



# TEARING ABDOMINAL PAIN

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Program/Dept(s): Mount Sinai Medical Center of Florida

**Mount Sinai**  
MEDICAL CENTER

# CHIEF COMPLAINT & HPI

- Chief Complaint
  - “Tearing abdominal pain”
  
- History of Present Illness
  - 25 year-old female with history of lupus vasculitis and antiphospholipid syndrome (APLS) admitted with 2 days of substernal chest pressure. On HOD # 2 she develops sudden onset 10/10 diffuse tearing abdominal pain. She had no fevers, chills or syncope.

# RELEVANT HISTORY

- Past Medical History
  - SLE, colonic vasculitis, CVA x 4, hypertension
- Past Surgical History
  - Cholecystectomy, closure of patent foramen ovale, D & C
- Family & Social History
  - Lives with mother
  - Does not drink alcohol or use recreational drugs
- Medications
  - Warfarin, metoprolol, rosuvastatin, enalapril
- Allergies
  - NKDA

# DIAGNOSTIC WORKUP

- Physical Exam
  - **BP:** 100/70, **HR:** 119, **RR:** 30, **O<sub>2</sub>Sat:** 97% RA
  - **General:** Young, chronically-ill appearing female, in pain
  - **Cardiac:** Tachycardiac, no murmurs, rubs or gallops.
  - **Pulm:** CTAB. No wheezes, rhonchi or rales.
  - **Abd:** Tender to palpation. Hypoactive BS, + guarding and rebound tenderness
  - **Vascular:** peripheral pulses 2+ bilaterally

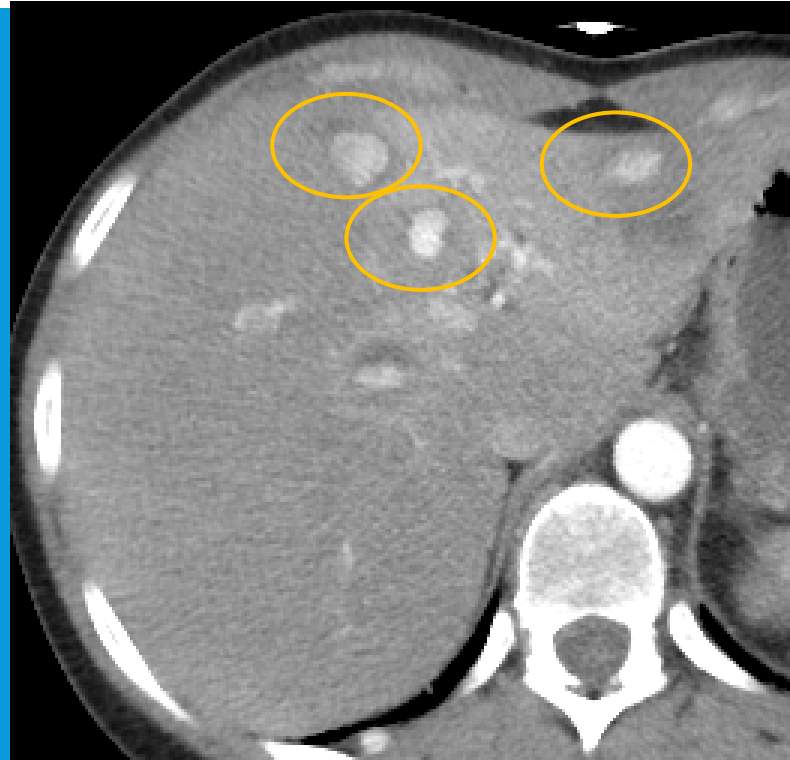
- Laboratory Data



- Cr: 0.63
  - **INR:** 3.62; **PTT:** 53.5
  - LFTs: wnl
  - Lipase: 110
  - Troponin I: <0.040
  - **CRP:** 111; **ESR:** 117
- EKG: sinus tachycardia

