

Scientific Session IV-A

Paper #24
January 12, 2018
10:15 am

DECONSTRUCTING DOGMA: NON-OPERATIVE MANAGEMENT OF SMALL BOWEL OBSTRUCTION IN THE VIRGIN ABDOMEN

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JPS Health Network

Presenter: Morgan L. Collom, DO

Discussant: April E. Mendoza, MD, University of California San Francisco

Objectives: Management of SBO has become more conservative, especially in those patients with previous abdominal surgery (PAS). However, surgical dogma continues to promote operative exploration for patients with SBO with no previous abdominal surgery (NAS). With the increase in use of CT resulting in more SBO diagnoses, it is important to reevaluate the role of mandatory exploration. Gastrografin (GG) decreases the need for operative exploration and may be an option for patients without previous surgery. We hypothesize that the use of GG in the SBO population without previous surgery will be equally effective in reducing operative exploration rate compared to the SBO population with previous surgery.

Methods: This prospective, multi-institutional, observational study was performed by comparing adjusted operative exploration rates between NAS and PAS. Rate adjustment was accomplished through multivariate logistic regression.

Results: Overall, 601 patients were included in the study; 500 with and 101 patients without prior abdominal surgery. The groups were similar except for age, gender, prior abdominal surgery including colon surgery, prior SBO admission and history of cancer as shown in Table 1. Multivariate analysis showed that PAS (OR = 0.47, $p=0.03$) and the use of GG (OR = 0.11, $p<0.01$) were independent predictors of not needing surgery, while ICU admission (OR = 16.0, $p<0.01$) was associated with a higher likelihood of need for operation. Figure 1 demonstrates that the use of GG significantly decreased the need for operation not only in the PAS group but also, and even more substantially, in the group of patients with NAS.

Conclusions: Patients receiving GG in both the NAS and the PAS group had lower rates of operative exploration for SBO compared to those that did not receive GG. Based on these results, patients with a diagnosis of SBO with NAS should be considered for GG and not automatic operative exploration.

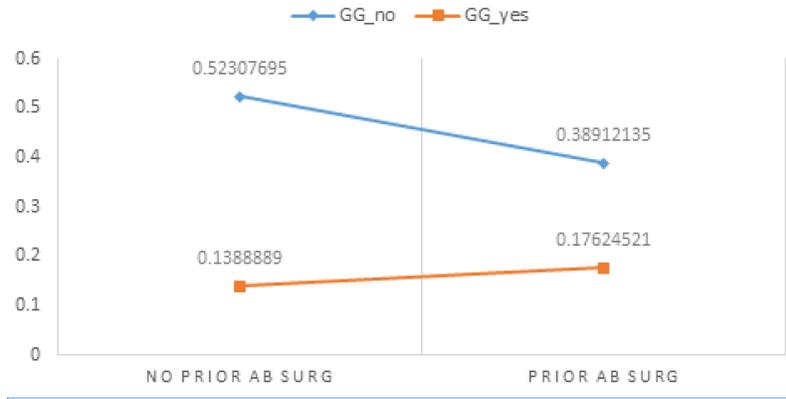


Figure 1.0. Comparing surgery rates for patients with and without history of abdominal surgery, N = 601.

Characteristic	Non-Gastrografin group N=304 (%)	Gastrografin group N=297 (%)	P-value
Operative exploration	127 (41.8)	51 (17.2)	< 0.01
Age >= 65 years	126 (41.5)	150 (50.5)	0.03
Female	140 (46.1)	135 (45.5)	0.88
Prior SBO admission, yes	95 (31.3)	120 (40.4)	0.02
Prior SBO surgery, yes	42 (13.8)	67 (22.6)	0.01
Prior abdominal surgery, yes	239 (78.6)	261 (87.9)	< 0.01
Readmission within 30 days	51 (16.8)	32 (10.8)	0.03
Surgical admission, yes	212 (69.7)	241 (81.1)	< 0.01
SBP, mean (SD)	136.1 (23.0)	136.3 (22.2)	0.92
BMI, mean (SD)	26.7 (7.3)	28.1 (6.9)	0.02
Heart rate, mean (SD)	87.4 (18.1)	83.5 (16.5)	0.01
WBC, mean (SD)	10.4 (5.0)	10.3 (4.0)	0.82
Hx Crohn's disease	12 (4.0)	5 (1.7)	0.09
Prior total abdominal colectomy	16 (5.3)	20 (6.7)	0.45
Duration of obstipation, days, mean(SD)	1.7 (2.5)	1.3 (1.7)	0.04

