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UNDERSTANDING ACUTE DIVERTICULITIS IN ADULTS: AN UPDATE OF AN ALWAYS PRESENT DISEASE

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Advanced Clerkship in Radiology

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Agenda

- **Definitions**
- **Epidemiology**
- **Risk factors**
- **Anatomy**
- **Pathophysiology**
- **Natural history**
- **Diagnosis**
- **Differential diagnosis**
- **Menu of test**

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Definitions

- **Diverticulum: sac-like protrusion of the colonic wall, including mucosa and serosa, sparing the muscularis.**
- **Diverticulosis: Presence of many diverticula.**
- **Diverticulitis: Inflammation, generally due to microperforation of a diverticulum.**
- **Complicated diverticulitis: Acute diverticulitis + bowel obstruction, abscess, fistula or macroperforation.**

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Diverticular disease: epidemiology

- **Age dependent: less than 20% at age 40 to 60% by age 60**
- **Western society: prevalence rates 5-45%, of them 95% are sigmoid diverticula**
- **Asia: <1-5:1 million, predominantly right sided**
- **Risk factors: Low fiber, fat and red meat, obesity, smoking, NSAIDs.**

Colonic diverticulosis and diverticular disease: Epidemiology, risk factors, and pathogenesis. Uptodate. Last update: Dec 12th, 2013

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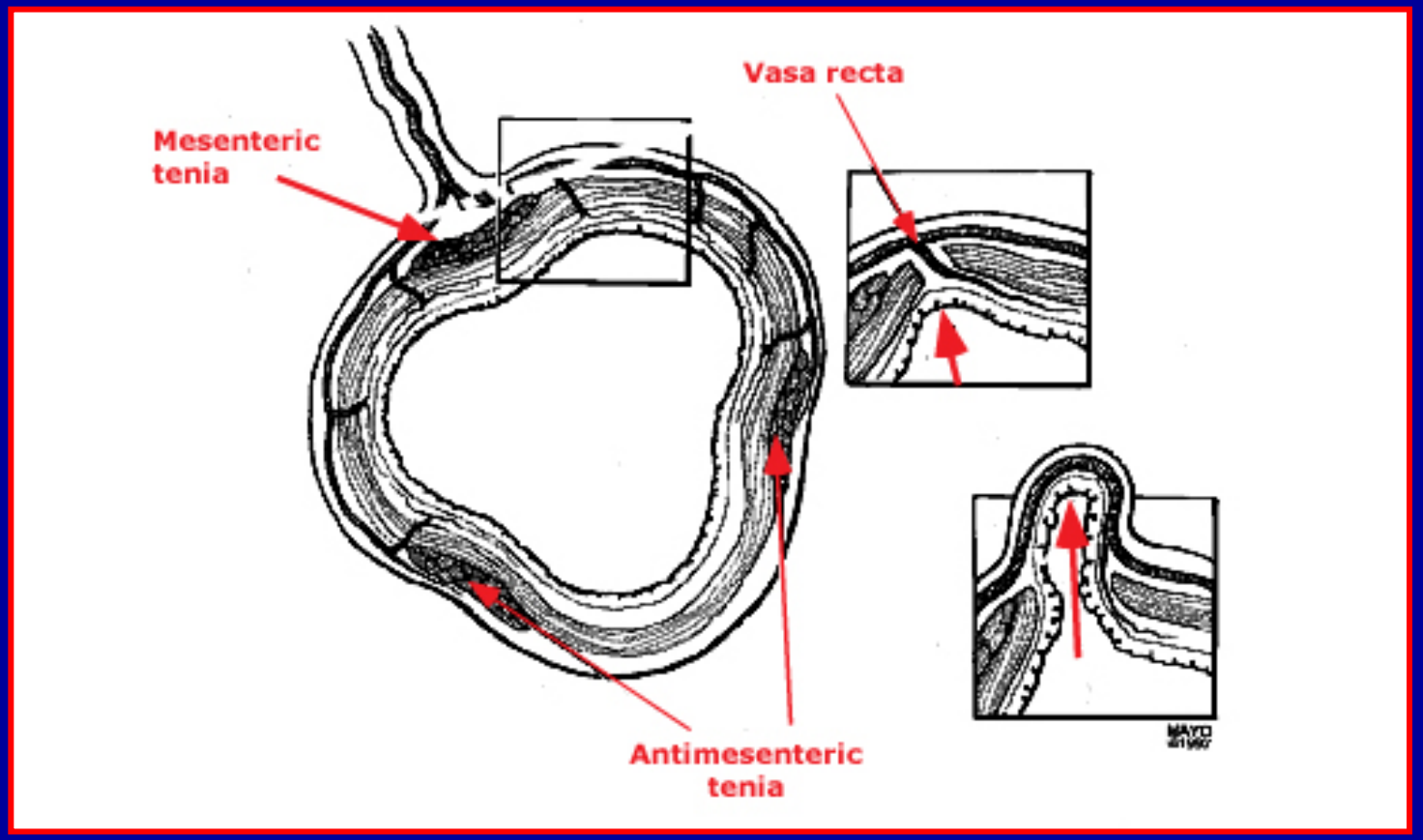
Anatomy of a diverticula



