Surgical Management of Traumatic Bowel Injuries in the Pediatric Population:

Experience Over 7 Years

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Background

- Bowel injuries are rare and varied with respect to severity and mechanisms
- Subtle, non-specific symptoms and imaging limitations →
  Delay in diagnosis
- Surgical management is diverse and incompletely described

Review injury mechanism, surgical management and outcomes after abdominal trauma

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Methods

- Retrospective review of patients >4 years old who underwent operative intervention suspicion of bowel injury from 2006-2013

- Data evaluated:
  - Demographics
  - Injury mechanism
  - Time to operation
  - Procedure performed
  - Outcomes

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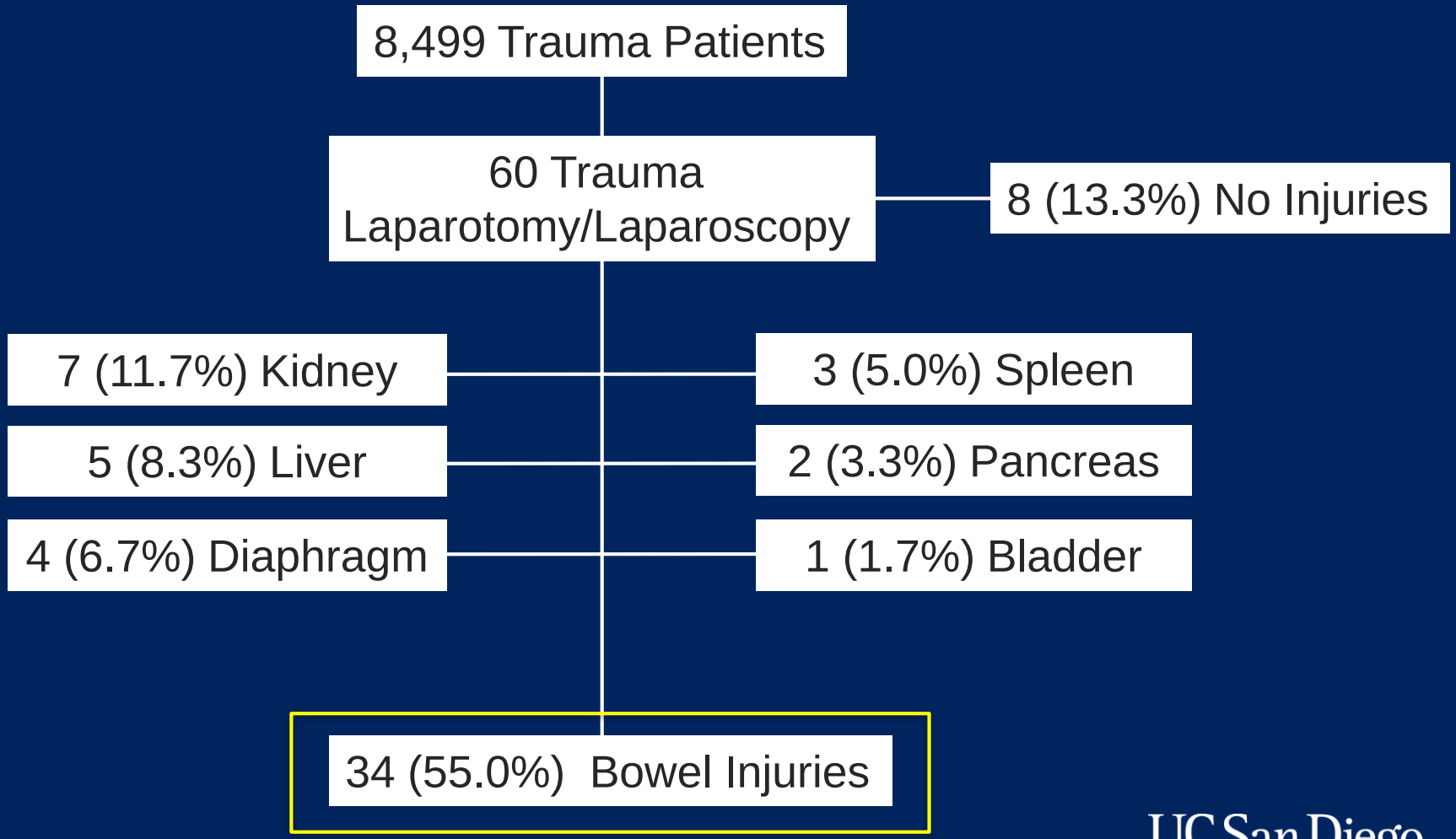
Results