Table 1. Selected characteristics of SBO patients by Gastrografin challenge status, N = 601.

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CAN ACUTE CARE SURGEONS PERFORM WHILE FATIGUED? AN EAST MULTICENTER PROSPECTIVE STUDY

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Presenter: Kevin M. Schuster, MD, MPH

Discussant: Lawrence Lottenberg, MD, Charles E. Schmidt College of Medicine, Florida Atlantic University

Objectives: Fatigued surgeon performance has only been assessed in simulated sessions or retrospectively after a night on call. Our goal was to determine if self-reported fatigue of acute care surgeons affects patient outcome.

Methods: Four acute care surgery services prospectively collected emergency case outcomes over 18 months. Surgeons defined emergency cases by identifying the patient as needing an immediate operation upon consultation or admission. Surgeons reported, the following day, sleep time accumulated prior to operation, if non-clinical delays to operation occurred and patient volume during the shift. To maximize differences, fatigued surgeons were defined as performing a case after midnight without having slept in the prior eighteen hours. Rested surgeons performed cases before 9 PM or after at least 3 hours of sleep prior to operation. A four-level ordinal scale was used to assign case complexity. Hierarchical logistic regression models were constructed to assess the impact of fatigue on morbidity and mortality while controlling for center and patient level factors.

Results: Of 720 cases collected 567 met criteria for fatigue or rested. Of these cases 158 (27.9%) were performed at night and 154 by a fatigued surgeon. Rested surgeons were more likely to be operating on an older or female patient, other characteristics were similar. Outcomes including mortality, major morbidity, blood loss, incidence of abdominal closure and ostomy creation were similar (Table 1). After controlling for center and patient factors, surgeon fatigue did not impact mortality or major morbidity (Table 2). Mortality variance was 8.3% and morbidity variance was 7.8% at the center level.

Conclusions: Surgeons have similar outcomes in a fatigued or rested state and have equal rates of ostomy creation and fascial closure. Work schedules for acute care surgeons should not be adjusted for the sole purpose of improving patient outcomes.

	Rested surgeon n(%)	Fatigued surgeon n (%)	p
Total patients	413 (72.8)	154 (27.2)	
Age: mean (SD)	52.6 (19.7)	48.5 (20.1)	0.034
Gender female	185 (44.8)	52 (33.8)	0.018
Race			
White	243 (60.8)	81 (54.0)	0.344
Black or African American	102 (25.5)	45 (30.0)	
Asian	10 (2.5)	7 (4.7)	
Other	45 (11.3)	17 (11.3)	
Admitted from			
Home	328 (81.8)	119 (79.9)	0.851
Other acute care hospital	69 (17.2)	28 (18.8)	
ECF	4 (1.0)	2 (1.3)	
Presented with severe sepsis/septic shock	86 (20.8)	33 (21.6)	0.861
Presented with hemorrhagic shock	77 (18.6)	29 (18.8)	0.960
Fascia left open	103 (25.4)	45 (29.6)	0.321
Ostomy created	47 (57.3)	12 (38.7)	0.077
Death	39 (9.82)	12 (8.28)	0.585
Major Morbidity	188 (47.36)	71 (48.97)	0.740

