GUIDELINES FOR MANAGEMENT OF MESENTERIC ANEURYSMS

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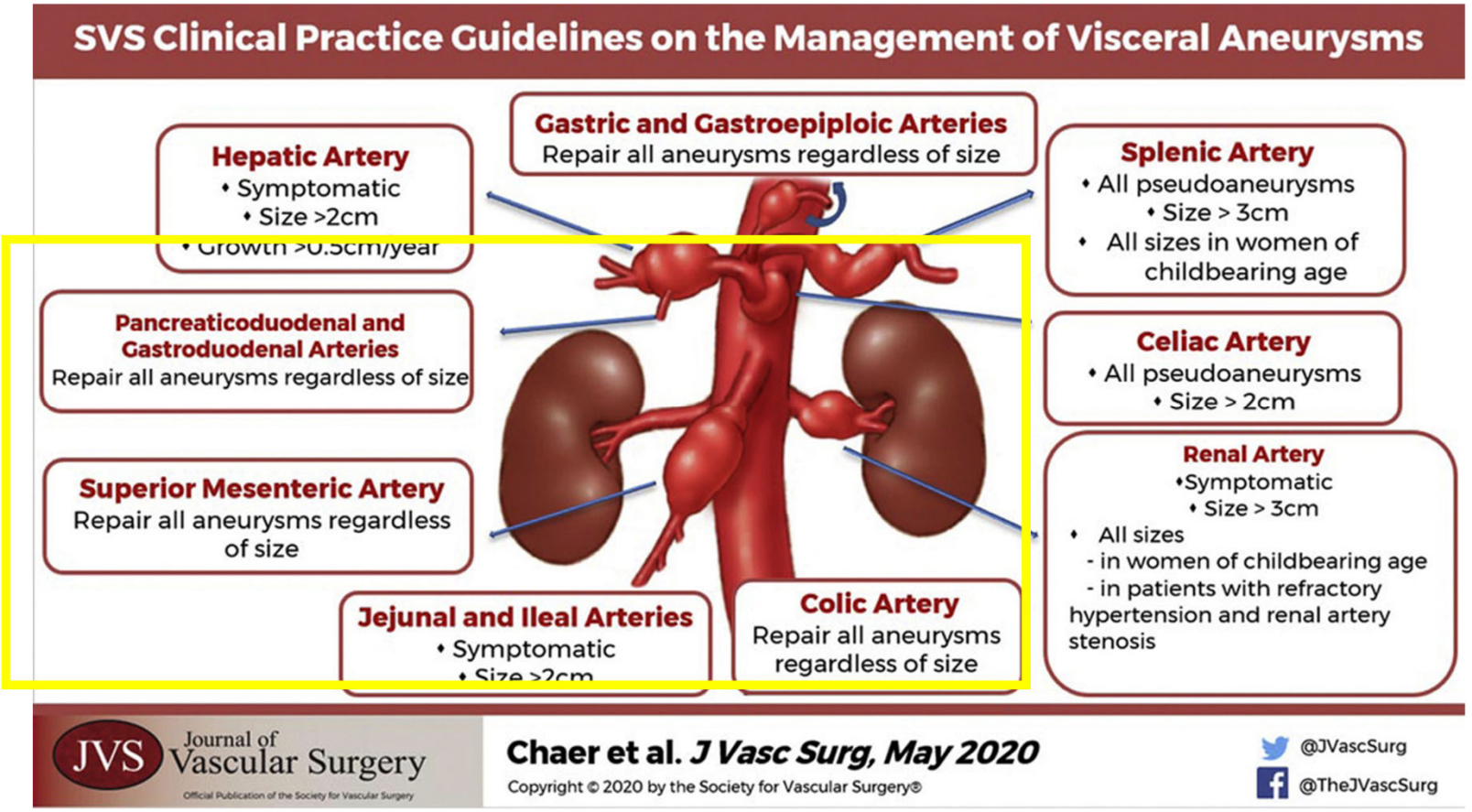
DISCLOSURE