Taken from: Colonic diverticulosis and diverticular disease: Epidemiology, risk factors, and pathogenesis. Uptodate. Last update: Dec 12th, 2013

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Pathogenesis

- **Abnormal colonic motility: ↑ segmental contractions.**
- **Laplace law: P=T:r; sigmoid has the smallest radio→highest pressure.**
- **Erosion of diverticular wall by increased intraluminal pressure.**
- **Microperforation occurs→spill of bowel content→pneumoperitoneum, inflammation of pericolonic fat, abscess formation.**
- **No hypertrophy or hyperplasia of the bowel wall.**

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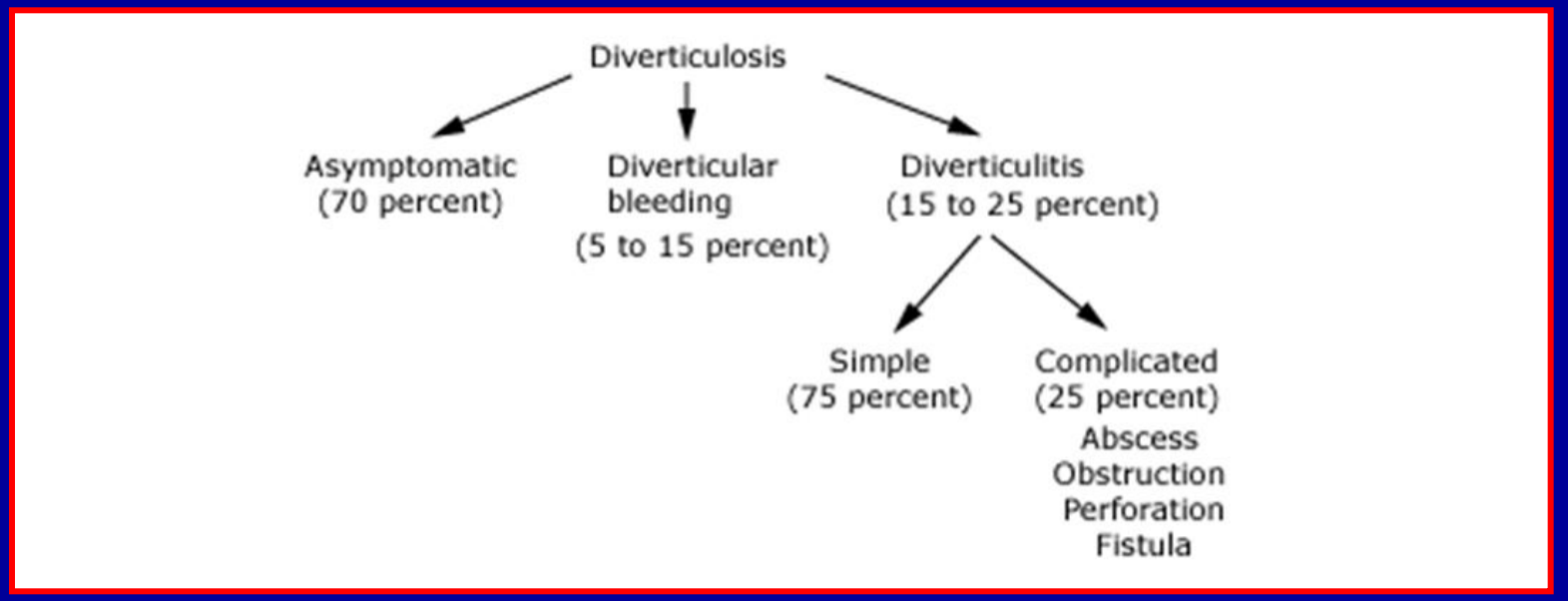
Natural history of diverticulosis



Clinical manifestations and diagnosis of acute diverticulitis in adults. Uptodate. Last update: April 14th, 2014.

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Our patient: presentation

49 yo M presents to the ED with several days of intermittent left lower quadrant abdominal pain.

No nausea, no vomiting. +BM, no BRBPR

T: 101°F. HR: 101 bpm, BP: 143/88 mmHg

Previous medical history: Obesity BMI: 37 kg/m^2

No medications

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Our patient: relevant findings

Physical examination:

Tender LLQ to palpation

Non-distended abdomen, +rebound

Laboratory:

WBC: 14.000/uL, Hb 11,5 mg/dL, plat: 420.000/mm^3

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Differential diagnosis?

