

Diagnosis and Management of Internal Hernias in Gastric Bypass Patients

SUNY Downstate Case Conference

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Case - History

- 26 yo F, 3 yrs s/p laparoscopic Roux en Y gastric bypass surgery, presented with a 1 month history of intermittent crampy epigastric and RUQ abdominal pain, acutely worse in the past 3 hrs. Reported nausea, no vomiting, regular bowel movements and flatus. Denies F/C. Endorsed preceding dietary indiscretions.

Case - History

- Pt had recently been seen in the clinic for symptoms similar in character but milder in intensity. Pt reported losing appx 160 lbs since the procedure and weighed appx 300 lbs at presentation.

Case - Exam

- HR: 63 BP: 149/72 RR: 18 SaO₂: 100%
- Obese, NAD
- Soft, min epigastric/RUQ tenderness
- No peritoneal signs

Case - Labs

- CBC: 7.8/12.6/35.3/260
- BMP: 142/4.2/106/26/14/1/109
- PT/INR: 14.7/1.2
- Amylase/Lipase: 37/58
- Lactate: 2.5
- UA: Neg







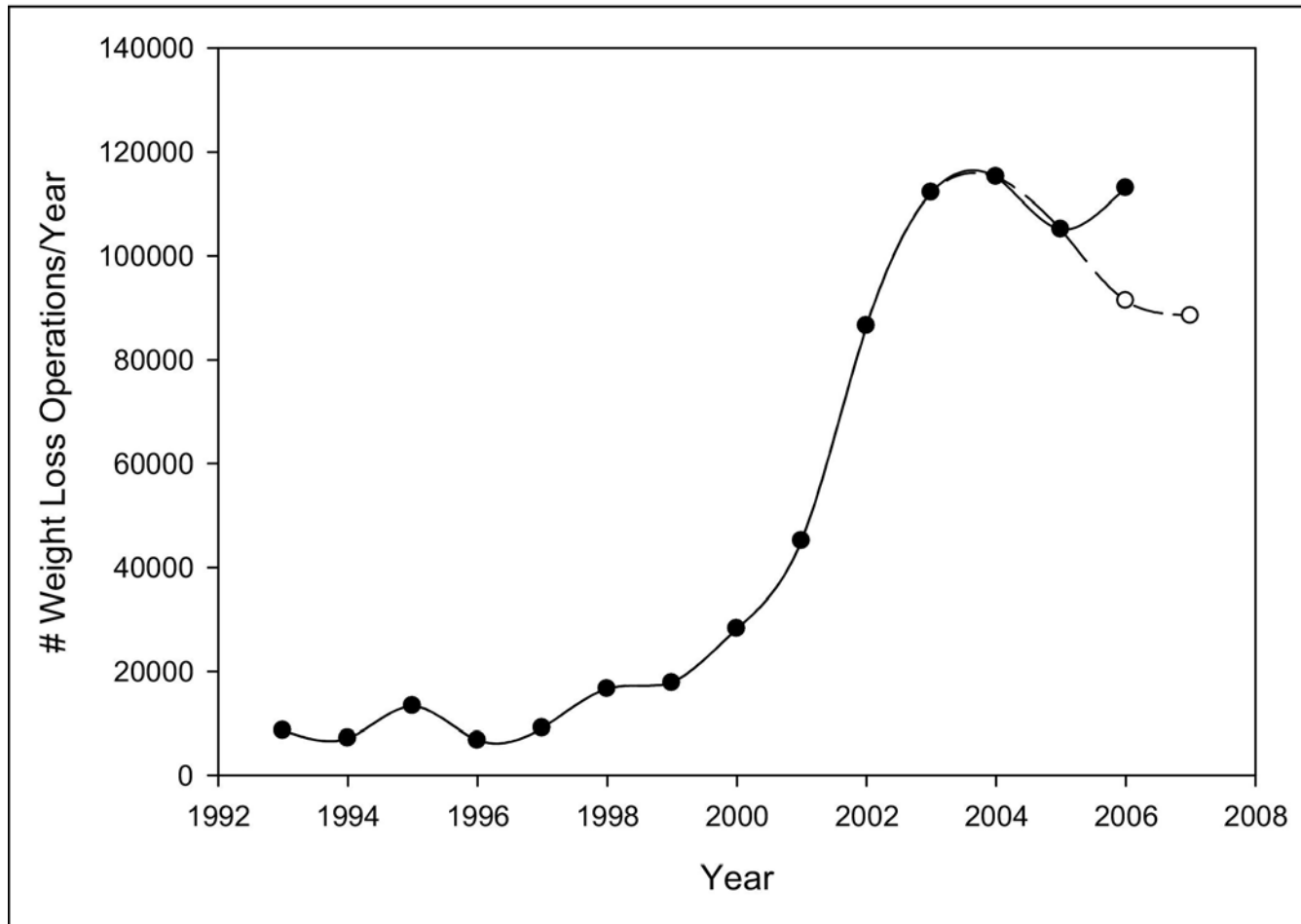
Case – Hospital Course

- OR for exploratory laparoscopy
 - Internal hernia at jejunojejunostomy anastomosis discovered.
 - Hernia reduced and defect repaired.
- Tolerated diet POD 1.
- Discharged to home POD 2.