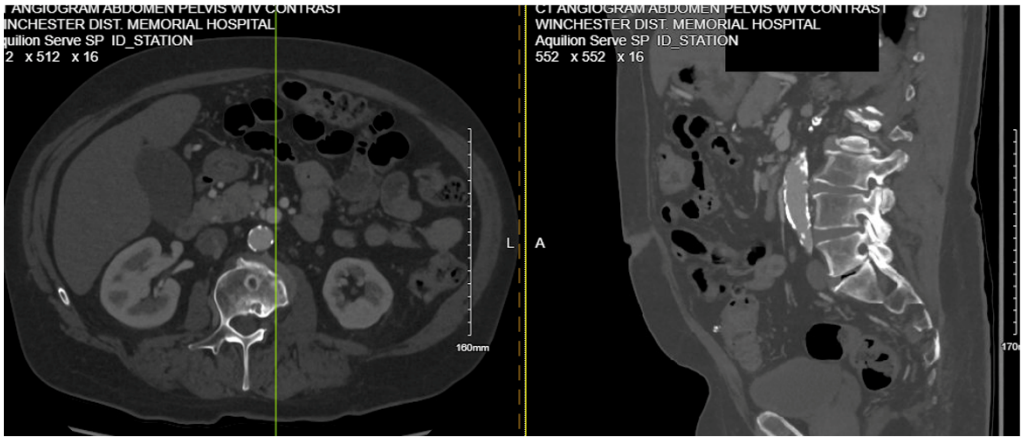
- I have no current relationships with commercial entities

GUIDELINES FOR MANAGEMENT OF MESENTERIC ANEURYSM



ENCOUNTERED SCENARIOS

- Case 1: 70 yrs old male presented to clinic for Claudication work up. Incidental 1.2 cm PDA aneurysm.
- Case 2: 33 yrs old male presented to ER urinary frequency and sudden LT flank pain, CT done and showed b/l non obstructing renal calculi and incidental 1.5 cm IPDA and median arcuate ligament syndrome
- Case 3: 44 yrs old female referred to your clinic for incidental 2.5cm proximal SMA aneurysm found during CT scan for cholecystitis.
- Case 4: 81 yrs Male, Trauma patient admitted to ortho with hip fracture, incidental 1.8 SMA aneurysm on PAN scan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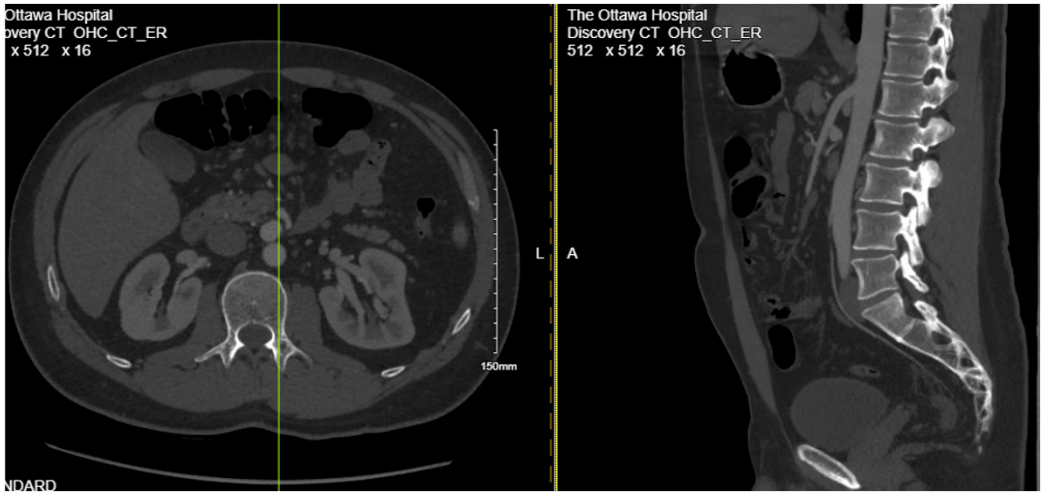
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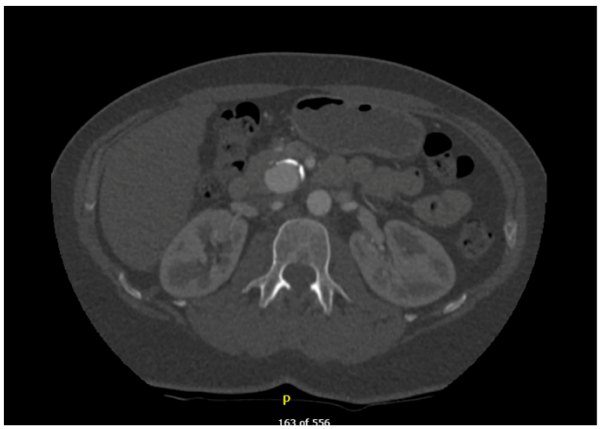
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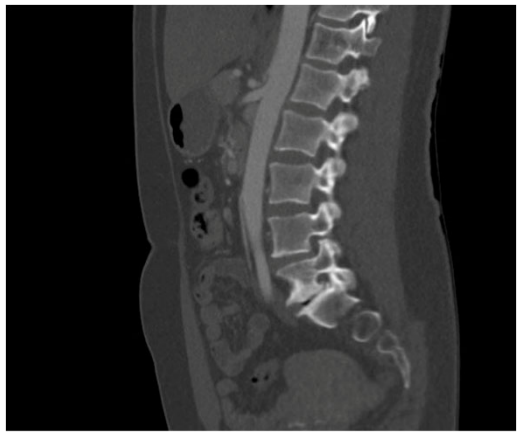
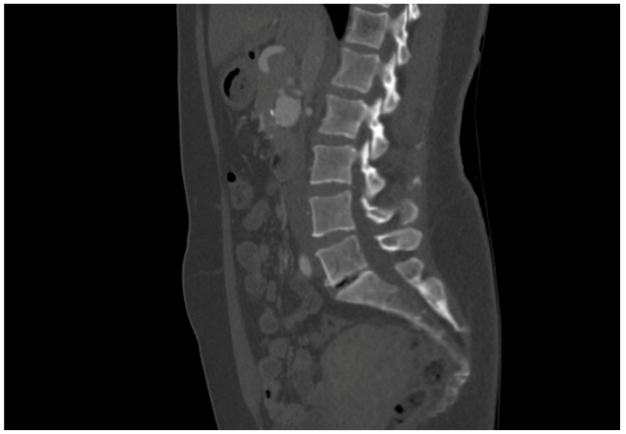
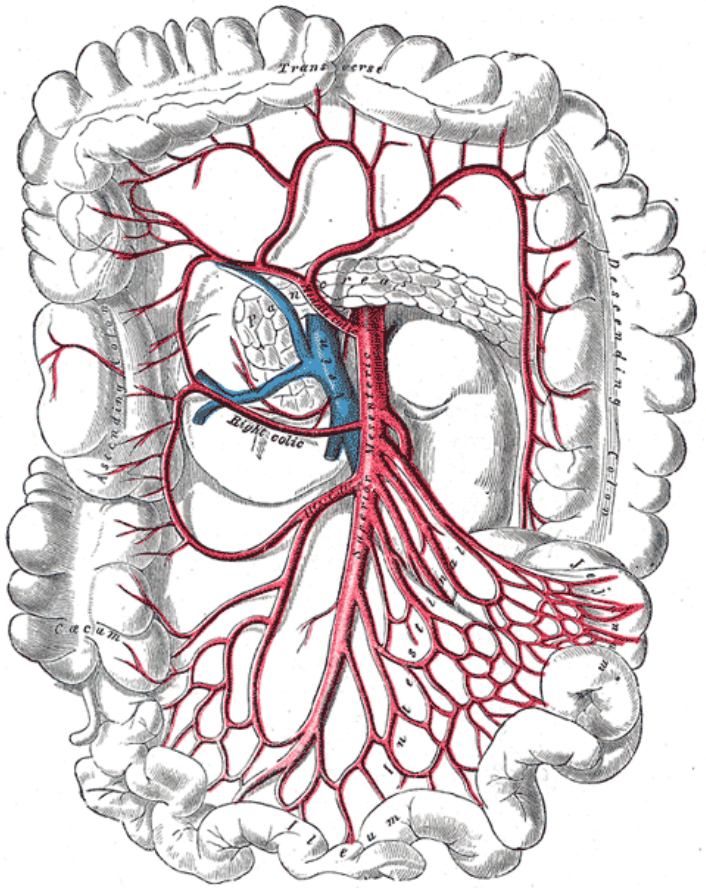




