

Internal Hernia

Ajit Nihal Ahmad, MD

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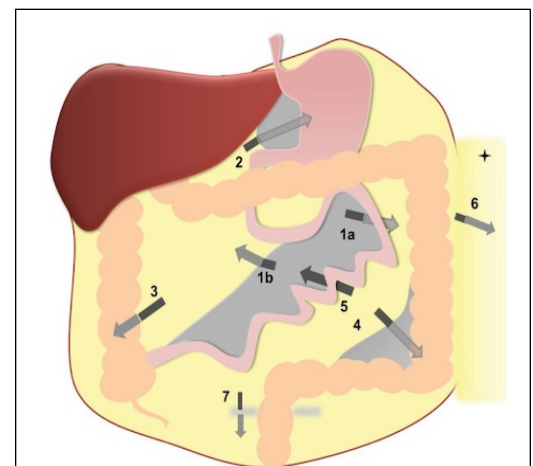
Definitions and Classification

Definition

- Herniation Through an Opening in the Peritoneum or Mesentery
- Opening Can Be Congenital or Acquired

Types ¹

- *Paraduodenal* ^{2,3}
 - Historically the Most Common (53%) – Not Anymore Given Frequency of Newer Laparoscopic Procedures
- *Foramen of Winslow* ⁴
 - Herniation Through the Foramen of Winslow into the Lesser Sac
- *Peri-Cecal* ⁵
 - Herniation in the Pericecal Fossa
- *Inter-Sigmoid* ⁶
 - Herniation Through the Intersigmoid Fossa
 - Most Often Easily Reducible
 - Debated if it is a True Aperture/Hernia
- *Supravesical* ⁷
 - Herniation into the Space of Retzius
 - Can Be Anterior, Lateral, or Posterior to the Bladder
- *Trans-Omental* ⁸
 - Herniation Through the Greater or Lesser Omentum



Sites of Internal Hernia:
(1a) Left Paraduodenal Hernia;
(1b) Right Paraduodenal Hernia;
(2) Foramen of Winslow Hernia;
(3) Pericecal Hernia;
(4) Sigmoid-Related Hernia;
(5) Transmesenteric Hernia;
(6) Transomental Hernia;
(7) Supravesical Hernia ¹⁷

- *Trans-Mesenteric*⁹
 - Herniation Through a Complete Defect in the Mesentery
 - Either from a Congenital Defect or from a Surgical Defect (Retrocolic Roux-en-Y)
- *Retro-Anastomotic*
 - Related to a Surgical Anastomosis – Reduce Risk by Closing All Mesenteric Defects¹⁰
 - Risk After Roux-en-Y Gastric Bypass: 2-5%^{11,12}
 - Risk After Laparoscopic Colorectal Surgery: 0.65%¹³

Paraduodenal Hernias

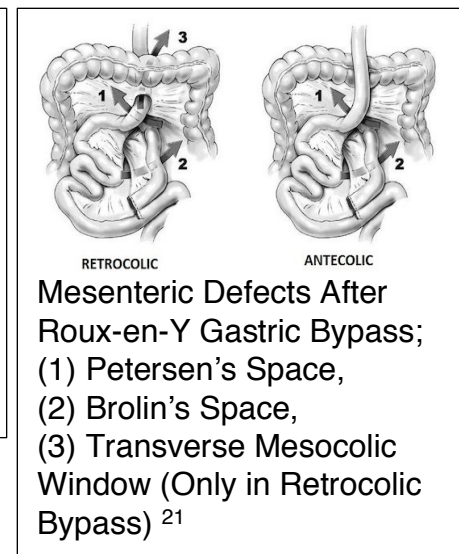
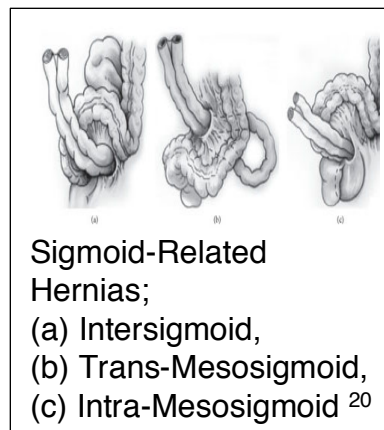
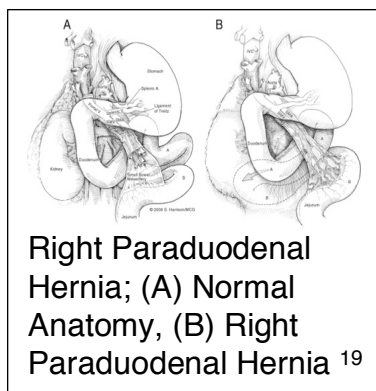
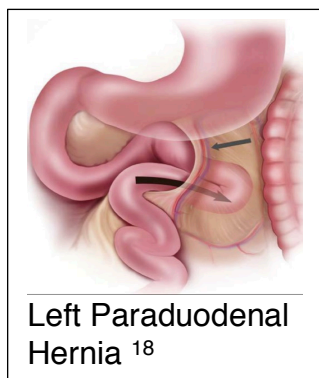
- *Left Paraduodenal Hernia*: Herniation Through Landzert's Fossa²
 - More Common Than on the Right (75%)
- *Right Paraduodenal Hernia*: Herniation Through Waldeyer's Fossa³