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Questions

Bariatric Procedure Incidence



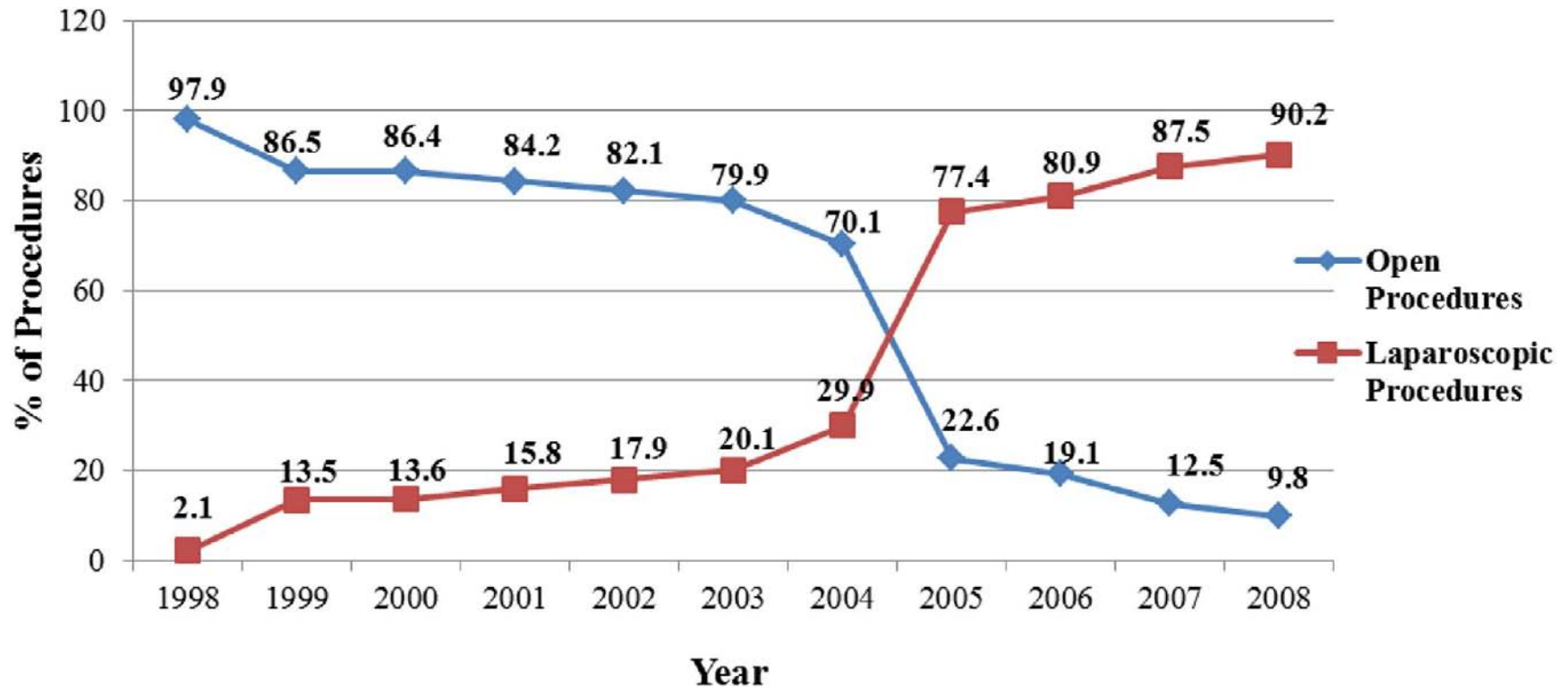
Livingston, E.H., 2010. The incidence of bariatric surgery has plateaued in the U.S. *The American Journal of Surgery*, 200(3), pp.378-385.



Bariatric Procedure Types

Procedure Type	n (%)
Proximal Gastric Bypass	9906 (61.2)
Distal Gastric Bypass	3234 (20.0)
Vertical Banded Gastroplasty	1445 (8.9)
Revision Bariatric Surgery	1225 (7.6)
Other	345 (2.1)

Laparoscopic vs Open Procedures





Complications

COMPLICATION	No. of Complications	% of all Complications	% of 1,040 Patients
Stenosis at gastrojejunostomy	51	33.3%	4.9%
Internal hernia	26	17.0%	2.5%
Gallstones	15	9.8%	1.4%
Marginal ulcer - NSAIDs induced ⁱ	14	9.2%	1.4%
Staple-line failure	10	6.5%	1.0%
Stenosis at mesocolon	9	5.9%	0.9%
Bleeding requiring transfusion or re-operation	6	3.9%	0.6%
Death	5	3.3%	0.5%
Incomplete division of stomach	4	2.6%	0.4%
Pulmonary embolism	3	2.0%	0.3%
Trocar hernia (bladed 2; non-bladed 1)	3	2.0%	0.3%
Deep venous thrombosis	2	1.3%	0.2%
Perforation ⁱⁱ	2	1.3%	0.2%
Central pontine myelinolysis	1	0.7%	0.1%
Pneumonia	1	0.7%	0.1%
Wound infection	1	0.7%	0.1%
Total	153	100.0%	14.7%

Higa, K.D., Boone, K.B. & Ho, T., 2000. Complications of the laparoscopic Roux-en-Y gastric bypass: 1,040 patients--what have we learned? *Obesity Surgery*, 10(6), pp.509-513.

