Impact of Methocarbamol on Opioid Use After Various Types of Hernia Repair - Pilot RCT

Presented by: Nicole Rieger, MD

University of South Carolina School of Medicine Greenville
Prisma Health Upstate

Disclosures

- I have no personal disclosures
- Ethicon/J&J (Dr. Warren)

Opioid use after surgery

- It is well established that surgeons historically overprescribe opioids[1-3]
- 2020 review[3]
  - 64% of IHR and 60% of PVHR patients did not require opioids post-op
- There is still work to do

1 Hill MV, McMahon ML, Stucke RS, Barth RJ. Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. Ann Surg. 2017 Apr;265(4):709e714.
2 Bicket MC, Long JJ, Pronovost PJ, Alexander GC, Wu CL. Prescription opioid analgesics commonly unused after surgery: a systematic review. JAMA Surg. 2017;152:1066e1071
3 Millard JL, Moraney R, Childs JC, et al. Opioid use after inguinal and ventral hernia repair. Am Surg. 2020 Aug;86(8):965e970.

Multimodal pain control

- Minimizes risks associated with opioids
- Helps achieve optimal recovery
- Examples
  - Tylenol
  - NSAIDs
  - Neuromodulators
  - Regional anesthesia
  - Muscle relaxants (methocarbamol)

Warren JA, Stoddard C, Hunter AL, et al. Effect of multimodal analgesia on opioid use after open ventral hernia repair. J Gastrointest Surg. 2017 Oct;21(10): 1692e1699.
Wick EC, Grant MC, Wu CL. Postoperative multimodal analgesia pain management with nonopioid analgesics and techniques: a review. JAM

Initial publications 2023

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Original Research Article

Impact of methocarbamol on opioid use after primary ventral and inguinal hernia repair

Caitlin Crosier [a], Brooke Hammond [b], Cecilia Carbonell [b], Katherine Hoffman [a], Shivani Desai [a], Dawn Blackhurst [a], Alfredo M. Carbonell [a, c], Michael W. Love [a, c], William S. Cobb [a, c], Jeremy A. Warren [a, c, *]

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Original Research Article

Impact of methocarbamol on opioid use after ventral incisional hernia repair

Shivani Desai [a], Cecilia Carbonell [b], Katherine Hoffman [a], Brooke Hammond [b], Caitlin Crosier [a], Dawn Blackhurst [a], Alfredo M. Carbonell [a, c], Michael W. Love [a], William S. Cobb [a, c], Jeremy A. Warren [a, c, *]

Initial publications 2023

Table 3
Opioid Outcomes for patients undergoing primary ventral hernia repair.

Data are presented as Median (IQR) or Number (%)

Characteristic	Methocarbamol Group	PM Controls	p-value
Number of patients	52	104	–
Admitted greater than 24 h	7 (13.5)	19 (18.3)	0.477
Inpatient total MME			
Median (IQR)	32 (10, 64)	29 (15, 53)	0.947
Opioids prescribed at discharge	29 (55.8)	94 (90.4)	<0.001*
Total MME prescribed at discharge			
Median (IQR)	20 (0, 45)	50 (25, 75)	<0.001*
Opioid refill required	2/29 (6.9)	1/94 (1.1)	0.075
Rescue opioid required	1/23 (4.6)	0/10 (0.0)	0.493

Note: Table 2 P-values from Wilcoxon Rank Sum test for continuous data (medians) and the Chi-square test for categorical data (proportions).

Table 4
Opioid Outcomes for patients undergoing inguinal hernia repair.

Data are presented as Median (IQR) or Number (%)

Characteristic	Methocarbamol Group	PM Controls	p-value
Number of patients	52	104	–
Admitted greater than 24 h	1 (1.9)	6 (5.8)	0.274
Inpatient Total MME			
Median (IQR)	0 –	15 (10, 38)	0.309
Opioids prescribed at discharge	35 (67.3)	91 (87.5)	0.003*
Total MME Rx at discharge			
Median (IQR)	25 (0, 25)	40 (25, 50)	<0.001*
Opioid Refill Required	3/35 (8.6)	0/91 (0.0)	0.005*
Rescue opioid required	1/17 (5.9)	0/13 (0.0)	0.374

Note: Table 2 P-values from Wilcoxon Rank Sum test for continuous data (medians) and the Chi-square test for categorical data (proportions).

Initial publications 2023

Table 2
Opioid outcomes.