DEFINITION:

- Mesenteric aneurysm: 1.5 to 2 times its normal diameter
- SMA: 6-9 mm
- IMA: 41 mm
- PDA: 1.4-1.5 mm
- GDA: ?3-5 mm



EPIDEMIOLOGY AND ETIOLOGY SMA ANEURYSMS

- 3.5-8% of all visceral aneurysms
- Male predominance
- Almost exclusively at the first 5 cm of the vessel
- 38-50% present with rupture
- Mortality can range from 30-90%

- Etiology:
  - o Infectious (60%)**
    - Majority are <50 yrs old, History of infective endocarditis and IV drug us
    - Organisms: Streptococcus (47%) Staphylococcus (28%)
  - o Atherosclerosis
  - Dissections
  - ⊙ Connective tissue disease
  - o Polyarteritis Nodosa
  - o Pancreatitis
  - o Trauma

SYMPTOMS AND SIGNS SMAA

- 70-90% of SMAA are symptomatic
- Abdominal pain
- Fever
- Weight loss
- Nausea and vomiting
- GI bleed

DIAGNOSIS & INDICATION TO TREAT

1. Diagnosis and evaluation

Recommendations for diagnosis and evaluation of SMAA			
	Recommendation	Strength of recommendation	Quality of evidence
1.1	In patients with SMAA, we recommend CTA as the diagnostic tool of choice.	1 (Strong)	B (Moderate)
1.2	We recommend mesenteric angiography to delineate anatomy in preoperative planning for SMAA repair.	1 (Strong)	B (Moderate)