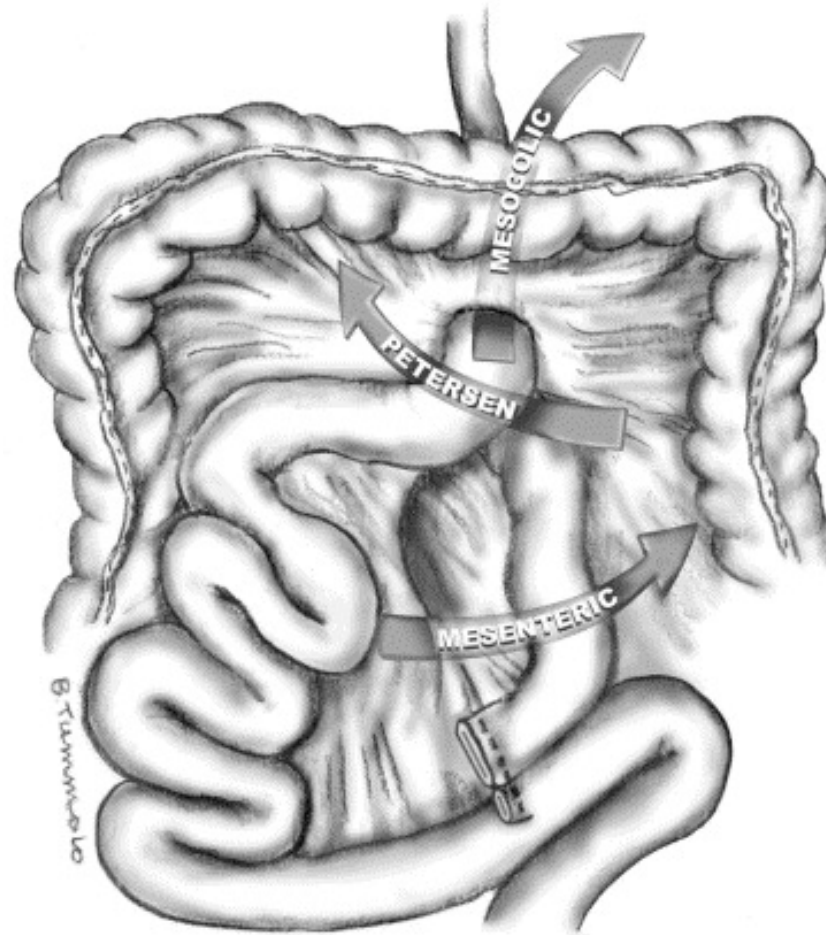
Complications – Open vs Laparoscopic

Table 3. Complications After Open and Laparoscopic GBP

Complication	No. (%) of Patients		P Value
	Open GBP	Laparoscopic GBP	
Intraoperative			
Iatrogenic splenectomy	5/1218 (0.41)	Not reported	
Perioperative			
Anastomotic leak	42/2497 (1.68)	71/3464 (2.05)	.31
Bowel obstruction	Not reported	10/577 (1.73)	
Gastrointestinal tract hemorrhage	8/1334 (0.60)	11/570 (1.93)	.008
Pulmonary embolus	20/2577 (0.78)	11/2651 (0.41)	.09
Wound infection	34/513 (6.63)	97/3258 (2.98)	<.001
Pneumonia	5/1504 (0.33)	3/2075 (0.14)	.24
Death	24/2771 (0.87)	8/3464 (0.23)	.001
Late			
Bowel obstruction	53/2507 (2.11)	91/2887 (3.15)	.02
Incisional hernia	128/1492 (8.58)	14/2958 (0.47)	<.001
Stomal stenosis	15/2233 (0.67)	164/3464 (4.73)	<.001

Abbreviations: GBP, gastric bypass; NS, not significant.

Anatomy

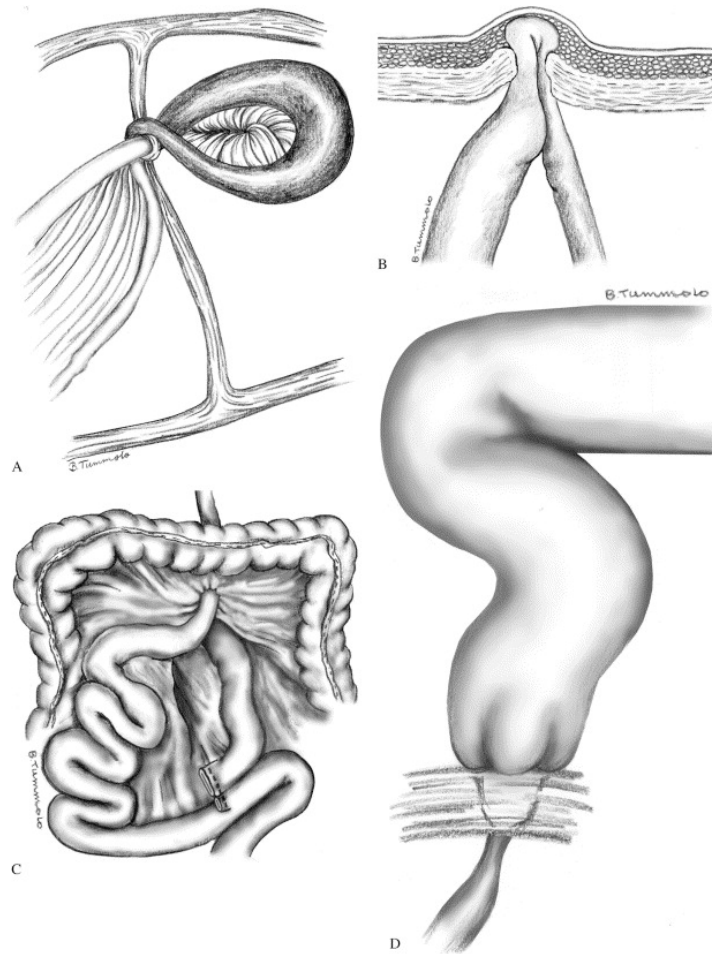




Anatomy

Site	n (%)
Transverse mesocolon	44/66 (67)
Jejunal mesentery	14/66 (21)
Peterson's space	5/66 (7.5)
Multiple sites	3/66 (4.5)