Table 1: SD - Standard deviation, ECF - extended care facility

	Odds ratio for mortality (95% CI)	p	Odds ratio for major morbidity (95% CI)	p
Age	1.06 (1.03 – 1.09)	<0.001		
Admit From				
Home	Reference		Reference	
Other acute care hospital	1.49 (0.55 – 4.11)	0.042	0.87 (0.47 – 1.63)	0.763
ECF	31.73 (1.76 – 571.39)	0.019	1.49 (0.11 – 19.9)	0.686
Functional Status				
Independent			Reference	
Partially dependent			451.96 (<0.01 - >999)	0.756
Totally dependent			0.98 (0.13 – 15.97)	0.386
Hypertension	1.40 (0.55 – 3.55)	0.476		
CHF	5.01 (1.36 – 18.40)	0.011		
Dyspnea	2.77 (0.60 – 12.83)	0.329		
Ventilator dependent	5.86 (1.99 – 17.28)	0.001	2.34 (0.88 – 6.25)	0.088
Ascites	1.15 (0.28 – 4.70)	0.845		
Weight loss	2.44 (0.52 – 11.41)	0.257		
Bleeding disorder	0.93 (0.33 – 2.63)	0.896	1.87 (0.86 – 4.07)	0.116
Sepsis				
None	Reference		Reference	
SIRS	3.86 (1.20 – 12.46)	0.277	1.68 (0.94 – 3.00)	0.082
Sepsis	5.38 (1.43 – 20.28)	0.148	1.97 (0.95 – 4.09)	0.069
Septic shock	10.88 (3.04 – 38.90)	<0.001	16.76 (4.63 – 60.66)	<0.001
Hemorrhagic shock	4.84 (1.31 – 17.85)	0.018		
Hemoglobin	0.84 (0.69 – 1.01)	0.067	0.91 (0.99 – 1.01)	0.057
Case complexity				
Level I	Reference		Reference	
Level II	213.08 (0.09 - > 999)	0.193	3.79 (1.08 – 13.35)	0.038
Level III	242.04 (0.11 - >999)	0.153	6.16 (1.76 – 21.61)	0.005
Level IV	835.71 (0.31 - >999)	0.095	21.71 (3.83 – 123.08)	<0.001
Surgeon Fatigue	1.47 (0.54 – 3.96)	0.448	1.38 (0.82 - 2.30)	0.224
Model area under ROC curve	0.921		0.862	

Table 2: ECF - extended care facility, CHF - congestive heart failure, SIRS - systemic inflammatory response syndrome, ROC - receiver operating characteristic

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RAPID RECOVERY OF PROTEIN DEBT IS ASSOCIATED WITH FEWER COMPLICATIONS IN CRITICALLY INJURED ADULTS

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Presenter: Jennifer L. Hartwell, MD, FACS

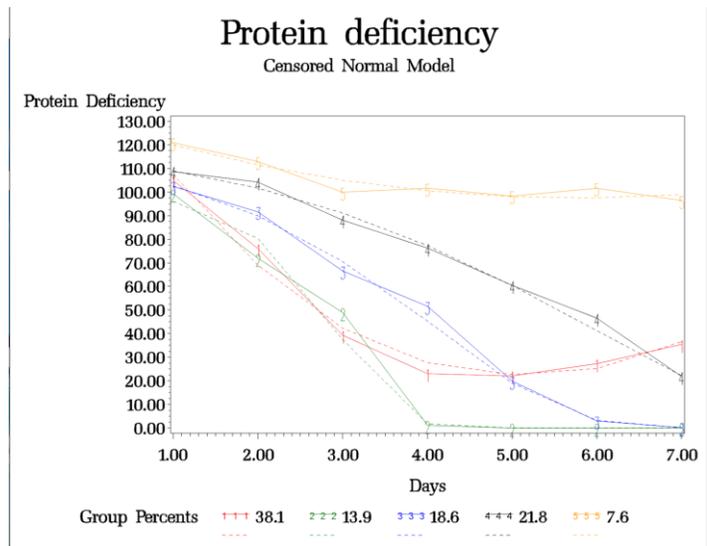
Discussant: Mack D. Drake, DO, Grady Memorial Hospital

Objectives: Injured patients are at risk of accumulating protein and caloric debt due to interrupted feeding. We hypothesized that differing injury patterns would result in variability in correcting the protein debt and that failure to meet protein goals during the first week of ICU admission would be associated with increased complications.