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Isolated Bowel Injuries: Patient Characteristics

Demographics	
Age (years), Average +/- SD	7.7 +/- 3.2
Male, N (%)	19 (57.6)

Mechanism of Injury, N (%)	
Penetrating (GSW, Stab, Other)	4 (11.8)
Motor Vehicle Collision	14 (41.2)
Bicycle Accident	7 (20.6)
Pedestrian vs. Auto	3 (8.8)
NAT	3 (8.8)
Fall	2 (5.9)
Assault	1 (2.9)

Injury Severity	
ISS, Average +/- SD	18.8 +/- 16.9

Blunt Abdominal Trauma: Presentation & Imaging

Presenting Symptoms	
Pain	73.3%
Ecchymosis	40.0%
Distension	20.0%
Seatbelt Sign	16.1%

Imaging Findings	
Free Fluid	56.7%
Bowel Wall Thickening	30.0%
Pneumoperitoneum	23.3%
Mesenteric Bleed/Edema	20.0%

17 (57%) → Exploratory Laparotomy
13 (43%) → Observation

8 (38.5%) → Dx Laparoscopy
5 (61.5%) → Exploratory Laparotormy

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Delayed Operative Group (>4 Hours)

Reason for Operative Exploration

Persistent Pain	9 (69.2%)
Fever	4 (30.8%)
Labs (Leukocytosis or Bandemia)	4 (30.8%)
Emesis	2 (15.4%)
Tachycardia	1 (7.7%)
Imaging Changes	4 (30.8%)

⇧ free fluid, bowel enhancement
⇧ free fluid
⇧ free fluid, dilated loops of bowel
⇧ free fluid, ⇧ bowel wall thickening

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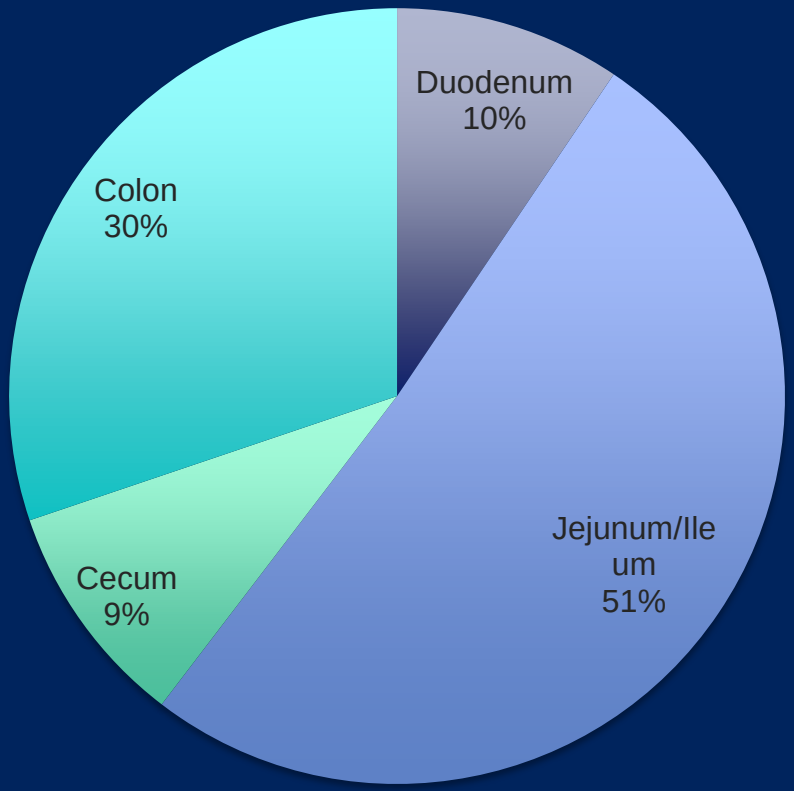
Injury Location