Other Anatomic Causes of Obstruction



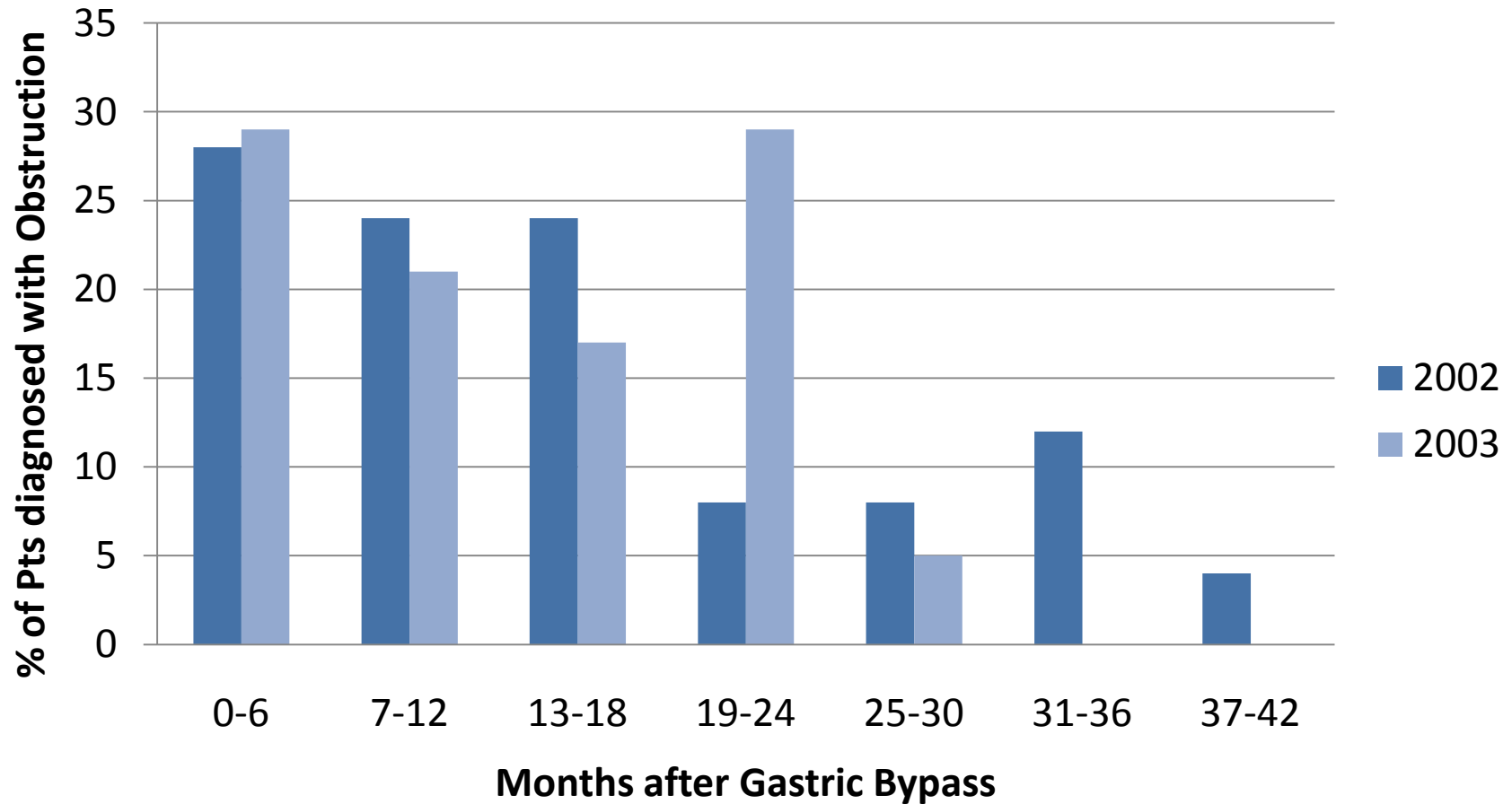


Internal Hernia Presentation

Symptoms	n (%)
Postprandial abdominal pain	38/43 (88)
Nausea	27/43 (61)
Vomiting	27/43 (61)
Pain, nausea, vomiting	23/43 (52)

Exam findings	n (%)
Diffuse abdominal tenderness	20/43 (47)
Benign abdominal exam	9/43 (20)

Timing of Obstruction





Workup

- H&P
- Operative report
- Studies
 - Upper GI Series
 - CT Scan
- Endoscopy

Radiographic Workup

Study	% done / sensitivity
CT Scan	86 / 64
Upper GI Series	10
Both	7
None	14

Subsequent review of all imaging studies revealed diagnostic abnormalities in 97% of patients.



Radiographic Workup

Table 2. Causes of Bowel Obstruction in Negative vs Positive Computed Tomographic Scan Results

Cause	Cases With Positive CT Scan Results, No.	Cases With Negative CT Scan Results, No.
Internal hernias	13	19
Roux limb stricture	0	1
Adhesions	7	1
Kink at enteroenterostomy	1	0
Port-site hernia	1	0
Obstruction at enteroenterostomy	1	0
Abscess	1	0

Abbreviation: CT, computed tomography.

Table 3. Causes of Bowel Obstruction in Negative vs Positive Upper Gastrointestinal Study Results

Cause	Cases With Positive UGI Study Results, No.	Cases With Negative UGI Study Results, No.
Internal hernias	6	14
Roux limb stricture	18	2
Adhesions	2	2
Kink at enteroenterostomy	4	2
Port-site hernia	0	1