2. Size criteria for invasive intervention (true and false aneurysms)

Recommended intervention criteria for SMAA			
	Recommendation	Strength of recommendation	Quality of evidence
2.1	We recommend repair of all SMAAs and pseudoaneurysms as soon as the diagnosis is made regardless of size.	1 (Strong)	A (High)
2.2	We suggest careful observation of SMAA because of dissection unless refractory symptoms develop.	2 (Weak)	B (Moderate)

MANAGEMENT

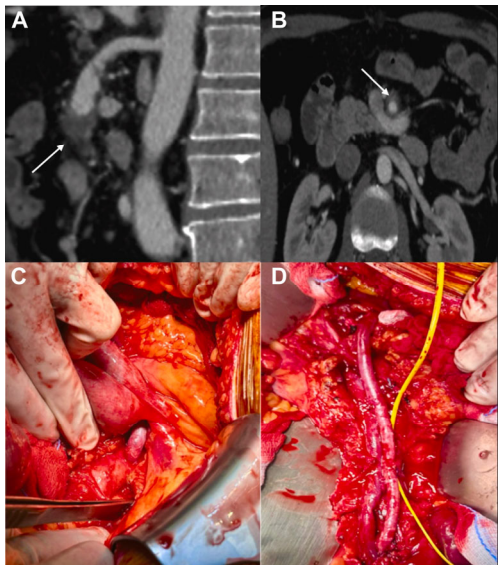
Options:

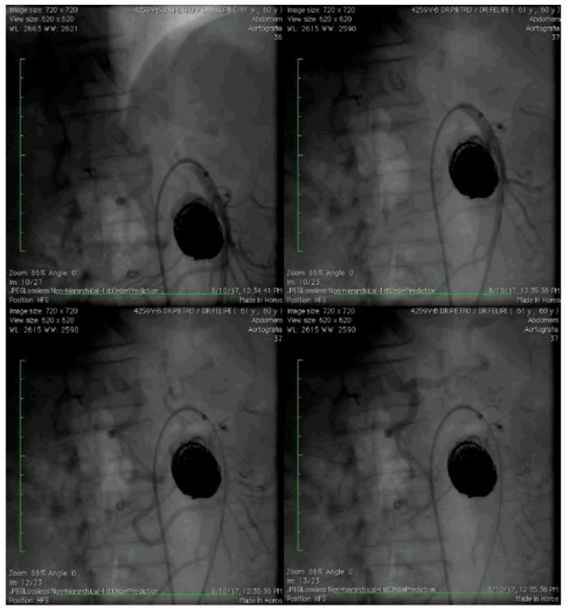
Open repairs:

- Aneurysmorrhaphy
- Aneurysectomy + reconstruction

Endovascular repairs:

- Coil embolization
- Covered stent grafts





MANAGEMENT

3. Treatment options

Recommendations for treatment of SMAA			
	Recommendation	Strength of recommendation	Quality of evidence
3.1	We recommend an endovascular-first approach to all SMAAs if it is anatomically feasible.	1 (Strong)	B (High)

4. Screening for concomitant aneurysm

Recommendations for screening of patients with SMAA			
	Recommendation	Strength of recommendation	Quality of evidence
4.1	We suggest abdominal axial imaging to screen for concomitant intra-abdominal aneurysms in patients who did not have CTA at the time of diagnosis.	2 (Weak)	B (Moderate)

WHAT ABOUT THIS PATIENT?

- Mr. X is 81 yrs old, known CHF, Afib on Xarelto, CKD, DM, PVD
- Sustained a Fall.
- PAN scan; Showed incidental SMA aneurysm 1.8 cm

- On CT scan there is significant bilateral iliac disease with near occlusion of his RT EIA.

CAN IT BE OBSERVED?

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Aneurysms of the superior mesenteric artery and its branches

Grayson S. Pitcher, MD [a] · Nolan C. Cirillo-Penn, MD [b] · Bernardo C. Mendes, MD [b] · ... · Thomas C. Bower, MD [b] · William S. Harmsen, MS [b] · Jill J. Colglazier, MD [b] ... Show more

Affiliations & Notes Article Info

ROLE OF OBSERVATION ?

