

IV Acetaminophen (Ofirmev) in Bariatric Surgery

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 Pharmacotherapy Rounds
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Objectives

- Identify the types of bariatric surgeries
- State the indications of IV acetaminophen and its use in bariatric surgery
- Analyze results regarding literature on IV acetaminophen in bariatric surgery

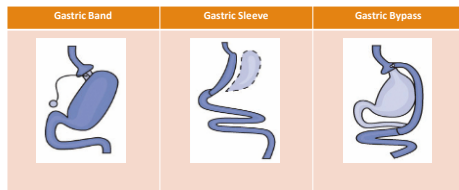
Survey

- How often do you see an order for **IV acetaminophen** for bariatric surgery patients in your institution?
 - Frequently
 - Rarely
 - I've never seen this order

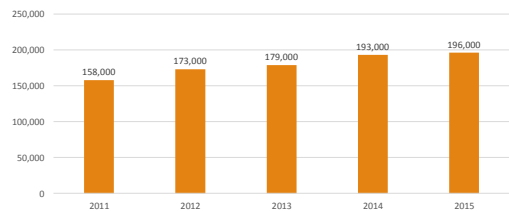
Bariatric Surgery

- Operation that results in weight loss by restricting the amount of food the stomach can hold, causing malabsorption of nutrients, or by a combination of both gastric restriction and malabsorption
- Indications
 - BMI ≥ 40 , or more than 100 pounds overweight
 - BMI ≥ 35 and at least two obesity-related co-morbidities such as :
 - Type II diabetes, hypertension, sleep apnea and other respiratory disorders, non-alcoholic fatty liver disease, osteoarthritis, lipid abnormalities, gastrointestinal disorders, or heart disease
 - Inability to achieve a healthy weight loss sustained for a period of time with prior weight loss efforts

Bariatric Surgery



Estimate of Bariatric Surgery Numbers



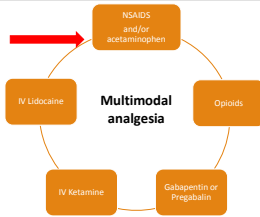
Postoperative Priorities

- Pain management
- Leakage from surgical site
- Nausea and vomiting
- Intravenous fluid management
- Pulmonary hygiene
- Ambulation

2016 Guidelines : American Pain Society

- Management of Postoperative Pain
 - Multimodal analgesia
 - Variety of analgesic medications
 - Techniques combined with non pharmacological interventions

2016 Guidelines : American Pain Society



Acetaminophen Injection (Ofirmev)

- Approved by the FDA November 2010 for management of postoperative pain
- Indications
 - Management of mild to moderate pain
 - Management of moderate to severe pain with adjunctive opioid analgesics
 - Reduction of fever
- Generic formulation not available



Dosing IV Acetaminophen

Age group	Dose given every 4 hours	Dose given every 6 hours	Maximum single dose	Maximum total daily dose of acetaminophen (by all routes)
Adults and adolescents (13 years and older) weighing > 50kg	650 mg	1000 mg	1000 mg	4000 mg in 24 hours
Adults and adolescents (13 years and older) weighing <50kg	12.5mg/kg	15mg/kg	15mg/kg	75mg/kg in 24 hours (up to 3750mg)
Children 2 to 12 years of age				

IV vs PO

	IV acetaminophen	PO acetaminophen
Onset of action	5 - 10 minutes	<1 hour
Bioavailability	100%	85-98%
Peak plasma concentration	15 minutes	30 - 60 minutes
Duration	4 - 6 hours	4 - 6 hours

2016 Guidelines : American Pain Society

- No clear differences between IV versus oral administration of acetaminophen in reducing postoperative pain
- Studies have found IV administration leads to a quicker increase in plasma levels
- Does not have a statistical significance in reducing postoperative pain

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Scheduled Intravenous Acetaminophen Reduces Postoperative Narcotic Analgesic Demand and Requirement After Laparoscopic Roux-en-Y Gastric Bypass

Saurabh, et al. (2014)

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Saurabh, et al. (2014) Methods

- Objective: Determine whether use of IV acetaminophen reduces postoperative narcotic demand and requirement during the first 24 hours in patients undergoing laparoscopic Roux-en-Y gastric bypass (LRYGB) surgery
- Retrospective electronic medical record (EMR) review of laparoscopic Roux-en-Y gastric bypasses performed for severe obesity between 2011 and 2013
- Compared groups based on 24-hour narcotic analgesic demand and requirements

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Saurabh, et al. (2014) Methods

- Primary endpoint**
 - Evaluate the effect of adding scheduled IV acetaminophen on postoperative morphine sulfate patient-controlled analgesia (PCA) usage
- Secondary endpoint**
 - Complications that occurred during the 24-hour postoperative period
 - 30-day postoperative complications between groups