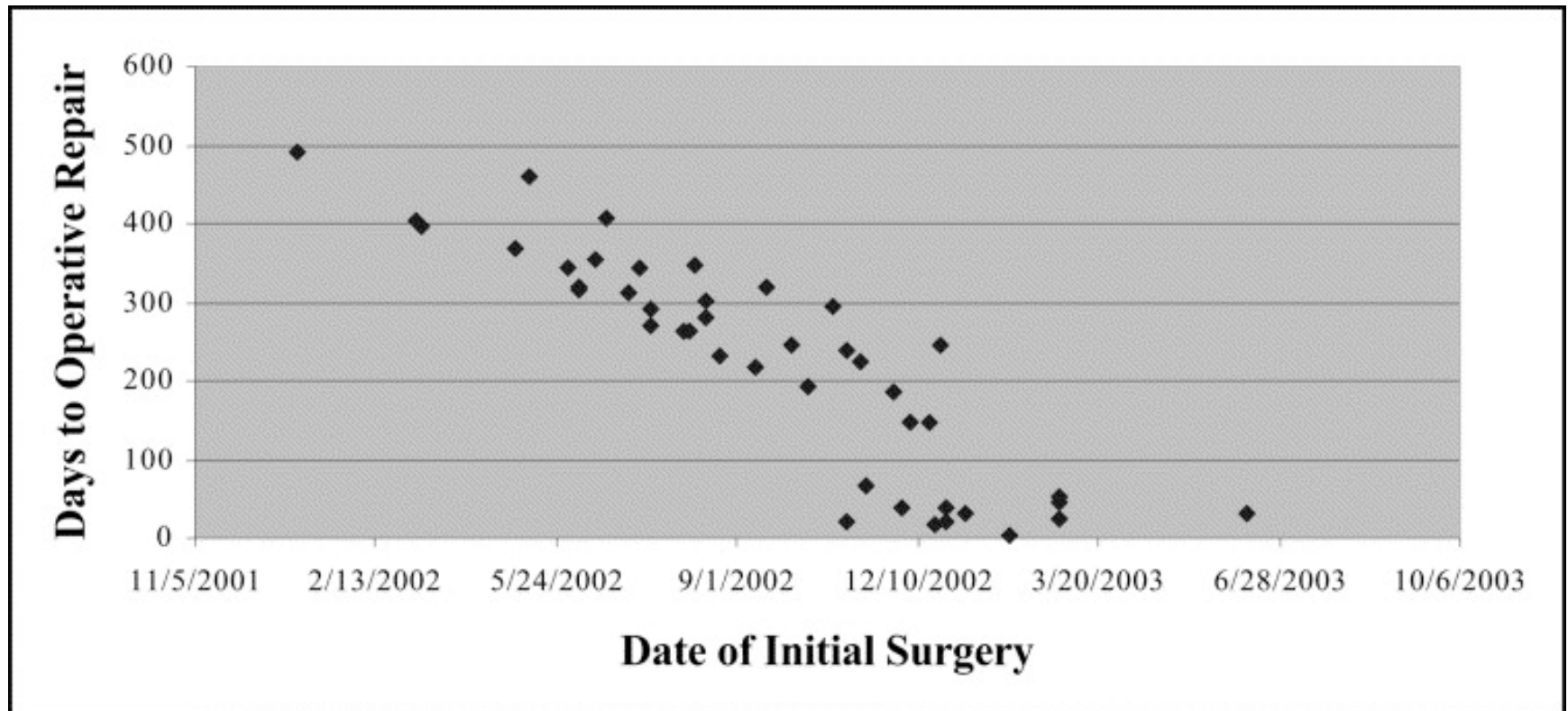
Abbreviation: UGI, upper gastrointestinal.

CT Scan for Internal Hernia Diagnosis

Sign	Sensitivity (%)			Specificity (%)		
	Reviewer 1	Reviewer 2	Reviewer 3 (Resident)	Reviewer 1	Reviewer 2	Reviewer 3 (Resident)
Swirled mesentery	61	78	83	94	89	67
Mushroom	33	72	33	89	89	100
Hurricane eye	17	11	6	100	100	100
Small-bowel obstruction	11	28	39	94	89	83
Clustered loops	17	6	6	72	78	83
Small-bowel behind superior mesenteric artery	0	22	44	100	89	94
Right-sided anastomosis	11	6	6	100	100	100
Overall impression	56	78	72	89	78	78

Lockhart, M.E. et al., 2007. Internal Hernia After Gastric Bypass: Sensitivity and Specificity of Seven CT Signs with Surgical Correlation and Controls. *Am. J. Roentgenol.*, 188(3), pp.745-750.

Interval Between Procedure and Repair



Treatment

- Prevention
 - Close all defects
 - Non-absorbable sutures
- Early surgical intervention
 - Hernia reduction
 - Repair defects

