Endovascular Techniques for Visceral Artery Aneurysm Treatment

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Disclosure

Speaker name:
.....Stefan Müller-Hülsbeck..........................................................

I have the following potential conflicts of interest to report:

☒ Consulting:  Terumo, Boston Scientific, GE, Cordis Johnson&Johnson, Eurocor
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Indication for treatment I
- due to a higher risk of rupture

• elective repair is preferable in the appropriately chosen patient

  I. splenic artery aneurysms measuring 2 cm or larger and those found in women of childbearing age, > 4 cm cirrhotic patients
  II. persons undergoing liver transplantation
  III. Hepatic artery aneurysms 2 cm or larger
  IV. Superior Mesenteric Artery + non-symptomatic Renal Artery > 1 to 1.5 cm)
  V. those that are multiple or non-atherosclerotic in nature

Indication for treatment II
- due to a higher risk of rupture

- treatment indicated regardless location or measure
  I. visceral artery pseudoaneurysms

(increasing incidence / iatrogenic / pancreatitis)


- reperfusion is an important complication of endovascular management

Incidence 0.01% - 2%

Access – transbrachial, left

- proper stability of the vascular access platform
- triaxial system
  I. reinforced vascular sheath (65–90 cm)
  II. 6-F guiding or 5-F diagnostic angled catheter
  III. microcatheter
Aneurysms morphology – treatment options

- Saccular Aneurysm
- Fusiform Aneurysm
- Ruptured Aneurysm
Endovascular treatment options

Stent-graft
- Atrium V12 (.035+.014), Viabahn (.035+0.018), Fluency, Wallgraft

Aneurysm with coils
- Numerous detachable: Concerto, Retracta, Azur, Ruby, ...

Blocking of inflow and outflow
- AVP, ...

= main branches, easily accessible, proximal

= narrow neck

= ruptured aneurysm
Endovascular treatment options

• **BMS (open-cell, SES) neck support**
  Coiling through • **Solitaire, Expert, ...**
  = wide neck

• **Flow-diverter**
  = preservation of side branches

• **Glue**
  N-Butyl-2-cyanoacrylate (Histoacryl)
  Ethylene Vinyl Alcohol Copolymer (Onyx)
  = peripheral locations
Narrow neck – dens packing technique (>24%)

- Packing density >24% calculated coil length
  I. 800cm for 20-mm aneurysm
  II. 3,000cm for 30-mm aneurysm

Renal artery aneurysm


Figure 1. Measurement of the aneurysm and the parent artery size on 3D-CTA (A). Angiography shows the aneurysms and irregularity of the renal artery (B). The first framing coil was deployed under balloon protection (C). Tight packing of the aneurysm was achieved (D). The final angiogram demonstrates exclusion of the aneurysm, while preserving the renal artery (E).
Gastroduodenal artery aneurysm


Figure 2. Measurement of the aneurysm size on 3D-CTA (A). Angiography shows a large wide-neck aneurysm of the proximal gastroduodenal artery (GDA) (B). After embolization of the right gastric artery and the distal GDA, the first framing coil was deployed in the aneurysm (C). The aneurysm was packed as tightly as possible (D).
Splenic artery aneurysm – covered stent

49-year-old female, asymptomatic
Splenic artery aneurysm – covered stent

- Material
  - Sheath 90cm 6F
  - Cobra 4F
  - GW .018-inch
  - SES – covered

49-year-old female, asymptomatic
Splenic artery aneurysm – covered stent

49-year-old female, asymptomatic
Splenic artery aneurysm – covered stent

49-year-old female, asymptomatic

FU @ 24hrs
Endovascular Treatment of Visceral Artery Aneurysms and Pseudoaneurysms in 100 Patients: Covered Stenting vs Transcatheter Embolization

Massimo Venturini, MD¹, Paolo Marra, MD¹, Michele Colombo, MD¹, Marco Alparone, MD¹, Giulia Agostini, MD¹, Luca Bertoglio, MD²,

