Endovascular treatment of renal and visceral artery aneurysms

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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 (major)
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- **Consulting Fees/Honoraria**
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  - Abbott Vascular (minor)
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- **Equity Interests/Stock Option**
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  - PQ Bypass (minor)
  - AneuMed (minor)

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

- **Speaker’s Bureau**
  - None
Objectives

• Review the etiologies and manifestations of visceral artery aneurysms
• Discuss the anatomic considerations that affect treatment selection
• Provide an overview of endovascular options for treatment of these aneurysms
• Demonstrate case examples
Anatomic Considerations that Influence Choice of Treatment

- Size of vessel: large (> 5-6 mm) vs small
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- Aneurysm morphology: saccular vs fusiform
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- 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
Visceral Artery Aneurysm

Exclusion
Covered Stents

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

Exclusion

coils or thrombin
Visceral Artery Aneurysm

Isolation
# Occlusive Agents

<table>
<thead>
<tr>
<th>Material</th>
<th>Non-detachable Coils</th>
<th>Detachable Coils</th>
<th>Detachable Vascular Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Vessels</td>
<td>Platinum Lg, Med, Sm</td>
<td>Platinum Lg, Med &amp; Sm</td>
<td>Nitinol Lg, Med</td>
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<td>Controlled Delivery</td>
<td>Semi</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Occlusion Area</td>
<td>Circle</td>
<td>Circle</td>
<td>Cross Section</td>
</tr>
</tbody>
</table>

![Image of non-detachable coils](image1.png)
![Image of detachable coils](image2.png)
![Image of detachable vascular plug](image3.png)
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 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)

Celiac Artery Aneurysm

CTA and Angio shows large celiac artery aneurysm
Celiac Artery Aneurysm

Lateral film during placement of covered stent

Embo left gastric artery
Celiac Artery Aneurysm

Self-expanding Fluency

Post Covered Stent
Hepatic Artery Pseudoaneurysm
Hemobilia in patient with Hx of pancreatitis
Hepatic Artery Pseudoaneursym

Hepatic artery stenting using a covered stent
Hepatic Artery Pseudoaneursyms
Pre and Post covered stent (Jostent/Graftmaster)
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
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)
Clinical Manifestations

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

- Covered stent
- Embolization
- Combination therapy
RAA – Covered Stent Therapy

Left renal artery aneurysm – Courtesy Dr. Klaus Hagspiel
RAA – Covered Stent Therapy

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Left renal artery aneurysm – Courtesy Dr. Klaus Hagspiel
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
Lt. Renal Artery Pseudoaneurysm

Post partial nephrectomy – Courtesy Dr. Cenk Turba
Lt. Renal Artery Pseudoaneurysm

Post partial nephrectomy – *Courtesy Dr. Cenk Turba*
Lt. Renal Artery Pseudoaneurysm

Post partial nephrectomy – Courtesy Dr. Cenk Turba
Lt. Renal Artery Pseudoaneurysm

Balloon occlusion thrombin injection – Courtesy Dr. Cenk Turba
Rt. RAA – Combination Therapy

Dual access
Rt. RAA – Combination Therapy

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

Embolization of isolated RAA
Summary RAAs: Best Approaches

- Prevalence of 0.1 – 1%
- Repair in women contemplating pregnancy
- Repair if enlarging or symptomatic (pain, hematuria, refractory hypertension, emboli)
- Covered stents (off-label)
- Embolization for narrow neck aneurysms or post traumatic pseudoaneurysms
- Surgical options and complex endovascular solutions are viable options depending upon institutional expertise.