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LLQ pain differential diagnosis

Gastrointestinal
- Constipation
- Incarcerated hernia
- Infectious colitis
- Inflammatory bowel disease
- Ischemic bowel
- Omental infarction
- Sigmoid diverticulitis

Genitourinary
- Prostatitis
- Seminal vesiculitis
- Ureterolithiasis
- Urinary tract infection

Gynecologic
- Ectopic pregnancy
- Endometriosis
- Hemorrhagic or ruptured ovarian cyst
- Malignancy
- Miscarriage
- Mittelschmerz
- Ovarian torsion
- Pelvic congestion syndrome
- Ruptured corpus luteum
- Uterine fibroids

Vascular
- Aortitis/vasculitis
- Dissection/aneurysm

Other
- Abdominal wall abscess
- Abdominal wall hematoma
- Psoas abscess
- Retroperitoneal hemorrhage

Hammond N, Nikolaidis P, Miller F. Left Lower-Quadrant Pain: Guidelines from the American College of Radiology Appropriateness Criteria *Am Fam Physician.* 2010;82(7):766-770

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What is the best available image for certifying the presence of diverticulitis?

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ACR recommendations

Variant 1: **Typical clinical presentation for diverticulitis, suspected complications or atypical presentations.**

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis with contrast	9	Oral and/or colonic contrast may be helpful for bowel luminal visualization.	☢☢☢☢
CT abdomen and pelvis without contrast	6		☢☢☢☢
CT abdomen and pelvis without and with contrast	5		☢☢☢☢
MRI abdomen and pelvis without contrast	5		O
MRI abdomen and pelvis without and with contrast	5	See statement regarding contrast in text under "Anticipated Exceptions."	O
X-ray contrast enema	4		☢☢☢
US abdomen transabdominal graded compression	4		O
US pelvis transrectal	4		O
US pelvis transvaginal	4		O
X-ray abdomen and pelvis	4		☢☢☢

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

Miller FH. ACR Appropriateness Criteria® left lower quadrant pain — suspected diverticulitis. Reston (VA): American College of Radiology (ACR); 2011. 5 p.

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What is the importance of choosing the most accurate image modality?

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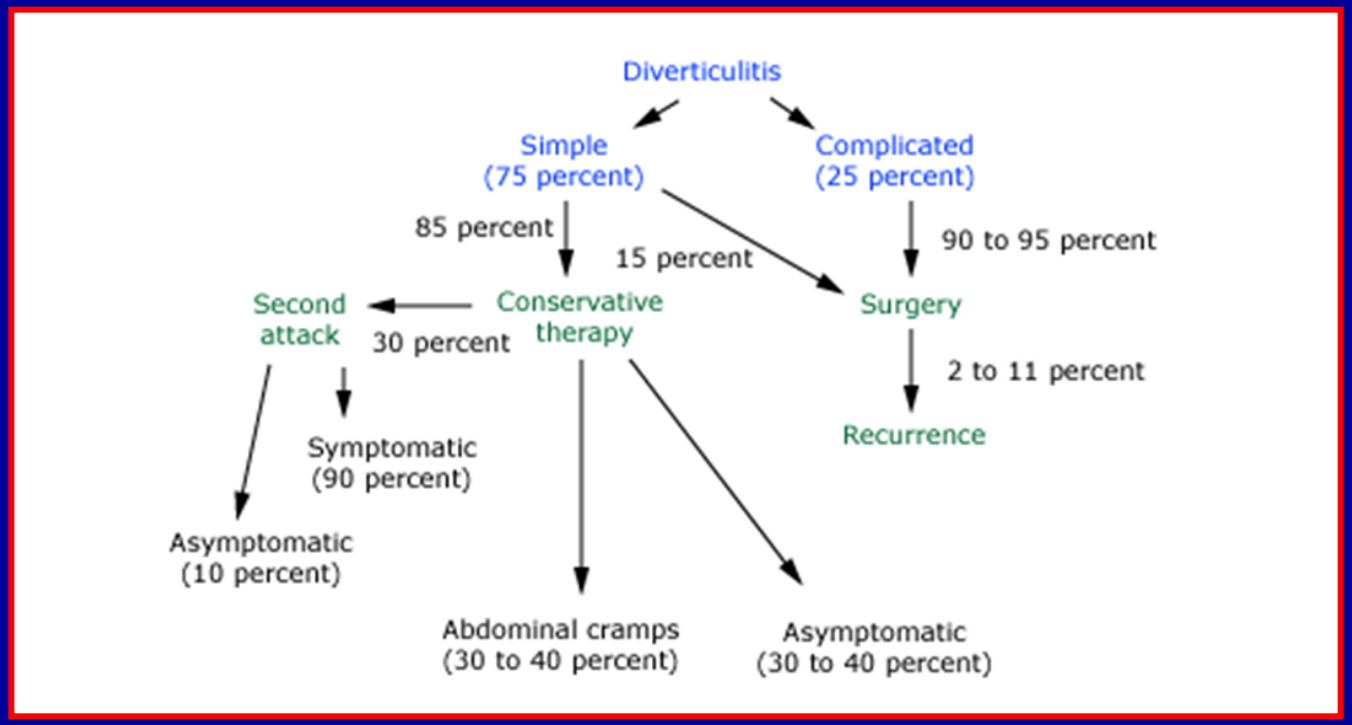
Natural history of diverticulitis



