

Liposomal bupivacaine versus catheter-based blocks in patients undergoing surgical stabilization of rib fractures (SSRF)

John Lucas MD, Leeanna Clevenger MD, Alicia Privette MD, Stuart Leon MD, Mujahed Laswi MD
Evert Eriksson MD

BACKGROUND

Pain control is of paramount importance in caring for patients who have undergone SSRF.

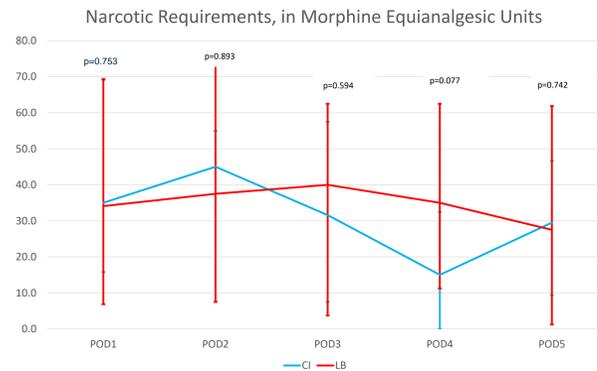
- We aim to use a multi-modal pain regimen to decrease narcotic usage
- We employ loco-regional anesthesia techniques to achieve early post-op pain control
- Loco-regional techniques range from central to peripheral blocks
- What is the most **efficient** way to deliver a long-acting anesthetic directly to the intercostal nerve bundles?

STUDY DESIGN

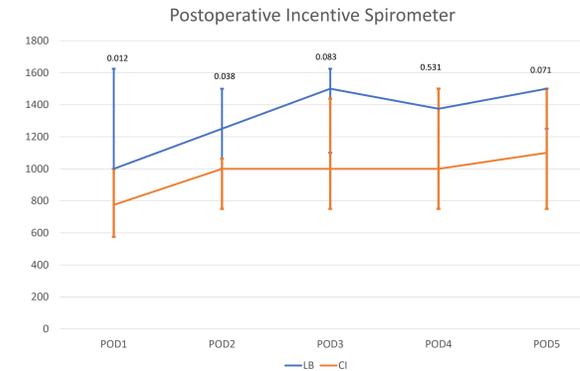
- Retrospective review of patients undergoing SSRF from 3/1/2018 – 9/1/2021
- Inclusion criteria:
 - age \geq 18 years
 - undergoing a single-field, unilateral SSRF
 - did not require mechanical ventilation
 - had some form of loco-regional anesthesia performed -- either liposomal bupivacaine (LB) or continuous infusion catheter (CI)
- Liposomal bupivacaine (LB) block was performed at time of surgery under thoracoscopic visualization, in all rib spaces excluding ribs 1 and 2
- CI epidural catheters were placed by the regional pain team (Anesthesiology) pre-operatively and managed by that service
- **Primary outcome**
 - Daily narcotic equivalents over the first 5 postoperative days
- **Secondary outcomes**
 - Doses of multimodal pain medications
 - Numeric pain scores
 - Incentive spirometer effort

RESULTS

Primary Outcome



Secondary Outcome



RESULTS CONTINUED

- No difference in postoperative pain scores ($p > 0.05$)
- No difference in postoperative doses of multimodal pain medications ($p > 0.05$)
- No procedural complications noted in the LB arm
- **Multiple complications were present in the CI arm**
 - 26% (5/19) had recurrent hypotension resulting in transfer to the ICU and removal of catheter
 - 16% (3/19) had catheter-related issues such as dislodgement

LIMITATIONS

- Off-label use of LB
- Retrospective design
- Pain scores are subjective and nurse-driven
- Thoracoscopic equipment is needed to perform injection of LB under direct visualization
- LB is thought to provide the greatest anesthetic benefit for a maximum of 3 days

PATIENT POPULATION

Baseline Demographics

	LB (n=18)	CI (n=19)	P_value
Age	62 +/- 11	60 +/- 18	0.677
Male	78%	63%	0.331
Mechanism of Injury			0.323
Fall	67%	69%	
MCC	11%	21%	
MVC	22%	5%	
AutoPed	0%	5%	
Comorbidities			
Alcohol Use Disorder	11%	10%	0.677
Current Smoker	39%	16%	0.113
COPD	6%	16%	0.323
HTN	56%	53%	0.560
Asthma	0%	5%	0.514
Dementia	0%	5%	0.514
Diabetes	22%	5%	0.153
CVA	5%	5%	0.743
CHF	11%	5%	0.479
A-Fib	5%	5%	0.743

Injury Severity/Location

	LB	CI	p_value
Injury Severity			
ISS	17.3 +/- 7.3	15.3 +/- 5.6	0.364
No. Fractured Ribs	6.2 +/- 2.9	6.7 +/- 2.4	0.555
No. Levels SSRF	4.5 +/- 1.5	4.3 +/- 1.2	0.683
Location of Repair			
Anterior	0%	5%	0.514
Anterolateral	0%	5%	0.514
Lateral	78%	58%	0.174
Posterolateral	50%	58%	0.630
Posterior	0%	11%	0.257
AIS Max			
Head	0 (0-3)	0 (0-2)	0.869
Face	0 (0-2)	0 (0-2)	0.578
Neck	0 (0-0)	0 (0-0)	N/A
Thorax	3 (3-4)	3 (2-4)	0.799
Abdomen	0 (0-4)	0 (0-4)	0.988
Spine	0 (0-3)	0 (0-0)	0.086
Upper Extremity	0 (0-3)	0 (0-2)	0.245
Lower Extremity	0 (0-3)	0 (0-3)	0.374
External	0 (0-0)	0 (0-1)	0.599
Length of Stay			
Hospital LOS	9 (5-27)	8 (4-29)	0.940
ICU LOS	2 (0-12)	3 (1-10)	0.284
Hospital Day to OR	2 (0-11)	2 (1-4)	0.775
LOS After OR	6 (3-21)	6 (2-27)	1.000

CONCLUSIONS

- The use of a single-dose intra-operative liposomal bupivacaine (LB) intercostal nerve block provided comparable pain control when compared to a continuous infusion (CI) catheter among patients undergoing SSRF
- LB significantly improved incentive spirometry on post-op days 1 and 2
- LB should be considered in patients undergoing SSRF to achieve comparable pain control and avoid iatrogenic hypotension and other catheter-related complications