- Only 18 of pts had growth >=1mm/yr
- Having large fusiform SMAA at diagnosis had higher risk for growth. Not found in saccular or dissection
- 91 pt had <20mm
  - Observed over 120 months
  - Non ruptured
  - Only 10 had growth >=1mm/yr

ARTICLE HIGHLIGHTS

- **Type of Research:** A single-center, retrospective cohort study
- **Key Findings:** A total of 144 aneurysms of the superior mesenteric artery and its branches were reviewed. Only two aneurysms had ruptured, and both patients had presented with rupture. A total of 91 aneurysms <20 mm in size were followed up for a median of 120.8 months (range, 30.2-232.2 months), and no ruptures occurred within this cohort during the follow-up period.
- **Take Home Message:** Aneurysms <20 mm with a degenerative etiology can be safely monitored without treatment.

Anatomic characteristics	
Fusiform	57 (40)
Saccular	30 (20)
Dissection-associated	57 (40)
Isolated branch aneurysm	41 (31)
Jejunal branch aneurysm	24 (18)
Pancreaticoduodenal branch aneurysm	14 (11)
Replaced hepatic artery aneurysm	1 (0.80)
Arc of Buhler aneurysm	2 (2.0)

Presentation	
Incidental	96 (73)
Acute abdominal pain	19 (15)
Chronic abdominal pain	25 (19)
Nausea	8 (6.1)
Back pain	8 (6.1)
Postprandial abdominal pain	7 (5.3)
Weight loss >10 lb	3 (2.3)
Diarrhea	3 (2.3)
Hematochezia	2 (1.5)

ROLE OF OBSERVATION ?

Table V. Operative details of superior mesenteric artery (SMA) aneurysm repair

Operative details	Patients, No. (%)
Open revascularization	36 (82)
Aneurysmorrhaphy with primary reconstruction or bovine pericardial patch angioplasty	9 (20)
Interposition graft with Dacron, with or without reimplantation of branches	7 (16)
Interposition graft with reversed saphenous vein, with or without reimplantation of branches	5 (11)
Supraceliac aorta to SMA bypass with Dacron graft	8 (18)
Iliomesenteric bypass with Dacron graft	2 (4.5)
Ligation and excision of branch aneurysm	5 (11)
Endovascular repair	8 (18)
Balloon expandable covered stent	3 (7)
Coil embolization	5 (11)

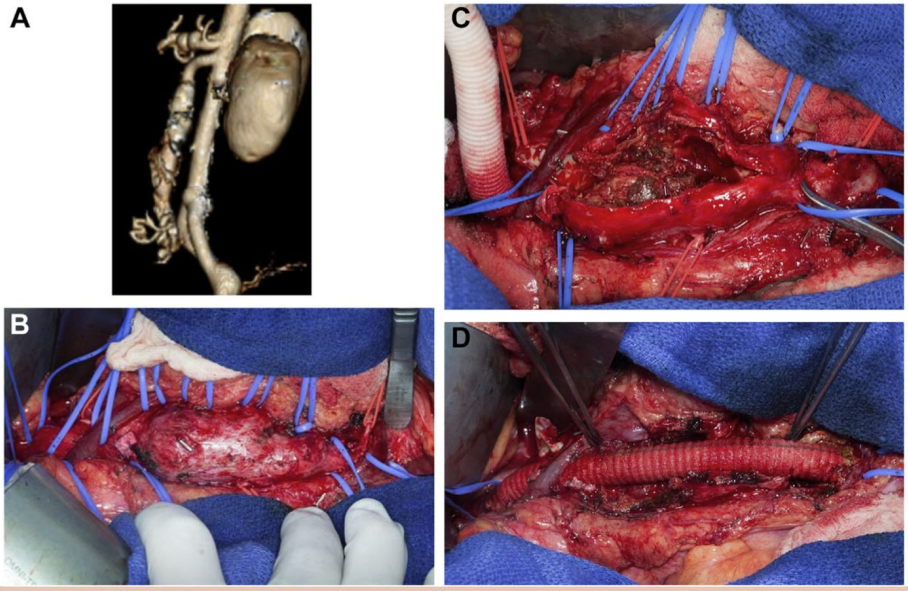
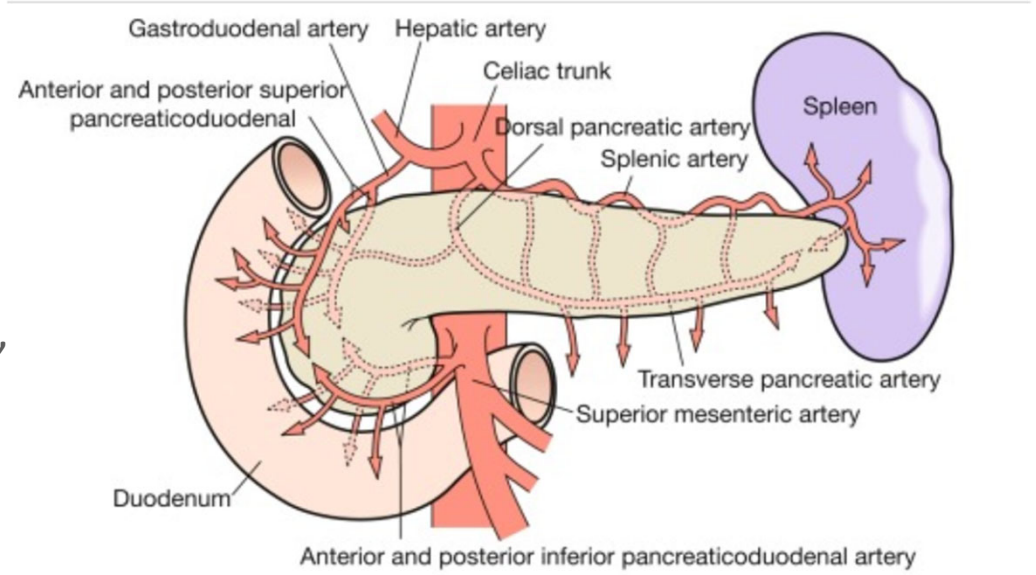