53 bowel injuries identified in 34 patients:

1 Injury: 18 (52.9%)
2 Injuries: 13 (38.2%)
3 Injuries: 3 (8.8%)

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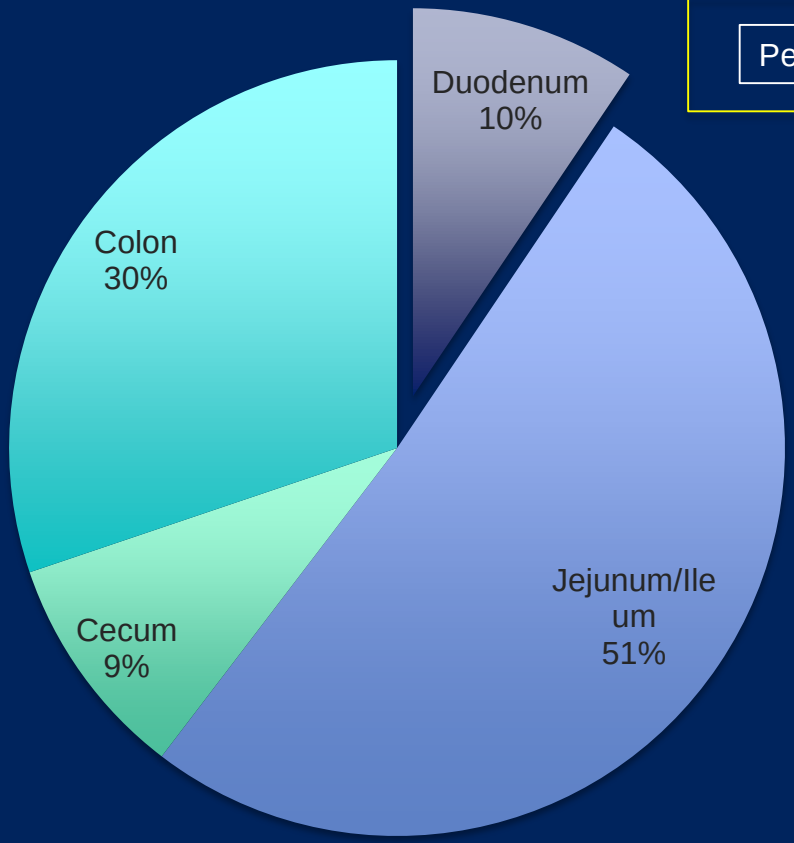
Injury Location



Perforation 5 (100%)

- Primary repair *1 (20%)*
- Resection + 1º Anastomosis *4 (80%)*

*None required pyloric exclusion or Roux-en-Y

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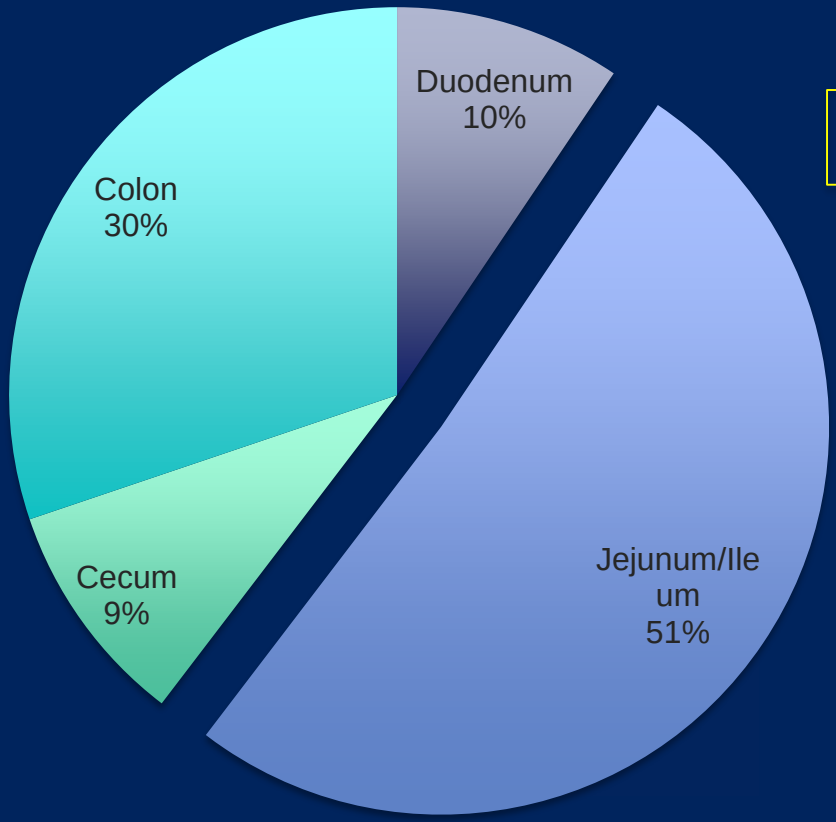
Injury Location