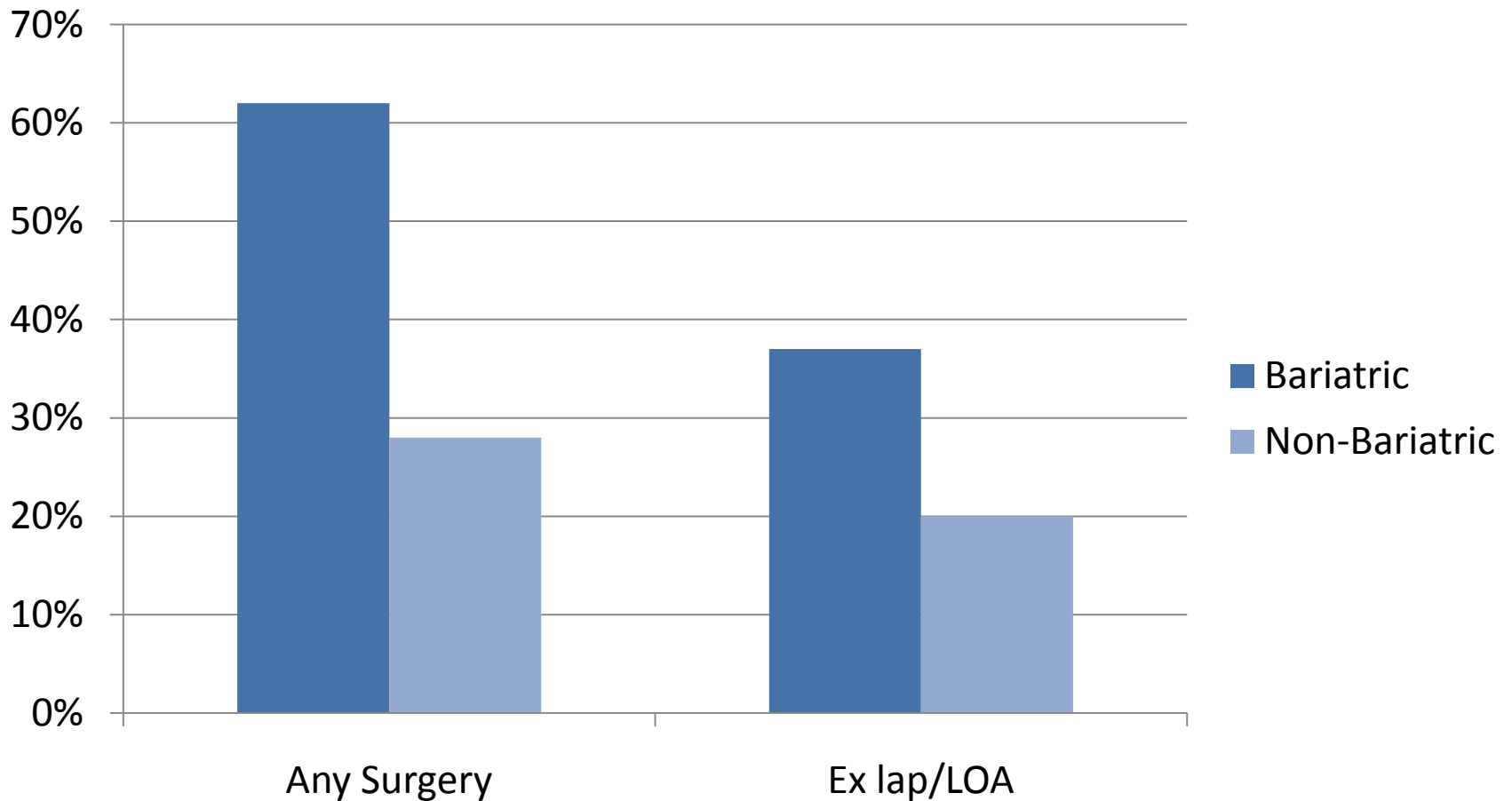


Antecolic vs Retrocolic

Roux limb position	Internal hernia
Retrocolic	7/274
Antecolic	0/205
	p = 0.025

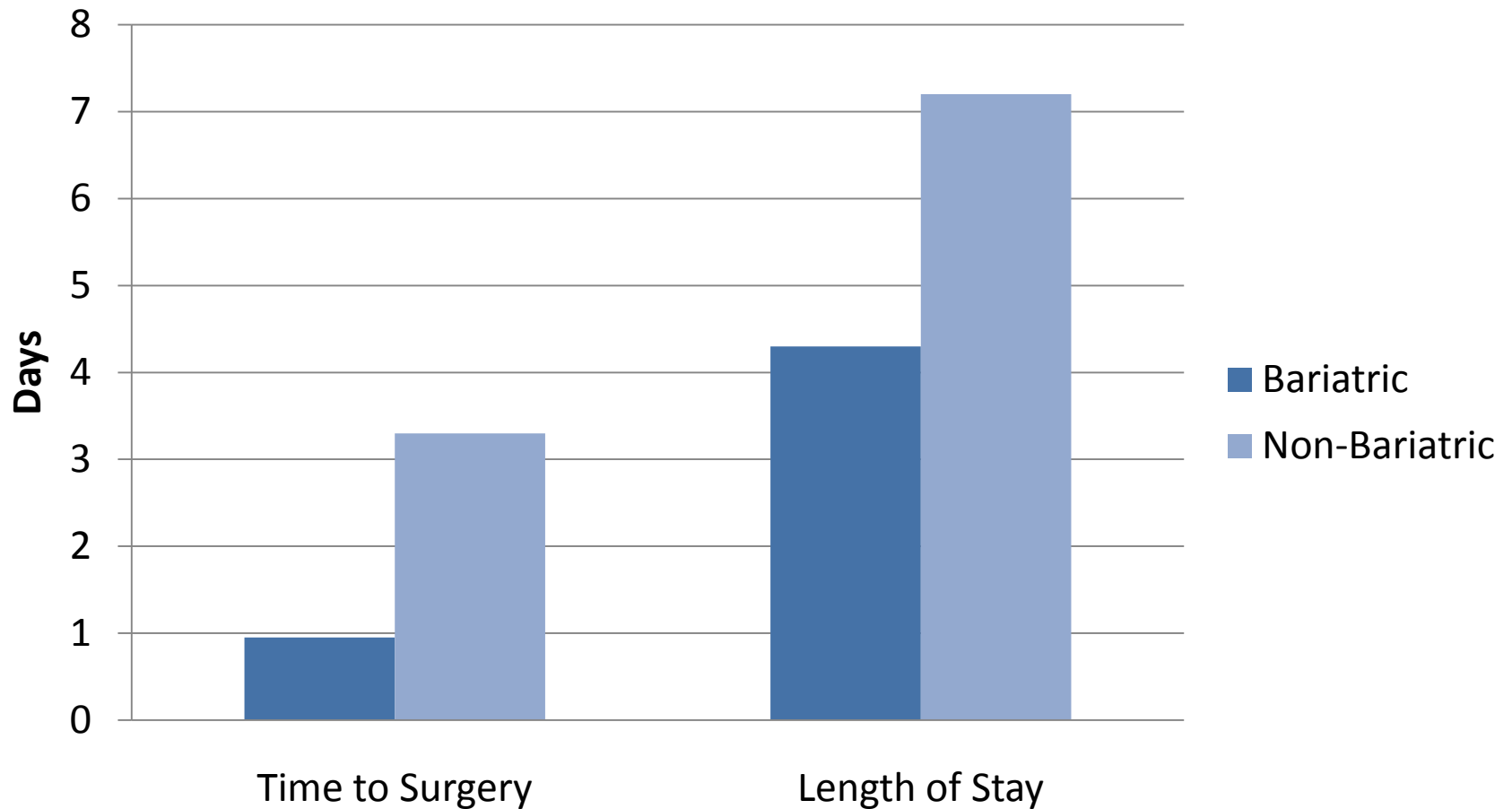
Steele, K.E. et al., 2008. Laparoscopic antecolic Roux-en-Y gastric bypass with closure of internal defects leads to fewer internal hernias than the retrocolic approach. *Surgical Endoscopy*, 22(9), pp.2056-2061.

