FLORIDA ORTHOPAEDIC INSTITUTE

Orthopaedic Research Day
6/17/16

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Periarticular Injection after Total Knee Arthroplasty Using Liposomal Bupivacaine vs a Bupivicaine Cocktail Injection:

Pain Control and its Effect on Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)scores and Patient Satisfaction

Background

- **General Anesthesia**
  - side effects
- **Peripheral Blocks**
  - delays for the surgeon, inefficient use of OR, muscular weakness, falls, delays in PT
- **Peri-articular Injections (PAI)**
  - equally effective, less expensive, easier to admin

Current multimodal advances may replace traditional blocks in arthroplasty

PAI vs FNB

Clin Orthop Relat Res. 2016 Feb 16. [Epub ahead of print]

Pain Control and Functional Milestones in Total Knee Arthroplasty: Liposomal Bupivacaine versus Femoral Nerve Block.

Yu S[1], Szulc A[2], Walton S[2], Bosco J[2], Iorio R[2].

- **Retrospective** (N =583 Exparel) vs (N = 527 FNB)
- No difference in Pain scores
- PAI
  - Lower Narcotic consumption (p=0.004)
  - Gait, stairclimbing milestones (p<0.001)
- Falls (PAI - 0.6%) vs (FNB - 2%)

PAI facilitates rapid rehabilitation while providing adequate pain control.

PAI vs PAI

The Journal of Arthroplasty 29 (2014) 1687–1690

Liposomal Bupivacaine Versus Traditional Periarticular Injection for Pain Control After Total Knee Arthroplasty

Deren T. Bagsby, MD, Phillip H. Ireland, MD, R. Michael Meneghini, MD

Department of Orthopaedic Surgery, Indiana University Health Physicians, Indiana University School of Medicine, Indianapolis, Indiana

- A retrospective cohort study
- ↑ Inpatient 24hr self-reported pain scores (P = 0.04)
- N=85 (ropivacaine, epinephrine and morphine)
  - **47.6%** Rate pain as mild
- N=65 (liposomal bupivacaine)
  - **16.9%** Rate pain as mild

Liposomal bupivacaine PAI provided **inferior pain control** compared to the less expensive traditional PAI

J Arthroplasty. 2016 Mar;31(3):633-6

Periarticular Injection After Total Knee Arthroplasty Using Liposomal Bupivacaine vs a Modified Ranawat Suspension: A Prospective, Randomized Study

Philip N. Collis, MD [a], Allison M. Hunter, MD [a], Michael D. Derek Vaughn, MD [a], Leah Y. Carreon, MD, MSc [b], Jiapeng Huang, MD, PhD [c], Arthur L. Malkani, MD [d]

- **pRTC**, 105 consectutive primary TKAs
  - N=54 (liposomal bupivacaine)
  - N=51 (Ropivacaine, epinephrine, ketorolac, and clonidine)
- Similar **Pain levels**, **Narcotic usage**, and **ROM**.
- Exparel group showed improved walking distance

PAI combo vs Plain Bupivicaine

The Journal of Arthroplasty 30 Suppl. 1 (2015) 64–67

Does Extended-Release Liposomal Bupivacaine Better Control Pain Than Bupivacaine After Total Knee Arthroplasty (TKA)? A Prospective, Randomized Clinical Trial

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St. Louis Joint Replacement Institute, St. Louis, Missouri

Variable	Study Group Liposomal Bupivacaine (n = 58)	Control Group Bupivacaine (n = 53)	P Values
Mean pain scale rating (scale 0–10)			
POD #1 AM	4.5 ± 2.4 (0–10)	4.6 ± 2.5 (0–9)	0.73
POD #1 PM	4.1 ± 2.3 (0–10)	4.5 ± 2.1 (0–8)	0.28
POD #2 AM	4.4 ± 2.1 (0–9)	4.8 ± 2.1 (0–9)	0.27
POD #2 PM	4.1 ± 2.1 (0–9)	4.6 ± 2.2 (0–10)	0.23
POD #3	3.9 ± 1.7 (1–9) (n = 51)	4.1 ± 1.8 (1–9) (n = 47)	0.57
Mean narcotic usage	51.8 ± 32 (5–185)	54.2 ± 32.8 (0–142)	0.34
Post-operative nausea	3 (5%)	2 (4%)	0.72
Post-operative ROM			
POD #2	81 ± 14 (50–112)	77 ± 15 (44–104)	0.14
3 weeks	107 ± 10 (76–120)	108 ± 13 (60–128)	0.47

- pRTC, Blinded, multimodal pain protocol
- Study Medication cost ($285.00 vs $2.80)

This study **did not justify** the routine use of **Liposomal Bupivacaine**

Orthop Clin North Am. 2015 Oct;46(4):469-77. doi: 10.1016/j.ocl.2015.06.003. Epub 2015 Aug 6.