# DIAGNOSTIC WORKUP

- Non-invasive imaging:
  - CECT performed on admission revealed multiple lobulated intrahepatic hyperdense structures, compatible with hepatic artery aneurysms (circles)
  - There were multiple other pseudoaneurysms noted throughout the arterial vasculature, including the right IMA (arrow)

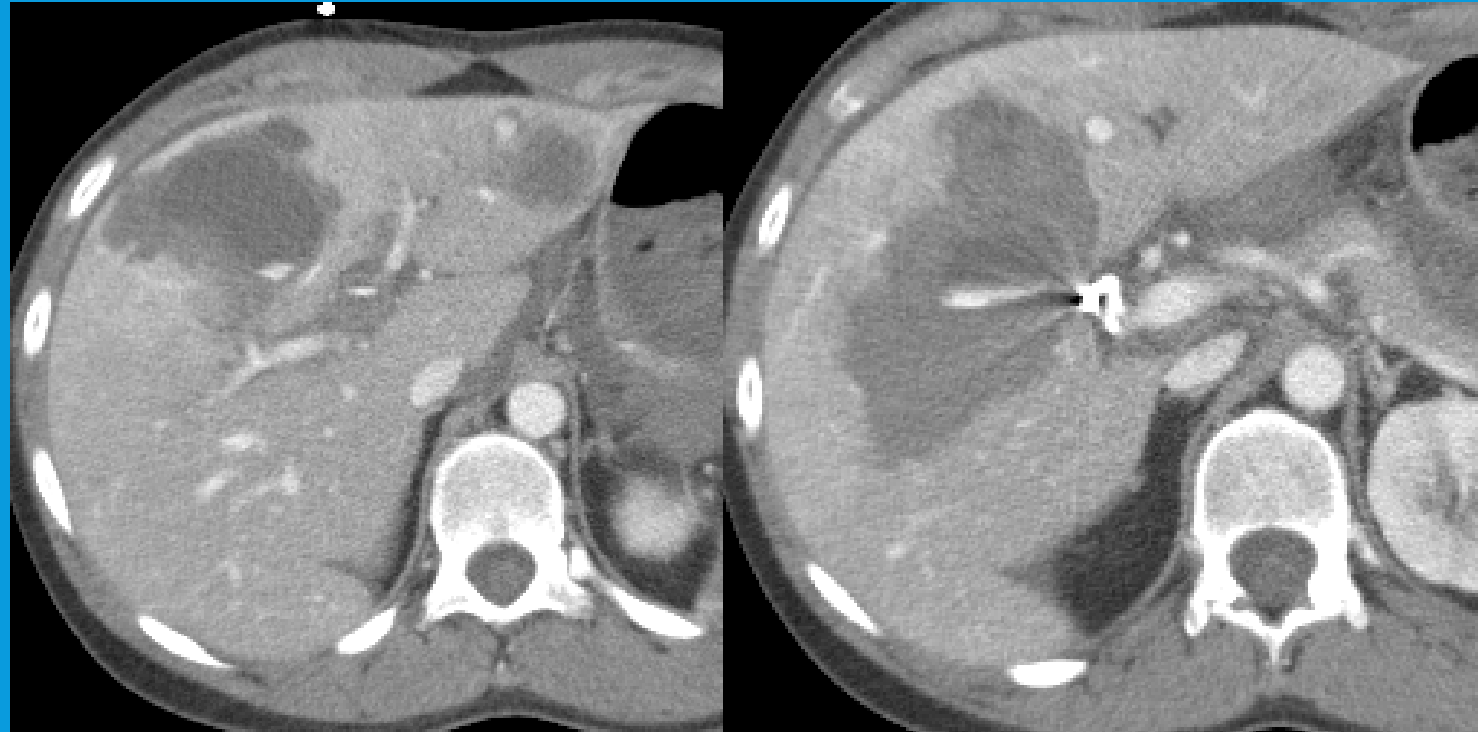


# DIAGNOSTIC WORKUP – QUESTION

- A repeat CECT was performed at the onset of abdominal pain. What salient findings are present?