Comparison to Non-Bariatric Bowel Obstruction



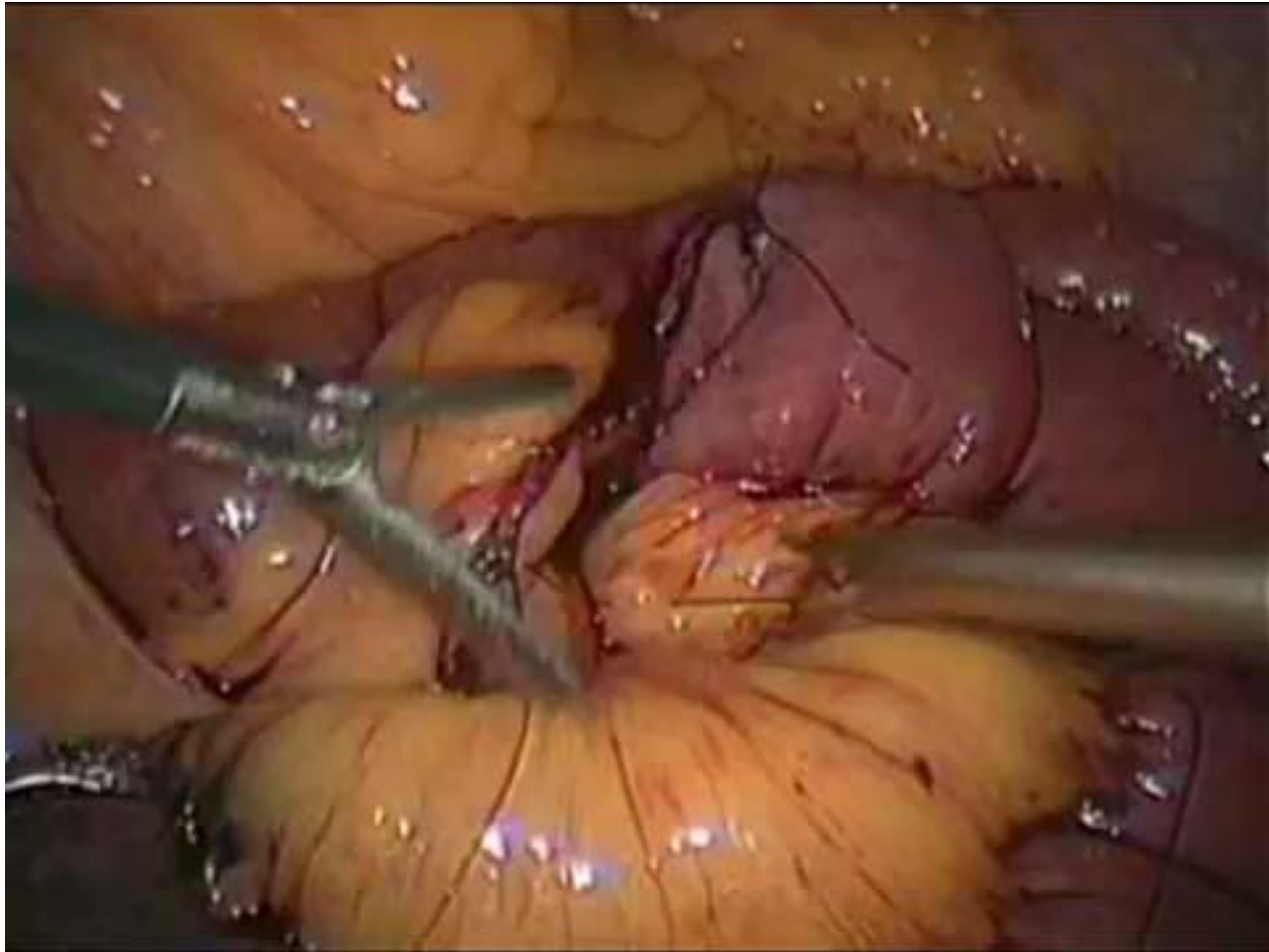
Martin, M.J., et. al. Bowel obstruction in bariatric and nonbariatric patients: major differences in management strategies and outcome. *Surgery for Obesity and Related Diseases*, 7(3), pp.263-269.