Methods: Injured adults who were unable to be volitionally fed were included. Data collected included demographics, injury characteristics, major surgical procedures, total prescribed and delivered protein and calories during the first seven days of admission, and complications. Group-based trajectory modeling (GBTM) was used to identify subgroup feeding trajectories.

Results: The included 274 patients (71.2% male) had a mean age 50.56 years \pm 19.76, mean ISS 26 \pm 14, time to first nutrition 39.6 hours \pm 24.3, mean caloric debt/7 days 5717.9 calories \pm 2290.65, mean protein debt/7 days 383 grams \pm SD 160.8. C norm modeling reveals five quintiles of patients with varying trajectories of protein deficits over the first week of admission (graph). Group 5 never closes the protein gap, includes more patients with digestive tract injuries (33%, $p=0.0002$), higher mean number of surgeries (1.71, $p=0.001$), longer time to first nutrition (61.9 hours, $p=0.001$) and the highest mean number of complications (1.52, $p=0.0086$). Group 2, who close their protein debt within 4 days, have the lowest mean number of complications (0.62, $p=0.0086$). (table)

Conclusions: There is heterogeneity in the trajectory of protein debt recovery among injury pattern groups. Patients with digestive tract injuries are at increased risk for failure to close their protein debt with a significantly increased risk of complications. There is a decline in complication rates if the protein debt is closed within four days, calling into question the application of current guidelines that NPO status may be acceptable for up to seven days.



Protein Deficiency Trajectory Over First Week of Critical Care Admission

Group	% Blunt	% Penetrating	% Ortho Injury	% Digestive Tract Injury	Mean Complications	Mean # Surgeries	Mean Time 1 st nutrition
1	94.29	3.81	20.95	6.67	1.34	0.93	32.18
2	90.48	9.52	16.67	0	0.62	0.74	23.57
3	90	8	22	12	1.02	0.9	42.6
4	89.29	7.14	44.64	19.64	1.23	1.7	54.43
5	85.71	14.29	42.86	33.33	1.52	1.71	61.9
p-value	0.5542	0.3165	0.0026	0.0002	0.0086	0.001	0.001

Protein Debt Trajectory Group Characteristics

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COMPARISON OF TWO WATER-SOLUBLE CONTRAST PROTOCOLS FOR SMALL BOWEL OBSTRUCTION

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Medical College of Wisconsin