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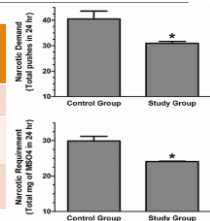
Saurabh, et al. (2014) Results

	Control group Morphine PCA only (n=229)	Study group Morphine PCA and IV acetaminophen (n=189)
Age (yr)	43 ± 0.7 (18-68)	44 ± 0.8 (23-68)
Male	23%	16%
Female	77%	84%
BMI	45.8 ± 0.4 (36-82.3)	46 ± 0.5 (35.3-77.4)
Type 2 diabetes	29%	35%

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Saurabh, et al. (2014) Results: Total PCA pushes

	Control group Morphine PCA only (n=229)	Study group Morphine PCA and IV acetaminophen (n=189)	P value
Narcotic demand (pushes/1 st 24h)	40.5 ± 3.1 (2-206)	30.9 ± .8 (0-174)	0.0017
Narcotic requirement (mg/1 st 24h)	29.9 ± 1.3 (0-111)	24.1 ± .1 (0-177)	0.004
Total IV acetaminophen in first 24 h	0 mg	3617 mg	



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Saurabh, et al. (2014) Conclusion

- IV acetaminophen reduces the demand for and requirements of narcotic analgesia after Roux-en-Y gastric bypass in the first 24 hours
- IV acetaminophen can be safely used for post operative analgesia in morbidly obese patients when used for 24 hours with compliance and dosage requirements

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Saurabh, et al. (2014) Critical Appraisal

Strengths

- Researchers do not have a conflict of interest to the study
- Looked at a specific subset of bariatric surgeries
- Utilized an order set for pain management

Limitations

- Retrospective in nature
- Lacks objective pain assessment on patients
- Monitoring acetaminophen induced side effects and effect on liver enzymes

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Effect of Intravenous Acetaminophen on Postoperative Opioid Use in Bariatric Surgery Patients

Wang, et al. (2015)

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Wang, et al. (2015) Methods

- Objective: To determine whether IV acetaminophen reduces opioid requirements after bariatric surgery
- Retrospective chart review analysis of bariatric surgery patients who
 - Received only opioids for postoperative pain from January 2012 to June 2012
 - Received at least four doses of IV acetaminophen plus opioids from October 2012 to March 2013

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Wang, et al. (2015) Methods

- Primary endpoint**
 - Difference in opioid consumption, expressed in oral morphine equivalents (OME)
- Secondary endpoint**
 - Reduction in baseline pain score
 - Total amount of each opioid used
 - Average hospital length of stay

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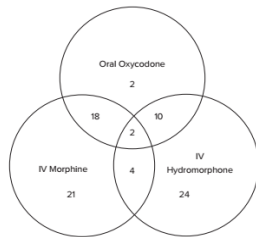
Wang, et al. (2015) Data Analysis

Characteristics	All Patients (N=88)	IV acetaminophen (1g)		P value
		Yes (n=44)	No (n=44)	
Mean age (years)	41.85 ± 10.35	43.73 ± 11	39.98 ± 9.4	0.089
Gender, n (%)				0.792
Male	18 (20.4)	8 (18.2)	10 (22.7)	
Female	70 (79.6)	36 (81.8)	34 (77.3)	
Mean BMI (kg/m ²)	45.03 ± 6.3	46.39 ± 6.26	43.68 ± 6.12	0.043

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Wang, et al. (2015)
Data Analysis

- Distribution of patients among narcotic classes
- Seven of the 88 patients received no narcotic



Wang, et al. (2015)
Results : Comparison of Opioid consumption

	IV acetaminophen (1g)				P value
	Yes		No		
Opioid use	N	Median	N	Median	
OME	44	93.5mg	44	63mg	0.017
Hydromorphone, IV	34	4.5mg	6	7.75mg	0.348
Morphine, IV	8	8mg	37	16mg	0.049
Oxycodone, oral	12	25mg	20	20mg	0.626

Wang, et al. (2015)
Results : Comparison of Pain scores

Variables	All patients (n = 88) Median (IQR)	IV Acetaminophen (1g)		P value
		Yes (n = 44) Median (IQR)	No (n = 44) Median (IQR)	
Baseline pain score (0 to 10)	6 (6-8)	6 (6-8)	6 (6-8)	0.983
Pain score after analgesic use	3 (2-4)	3 (2.0-3.5)	3 (2-4)	0.173
Change in pain score	4 (3-5)	4 (3-5)	4 (3-4)	0.162

Wang, et al. (2015)
Conclusion

- The study found the acetaminophen/opiate group required significantly more opiates compared to the opiates alone group.
- Study arms did not alter average length of stay contributory to conclusion
- Authors conclude IV acetaminophen does not reduce opioid use for postoperative pain management in bariatric surgery patients