Fig. A, Three-dimensional reconstruction of a large superior mesenteric artery (SMA) aneurysm involving multiple branches. **B-D,** Resection and reconstruction of the aneurysm using an interposition graft.

GDA AND PDA ANEURYSMS

- 2% for the PDA and1.5% for GDA
- No definitive study evaluate natural history
- Male predominance, 4:1
- Average presentation ~60's
- Almost associated with pancreatic pathology, celiac occlusion (50-69%) , abdominal trauma, iatrogenic causes



GDA AND PDA ANEURYSMS

•Presentation:

•Asymptomatic

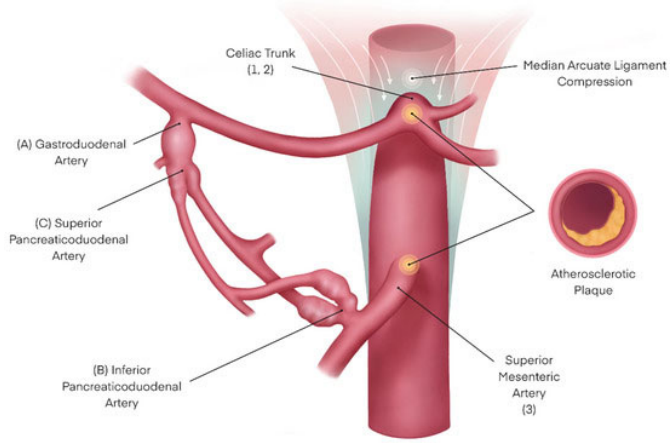
•Vague abdominal pain that might radiate to the back

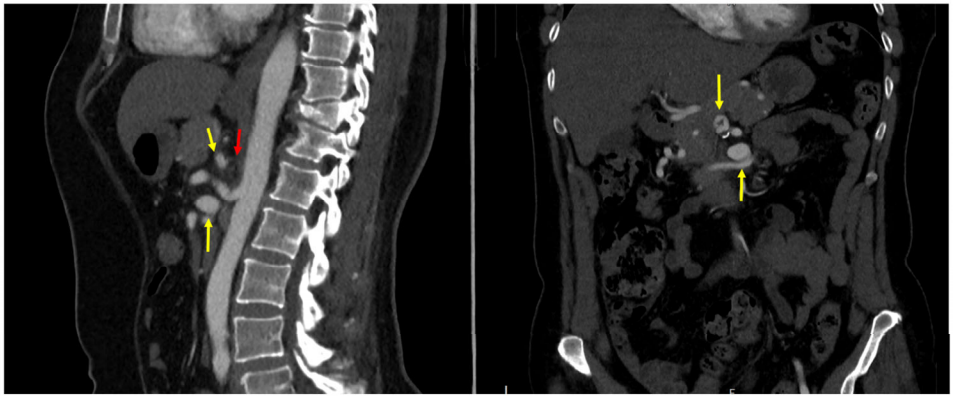
•GI bleed, hypotension, emesis, diarrhea and jaundice

•75% of the cases presented as rupture

- with 50% mortality in one series. Another series 62% presented as rupture and 21%mortality.
- Rupture been reported in cases <10 mm aneurysms

•65% biliary system is the site of rupture, 35% in the retroperitoneum





SVS GUIDELINES FOR PDA & GDA

1. Diagnosis and evaluation

Recommendations for diagnosis and evaluation of PDAA and GDAA			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
1.1	In patients who are thought to have GDAA and PDAA, we recommend CTA as the diagnostic tool of choice.	1 (Strong)	B (Moderate)
1.2	In patients in whom celiac stenosis is suspected, we suggest further workup with duplex ultrasound to elucidate whether the stenosis is hemodynamically significant.	2 (Weak)	C (Low)
1.3	In patients with high radiation exposure risks or renal insufficiency, we suggest non-contrast-enhanced MRA for diagnosis.	2 (Weak)	C (Low)
	Technical remark: Non-contrast-enhanced MRA is best suited to children and women of childbearing potential or those who have contraindications to CTA or MRA contrast materials (ie, pregnancy, renal insufficiency, or gadolinium contrast material allergy).		