Presenter: Priscilla Ding, BS

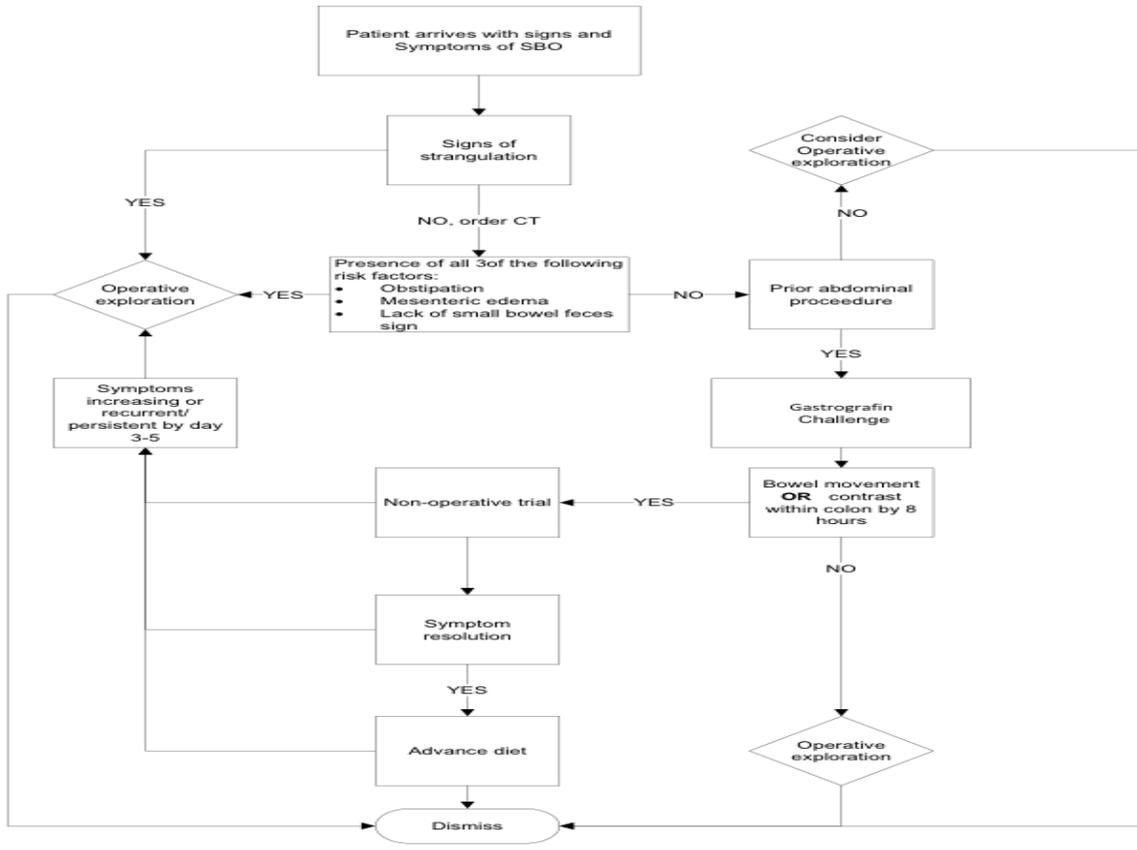
Discussant: Melissa M. Boltz, DO, MBA, Penn State Milton S. Hershey Medical Center

Objectives: Small bowel obstruction (SBO) accounts for 15% of acute surgical admissions, 300,000 operations and up to \$2.3 billion in expenditures annually. Recent guidelines advocate a water-soluble contrast challenge (WSCC) protocol as a cornerstone to treatment but whether high osmolar (Gastrografin, GG) or isosmolar (Omnipaque, OP) contrast agents should be used is unknown. We aim to evaluate the adoption and compare the efficacy of two SBO WSCC protocols which utilize differing osmolar WSCC agents.