Liposomal Bupivacaine: A Comparative Study of More Than 1000 Total Joint Arthroplasty Cases.

Barrington JW[1], Olugbode O[2], Lovald S[3], Ong K[4], Watson H[5], Emerson RH Jr[2].

- 1124 consecutive TKA / THA,
  (PAI – Marcaine +/- ketorolac, and morphine)
- 1124 matched group (EXPAREL)

Table 3
Aggregate cost data for supplies and pharmaceuticals for a subset of patients in the Pre and Post groups

Cost	Pre	Post	Change
Cost of Supplies ($)	11,900,847	10,394,427	1,506,420
Cost of Pharmaceuticals ($)	371,506	631,813	−260,307
Total Change			1,246,113

Even though its more expensive, it reduced overall cost.

Hypothesis

- There is **NO Difference** in post-operative opioid usage /pain parameters after TKA in pts who received two different PAIs.
- Pts with (HCAHPS) **Pain was always well controlled** had greater satisfaction in other domains of the questionnaire.

Single Center Study - Tampa General Hospital

Inclusion: ≥ 18 years of age
TKA or rev TKA
Received PAI

Exclusion: < 18 year of age
Not TKA or rev TKA
Peripheral nerve block

***Same Multimodal Pain / Surgical / Physical Therapy Protocols**

EXPAREL – MUE (Prospective)
April 2014–September 2014

N=259 (TKA)
N =11 (rev TKA)
*EMR Procedure Codes
*ERX 153726

Retrospective Cohort
October 2013 –March 2014

N=307 (TKA)
N =22(rev TKA)
*EMR Procedure Codes

ALOS
OPIATE USAGE
- 1st Admin
- MS Equiv per case
- MS Equiv per day
-Mean Direct Care Cost

MULTIMODAL PAIN PROTOCOL

Pre-emptive oral pain medications

Preoperative Single Shot Spinal

Intraoperative Peri-Articular injection (PAI)

Post – Operative Narcotics and NSAIDs

PAI COCKTAIL 1	**Ropivacaine** (PF) 5 mg/mL (0.5 %) Soln	16 mL
	morphine 10 mg/mL Soln	6 mg
	EPINEPHrine 1 mg/mL (1:1,000) Soln	0.2 mL
	methylPREDNISolone acetate 40 mg/mL Susp	40 mg
	sodium chloride 0.9 % Soln25 mL	25 mL
PAI COCKTAIL 2	**Ropivacaine** (PF) 5 mg/mL (0.5 %) Soln	49.25 mL
	ketorolac 30 mg/mL (1 mL) Soln	30 mg
	EPINEPHrine 1 mg/mL (1:1,000) (1mL) Soln	0.5 mL
	clonidine 1,000 mcg/10 mL (100 mcg/mL) Soln	0.08 mg
	sodium chloride 0.9 % Soln	48.45 mL
LIPOSOMAL BUPIVICAINE	Marcaine 0.5% marcaine / 1:200,000 epinephrine	30cc
	Liposomal Bupivacaine (1 vial; 1.33% ,266 mg)	20cc
	+ normal saline	30-60cc

APPENDIX 2: Morphine Equivalent Conversion Table

Drug Name	Morphine Equiv Dose (mg)
Fentanyl 1,250 mcg/ 25 mL (**50 mcg/mL** in 0.9% NaCl)	5
Fentanyl PF (50 mcg/mL) inj	5
Hydrocodone/APAP 5-325 mg tabs	5
Hydrocodone/APAP 7.5-325 mg tab	7.5
Hydromorphone 10mg/50 mL **(0.2 mg/mL)** in 0.9% NaCl	1.33
Hydromorphone 1mg/mL inj	6.67
Hydromorphone 1mg/mL inj	6.67
Hydromorphone 2 mg tabs	8
Hydromorphone 2 mg/mL inj	13.33
Hydromorphone 2 mg/mL inj	13.33
Meperidine 50 mg/mL inj	6.67
Morphine 0.5 mg/mL	0.5
Morphine 10 mg/mL inj	10
Morphine 2 mg/mL IV cartridge	2
Morphine 4 mg/mL inj	4
Morphine ER 30 mg tabs, extended release	30
Oxycodone 15 mg tab	22.5
Oxycodone 5 mg tabs	7.5
Oxycodone ER 10 mg, extended release 12h tab	15
Oxycodone ER 20 mg tabs, extended release 12h	30
Oxycodone/APAP 5-325 mg tablet	7.5
Oxycodone/APAP 7.5-325 mg tab	11.25