Click on one of the following answers:

- A. Hepatic abscesses
- B. Hepatic hemorrhage
- C. Hepatic laceration
- D. Hepatic cysts

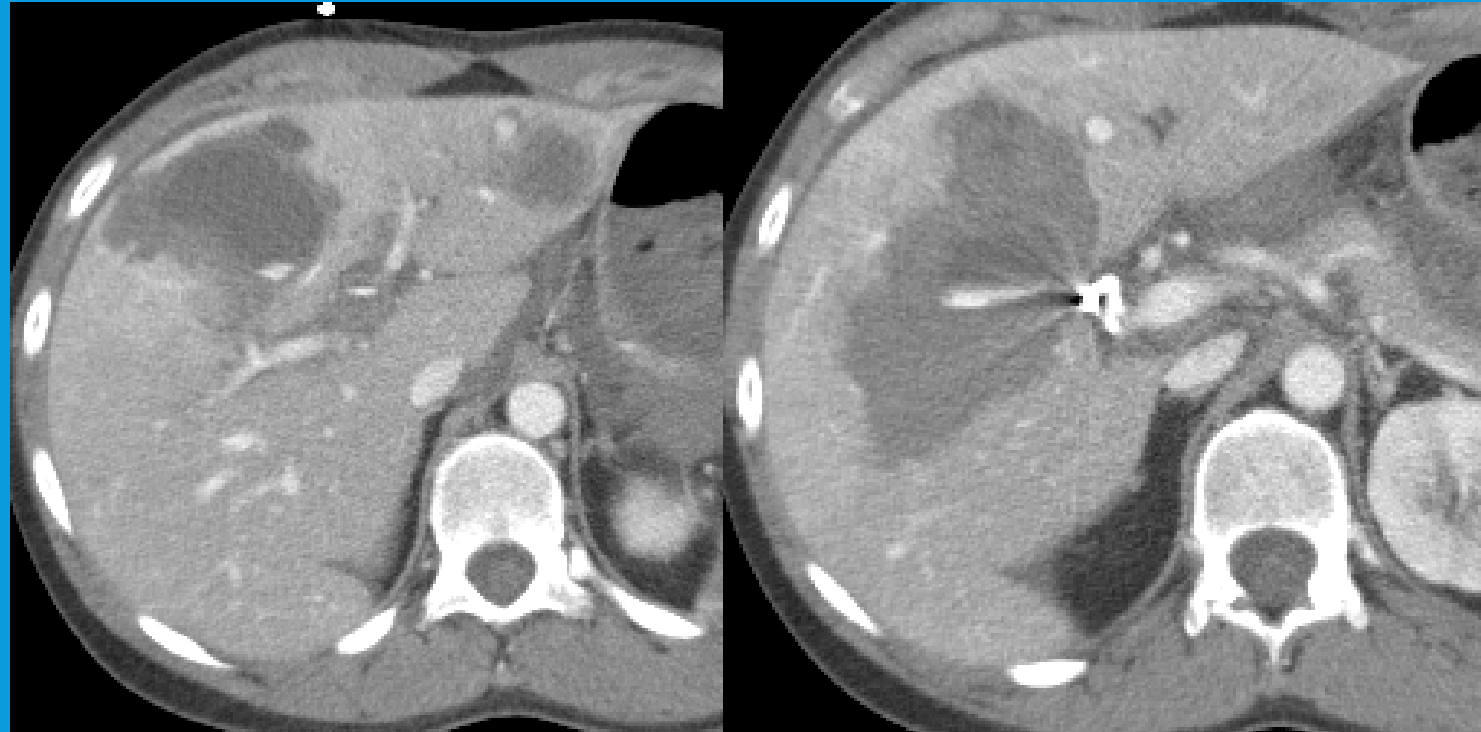


# CORRECT!

- A repeat CECT was performed at the onset of abdominal pain. What salient findings are present?