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Our patient: axial C+, CT findings

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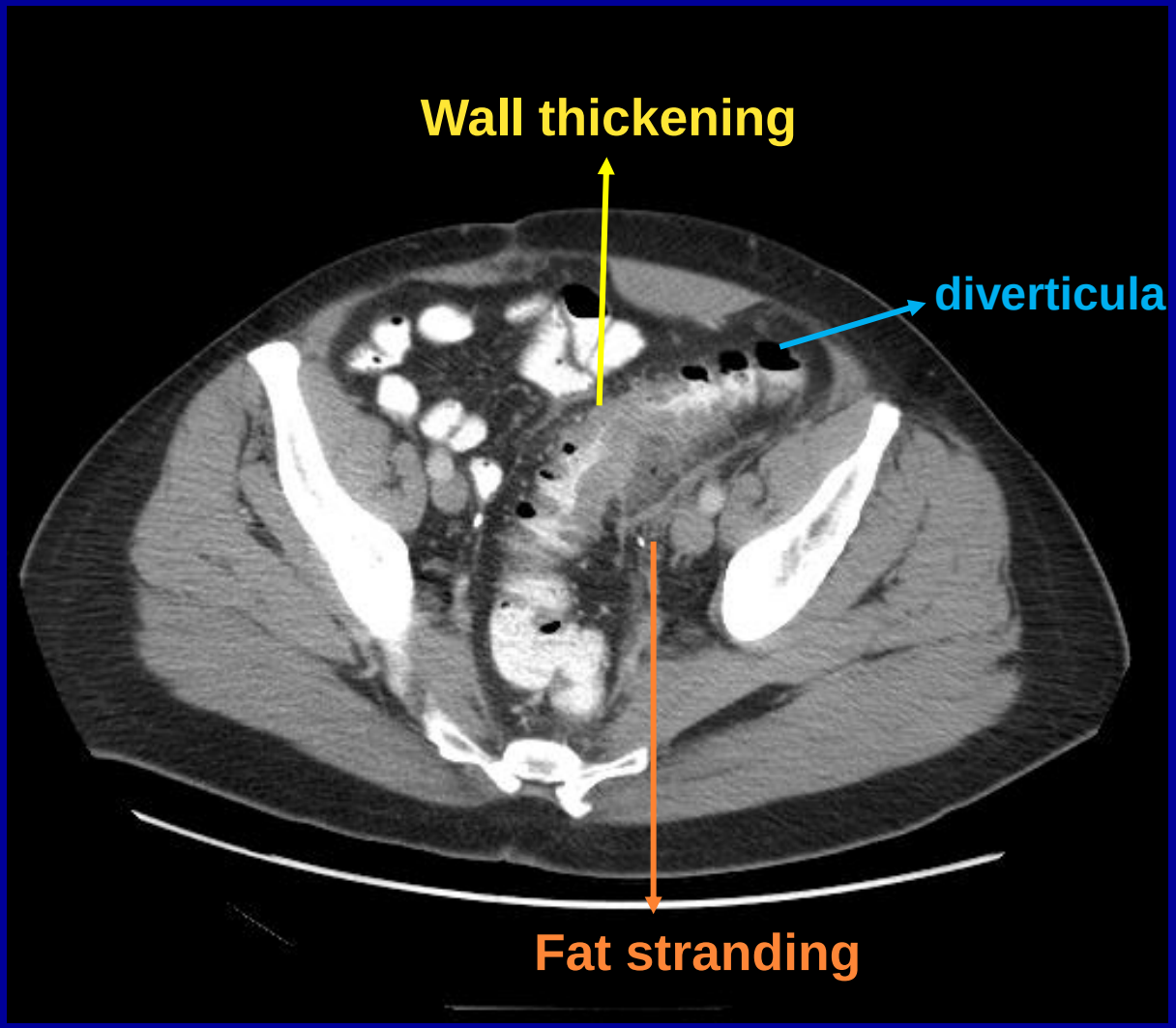

