Pain Relief After Trapeziectomy: A Double-Blind Randomized Control Trial of Opioid versus Non-Opioid Analgesia

Gabriella B Smith, Ashley Titan, Deborah Kenney, Nicole Segovia Pham, Tara Shelby, Robert Reitz, Angela A Wang, Paige M Fox, Jeffrey Yao, Amy L Ladd

INTRODUCTION:

In the United States, opioids are commonly prescribed for postoperative pain management following trapeziectomy for carpometacarpal osteoarthritis. Due to the opioid epidemic and a heightened awareness of the risks associated with opioid use, orthopaedic surgeons have started to consider non-opioid pain management alternatives. Non-opioid analgesia presents an opportunity to manage patient pain while reducing the risk of adverse effects of opioids. Despite prior investigations into non-opioid pain control after trapeziectomy, there are no standardized guidelines for trapeziectomy patients. The purpose of this randomized control trial is to assess the efficacy of ibuprofen and acetaminophen combination compared to oxycodone for pain management in the first 30 days following trapeziectomy for thumb carpometacarpal osteoarthritis.

METHODS:

We conducted an IRB-approved double-blind randomized control trial. Eligible preoperative trapeziectomy patients at two academic centers and a Veterans Affairs hospital were approached and consented between February 2021 and May 2025. Exclusion criteria included non-English speakers, multiple surgeries, substance use history, medication allergies, recent opioid use, pregnancy, organ failure, coagulopathy, gastric bleeding, and complex regional pain syndrome. Enrolled participants were double-blind randomized using randomization tables to receive 20 doses of study medication: either 400mg ibuprofen and 500mg acetaminophen in combination or 5mg oxycodone for the first 30 days after surgery. All patients received a nerve block prior to surgery, and a subset of patients chose to use a pain pump, which provides a continuous infusion of local anesthetic to the arm for up to 5 days postoperatively. All patients received 4 standardized 5mg oxycodone rescue medications for breakthrough pain that was inadequately controlled by the assigned study intervention. When patients switched to over the counter medication for pain control, they returned their study medications, at which point study and rescue medications were counted. Numerical pain scores, worst and average, out of 10 were recorded on postoperative days 1-30 via text messaging in REDCap.

Bivariate analysis of demographics, baseline characteristics, and outcomes between the two groups included Mann-Whitney tests, Fisher's exact tests, and chi-square tests. Linear mixed-effects models were used to analyze daily pain scores between the treatment groups adjusting for postoperative day, study medication use, initial pain, pain pump use, gender, and the interaction between treatment and medication use.

RESULTS:

Sixty-one patients enrolled in the study with 29 (47.5%) randomized to ibuprofen and acetaminophen combination. Of the 61, 38 (62.3%) were female, and 34 (55.7%) had surgery on their dominant hand. Baseline characteristics and demographics were not significantly different between treatment groups except for surgery on the right hand being greater in the ibuprofen and acetaminophen group (Table 1). Average pain for the first 7 days was 0.6 points higher for the oxycodone group compared to the ibuprofen and acetaminophen group (p=0.04, Table 2). After adjusting for covariates, worst and average daily pain in the first 7 postoperative days and postoperative days 8-30 were not significantly different between patients given oxycodone and patients given ibuprofen and acetaminophen (Table 3). In the first 7 days, higher daily worst and average daily pain were associated with earlier postoperative day, study medication use on a particular day, higher baseline pain, and no use of a pain pump. The interaction between study medication used and treatment was also significant for average daily pain. For postoperative days 8-30, higher daily worst and average daily pain scores were associated with days closer to surgery. Higher baseline pain was also associated with average daily pain. After the first postoperative day, rates of medication use were consistently lower for the oxycodone group until day 14 (Figure 1).

DISCUSSION AND CONCLUSION:

Our double-blind randomized control trial demonstrates that ibuprofen and acetaminophen combination provides effective pain control following trapeziectomy as patients had similar pain scores in the first 30 days postoperatively regardless of treatment group, with the exception of the non-opioid treatment group having lower average pain in the first 7 days compared to oxycodone patients. Further enrollment is warranted to confirm these findings with a goal to enroll 121 patients. These findings can shape national guidelines to promote effective postoperative pain management following trapeziectomy while also minimizing unnecessary opioid use.

Figure 1. Rate of study medication use in the first 30 days following trapeziectomy
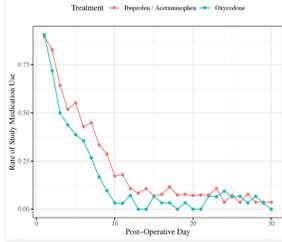
Treatment — Ibuprofen / Acetaminophen — Oxycodone

(y-axis: Rate of Study Medication Use; x-axis: Post-Operative Day)