- Serosal Tear *2 (7.4%)*
  - Oversew *2 (100%)*
- Perforation *15 (55.6%)*
  - Primary Repair *3 (20%)*
  - Resection + 1º Anastomosis *9 (60%)*
  - Resection + Ostomy *2 (13.3%)*
  - Resection + TAC *1 (6.7%)*
- Mesenteric Defect *5 (18.5%)*
  - Primary Repair *2 (40%)*
- Mesenteric Hematoma/Bleeding *5 (18.5%)*
  - Vessel Ligation *1 (20%)*

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Injury Location

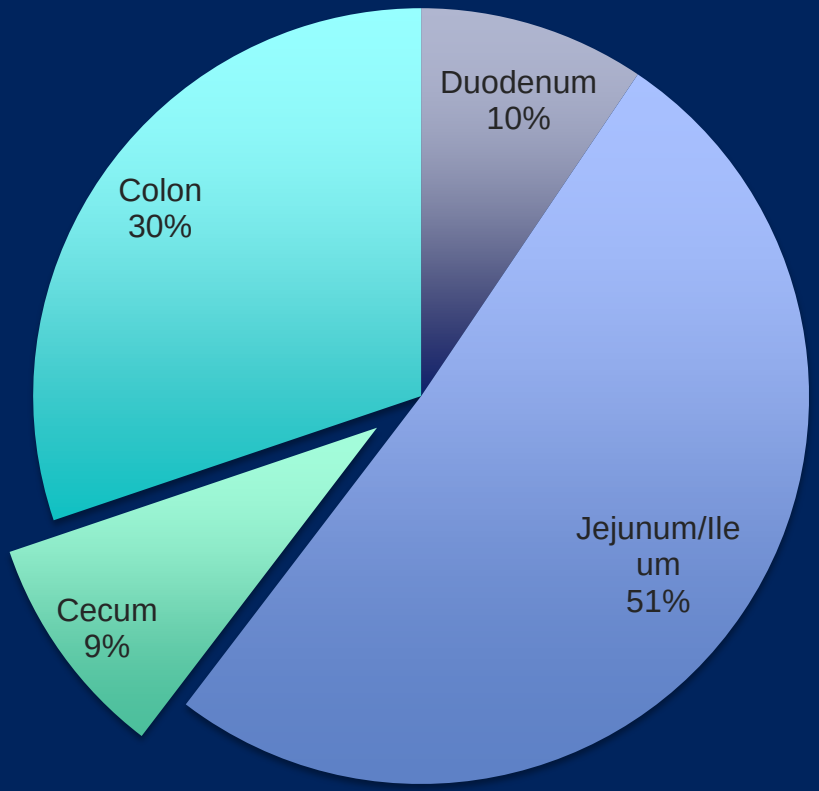
Resection + Ostomy *1 (50%)*

Primary Repair *1 (50%)*

Perforation *2 (40%)*

Oversew 3 *(100%)*

Serosal Tear 3 (60%)