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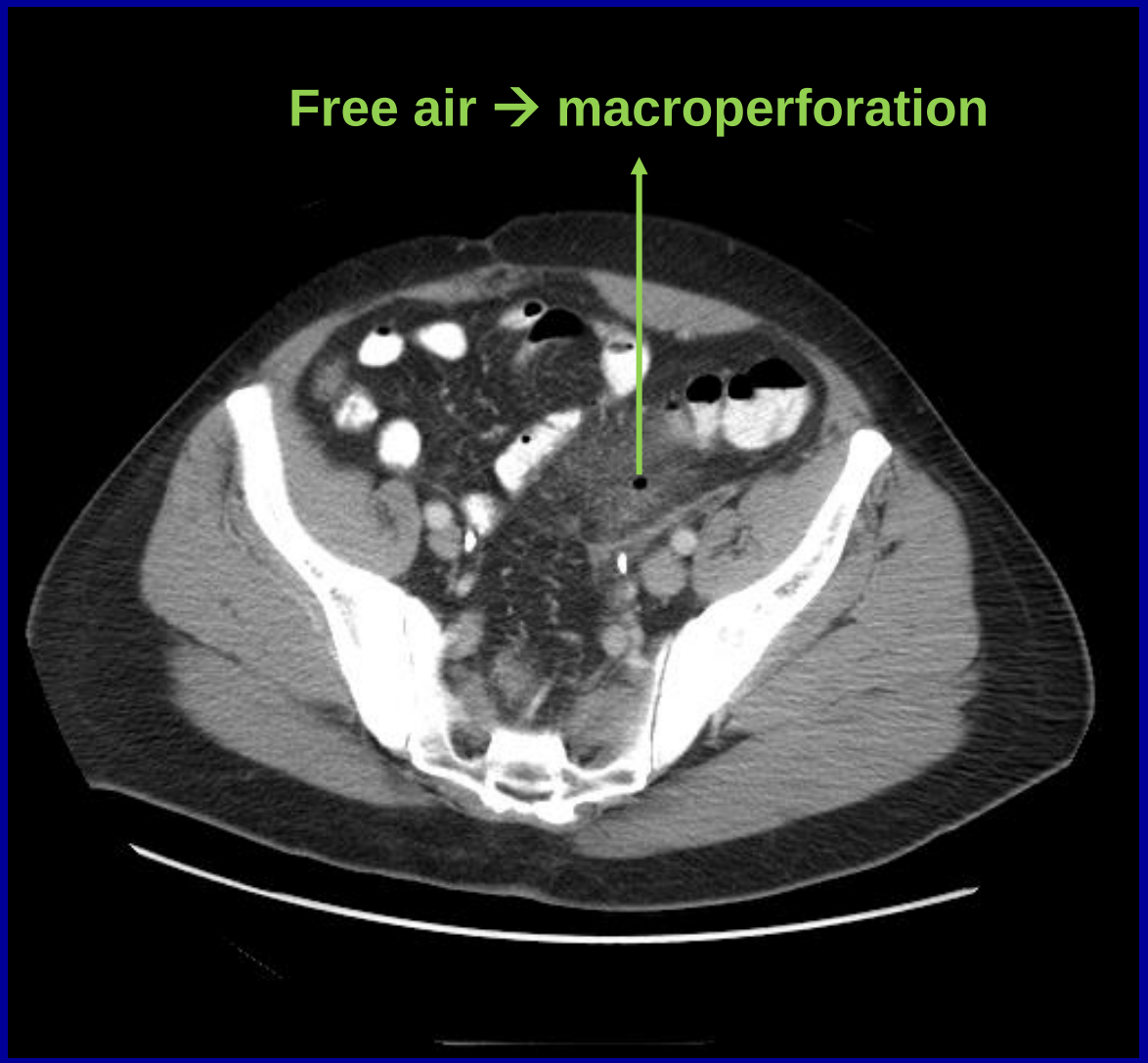

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Our patient: management and outcomes

- **Conservative management.**
- **Two days of nothing by mouth and IV antibiotics (ampicillin/sulbactam) then switched to oral for two weeks.**
- **Colonoscopy at six weeks showed no mass nor stricture.**

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What is the best radiological image for evaluating diverticulitis?

- **Meta-analysis 2008: Accuracy of US and CT→ comparable.**
- **2011 Accuracy of US→ overstimated.**
- **The sensitivity of CT in detecting diverticulitis was significantly higher than that of US: 84% versus 61% (p=0.048).**
- **PPV are comparable.**
- **CT protocol solely using IV contrast is not less accurate than extended contrast agent usage.**

Van Randen et al. A comparison of the Accuracy of Ultrasound and Computed Tomography in common diagnoses causing acute abdominal pain. Eur Radiol (2011) 21:1535–1545