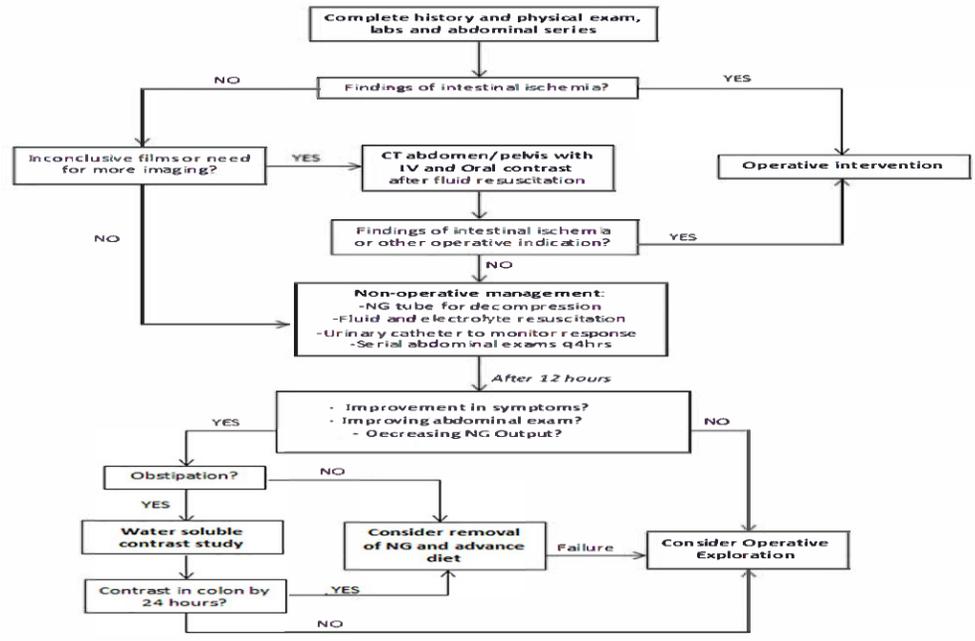
Methods: A multicenter, prospective observational study was conducted from July 2015-January 2017. Logistic and linear regression were used to investigate the influence of WSCC administration on length of stay (LOS), operative rate (OR), and time to operation both within and between each institution's protocol.

Results: 287 patients were treated for SBO at two institutions (150 at Int1, 137 at Int2; median age 65 ± 16 ; 57% female). 61% (Int1 75 pts, Int2 95 pts) received a WSCC and 39% (Int1 70 pts, Int2 35 pts) underwent an operation. Both contrast agents decreased LOS (GG 6d vs 16d, $p=.001$; OP 4.5d vs 6d $p=.69$) and OR (GG 26% vs 74%, Odds Ratio 0.13 $p<.0001$; OP 16% vs 47%, Odds Ratio 0.21 $p=.0002$) as compared to those patients who did not get contrast. The time to operation was increased with use of either agent (GG 92hrs vs 22hrs $p<.0001$; OP 72hrs vs 40hrs $p=.0004$) but without an increase in small bowel resection rate. When comparing the WSCC agents there was not a significant difference between LOS, OR, or time to operation. There were significant differences between protocols in OR (Int1 50% vs Int2 26% $p<.0001$) and time to operation (Int1 46hrs vs Int2 41hrs $p=.033$).

Conclusions: Utilization of either contrast agent reduced length of stay and operative rates. We found significant differences in outcomes between protocols, but additional investigations are needed to determine the exact etiology of these results and optimize these protocols.



Institution 1: SBO Protocol Using Gastrografin (High Osmolar)



Institution 2: SBO protocol Using Omnipaque (Isosmolar)

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THE OPIOID EPIDEMIC IN ACUTE CARE SURGERY—CHARACTERISTICS OF OVERPRESCRIBING FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY

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Presenter: Kristine T. Hanson, MPH

Discussant: Jeffrey D. Kerby, MD, PhD, University of Alabama at Birmingham

Objectives: Postoperative prescribing must be optimized in emergency surgery patients to address the opioid epidemic as misuse is commonly preceded by a prescription for acute pain. The purpose of this study was to identify characteristics associated with higher opioid prescribing following laparoscopic cholecystectomy (LC).

Methods: Patients age ≥ 18 who underwent LC at a single institution 2014-2016 were identified. Opioids prescribed at discharge were converted to oral morphine equivalents (OME) and compared to CDC guidelines (200 OME). Preoperative opioid use was defined as any opioid prescription ≤ 90 days before LC. Univariate and multivariable methods determined characteristics associated with a top tertile opioid prescription.