Click on one of the following answers:

- A. ~~Hepatic abscesses~~
- B. **Hepatic hemorrhage. There are new areas of hepatic intra-parenchymal hemorrhage, compatible with aneurysm rupture.**
- C. ~~Hepatic laceration~~
- D. ~~Hepatic cysts~~



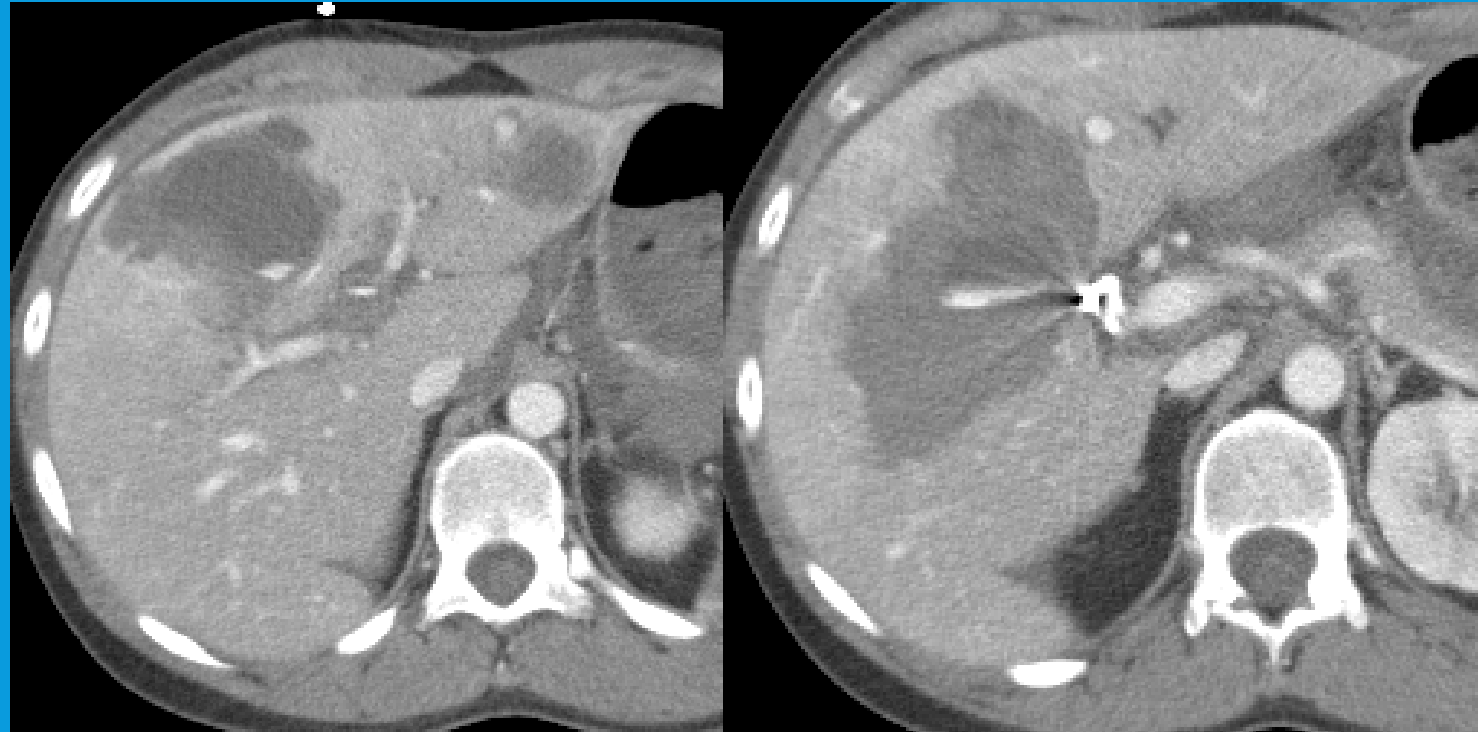
[CONTINUE WITH CASE](#)

# SORRY. THAT'S INCORRECT.

- A repeat CECT was performed at the onset of abdominal pain. What salient findings are present?