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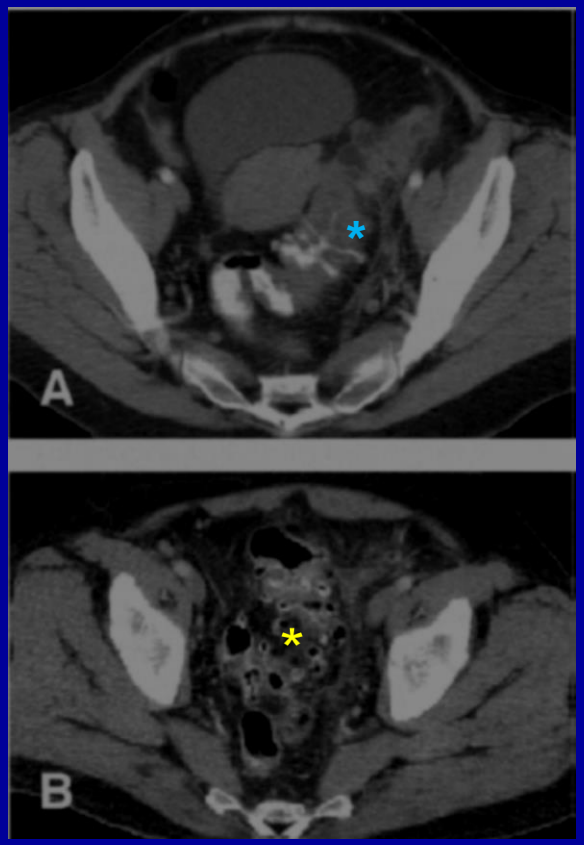
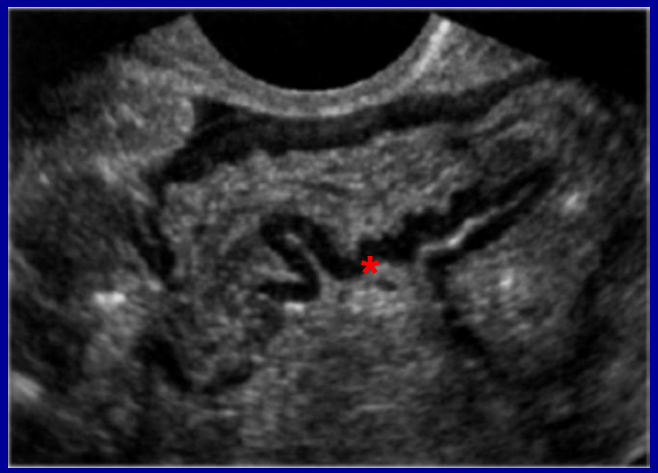
Classic radiological findings of diverticulitis



*** Bowel Wall thickening (>4mm)**

*** Sigmoid diverticula**



US: Muscular hyperthrophy with sawtooth appearance

Pictures taken from: O'Malley M, Wilson S. Ultrasonography and computed tomography of appendicitis and diverticulitis. Seminars in Roentgenology. Vol XXVI, No 2 (April), 2001: pp138-147

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Now let's see another interesting case

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Companion patient 2

61 yo M, with PMH of HTN and 3 episodes of uncomplicated diverticulitis. 3 months prior to visit the ER he experienced a new onset of pneumaturia. 4 weeks later experienced a significant UTI and was treated with ATB by his PCP, not responding and seeing significant amount of stool coming out in his urine. For that reason decided to consult to ER.