Characteristic	Robaxin group	PM Controls	p-value
Number of patients	101	202	–
Admit to hospital >24 h	66 (54.1)	125 (62.8)	0.123
Inpatient Total MME Median (IQR)	23 (8, 100)	25 (8, 65)	0.847
Opioids prescribed at discharge	88 (87.1)	175 (86.6)	0.904
Median MME Rx at discharge Median IQR	60 (40, 75)	75 (50, 80)	0.021*
Opioid Refill Required	11/88 (12.5)	29/175 (16.6)	0.386
Rescue Opioid Required	2/13 (15.4)	0/27 (0.0)	0.037*

Note: Data is presented as Median (IQR) or Number (%). P-values from Wilcoxon Rank Sum test for continuous data (medians) and the Chi-square test for categorical data (proportions).

Initial publications 2023

Table 3
Subgroup analysis for open VIHR.

Characteristic	Robaxin group	PM Controls	p-value
Number of patients	53	107	–
Admit to hospital >24 h	33 (62.3)	76 (71.0)	0.263
Inpatient Total MME Median (IQR)	23 (8, 120)	36 (10, 76)	0.895
Opioids prescribed at discharge	47 (88.7)	89 (83.2)	0.359
Median MME Rx at discharge Median IQR	50 (20, 75)	60 (30, 90)	0.295
Opioid Refill Required	5/47 (10.6)	13/36 (36.1)	0.005*
Rescue Opioid Required	2/6 (33.3)	0/18 (0.0)	0.011*

Table 4
Subgroup analysis for robotic VIHR.

Characteristic	Robaxin group	PM Controls	p-value
Number of patients	48	95	–
Admit to hospital >24 h	21 (43.8)	47 (49.5)	0.518
Inpatient Total MME Median (IQR)	15 (5, 36)	11 (0, 52)	0.770
Opioids prescribed at discharge	41 (85.4)	86 (90.5)	0.360
Median MME Rx at discharge Median IQR	60 (43, 75)	75 (50, 75)	0.054
Opioid Refill Required	6/41 (14.6)	16/86 (18.6)	0.580
Rescue Opioid Required	0/7	0/9	–

Cohorts

- Prospective randomized Pilot study
  1. Open retromuscular ventral/incisional hernia repair
  2. Inguinal hernia repair
  3. Primary ventral hernia repair
  4. Robotic retromuscular ventral/incisional hernia repair

Hypothesis

- Methocarbamol reduces post-operative opioid use
- Does not increase pain or rescue opioid use

Methods

- 30 per cohort
- Exclusion:
  - Chronic opioid use
  - Inability to take NSAIDs or Tylenol
- Primary outcome: Patient reported opioid use at 30 days
- Secondary outcomes:
  - Pain at 2 and 7 days
  - Need for opioid refill or rescue opioid

Outpatient Prescribing protocol

Group 1: Primary Ventral Hernias

Control Group

Acetaminophen 1000mg TID
Ibuprofen 600mg TID
Tramadol 50mg TID PRN x 5 *or*
Hydrocodone/APAP 5/325mg TID PRN x 5 *or*
Oxycodone 5mg TID PRN x 3

Study Group

Acetaminophen 1000mg TID
Ibuprofen 600mg TID
Methocarbamol 500mg TID PRN x 10

Group 2: Inguinal Hernia Repair

Control Group

Acetaminophen 1000mg TID
Ibuprofen 600mg TID
Tramadol 50mg TID PRN x 5 *or*
Hydrocodone/APAP 5/325mg TID PRN x 5 *or*
Oxycodone 5mg TID PRN x 3

Study Group

Acetaminophen 1000mg TID
Ibuprofen 600mg TID
Methocarbamol 500mg TID PRN x 10

Inpatient Prescribing protocol

- Control group received methocarbamol
- Both groups given opioids based on inpatient needs

Discharge Opioid Prescribing for Hospitalized patients (>24hr LOS):

Base discharge prescriptions on prior 24hr opioid use

Morphine milligram equivalents (MME):

Hydrocodone	1	5mg hydrocodone = 5mg morphine
Oxycodone	1.5	5mg oxycodone = 7.5mg morphine
Tramadol	0.1	50mg tramadol = 5mg morphine