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CONTINUE WITH CASE

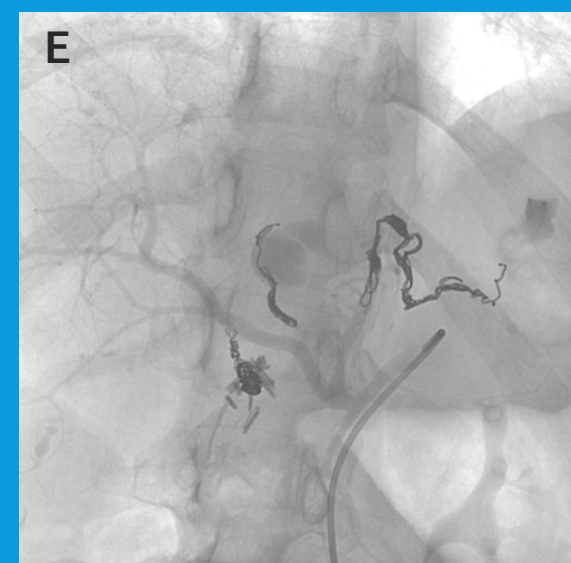
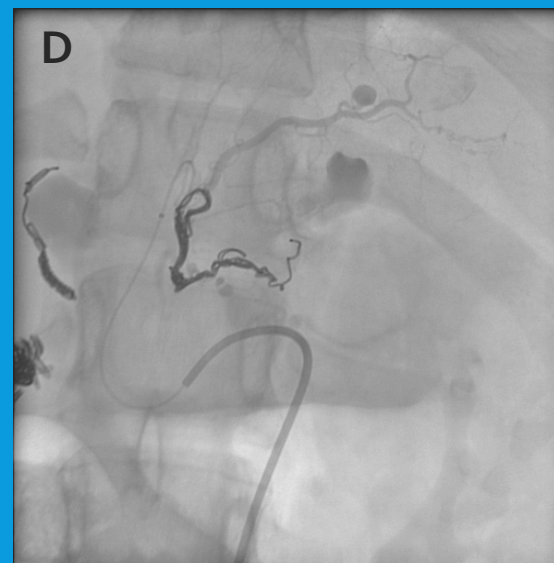
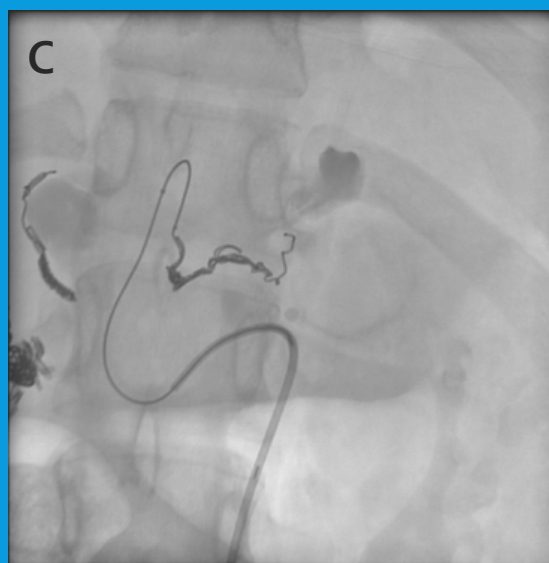
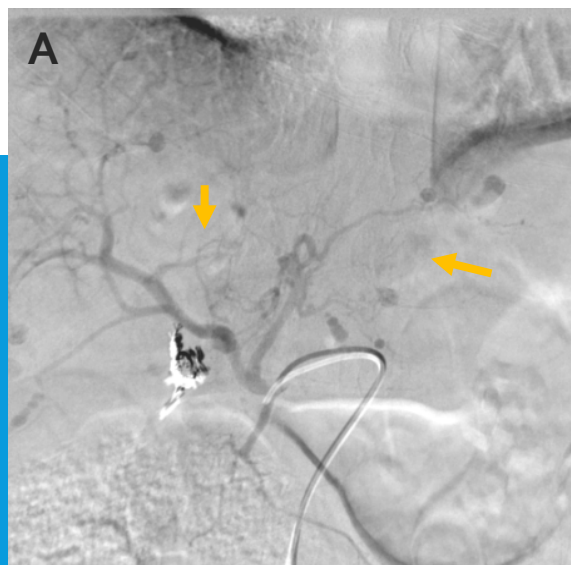


# DIAGNOSIS

- Ruptured visceral aneurysms/pseudoaneurysms.