2. Size criteria for invasive intervention

Recommended intervention criteria for PDAA and GDAA			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
2.1	In patients with noncomplicated GDAA and PDAA of acceptable operative risk, we recommend treatment no matter the size of the aneurysm because of the risk of rupture.	1 (Strong)	B (Moderate)

TREATMENT OF PDAA AND GDAA

3. Treatment options

Recommendations for treatment of PDAA and GDAA			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
3.1	In patients with intact and ruptured aneurysms, we recommend coil embolization as the treatment of choice.	1 (Strong)	B (Moderate)
3.2	In patients in whom coil embolization is not feasible, we suggest covered stenting or stent-assisted coil embolization as a treatment option in select cases of GDAA and PDAA.	2 (Weak)	C (Low)
3.3	In patients with appropriate anatomy, we suggest transcatheter embolization with liquid embolic agents as a treatment option for both GDAA and PDAA.	2 (Weak)	C (Low)
3.4	In patients with suitable anatomy, we suggest flow-diverting, multilayered stents as a treatment option for GDAA and PDAA, although these have not been adequately studied to be recommended as a primary treatment modality.	2 (Weak)	C (Low)
3.5	In patients with nonruptured aneurysms, we suggest open surgical reconstruction if needed to preserve flow.	2 (Weak)	B (Moderate)
3.6	In patients with concomitant stenosis or occlusion, we suggest celiac artery reconstruction.	2 (Weak)	B (Moderate)

SCREENING AND SURVEILLANCE

4. De novo screening and screening for concomitant aneurysms

Recommendations for screening of patients with PDAA and GDAA			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
4.1	In patients with median arcuate ligament syndrome, we suggest screening for GDAA or PDAA with CTA or duplex ultrasound.	2 (Weak)	C (Low)

5. Follow-up and surveillance

Recommendations for follow-up and surveillance of PDAA and GDAA patients			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
5.1	In patients status post treatment of GDAA and PDAA, we recommend follow-up imaging after endovascular treatment of GDAA and PDAA to rule out persistent flow through the aneurysm sac.	1 (Strong)	B (Moderate)

JEJUNAL AND ILEAL & COLIC ANEURYSMS

- <3% of all visceral aneurysms
- Males and females affected equally
- After the sixth decade
- Multiple aneurysm identified in 10%
- Asymptomatic for the jejunal and Ileal. Colic aneurysms tend to be symptomatic

- Jejunal and ileal : 30 % rupture
- Colic : 70%
- Mortality is 20-50%

JEJUNAL AND ILEAL & COLIC ANEURYSMS

- Causes:
- Medial degeneration
- Infection
- Inflammation
- Autoimmune disease (Polyarteritis Nodosa, Behcet Disease)
- Atherosclerosis >> secondary process

DIAGNOSIS AND INDICATION TO TREAT

1. Diagnosis and evaluation

Recommendations for diagnosis and evaluation of jejunal, ileal, and colic artery aneurysms			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
1.1	In patients who are thought to have jejunal artery, ileal artery, and colic artery aneurysms, we recommend CTA as the diagnostic tool of choice.	1 (Strong)	B (Moderate)
1.2	In patients with high radiation exposure risks or renal insufficiency, we recommend non-contrast-enhanced MRA for diagnosis.	1 (Strong)	C (Moderate)
	Technical remark: Non-contrast-enhanced MRA is best suited to children and women of childbearing potential or those who have contraindications to CTA or MRA contrast materials (ie, pregnancy, renal insufficiency, or gadolinium contrast material allergy).		
1.3	We recommend the use of catheter-based angiography for all emergent cases presenting with rupture (Grade 1B) and electively for preoperative planning (Grade 1C).	1 (Strong)	B (Moderate)
			C (Moderate)
1.4	We suggest screening all patients with jejunal, ileal, and colic artery aneurysms for vasculitis with routine inflammatory markers.	2 (Weak)	C (Moderate)

