Visceral Artery Aneurysms
The Silent Killer Comes Into Focus

Michael D. Dake, MD
Stanford University Hospital
Stanford, CA
Within the past 12 months, the presenter or their spouse/partner have had a financial interest/arrangement or affiliation with the organization listed below.

- **Research/Research Grants, Clinical Trial Support**
  - W. L. Gore
  - Cook Medical

- **Consulting Fees/Honoraria**
  - W. L. Gore
  - Abbott Vascular
  - Medtronic

- **Equity Interests/Stock Options**
  - CVRx
  - Enopace
  - TriVascular
  - Cytograft Tissue Engineering
  - Microfabrica
  - 480 Medical
  - Arsenal
  - Intact Vascular

- **Officer, Director, Board Member or other Fiduciary Role**
  - VIVA Physicians Group

- **Speaker’s Bureau**
  - None
Visceral Artery Aneurysms - Etiologies

- Trauma/iatrogenic
- Atherosclerosis
- Pancreatitis
- Mycotic/infectious
- Vasculitis
- Intrinsic collagen disease

Ehlers-Danlos, Gaucher’s, FMD, SMA
Visceral Aneurysms - Manifestations

- Most are asymptomatic
- GI bleeding (hemobilia)
- Peritoneal/retroperitoneal bleeding
- Pain or end organ infarcts
- Extrinsic pressure Sxs
- Hypertension
- Fevers
Visceral Aneurysms

Treatment:

Celiac, SMA, GDA, PDA aneurysms are uncommon → natural Hx unknown
Elective repair → mortality < 0.05%
Splenic, hepatic and renal artery aneurysms are the most common
Visceral Artery Aneurysms - Therapy

- No treatment
- Medical therapy
- Surgery
- Embolization
- Covered stents
Vasculopathy: Ehlers-Danlos

No good treatment
PAN with Liver Infarct
Angiogram Pre-Treatment
Angiogram Post-Medical Therapy
Visceral Aneurysms - Treat

Symptomatic – pain, HTN, bleed (1, 2)
Enlarging (1, 2)
≥ 2 – 2.5 cm (1, 2)
Women of childbearing age (1, 2)
Liver transplant recipient (1, 2)
True aneurysms (esp liver) (3)
Multiple (3)
Peripancreatic pseudoaneurysms (4)

Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
- Aneurysm morphology: saccular vs fusiform
Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
- Aneurysm morphology: saccular vs fusiform
- Mouth of aneurysm: wide (> 10 mm) vs narrow
Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
- Aneurysm morphology: saccular vs fusiform
- Mouth of aneurysm: wide (> 10 mm) vs narrow
- Vessel tortuosity leading to aneurysm
Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
- Aneurysm morphology: saccular vs fusiform
- Mouth of aneurysm: wide (> 10 mm) vs narrow
- Vessel tortuosity leading to aneurysm
- Branches associated with aneurysm sac
Rich Collateral Supply

Exclusion vs. Isolation of the aneurysm
Visceral Artery Aneurysm

Exclusion
Covered Stents

- Fluency (SX)
- iCAST (BX)
- Wallgraft (SX)
- Jostent (BX)
- Viabahn (SX)
Celiac Artery Aneurysm

CTA and Angio shows large celiac artery aneurysm
Celiac & Mesenteric Artery Aneurysms

- 59 pts with 61 aneurysms – single institution
- 24 surgery vs. 35 endovascular
- Endovascular → embolization or stent-graft
- 28 splenic & 22 hepatic aneurysms
- Endovascular tech success = 89%
- Endovascular Rx
  - More pseudoaneurysms (p < 0.01)
  - ↑ incidence cancer (p = 0.03)
  - ↓ hospital stay (6.6 vs. 24 days, p < 0.001)
- Complications & 30 day mortality – no difference
Celiac Artery Aneurysm