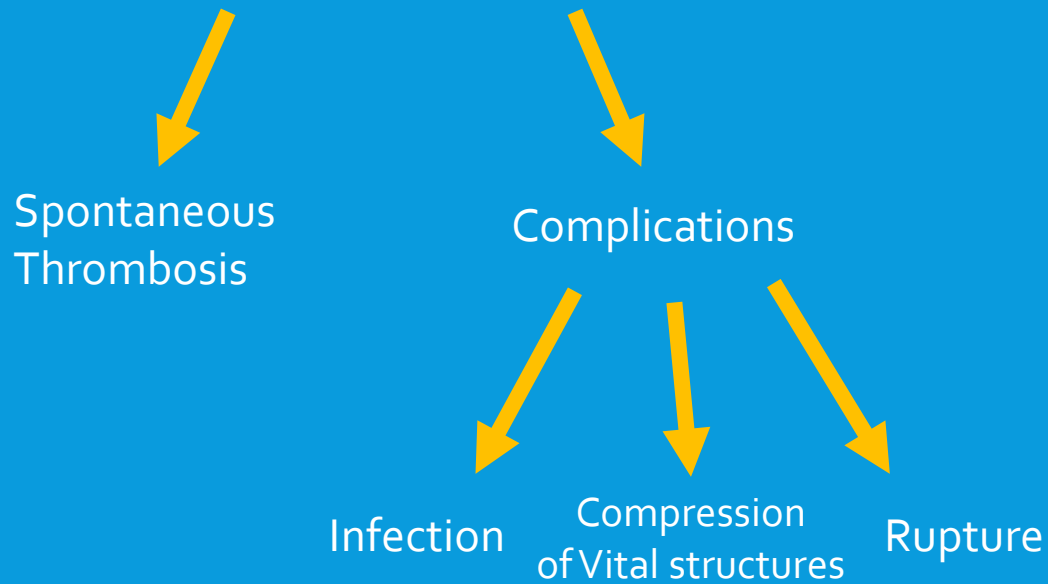
# INTERVENTION

- Ultraslective embolization with Penumbra Ruby Coils (Penumbra Inc, Alameda, CA) chosen to minimize nontarget embolization and loss of hepatic arterial flow.
- **Images A and B:** Active extravasation (yellow arrows) seen from right hepatic branch and multiple left hepatic artery branches. Right hepatic artery branch was embolized first (red arrow) and the left hepatic artery was then selected.
- **Images C and D:** Left hepatic artery ultra selective branch coil embolization with coil lengths ranging from 4 to 20 mm:
  - **Framing** with standard framing Ruby Coils measuring 3 – 6mm in secondary diameter.
  - **Tight packing** achieved with fill soft Ruby Coils measuring 2 – 4 mm in secondary diameter.
- **Image E:** Completed **ultraslective** coil embolization.



# SUMMARY & TEACHING POINTS

## Natural History of Visceral Pseudoaneurysms



### • Causes of visceral pseudoaneurysms:

- Iatrogenic: percutaneous biopsy/drainage, sternotomy, central line/pacer lead placement
- Atherosclerosis
- Trauma
- Tumor erosion
- Infection: *Salmonella* and *Staph*, TB, fungal
- Vasculitis:
  - Primary: Behcet's, PAN, SLE, GCA, Takayasu's
  - Secondary: Pancreatitis, etc.

### • Treatment indications:

- Symptomatic
- Asymptomatic: no way to predict rate of rupture, must be determined based on location, morphology, clinical setting

# SUMMARY & TEACHING POINTS

- Visceral aneurysmal disease has many potential etiologies and variable natural history
- Treatment is usually indicated in symptomatic patients.
- Treatment of asymptomatic patients should be tailored to aneurysm architecture and patient preferences.