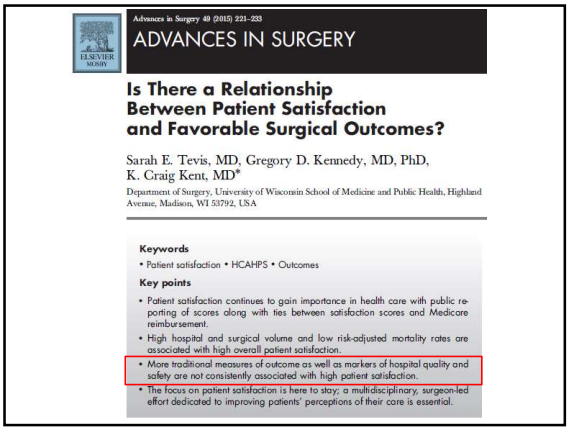
Overall Comparison of Liposomal Bupivicaine and Traditional PAI Groups in TKA and rev TKA

	Cases	ALOS (days)	Average Morphine Equivalent (mg/case)	Average Morphine Equivalent (mg/day)	Hours to 1st Opiate Admin
			.78	21.83	1.07
		p= 0.4454	P=0.5266	P=0.6089	P=0.0107

Average Morphine Equivalent Doses per **CASE** & **DAY**, Higher in Exparel group for TKA pts

Time to 1st Admin of Opiate was longer in the Exparel Group in TKA pts

No Difference in **ALOS**, opiate usage between Revision Groups



Advances in Surgery 49 (2015) 221–233

ADVANCES IN SURGERY

Is There a Relationship Between Patient Satisfaction and Favorable Surgical Outcomes?

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Keywords

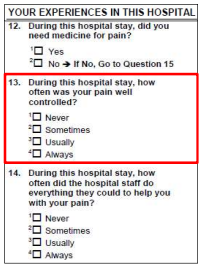
• Patient satisfaction • HCAHPS • Outcomes

Key points

- Patient satisfaction continues to gain importance in health care with public reporting of scores along with ties between satisfaction scores and Medicare reimbursement.
- High hospital and surgical volume and low risk-adjusted mortality rates are associated with high overall patient satisfaction.
- More traditional measures of outcome as well as markers of hospital quality and safety are not consistently associated with high patient satisfaction.
- The focus on patient satisfaction is here to stay; a multidisciplinary, surgeon-led effort dedicated to improving patients' perceptions of their care is essential.

HCAHPS:
Hospital Consumer Assessment of Healthcare Providers and Systems

- 25 questions assess patients' perception of their care
- 7 questions collect demographic information

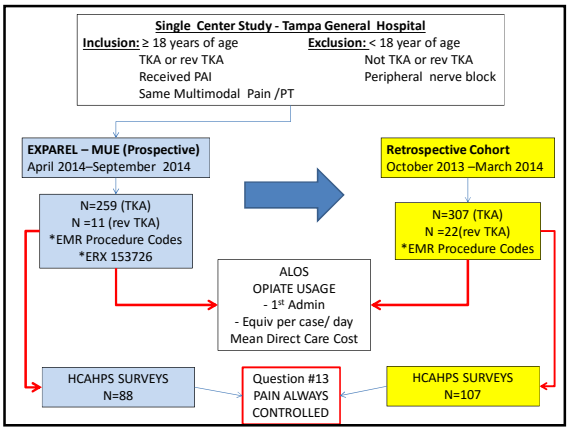

YOUR EXPERIENCES IN THIS HOSPITAL

12. During this hospital stay, did you need medicine for pain?
   1☐ Yes
   2☐ No → If No, Go to Question 15

13. During this hospital stay, how often was your pain well controlled?
   1☐ Never
   2☐ Sometimes
   3☐ Usually
   4☐ Always

14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?
   1☐ Never
   2☐ Sometimes
   3☐ Usually
   4☐ Always