Lateral film during placement of covered stent

Embo left gastric artery
Celiac Artery Aneurysm

Self-expanding Fluency

Post Covered Stent
Left Gastric Aneurysm

68 yo female with wt loss and post-prandial pain
Chronic Mesenteric Ischemia
Covered BEX Stent – Lt Gastric Aneurysm

POST
Complicated Cholecystectomy with Hepatic Laceration and R Portal Vein Thrombosis
Post Thrombin CTA
Covered Stent (Jostent)
Hepatic Artery Pseudoaneurysm
Hemobilia in patient with Hx of pancreatitis
Hepatic Artery Pseudoaneurysm

Hepatic artery stenting using a covered stent
Hepatic Artery Pseudoaneursym
Pre and Post covered stent (Jostent/Graftmaster)
SMA Aneurysm
GI Bleeding; afebrile; Hx of pancreatitis
SMA Aneurysm
Post-embolization with detachable coils
SMA Aneurysm

Recurrent GI bleeding; covered stent plus collateral embolization.

Post Covered Stent
Splenic Artery Aneurysms

- 0.04 – 0.010% incidence
- Multiple in 20% of patients
- Multiparous Women
- ↑ Frequency with portal HTN
- Rupture rare
- Rx → Sxs or >2.5cm, women of childbearing age
Splenic Artery Aneurysm

Covered Stent
Splenic Artery Aneurysm

Self-expanding covered stent

Post self-expanding Viabahn
Renal Artery Aneurysms

- Seen in ~ 0.1% of autopsies and up to 1% of renal angiograms
- Females >> males
- Most are saccular and non-calcified
- 90% are extraparenchymal
- Etiologies
  - FMD/Segmental medial arteriopathy
  - Atherosclerosis
  - Inflammatory, infectious, post-traumatic
  - Collagen disorders (Ehlers-Danlos, etc)
Renal Artery Aneurysms

FMD with bilateral renal artery aneurysms; aortic dissection
Clinical Manifestations

- Asymptomatic – majority
- Pain
- Hypertension (70%)
- Hematuria (30%)
- Distal emboli
- Arterial thrombosis
- Rupture (even < 2cm)
- AV fistula
Natural History: RAAs

- Not well understood
- Can rupture < 2cm
- Females of childbearing age have increased mortality rates
- Mortality rate for RAA rupture with pregnancy -> 70%
RAAs: Indications for Rx

- 2.0 cm
- Females considering pregnancy
- Aneurysm “expansion” (> 5mm)
- Symptoms
  - Rupture/AV fistula
  - Pain
  - Refractory hypertension in a young patient
  - Emboli/infarcts
  - Recurrent hematuria
  - ? Lack of calcification
Rt. RAA – Surgical Repair
Rt. RAA – Surgical Repair

One year f/u shows occluded Rt renal artery & atrophic kidney
RAAs: Endovascular Therapy

- Covered stent
- Embolization
- Combination therapy
52-year-old-woman with left flank pain and HTN
52-year-old-woman with left flank pain and HTN
Wallstent with custom fabricated PTFE cover
Post endograft placement
Renal Artery Aneurysm

S/P PTRA for FMD; Rt flank pain and recurrent hypertension

Angiogram & CTA show branches off aneurysm
RAA Embolization

S/P PTRA for HTN due to FMD; pain & persistent mild HTN

Embolization with detachable coils

2 yr F/U; pain resolved; HTN cured
Rt. RAA – Combination Therapy

Dual access
Rt. RAA – Combination Therapy

Uncovered nitinol stent into lower pole
Rt. RAA – Combination Therapy

Uncovered BEX stent into upper pole
Rt. RAA – Combination Therapy

Embolization of isolated RAA
Summary – Visceral Artery Aneurysms

- Uncommon, but significant
- Define etiology & anatomy
- Nature history not well known
- Tailored therapy for each patient
- Good endovascular options
Visceral Artery Aneurysms
The Silent Killer Comes Into Focus

Michael D. Dake, MD
Stanford University Hospital
Stanford, CA