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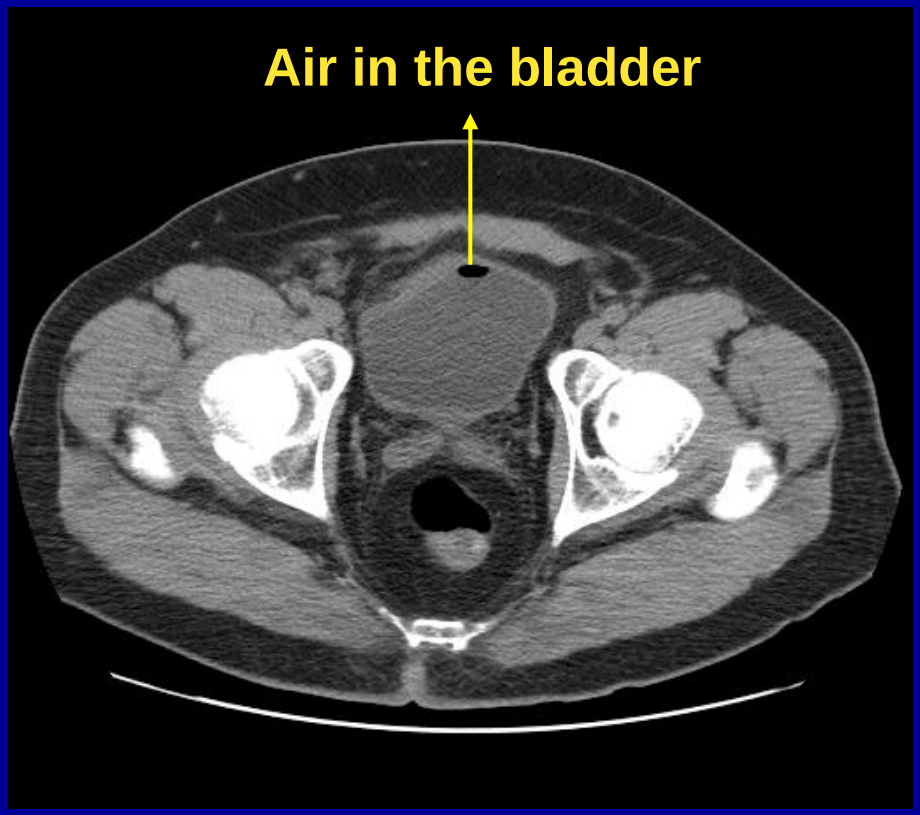
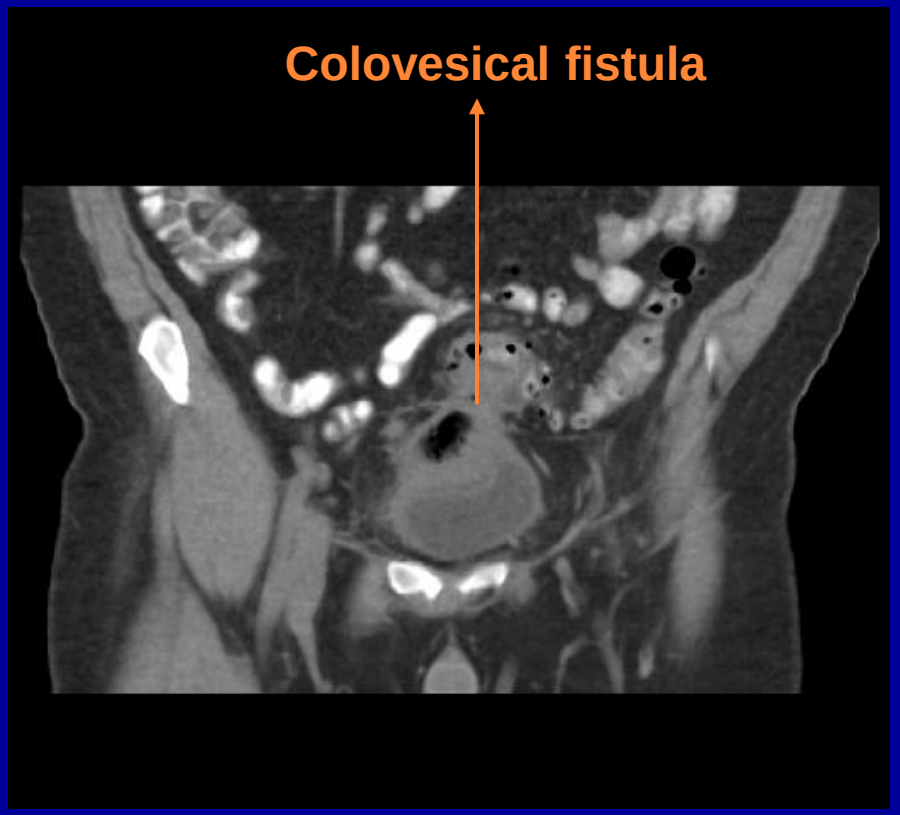
Companion pt 2: axial C+, CT findings





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Fistula as a complication of diverticulitis

- **Fistula formation account for up to 20% of surgically treated cases of diverticular disease**
- **The most frequent fistulas are colovesical (65%), colovaginal (25%), coloenteric and colouterine fistulas**
- **Diverticulitis: most common cause of a colovesical fistula**
- **Symptoms of colovesical fistula: pneumaturia, dysuria or irritative symptoms, and fecaluria**

Woods RJ, Lavery IC, Fazio VW, et al. Internal fistulas in diverticular disease. Dis Colon Rectum 1988; 31:591.

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Companion pt 2: Outcomes

- **Urine culture: (+) Klebsiella and E. coli.**
- **4 weeks later he underwent open sigmoid colectomy+ end colostomy.**
- **8 weeks post-op: Colorectal anastomosis.**
- **No complications on follow ups.**

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Companion patient 3

- **27 yo F, previously healthy presents to ER with severe left lower quadrant pain.**
- **No nausea, no vomiting. +BM, no BRBPR.**
- **T: 101,4°F. HR: 106, BP: 134/86.**
- **No medications. Menses last date: 1 week ago.**
- **PE: Tender LLQ to palpation. Mildly distended abdomen, +rebound.**
- **Labs: WBC: 16.500 uL, Hb: 11,9 mg/dL, plat: 420.000 mm^3.**

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Companion pt 3: axial C+, CT findings