Table 1. Patient demographics across study groups

	Overall (N=61)	Ibuprofen / Acetaminophen (N=29)	Oxycodone (N=32)	
	Mean [Range]	Mean [Range]	Mean [Range]	p-value
Worst Pain in the Past Week (0-10)	1.8 [0-6]	2.1 [0-6]	1.5 [0-6]	0.155
Current Pain (0-10)	3.0 [0-8]	3.0 [0-7]	2.9 [0-8]	0.508
	N (%)	N (%)	N (%)	p-value
Gender				
Female	38 (62.3%)	20 (69.0%)	18 (56.3%)	0.448
Male	23 (37.7%)	9 (31.0%)	14 (43.8%)	
Surgery Side				
Left	27 (44.3%)	8 (27.6%)	19 (59.4%)	0.025*
Right	34 (55.7%)	21 (72.4%)	13 (40.6%)	
Surgery on Dominant Hand				
No	27 (44.3%)	10 (34.5%)	17 (53.1%)	0.228
Yes	34 (55.7%)	19 (65.5%)	15 (46.9%)	

*denotes significance p<0.05

Table 2. Pain management characteristics and other analgesia use

	Overall (N=61)	Ibuprofen / Acetaminophen (N=29)	Oxycodone (N=32)	
	Mean [Range]	Mean [Range]	Mean [Range]	p-value
Worst Pain, Days 1-7	4.0 [0.9, 7.6]	3.7 [0.9, 7.0]	4.3 [1.9, 7.6]	0.163
Worst Pain, Study Duration	3.0 [0.2, 6.8]	2.9 [0.2, 6.5]	3.2 [0.6, 6.8]	0.228
Average Pain, Days 1-7	2.6 [0.3, 5.8]	2.3 [0.3, 5.3]	2.9 [1.1, 5.8]	0.041*
Average Pain, Study Duration	1.9 [0.2, 5.2]	1.8 [0.2, 5.2]	2.0 [0.3, 4.1]	0.245
Days on Pain Pump	3.5 [1.0, 6.0]	3.6 [1.0, 6.0]	3.5 [1.0, 5.0]	> 0.999
Blister Packs Returned	9.7 [0.0, 20.0]	8.9 [0.0, 19.0]	10.3 (7.03)	0.361
Rescue Medications Returned	3.0 [0.0, 4.0]	2.9 [0.0, 4.0]	2.97 (1.56)	0.751
	N (%)	N (%)	N (%)	p-value
Pain Pump Used				
Yes	25 (41.0%)	14 (48.3%)	11 (34.4%)	0.400
No	36 (59.0%)	15 (51.7%)	21 (65.6%)	
Additional Opioids Prescribed				
Yes	3 (8.3%)	2 (12.5%)	1 (5.0%)	0.840
No	33 (91.7%)	14 (87.5%)	19 (95.0%)	
Rescue Medication Used, Days 1-7				
Yes	23 (37.7%)	11 (37.9%)	12 (37.5%)	> 0.999
No	38 (62.3%)	18 (62.1%)	20 (62.5%)	
Rescue Medication Used, Study Duration				
Yes	28 (49.1%)	15 (53.6%)	13 (44.8%)	0.693
No	29 (50.9%)	13 (46.4%)	16 (55.2%)	

*denotes significance p<0.05

Table 3. Adjusted multivariable models for daily worst and average pain scores

	Days 1-7			
Variable	Daily Worst Pain Estimate [95% CI]	p-value	Daily Average Pain Estimate [95% CI]	p-value
Oxycodone vs. Control	0.5 [-0.3, 1.3]	0.229	0.3 [-0.3, 1.0]	0.285
Postoperative Day	-0.2 [-0.3, -0.1]	< 0.001*	-0.2 [-0.2, -0.1]	< 0.001*
Study Medication Used	1.2 [0.7, 1.8]	< 0.001*	0.6 [0.2, 1.0]	< 0.001*
Initial Pain (Worst in Past Week)	0.3 [0.1, 0.5]	0.012*	0.3 [0.2, 0.5]	< 0.001*
Postoperative Pain Pump Used	-0.9 [-1.5, -0.2]	0.018*	-0.7 [-1.2, -0.1]	0.020*
Male vs. Female	-0.6 [-1.3, 0.04]	0.080	-0.6 [-1.1, -0.01]	0.058
Oxycodone Study Medication Used	0.6 [-0.2, 1.3]	0.166	0.8 [0.2, 1.3]	0.009*
	Days 8-30			
Variable	Daily Worst Pain Estimate [95% CI]	p-value	Daily Average Pain Estimate [95% CI]	p-value
Oxycodone vs. Control	0.4 [-0.4, 1.2]	0.319	0.2 [-0.3, 0.7]	0.459
Postoperative Day	-0.03 [-0.04, -0.02]	< 0.001*	-0.02 [-0.02, -0.01]	< 0.001*
Study Medication Used	0.3 [-0.05, 0.7]	0.091	0.2 [-0.1, 0.5]	0.140
Initial Pain (Worst in Past Week)	0.2 [-0.01, 0.5]	0.077	0.2 [0.1, 0.4]	0.014*
Postoperative Pain Pump Used	-0.1 [-0.9, 0.7]	0.8668	0.02 [-0.5, 0.6]	0.935
Male vs. Female	-0.3 [-1.1, 0.5]	0.470	-0.3 [-0.8, 0.3]	0.355
Oxycodone Study Medication Used	0.1 [-0.4, 0.7]	0.601	0.2 [-0.1, 0.6]	0.233

*denotes significance p<0.05