Timing of Repair

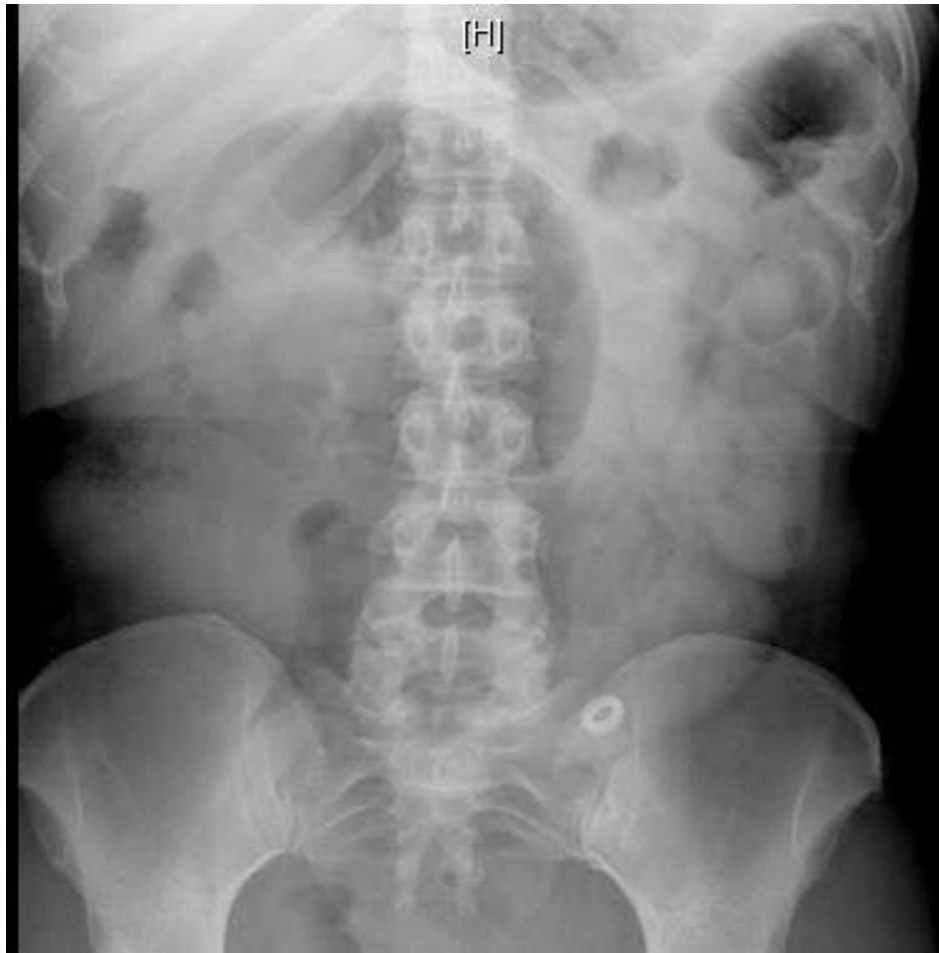


Martin, M.J., et. al. Bowel obstruction in bariatric and nonbariatric patients: major differences in management strategies and outcome. *Surgery for Obesity and Related Diseases*, 7(3), pp.263-269.

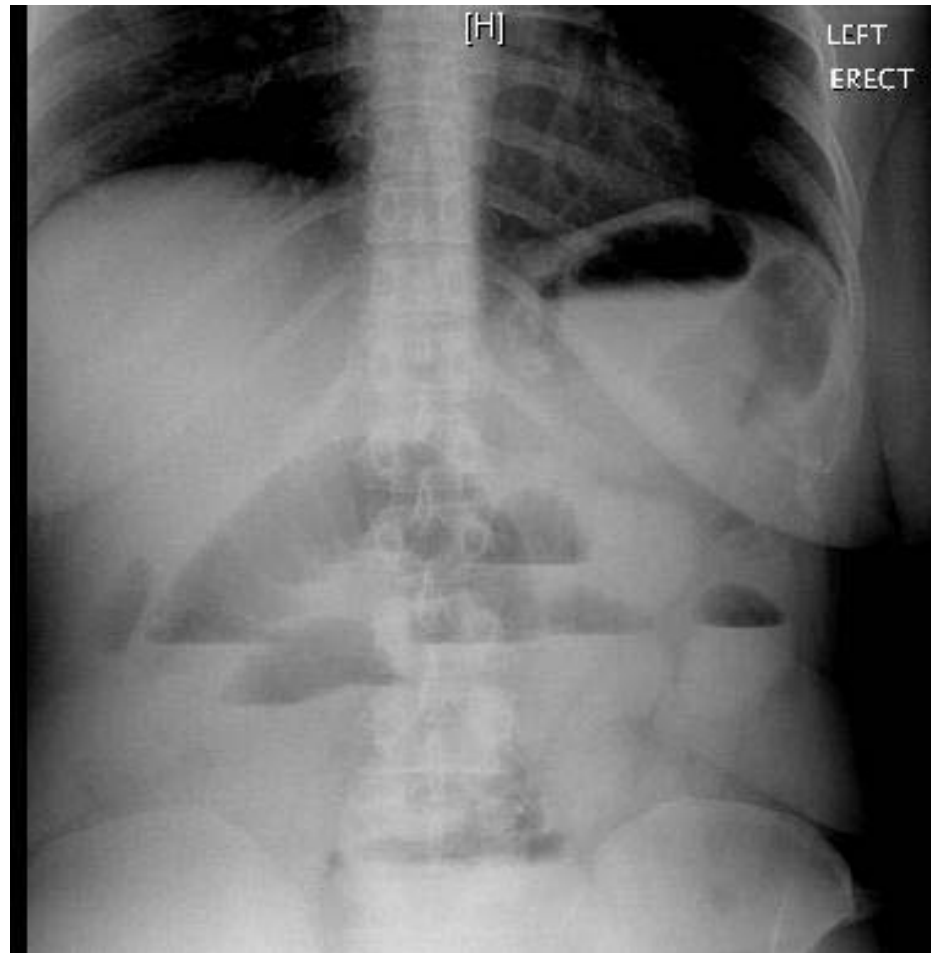
Cases



Case 4



Case 4



Case 4



Case 4



Conclusions

- Post Roux-en-Y internal hernias can occur at 3 sites: 1. Transverse mesocolon; 2. Peterson's space; 3. Jejunojejunosotomy anastamosis.
- Radiographic studies lack sensitivity.
- Patient presentation is often subtle warranting a high index of suspicion and prompt surgical intervention.

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