2. Size criteria for invasive intervention (true aneurysms vs pseudoaneurysms)

Recommended intervention criteria for jejunal, ileal and colic artery aneurysms			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
2.1	We recommend elective intervention for jejunal and ileal artery aneurysms >2 cm in maximal diameter and for all colic artery aneurysms, any size.	1 (Strong)	B (Moderate)
2.2	We recommend emergent intervention for any jejunal, ileal, or colic artery aneurysm, any size, resulting in patient symptoms or rupture and all mesenteric branch vessel pseudoaneurysms.	1 (Strong)	A (High)

TREATMENT AND FOLLOW UP

3. Treatment options

Recommendations for treatment of jejunal, ileal, and colic artery aneurysms			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
3.1	We suggest open surgical ligation or aneurysm excision for cases of jejunal, ileal, and colic artery aneurysms when laparotomy is being considered for hematoma evacuation or bowel assessment for viability.	2 (Weak)	B (Moderate)
3.2	We suggest endovascular embolization for cases of jejunal, ileal, and colic artery aneurysm.	2 (Weak)	B (Moderate)
3.3	We suggest medical treatment of nonruptured, asymptomatic ileal, jejunal, and colic artery aneurysms associated with polyarteritis nodosa.	2 (Weak)	B (Moderate)

TREATMENT AND FOLLOW UP

4. Screening for concomitant aneurysms

Recommendations for screening of patients with jejunal, ileal, and colic artery aneurysms			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
4.1	We suggest abdominal axial imaging to screen for concomitant abdominal aneurysms.	2 (Weak)	B (Moderate)
4.2	We suggest one-time screening CTA (or MRA) of the head, neck, and chest for those patients with segmental arterial mediolysis.	2 (Weak)	B (Moderate)

5. Follow-up and surveillance

Recommendations for follow-up and surveillance of jejunal, ileal, and colic artery aneurysm patients			
	Recommendation	**Strength of recommendation**	**Quality of evidence**
5.1	We suggest interval surveillance (ie, every 12-24 months) with axial imaging (ie, CTA or MRA) for cases of segmental medial arteriolysis in light of reported cases of rapid arterial transformation and to monitor regression in cases of polyarteritis nodosa.	2 (Weak)	B (Moderate)
5.2	We suggest postembolization surveillance every 1 to 2 years with axial imaging to assess for vascular remodeling and evidence of aneurysm reperfusion.	2 (Weak)	B (Moderate)

IMA ANEURYSMS

- Very rare
- No details given in SVS
- Treatment should be individualized

**

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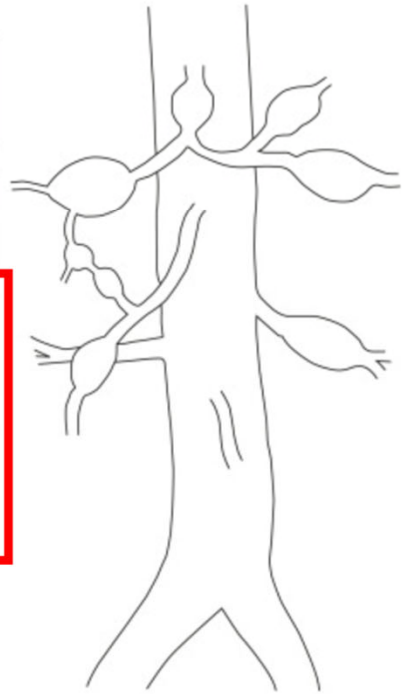
Symptomatic visceral artery aneurysm irrespective of size and location.	Class I, Level C
Coeliac artery aneurysm ≥3.0 cm	Class IIa, Level C
Pancreaticoduodenal artery aneurysm ≥1.5 cm	Class IIa, Level C
Superior mesenteric artery aneurysm ≥3.0 cm	Class IIa, Level C



Splenic artery aneurysm ≥3.0 cm	Class IIa, Level C
Pregnant asymptomatic patients regardless of aneurysm size	Class IIa, Level C
Female asymptomatic patients of childbearing age	Class IIb, Level C
Renal artery aneurysm ≥3.0 cm	Class IIa, Level C
Pregnant asymptomatic patients regardless of aneurysm size	Class IIa, Level C

BACK TO CASES

- Case 1: Waiting preop and cardiac assessment for open repair, aneurysm ligation and supraceliac aortohepatic or iliohepatic
- Case 2: IPDA >> Coil embolization
- Case 3: GDA aneurysm: open, ligated + aorotohepatic bypass and release of MALS
- Case 4: What would you do?

CONCLUSION

- Treat all symptomatic, pseudoaneurysms and rupture
- Patient considerations as well as anatomy is paramount in treatment decisions; endo vs open
- There is a role for observation for Asymptomatic small SMAA

THANK YOU!

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