Results: Of 1309 patients, 34% had an emergent LC and 66% were elective. Nearly all (96%) received opioids at discharge. Median OME was 225 (IQR 150-300), and 59% were prescribed above CDC guidelines. Top tertile prescriptions (≥ 300 OME) were more likely in patients age < 50 (37% vs 31%, $p=.04$) but did not vary by sex ($p=.41$). Prescribing did not differ for patients with acute cholecystitis, biliary colic, and gallstone pancreatitis ($p=.12$). While median OME did not differ between emergent and elective LC (225, IQR 150-300 for both, $p=.13$) (Figure), emergent had more top tertile prescriptions (37% vs 31%, $p=.04$). However, preoperative opioid use was more likely in elective patients (15% vs 9%, $p=.002$). On multivariable analysis adjusting for diagnosis, age, and preoperative use, emergent status was not associated with top tertile prescription (Table). Refill rate was 7%.

Conclusions: Over half of patients undergoing LC were prescribed opioids in excess of CDC guidelines. Variation in prescribing patterns was not fully explained by patient factors. Acute care surgeons have an opportunity to optimize prescribing practices with the ultimate goal of reducing opioid misuse.

Figure. Opioid oral morphine equivalents (OME) prescribed at discharge following emergent vs elective laparoscopic cholecystectomy.

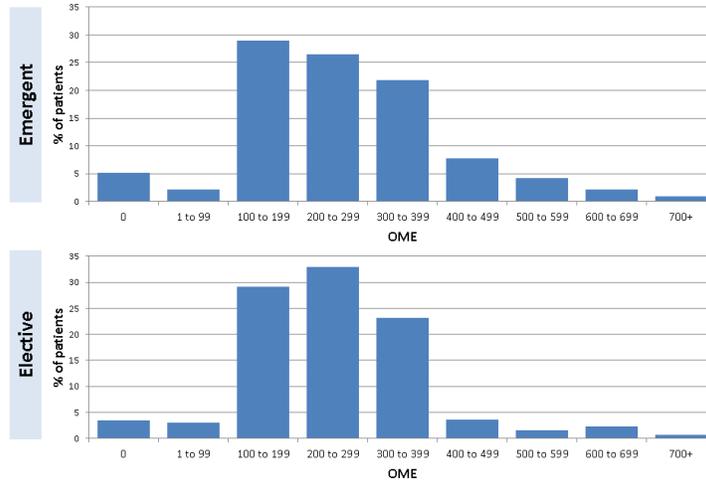


Figure. Opioid oral morphine equivalents (OME) prescribed at discharge following emergent vs elective laparoscopic cholecystectomy.

Table. Odds of a top tertile opioid prescription at discharge.

	OR	95% CI	p-value
Emergency Department Admission (Ref: no)			
Yes	1.24	0.93-1.64	0.15
Diagnosis (Ref: Acute Cholecystitis)			
Pancreatitis	1.35	0.91-2.03	0.14
Biliary colic/Other Biliary	0.94	0.70-1.26	0.67
Age (Ref: 50+ years)			
<50 years	1.26	0.98-1.60	0.05
Pre-operative Opioid Use (Ref: Naive)			
Pre-operative Use	1.38	0.99-1.93	0.06

Abbreviations: CI, Confidence Interval; OR, Odds Ratio.

Table. Odds of a top tertile opioid prescription at discharge.

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EAST MULTICENTER TRIAL ON TARGETED TEMPERATURE MANAGEMENT FOR HANGING-INDUCED CARDIAC ARREST

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R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine

Presenter: Cindy H. Hsu, MD, PhD

Discussant: David T. Efron, MD, Johns Hopkins Hospital

Objectives: We sought to determine the outcome of suicidal hanging and the impact of targeted temperature management (TTM) on hanging-induced cardiac arrest (CA) through a multicenter retrospective study sponsored by Eastern Association for the Surgery of Trauma (EAST).

Methods: We collected patient demographics, CA variables, diagnostics studies, TTM metrics, and discharge outcome from January 1989 to December 2015. Cerebral performance category (CPC) score of 1 or 2 was considered good neurologic outcome, while CPC of 3 or 4 was considered poor outcome. Chi-square and ANOVA tests were performed for categorical and continuous variables, respectively.