Selection of top-category ratings in each subsection of the HCAHPS

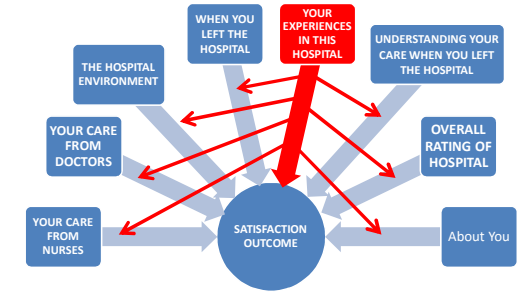


	Total Knee Replacement (81.54) and Revision Knee Replacement (00.80)			
	LIPOSOMAL BUPIVICAINE PAI		TRADITIONAL PAI	
TKA and Rev TKA CASES#	270		329	
HCAHPS Respones	88		107	
Survey Response Rate	33%		33%	
QUESTION # 13				
[1] Never	2	2%	0	0%
[2] Sometimes	1	1%	1	1%
[3] Usually	28	32%	26	24%
[4] Always	54	61.36%	74	69.16%
[X]Null	3	3%	6	6%

(HCAHPS) PAIN WELL CONTROLLED SELECTION "ALWAYS"			
LIPOSOMAL BUPIVICAINE PAI		TRADITIONAL PAI	
88 cases	61.4%	107 cases	69.2%

No Difference between groups P=0.2900

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)



**IRB addendum was requested for supplemental access for analysis.*

HCAHPS SURVEYS : TOP BOX SCORES ***p (Fisher Exact Test)**

N=88
N=107

YOUR CARE FROM NURSES

	1		2		3		4	
	During this hospital stay, how often did **nurses** treat you with **courtesy** and respect?		During this hospital stay, how often did **nurses listen** carefully to you?		During this hospital stay, how often did **nurses explain** things in a way you could understand?		During this hospital stay, after you pressed the **call button**, how often did you get help as soon as you wanted it?	
Exparel PAI	88	**88%**	69	78%	76	86%	50	57%
Traditional PAI	107	**87%**	85	79%	87	81%	79	74%
	P = 0.438		P = 0.862		P = 0.438		**P =0.015**	

YOUR CARE FROM DOCTORS

	5		6		7	
	During this hospital stay, how often did **doctors** treat you with **courtesy** and respect?		During this hospital stay, how often did **doctors listen** carefully to you?		During this hospital stay, how often did **doctors explain** things in a way you could understand?	
Exparel PAI	80	**91%**	69	**78%**	69	**78%**
Traditional PAI	98	**92%**	88	**82%**	89	**83%**
	P = 0.987		P = 0.587		P = 0.465	

THE HOSPITAL ENVIRONMENT

	8		9	
	During this hospital stay, how often were your **room** and bathroom kept **clean**?		During this hospital stay, how often was the area around your **room quiet** at night?	
Exparel PAI	63	72%	52	59%
Traditional PAI	75	70%	70	65%
	P = 0.875		P = 0.376	

THE HOSPITAL ENVIRONMENT

	11		13		14		16		17	
	How often did you **get help** in getting to the **bathroom** or in using a bedpan as soon as you wanted?		During this hospital stay, **how often was your pain well controlled**?		During this hospital stay, how often did the hospital staff do **everything they could to help you with your pain**?		Before giving you any new medicine, how often did hospital staff tell you **what the medicine was for**?		Before giving you any new medicine, how often did hospital staff describe **possible side effects** in a way you could understand?	
Exparel PAI	45	51%	54	61%	72	82%	56	64%	32	36%
Traditional PAI	69	64%	74	69%	89	83%	65	61%	41	38%
	P = 0.081		P = 0.291		P = 0.851		P = 0.767		P = 0.882	

HCAHPS : TOP BOX SCORES

	OVERALL RATING OF HOSPITAL			
	21		22	
	‚What number would you use to rate this hospital during your stay?		Would you recommend this hospital to your friends and family?	
	10 - Best Hospital		**Definitely Yes**	
Exparel PAI	46	52%	76	86%
Traditional PAI	79	74%	97	91%
	p =0.00259		p=0.371088	

OVERALL HOSPITAL RATING WAS HIGHER IN THE TRADITIONAL PAI GROUP

***No statistical differences noted between groups:**
ABOUT YOU DOMAIN Race, language, education, general health, mental status ratings.

Considerations

- PAI are Technique dependent
- No Standardization of the technique
- Control for variability between patient groups.

- Better understanding by clinicians of how this data is interpreted and used
- Does satisfaction translate to a better clinical outcome?

Conclusions

- Findings support current literature on PAIs
- Ideal cocktail has yet to be determined
- Patient Satisfaction is multifactorial.
- Relationship of pain perception on outcome is yet to be determined.

Thank you

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