Sigmoid-Related Hernias

- *Inter-Sigmoid*: Herniation Through the Inter-Sigmoid Fossa⁶
 - Most Often Easily Reducible
 - Debated if it is a True Aperture/Hernia
- *Trans-Mesosigmoid*: Herniation Through a Complete Defect in the Sigmoid Mesocolon¹⁴
- *Intra-Mesosigmoid*: Herniation into an Incomplete Defect in the Sigmoid Mesocolon Through Only a Single Layer with the Sac Inside the Sigmoid Mesocolon¹⁵
 - Most Commonly the Left

Mesenteric Defects After a Roux-en-Y Gastric Bypass

- *Petersen's Space*: Mesenteric Defect Between the Roux Limb Mesentery and Transverse Mesocolon
- *Brolin's Space (Mesojejunal Window)*: Mesenteric Defect at the Jejunojejunostomy
- *Transverse Mesocolon Defect*: Mesenteric Defect Under the Transverse Colon
 - The Most Common Site¹⁶
 - Only Present After Retrocolic Procedures, Not in Antecolic Procedures



Congenital Anatomic Defects

Landzert's Fossa

- Present in 2% of the Population
- Located Behind the Fourth Portion of the Duodenum
- Formed by the Mesenteric Fold from the IMV and Left Colic Artery
- Site of a Left Paraduodenal Hernia

Waldeyer's Fossa

- Present in < 1% of the Population
- Located Under the Third Portion of the Duodenum
- Formed by the Mesenteric Fold from the SMA
- Site of a Right Paraduodenal Hernia

Foramen of Winslow

- Also Known as the Epiploic or Omental Foramen
- Communication Between the Greater Sac and Lesser Sac
- Anteriorly Bordered by the Hepatoduodenal Ligament

Pericecal Fossa

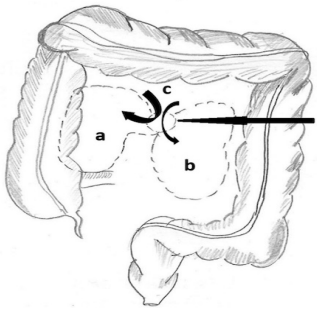
- Located Behind the Cecum/Ascending Colon
- Subtypes:
 - Ileocolic Fossa
 - Ileocecal Fossa
 - Retrocecal Fossa
 - Paracecal Fossa

Intersigmoid Fossa

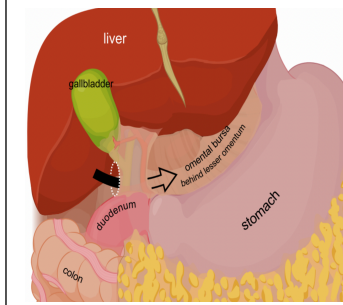
- Present in 65% of the Population
- Formed Between 2 Adjacent Sigmoid Segments and Their Mesentery
- Debated if it is a True Aperture

Supravesical Fossa

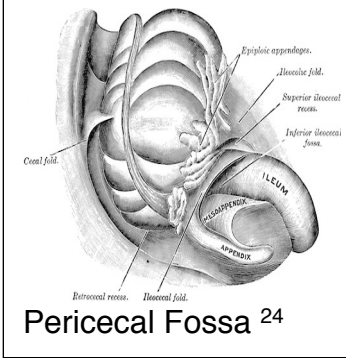
- Triangular Area Bounded by the Peritoneal Reflection Over the Dome of the Bladder and the Lateral Umbilical Folds
- *Space of Retzius*: Potential Space Below the Supravesical Fossa, Between the Pubic Symphysis and Bladder