Wang, et al. (2015)
Critical Appraisal

Strengths

- Objective pain scores were monitored and analyzed
- Included postoperative length of stay
- Looked at different opioids and compared by oral morphine equivalents

Limitations

- Retrospective in nature
- Small sample size
- Prescriber discretion in choosing IV narcotic for pain management

IV Acetaminophen Results in Lower Hospital Costs and Emergency Room Visits Following Bariatric Surgery: Double-Blind, Prospective, Randomized Trial in a Single Accredited Bariatric Center

Chaar, et al. (2016)

Chaar, et al. (2016) Methods

- Objective: Investigate the economic impact of IV Acetaminophen in bariatric surgery and its effect on patient's pain, satisfaction, and hospital length of stay
- Double-blind, prospective, randomized controlled trial in patients that underwent Roux-en-Y (LRYGB) gastric bypass or laparoscopic sleeve gastrectomy (LSG)

Chaar, et al. (2016) Methods

- Primary endpoint**
 - Direct hospital costs
 - Length of stay
 - Postoperative pain
 - Patient satisfaction
- Secondary endpoint**
 - Indirect costs
 - Rescue narcotics dosage
 - 30-day outcomes

Chaar, et al. (2016) Results

	Age Mean ± SD	Gender N (%)	Race N (%)	Type of surgery N (%)
IV acetaminophen (n=50)	43.2 + 15.8	36 female (72%) 15 male (28%)	36 White (72%) 10 Hispanic (20%) 4 African American (8%)	LRYGB 40 (80%) LSG 10 (20%)
Normal saline (n=50)	41.1 + 13.9	39 female (78%) 11 male (22%)	44 White (88%) 5 Hispanic (12%)	LRYGB 32 (64%) LSG (36%)

Chaar, et al. (2016) Results

	Direct Costs Mean ± SD	P value
IV acetaminophen (n=50)	\$3089.18 ± 1366.27	0.76
Normal Saline (n=50)	\$2991.62 ± 1169.58	
LRYGB (n=72)	\$3036.13 ± 1311.53	0.92
SG (n=28)	\$3051.40 ± 1164.30	
Treatment type		
IV acetaminophen + LRYGB (n=40)	\$3089.36 ± 1369.75	0.92
IV acetaminophen + SG (n=10)	\$3088.47 ± 1425.78	
Normal saline + LRYGB (n=32)	\$2969.59 ± 1253.39	
Normal saline + SG (n=18)	\$3030.80 ± 1037.08	

Chaar, et al. (2016) Results

	Median costs for total number of ED visits	Sum of indirect costs related to abdominal pain		Proportion of patients with indirect costs related to abdominal pain
		Total	ED visits for abdominal pain	
IV acetaminophen	\$5,818.85	\$13,185	\$7366	2/10 (20%)
Normal saline	\$6,878.70	\$39,293	\$30,572	8/10 (80%)
P value	N/A			0.05

Chaar, et al. (2016) Results

	Patient satisfaction score Median (range)	P value	Patient pain rating score Mean ± SD	P value
IV acetaminophen (n=50)	4 (1-5)	0.23	6.19 ± 2.40	0.86
Normal saline (n=50)	5 (1-5)		6.31 ± 2.49	
LRYGB (n=72)	5 (1-5)	0.94	6.48 ± 2.29	0.20
SG (n=28)	5 (1-5)		5.67 ± 2.73	

Chaar, et al. (2016) Conclusion

- IV acetaminophen results in significant indirect cost savings and reduced the number of ED visits in the first 30 days
- IV Acetaminophen found to be safe and effective for the obese population
- Use of IV Acetaminophen for pain control following bariatric surgery should be seriously considered

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Chaar, et al. (2016) Critical Appraisal

Strengths

- Randomized controlled trial
- Patient pain scores
- Patient satisfaction scores

Limitations

- ED readmission rates not significant
- Direct cost savings not significant
- Three of the researchers received study funding from Mallinckrodt Pharmaceuticals

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Literature Summary

Saurabh, et al.

- Retrospective EMR review
- Evaluate effect of IV acetaminophen on postoperative morphine PCA usage
- Reduction in the demand and requirements of narcotic analgesia in the first 24 hours

Wang, et al.

- Retrospective chart review
- Determine whether IV acetaminophen reduces opioid requirements postop
- Acetaminophen/opiate group required significantly more opiates compared to opiates alone

Chaar, et al.

- Double-blind, prospective, randomized controlled trial
- Investigate economic impact of IV acetaminophen on patient's pain and satisfaction scores and hospital length of stay
- Indirect cost savings and reduction in ED visits in first 30 days

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Conclusion

- Data is not conclusive and randomized controlled trials are warranted
- Patient's should be assessed based on their clinical assessment before deciding IV acetaminophen would be beneficial
- American Pain Society guidelines state there is not a clear difference between IV and PO acetaminophen
- Would not recommend routine use of IV acetaminophen

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Questions??



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