MME last 24 hrs	Rec. discharge dose (total MME)	Medication equivalent
0-5 (0-1 pills)	15	hydrocodone 5mg x 3 tramadol 50mg x 3 oxycodone 5mg x 2
6-15 (2-3 pills)	40	hydrocodone 5mg x 8 oxycodone 5mg x 6 tramadol 50mg x 8
16-30 (4-6 pills)	80	hydrocodone 5mg x 16 oxycodone 5mg x 12 tramadol 50 mg x 16
>30 (>6 pills)	100	hydrocodone 5mg x 20 oxycodone 5mg x 15 tramadol 50mg x 20

Open VHR results

- No difference in pain POD 2 or 7
- No difference in opioid refills
- Significant reduction in opioid use in study group

Table 1: Impact of methocarbamol on patient-reported opioid use after open VHR

Characteristic	M+	M-	p-value
Number of Patients	17	19	---
Age – Years			
Median (IQR)	64 (61, 69)	55 (45, 67)	0.068
Gender Male: No. (%)	10 (58.8)	8 (42.1)	0.505
Pain score @ 2 days			
Median (IQR)	4.5 (2, 7.5)	4 (2, 7)	0.652
Pain score @ 7 days			
Median (IQR)	3.5 (0.5, 4.5)	2 (1, 4)	0.827
Rescue/ Refill: No. (%)	2 (11.8)	0 (0)	0.216
Patient reported opioid use at 30 days: No. (%)			
Any	6 (35.3)	15 (79.0)	0.017*
Patient reported opioid use (# pills taken) at 30 days: No. (%)			
0	11 (64.7)	4 (21.0)	0.023*
1-2	2 (11.8)	3 (15.8)	
3-4	0	6 (31.6)	
5-10	3 (17.6)	3 (15.8)	
11-15	1 (5.9)	3 (15.8)	

Open VHR EuraHS

Table 3. EuraHS Scores by Treatment Group: Data are presented as Median (IQR)

Characteristic	Robaxin	No Robaxin	p-value
Number of Patients	20	19	---
Total EuraHS Score			
Pre	30 (23, 50)	33 (24, 55)	0.855
Post	29 (10, 49)	22 (13, 32)	0.518
Difference	-1 (-18, 9.5)	-12 (-19, 2)	0.383
P-value	0.279	0.012*	---
EuraHS Score (Pain)			
Pre	5 (1, 13)	10 (2, 15)	0.412
Post	5 (2, 11)	5 (2, 10)	0.778
Difference	-2 (-5, 2)	-1 (-9, 5)	0.888
P-value	0.362	0.336	---

IHR results

- No difference in pain POD 2 or 7
- Significant reduction in opioid use in the study group
- 85% did not require opioids in study group

Table 1: Impact of methocarbamol on opioid use after inguinal hernia repair

Characteristic	M+	M-	p-value
Number of Patients	21	16	---
Age – Years Median (IQR)	62 (53, 70)	60 (55, 70)	0.830
Gender Male: No. (%)	19 (90.5)	14 (87.5)	1.000
Pain score @ 2 days Median (IQR)	3 (2.5, 5)	3.5 (2, 5)	0.771
Pain score @ 7 days Median (IQR)	2 (1, 3)	2 (1, 4)	0.629
Rescue/ Refill: No. (%)	3 (14.3)	0 (0)	0.243
Patient reported opioid use at 30 days: No. (%)			
Any	3 (14.3)	8 (50.0)	0.030*
Patient reported opioid use (# pills taken) at 30 days: No. (%)			
0	18 (85.7)	8 (50.0)	0.019*
1-2	0	1 (6.2)	
3-4	0	4 (25.0)	
5-10	2 (9.5)	3 (18.8)	
11-15	0	0	
16-30	1 (4.8)	0	

Inguinal Hernia EuraHS

EuraHS Scores by Treatment Group at 30 days: Data are presented as Median (IQR)

Characteristic	Robaxin	No Robaxin	p-value
Number of Patients	21	16	---
Total EuraHS Score			
Pre	23 (14, 43)	20 (14, 50)	0.794
Post	13 (7, 33)	12 (7, 16)	0.470
Difference	-11 (-23, -4)	-13 (-45, 4)	0.499
P-value	0.010*	0.021*	---
EuraHS Score (Pain)			
Pre	8 (3, 13)	7 (4, 15)	0.878
Post	5 (2, 9)	3 (1, 6)	0.179
Difference	-1 (-4, -1)	-5 (-12, 1)	0.497
P-value	0.025*	0.022*	---

Primary VHR results

- M+ lower BMI
- No difference in pain POD 2 or 7
- Significant reduction in opioid use in the study group
  - Only 1 M+ patient using opioids at 30d vs 8 M-