Results: Total of 670 hanging patients from 16 centers were analyzed for this study. Their mean age was 34.6; 80.9% were male, and 70% were Caucasian. 192 patients (28.7%) including 20 dead on arrival suffered from CA. The CA patients had significantly higher Injury Severity Score (ISS), lower admission systolic blood pressure, more cerebral anoxia, and worse admission Glasgow Coma Score (GCS), survival, and neurologic outcome (Table 1). Of the 172 CA patients who survived to hospital admission, 80 (46.5%) received post-arrest TTM. Their unadjusted survival (23.8% vs 38%, $p=0.04$) and neurologic outcome (18.8% vs 35.9%, $p=0.01$) were worse than non-TTM CA patients (Table 2). However, after adjusting for admission GCS score of 3 to 8, differences between TTM vs non-TTM survival (23.8% vs 30.0%, $p=0.37$) and neurologic outcome (18.8% vs 28.8%, $p=0.14$) were not significant.

Conclusions: Hanging patients who suffered from CA had worse outcome than non-CA patients. CA patients who received post-arrest TTM had worse unadjusted survival and neurologic outcome than non-TTM patients, but these differences were not significant after adjusting for admission GCS score. Further analysis is necessary to determine TTM's role for the care of more severely injured hanging CA patients.

	CA (n=192)	Non-CA (n=478)	p-value
Age (Mean ± SD)	34.7 ± 13.4	34.6 ± 12.6	.90
Male, n (%)	156 (81.3)	386 (80.8)	.88
Caucasian, n (%)	140 (76.1)	329 (72.0)	.29
ISS (Mean ± SD)	16.6 ± 13.8	5.7 ± 6.5	<.001
Adm SBP (Mean ± SD)	125.3 ± 36.1	135.4 ± 23.7	<.001
Adm GCS, n (%)			<.001
3-8	180 (94.2)	209 (45.9)	
9-12	3 (1.6)	33 (7.3)	
13-15	8 (4.2)	213 (46.8)	
Cerebral anoxia, n (%)	108 (63.2)	56 (12.2)	<.001
Overall Survival, n (%)	54 (28.1)	461 (96.4)	<.001
Good neuro outcome, n (%)	48 (25.0)	450 (94.1)	<.001

Table 1: Characteristics of Cardiac Arrest and Non-Cardiac Arrest Hanging Patients

	TTM CA (n=80)	Non-TTM CA (n=92)	p-value
Age (Mean ± SD)	35.4 ± 12.7	34.9 ± 13.7	.81
Male, n (%)	65 (81.3)	75 (81.5)	.96
Caucasian, n (%)	63 (82.9)	66 (74.2)	.18
ISS (Mean ± SD)	17.6 ± 9.2	15.4 ± 13.4	.33
Adm SBP (Mean ± SD)	132.2 ± 35.9	118.8 ± 35.3	.02
Lowest SBP (Mean ± SD)	100.3 ± 24.7	96.2 ± 24.1	.30
Prehospital GCS, n (%)			.02
3-8	80 (100)	79 (92.9)	
13-15	0 (0)	6 (7.1)	
Adm GCS, n (%)			.006
3-8	80 (100)	80 (87.9)	
9-12	0 (0)	3 (3.3)	
13-15	0 (0)	8 (8.8)	
Admission laboratories (Mean ± SD)			
pH	7.2 ± 0.2	7.2 ± 0.2	.44
Base excess	-9.4 ± 5.7	-8.2 ± 6.3	.21
Lactate	7.6 ± 7.2	6.2 ± 4.2	.17
Cerebral anoxia, n (%)	52 (65.8)	55 (62.5)	.66
Overall Survival, n (%)	19 (23.8)	35 (38.0)	.04
Good neuro outcome, n (%)	15 (18.8)	33 (35.9)	.01

Table 2: TTM Versus Non-TTM Patient Characteristics and Outcome