# QUESTION

- What are indications for **surgical resection** of a pseudoaneurysm? Click on one of the following answers:
  - A. Infected pseudoaneurysm, urgent reduction in mass effect
  - B. Urgent reduction in mass effect, thrombosed pseudoaneurysm
  - C. Ruptured pseudoaneurysm, infected pseudoaneurysm
  - D. Pseudoaneurysm secondary to vasculitis, traumatic pseudoaneurysm

# CORRECT!

▪ What are indications for **surgical resection** of a pseudoaneurysm? Click on one of the following answers:

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[CONTINUE WITH CASE](#)

# SUMMARY & TEACHING POINTS

- Potential treatments include surgical and endovascular options
- Endovascular therapeutic options depend on external accessibility of pseudoaneurysm and whether the donor artery is expendable

## • Surgical treatment:

- Techniques
  - Ligation, bypass, resection of pseudoaneurysm with patch repair, organ resection
- Indications:
  - Infected pseudoaneurysm
  - Urgent reduction in mass effect
- Disadvantages:
  - Anesthesia related risks, MI, bleeding, wound infection, prolonged recovery

## • Endovascular treatment:







FEATURES	MANAGEMENT
<b>Superficial Artery</b> 	Management by ultrasound compression of pseudoaneurysm neck or pseudoaneurysm itself. Direct Percutaneous Management (see below)
<b>Endoluminally Inaccessible</b> 	Direct Percutaneous Management: <ul style="list-style-type: none"> <li>• Direct Coil Embolization</li> <li>• Direct Thrombin Injection</li> <li>• Direct Glue Injection</li> </ul>
<b>Endoluminally Accessible (Inexpendable Donor Artery)</b>	
<b>Narrow Neck</b> 	Embolization of Pseudoaneurysm Itself.
<b>Wide Neck</b> 	Embolization with Stent or Balloon Remodeling. Stent Graft Placement. Embolization with Balloon Remodeling (if infected).
<b>Endoluminally Accessible (Expendable Donor Artery)</b>	
<b>No Collateral Supply</b> 	Proximal Embolization of Donor Artery.
<b>Collateral Supply</b> 	Proximal and Distal Embolization of Donor Artery.

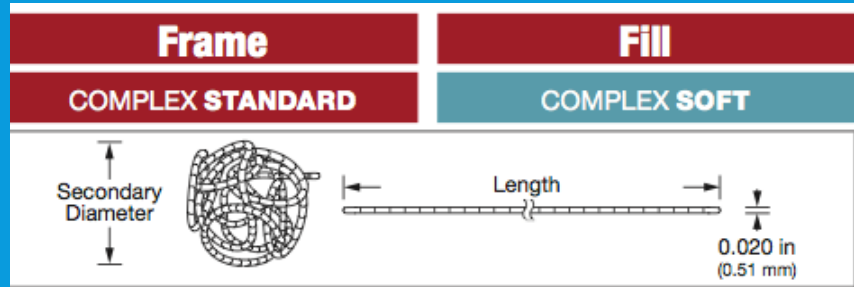
Table from: Saad NEA, Saad WEA, Davies MG, et al. Pseudoaneurysms and the role of minimally invasive techniques in their management. RadioGraphics 2005; 25:S173–S189.



# SUMMARY & TEACHING POINTS

- Embolization agent considerations:

**GOAL:** stop hemorrhage while preserving normal arterial vasculature



Images from website of Penumbra, Inc., (Alameda, CA)

## Coil Section:

Ruby Coils (Penumbra, Inc., Alameda, CA)

- Initially developed in field of neurovascular interventions – now available in peripheral
- Employ *controlled* mechanism of mechanical detachment
  - *Resheathability* allows *precise* placement before detachment
  - *Tight packing* can be achieved as coils have a range of softness
- 0.020" diameters comparable to 0.035" macrocoils but can be delivered through microcatheters
  - *Allows high coil volume to be delivered anywhere – even smallest arteries*
- Allows *ultraselective embolization* to reduce non-target embolization and maximize preservation of normal vasculature

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