)	5 (4.2)	18 (5.0)	
Other, n (%)	1 (0.8)	5 (1.4)	
Operative time (hr), mean (SD)	1.22 (0.61)	1.06 (0.53)	0.005
LOS (days), mean (SD)	7.05 (6.22)	6.39 (8.34)	0.37
CCI, mean (SD)	2.54 (2.86)	2.42 (2.55)	0.65

Outcomes, Univariate Analysis

	Intraoperative injection (n=118)	No injection (n=359)	P-value
Hospital LOS, mean (SD)	7.05 (6.22)	6.39 (8.34)	0.37
VTE, n (%)	3 (2.5)	10 (2.8)	1
MI, n (%)	7 (5.9)	11 (3.1)	0.25
SSI, n (%)	1 (0.8)	3 (0.8)	1
Stroke, n (%)	11 (9.3)	11 (5.0)	0.13
90 day readmission, n (%)	16 (13.6)	48 (12.0)	0.77
90 day reoperation, n (%)	1 (0.8)	16 (4.5)	0.12

Multivariate Analysis for increased Narcotic utilization

MME 0-24 hours	Estimate	STD Error	P-value
Age	83.75 (8.74)	82.80 (8.78)	0.31
Fracture type			
Femoral neck	REF	REF	REF
Intertrochanteric	31.45	19.73	0.11
Subtrochanteric	92.95	40.47	0.02
Femoral shaft	-38.45	62.25	0.54
Received local anesthesia	-42.55	21.94	0.05
CCI	-1.74	3.65	0.63
Hospital Service			
Hospital medicine	REF	REF	REF
Orthopaedics	77.16	38.54	0.05
General Surgery	70.85	46.08	0.12
Other	-24.50	84.28	0.77

Cummulative Post-operative Opiod Requirement

Results

- Patients who received local anesthetic injection (LAI) required significantly less MME post-operatively with equivalent VAS pain scores to those who did not receive LAI.
- Benefit of LAI was particularly seen within the first 8 hours following surgery and remained significant until 28 hours post-operative.
- No statistical difference in LOS, 90 day complications
- Multivariate analysis identified LAI as protective against increased MME use and subtrochanteric fractures and admission to orthoaidic service as a risk for increased MME consumption.

Limitations

- Retrospective analysis as a result causation cannot be assumed and only associations identified.
- Potential selection bias for those patients that received LAI.
- Unable to collect reliable data on pre-operative dementia and post-operative development of delirium.
- While this study did not directly look at rate of hospital aquired delirium, narcotic utilization has been demonstrated in prior studies to be correlated with development of acute delirum post-operatively

Conclusions

- LAI is safe and effective at reducing post-operative narcotic utilization with equivalent VAS pain scores in geriatric proximal and diaphyseal femur fractures.

Disclosures

- No financial support was received by any authors in conjunction with this study.