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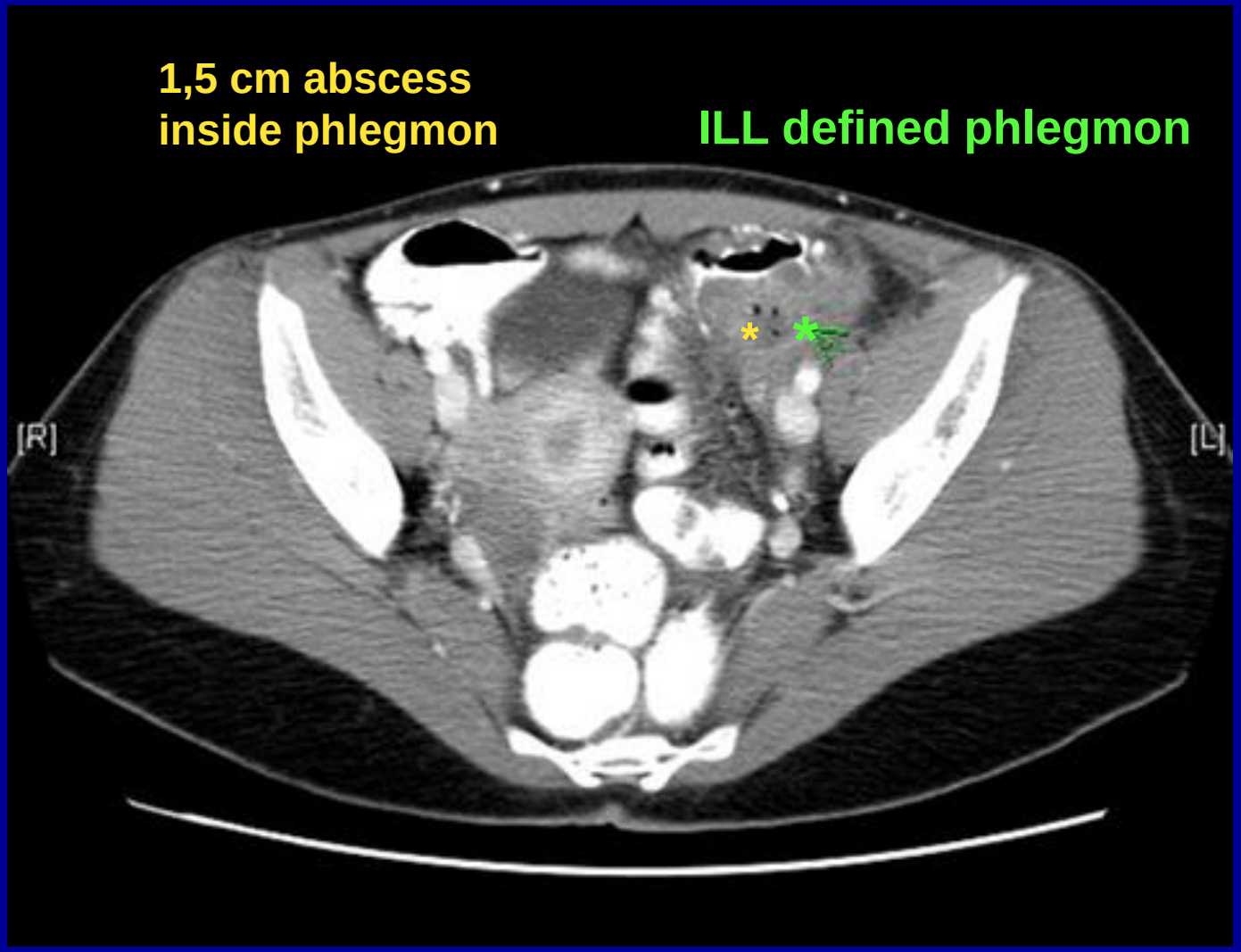

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How would you stage the severity of acute diverticulitis?

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Hinchey classification for colonic perforation due to diverticular disease

HINCHEY CLASIFICATION	
Stage I	Diverticulitis with confined paracolic abscess
Stage II	Diverticulitis with pelvic abscess
Stage III	Diverticulitis with purulent peritonitis
Stage IV	Diverticulitis with fecal peritonitis

Hinchey, E.J., Schaal, P.G. and Richard, G.K. Treatment of perforated diverticular disease of the colon. *Advances in Surgery* 12:85-109, 1978

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Now try to give a complete diagnosis

Taken from: Clinical manifestations and diagnosis of acute diverticulitis in adults. Uptodate. Last update: April 14th, 2014.

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Take home points

- **Diverticulosis Vs diverticulitis**
- **LLQ abdominal pain+tenderness**
- **Up to 25% of patients with acute diverticulitis have associated complications: bowel obstruction, abscess, fistula or perforation**
- **Best available images: CT**
- **Colonoscopy has no role in diagnosis but must be performed six weeks later for ruling out masses**
- **Most of cases of acute diverticulitis just require conservative management**

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1. Clinical manifestations and diagnosis of acute diverticulitis in adults. Uptodate. Last update: April 14, 2014.
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10. Acute diverticulitis complicated by fistula formation. Uptodate. Last update: Feb 11, 2013
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