Table 1: Impact of methocarbamol on opioid use after primary ventral hernia repair

Characteristic	M+	M-	p-value
Number of Patients	21	18	---
Age – Years: Median (IQR)	47 (41, 61)	54.5 (39.0, 63.0)	0.745
Gender Male: No. (%)	13 (61.9)	13 (72.2)	0.734
BMI: Median (IQR)	30.9 (25.9, 32.8)	31.6 (29.4, 40.3)	0.038*
Pain score @ 2 days Median (IQR)	4.0 (3, 6)	3.5 (2, 5)	0.499
Pain score @ 7 days Median (IQR)	1.5 (0.5, 2.5)	1.0 (0, 4)	0.987
Rescue/ Refill: No. (%)	0	2 (11.1)	0.207
Patient reported opioid use at 30 days: No. (%)			
Any	1 (4.8)	8 (44.4)	0.009*
Patient reported opioid use at 30 days: No. (%)			
0	20 (95.2)	10 (55.6)	0.010*
1-2	1 (4.8)	2 (11.1)	
3-4	0	3 (16.7)	
5-10	0	3 (16.7)	

Primary Ventral EuraHS

Table 3. EuraHS Scores by Treatment Group: Data are presented as Median (IQR)

Characteristic	Robaxin	No Robaxin	p-value
Number of Patients	21	18	---
Total EuraHS Score			
Pre	20 (14, 31)	18 (12, 42)	0.714
Post	15 (7, 24)	13 (9, 36)	0.725
Difference	-7 (-12, 2)	-4 (-7, 2)	0.888
P-value	0.084	0.185	---
EuraHS Score (Pain)			
Pre	3 (2, 8)	3 (2, 11)	0.798
Post	2 (0, 5)	3 (2, 7)	0.190
Difference	-2 (-6, 0)	0 (-4, 1)	0.488
P-value	0.128	0.363	---

Robotic VHR preliminary results

Impact of Methocarbamol on opioid use after robotic hernia repair

Characteristic	Robaxin	No Robaxin	p-value
Number of Patients	16	13	---
Age – Years Median (IQR)	57 (48, 66)	57 (50, 72)	0.524
(N=29 median age was 57, range was 32 to 78)			
Gender Male: No. (%)	3 (18.8)	6 (46.2)	0.226
Pain score @ 2 days Median (IQR)	7.0 (3.5, 8.5)	5.0 (3.0, 8.0)	0.338
Pain score @ 7 days Median (IQR)	4.5 (3.0, 6.0)	2.0 (1.5, 4.0)	0.064
Rescue/ Refill: No. (%)	3 (18.7)	0 (0.0)	0.232
Patient reported opioid use at 30 days: No. (%)			
Any	10/15 (66.7)	6/12 (50.0)	0.452
Patient reported opioid use at 30 days: No. (%)			
0	5 (33.3)	6 (50.0)	0.827
1-2	3 (20.0)	2 (16.7)	
3-4	0	1 (8.3)	
5-10	5 (33.3)	2 (16.7)	
11-15	1 (6.7)	0	
16-30	1 (6.7)	1 (8.3)	

Robotic Ventral EuraHS

EuraHS Scores by Treatment Group at 30 days: Data are presented as Median (IQR)

Characteristic	Robaxin	No Robaxin	p-value
Number of Patients	16	13	---
Total EuraHS Score			
Pre	25.0 (20.5, 53.5)	30.0 (23.0, 35.0)	0.759
Post	29.5 (16.5, 40.0)	24.0 (17.0, 30.0)	0.455
Difference	- 9.0 (-23.5, 14.0)	-5.0 (-16.1, -1.0)	0.913
P-value	0.454	0.197	---
EuraHS Score (Pain)			
Pre	4.5 (2.0, 17.5)	3.0 (1.0, 11.0)	0.226
Post	5.5 (2.5, 10.5)	6.0 (3.0, 7.0)	0.758
Difference	-1.5 (-9.0, 5.5)	0.0 (-5.0, 3.0)	0.553
P-value	0.511	0.488	---

Conclusions

- Methocarbamol reduces post operative opioid use
  - No increase in opioid refills/rescue
- Higher probability of ZERO opioid use
  - Open VHR 64% vs 21%
  - IHR 85.7% vs 50%
  - Primary VHR 95.3% vs 55.6%

Future Steps

- Complete analysis to assess for variance in hernia characteristics & comorbidities
- Multi-center studies
- Optimal dose