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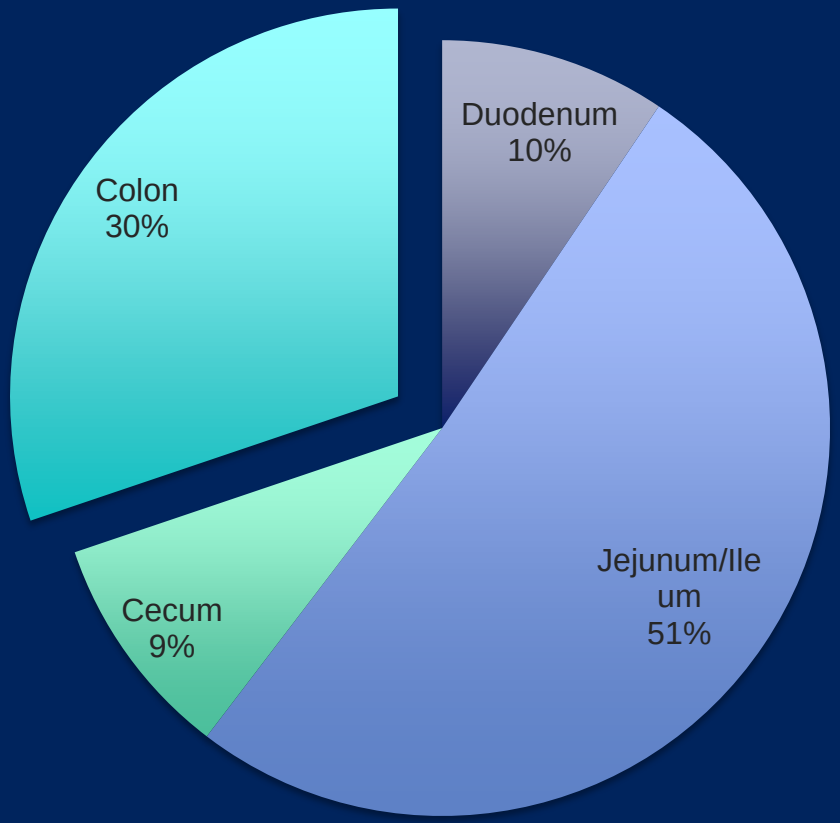
Injury Location

Vessel Ligation *1 (50%)* → Mesenteric Hematoma/Bleeding *2 (12.5%)*

Resect + Ostomy *1 (33%)*
Primary Repair *2 (66%)* → Mesenteric Defect *3 (18.8%)*

Resection + TAC *1 (25%)*
Primary Repair *3 (75%)* → Perforation *4 (25%)*

Oversew *7 (100%)* → Serosal Tear *7 (43.7%)*



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Outcomes After Isolated Bowel Injury

	OR < 4 Hours N=21	OR >4 Hours N=13		Total N=34
Time to OR (hours), Avg +/- Sd	2.0 +/- 0.9	17.9 +/- 5.3		7.8 +/- 8.3
LOS (days), Avg +/- SD	19.6 +/- 26.0	12.3 +/- 17.6		16.9 +/- 23.3
Time to Full Feeds (days), Avg +/- SD	9.8 +/- 8.1	8.3 +/- 7.1		9.2 +/- 9.3
Operative Repair				
Primary Repair	7 (33.3)	6 (46.2)		13 (38.2)
Resection + 1º Anastomosis	5 (23.9)	3 (23.1)		8 (23.5)
Resect + Ostomy	3 (14.3)	1 (7.7)		4 (11.8)
Resect + TAC	3 (14.3)	1 (7.7)		4 (11.8)
Complications	3 (14.3)	2 (15.4)		5 (14.7)
Death	1 (4.8)	0 (0)		1 (2.9)

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Conclusions

- Bowel injuries after abdominal trauma is rare and the most common symptom is persistent pain
- Injuries can be managed safely with primary repair or segmental repair in the majority of cases
- Need for complex repairs (ostomy, TAC) increases with severity of mechanism
  - Unchanged regardless of timing of surgery

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