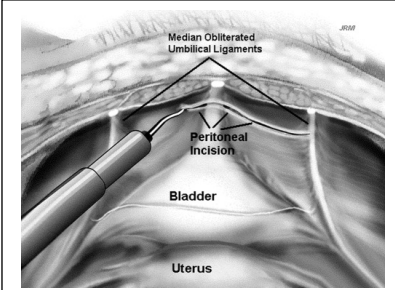
Paraduodenal Hernia Fossae;
 (a) Waldeyer's Fossa,
 (b) Landzert's Fossa,
 (c) Retroperitoneum,
 (d) Hernial Orifice ²²



Foramen of Winslow ²³



Pericecal Fossa ²⁴

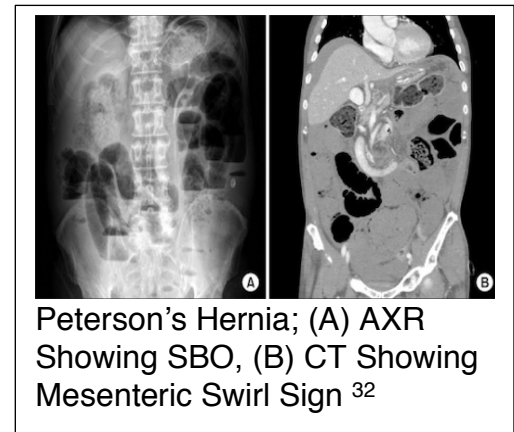


Incision into the Space of Retzius ²⁵

Management

Presentation

- Presentation is Mostly Nonspecific
- Can Be Asymptomatic
- Small Bowel Obstruction (SBO)
 - Nausea and Vomiting
 - Abdominal Pain and Distention
 - Obstipation (Unable to Pass Flatus or Stool)
 - ***See Small Bowel Obstruction (SBO)**
- Chronic Postprandial Pain
- Closed-Loop Obstruction Creates a High Risk for Bowel Ischemia, Strangulation, and Perforation



Peterson's Hernia; (A) AXR Showing SBO, (B) CT Showing Mesenteric Swirl Sign ³²

Diagnosis

- Primarily Made by CT
- CT Findings: ^{26,27}
 - Small Bowel Obstruction
 - Closed-Loop Obstruction
 - Mesenteric "Swirling"
 - Small Bowel Herniation into an Abnormal Location – Requires Sufficient Knowledge of Anatomic Spaces
 - "Mushroom Sign" – Herniated Bowel Resembling a Mushroom with the Constricted Mesenteric Pedicle Resembling a Mushroom Stalk
- May Be Found Intraoperatively if Not Diagnosed Preoperatively

- Diagnosis Mandates Urgent Surgical Exploration
- Potential Interventions:
 - Hernia Reduction
 - Bowel Resection
 - Defect Closure
- Exploration Can Be Done Open or Minimally Invasive

References

1. Ghahremani GG. Internal abdominal hernias. *Surg Clin North Am.* 1984 Apr;64(2):393-406.
2. Desjardins AU. LEFT PARADUODENAL HERNIA. *Ann Surg.* 1918 Feb;67(2):195-201.
3. Lahey FH, Trevor W. Right Paraduodenal Hernia. *Ann Surg.* 1945 Sep;122(3):436-43.
4. Square JE. A Case of Strangulated Internal Hernia into the Foramen of Winslow. *Br Med J.* 1886 Jun 19;1(1329):1163.
5. CUTHBERT FP, SMITH PE. Pericecal hernia; case report. *Ohio State Med J.* 1961 Jan;57:48-50.
6. Vickers DM, Fortuine ST. Intersigmoid Hernia. *Ann Surg.* 1933 May;97(5):713-6.
7. Skandalakis JE, Gray SW, Burns WB, Sangmalee U, Sorg JL. Internal and external supravescical hernia. *Am Surg.* 1976 Feb;42(2):142-6.
8. Hull JD 3rd. Transomental hernia. *Am Surg.* 1976 Apr;42(4):278-84.
9. Martin P. Obstructed Transmesenteric Hernia. *Br Med J.* 1946 Feb 16;1(4441):238.
10. Stenberg E, Szabo E, Ågren G, Ottosson J, Marsk R, Lönroth H, Boman L, Magnuson A, Thorell A, Näslund I. Closure of mesenteric defects in laparoscopic gastric bypass: a multicentre, randomised, parallel, open-label trial. *Lancet.* 2016 Apr 2;387(10026):1397-1404.
11. de Bakker JK, van Namen YW, Bruin SC, de Brauw LM. Gastric bypass and abdominal pain: think of Petersen hernia. *JLS.* 2012 Apr-Jun;16(2):311-3.
12. Frøkjær JB, Jensen WN, Holt G, Omar HK, Olesen SS. The diagnostic performance and interrater agreement of seven CT findings in the diagnosis of internal hernia after gastric bypass operation. *Abdom Radiol (NY).* 2018 Dec;43(12):3220-3226.
13. Toh JW, Lim R, Keshava A, Rickard MJ. The risk of internal hernia or volvulus after laparoscopic colorectal surgery: a systematic review. *Colorectal Dis.* 2016 Dec;18(12):1133-1141.
14. Steele G Jr, Sawyer RB, Sawyer KC. Retroperitoneal and transmesosigmoid herniation of ileum. Report of a case. *Rocky Mt Med J.* 1973 Jun;70(6):30-2.
15. Kheok SW, Haja Mohideen SM, Lim JW, Santhosh Raj SR. Intramesosigmoid hernia complicated by strangulated small-bowel obstruction. *BMJ Case Rep.* 2016 Jul 15;2016:bcr2016216369.
16. Higa KD, Ho T, Boone KB. Internal hernias after laparoscopic Roux-en-Y gastric bypass: incidence, treatment and prevention. *Obes Surg.* 2003 Jun;13(3):350-4.
17. Lanzetta MM, Masserelli A, Addeo G, Cozzi D, Maggialetti N, Danti G, Bartolini L, Pradella S, Giovagnoni A, Miele V. Internal hernias: a difficult diagnostic challenge. Review of CT signs and clinical findings. *Acta Biomed.* 2019 Apr 24;90(5-S):20-37. (License: CC BY 4.0)

18. Hassani KI, Aggouri Y, Laalim SA, Toughrai I, Mazaz K. Left paraduodenal hernia: A rare cause of acute abdomen. *Pan Afr Med J.* 2014 Mar 27;17:230. (License: CC BY 2.0)
19. Bittner JG 4th, Edwards MA, Harrison SJ, Li K, Karmin PN, Mellinger JD. Laparoscopic repair of a right paraduodenal hernia. *JLS.* 2009 Apr-Jun;13(2):242-9. (License: CC BY-NC-ND 3.0)
20. Chiarini S, Ruscelli P, Cirocchi R, D'Andrea V, Sensi B, Santoro A, Corsi A, Zeponi F, Fedeli P, Gioia S. Intersigmoid Hernia: A Forgotten Diagnosis-A Systematic Review of the Literature over Anatomical, Diagnostic, Surgical, and Medicolegal Aspects. *Emerg Med Int.* 2020 Jun 1;2020:4891796. (License: CC BY 4.0)
21. Kim, Y., & Crookes, P. F. (2014). Complications of Bariatric Surgery. In (Ed.), *Essentials and Controversies in Bariatric Surgery.* IntechOpen. (License: CC BY 3.0)
22. Mehra R, Pujahari AK. Right paraduodenal hernia: report of two cases and review of literature. *Gastroenterol Rep (Oxf).* 2016 May;4(2):168-71. (License: CC BY 4.0)
23. Wikimedia Commons. (License: CC BY-SA 3.0)
24. Gray H. *Anatomy of the Human Body* (1918). (License: Public Domain)
25. Pikaart DP, Miklos JR, Moore RD. Laparoscopic removal of pubovaginal polypropylene tension-free tape slings. *JLS.* 2006 Apr-Jun;10(2):220-5. (License: CC BY-NC-ND 3.0)
26. White RZ, Au J. Internal hernia post Roux-en-Y surgery: Radiological features for the surgeon. *ANZ J Surg.* 2022 Jan;92(1-2):274-275.
27. White RZ, Au J. Internal hernia associated with Roux-en-Y gastric bypass. *Surgery.* 2021 Dec;170(6):e31-e32.
28. Collard MK, Torcivia A, Genser L. Laparoscopic management of internal hernia after Roux-en-Y-gastric bypass. *J Visc Surg.* 2020 Oct;157(5):423-427.
29. O'Rourke RW. Management strategies for internal hernia after gastric bypass. *J Gastrointest Surg.* 2011 Jun;15(6):1049-54.
30. Titan AL, Garagliano JM, Spain D. Management of an internal hernia through the foramen of Winslow. *Trauma Surg Acute Care Open.* 2022 Jun 20;7(1):e000960.
31. Contival N, Menahem B, Gautier T, Le Roux Y, Alves A. Guiding the non-bariatric surgeon through complications of bariatric surgery. *J Visc Surg.* 2018 Feb;155(1):27-40.
32. Jang JS, Shin DG. A Peterson's hernia and subsequent small bowel volvulus: surgical reconstruction utilizing transverse colon as a new Roux-en-Y limb – 1 case. *J Korean Surg Soc.* 2013 Dec;85(6):309-13. (License: CC BY-NC 3.0)