Abstract

Purpose: To retrospectively report a large single-center experience of visceral artery aneurysms (VAAs) and pseudoaneurysms (VAPAs) treated with covered stenting (CS) as the first therapeutic option vs transcatheter embolization (TE). Methods: One hundred patients (mean age 59±14 years; 58 men) underwent 59 elective and 41 emergent endovascular procedures to treat 51 VAAs and 49 VAPAs. Seventy patients had TE and 30 received CS (27 Viabahn and 3 coronary stent grafts). Both TE and CS were performed in 10 cases. Results: Technical success was 96% (97% CS, 96% TE), and 30-day clinical success was 83% (87% CS, 81.4% TE). Four major complications occurred; 30-day mortality was 7%, mainly due to septic shock following pancreatic surgery. The midterm follow-up was 20.8 months in the total population and 32.8 months in the CS group. More than 6 months after CS all aneurysms remained excluded; stent patency was achieved in 88%. Twelve CS patients with >3 years’ follow-up had maintained stent patency. Conclusion: In endovascular treatment of visceral aneurysms, covered stenting was feasible in 30%. CS showed a slightly better efficacy than TE and good midterm patency. The Viabahn covered stent seems to be suitable for endovascular repair of tortuous visceral arteries affected by true or false aneurysms.
Splenic artery aneurysm – supporting stent

70-year-old female, asymptomatic
Splenic artery aneurysm – supporting stent

70-year-old female, asymptomatic

- Material
  - Guide 6F
  - Cobra 4F
  - GW .014-inch
  - BES 3.5x16
  - Microcatheter
Splenic artery aneurysm – supporting stent

70-year-old female, asymptomatic
Splenic artery aneurysm – flow diverter
Flow diverter

Wall Shear Stress! DANGER!

Immediate Flow Lamination
Immediate Wall Shear Stress Drop
+ 20% Side Branch Perfusion

In the OR
Aneurysm is Safe
Side Branch Perfusion Preserved and Improved

Progressive organized thrombus formation in lines of Zahn

9 months
Physiological Aneurysm Repair

Endothelialization

12 months
Splenic artery aneurysm – flow diverter

Courtesy of

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Endovascular Repair of Peripheral and Visceral Aneurysms
With the Cardiatis Multilayer Flow Modulator: One-Year
Results From the Italian Multicenter Registry

Maria Antonella Ruffino, MD, and Claudio Rabbia, MD, on behalf of the
Italian Cardiatis Registry Investigators Group

Vascular Interventional Radiology, San Giovanni Battista Hospital, Turin, Italy.

Purpose: To assess the efficacy of the Cardiatis Multilayer Flow Modulator (CMFM), a bare
cobalt alloy self-expanding stent, in the treatment of peripheral and visceral artery aneurysms.

Methods: In this multicenter (n=22), prospective, voluntary registry, 54 patients (47 men; mean
age 66 years, range 19–87) who underwent CMFM deployment for peripheral (n=35) or visceral
aneurysms (n=19) in a variety of target arteries were enrolled between June 2009 and June
2010. Among the 54 lesions, 44 had a total of 53 side branches. The main effectiveness endpoint
was stent and side branch patency with no aneurysm rupture or reperfusion at 1, 6, and 12
months after stent implantation. Outcome measures were complete aneurysm thrombosis and
sac shrinkage. The safety endpoint was freedom of complications (death, aneurysm rupture,
endoleak, need for reintervention, stent foreshortening, stent occlusion, and access-site
sequelae). Aneurysms were categorized as saccular (type I) or fusiform (type II) without a side
branch or with branch(es) in the sac (subtype A), neck (subtype X), or both (subtype AX).
Kaplan-Meier estimates were calculated for primary and secondary endpoints. Sac shrinkage
was correlated to aneurysm morphology subtypes and presence/absence of mural thrombus.

Results: Technical success was achieved in all patients. Mortality at 1 year was 5.5% (n=3),
including 1 perioperative death. Six patients were lost to follow-up. There was no aneurysm
rupture. Six (11.1%) stents occluded over the 1-year period; 3 asymptomatic patients were
not treated, 2 symptomatic patients had successful stent dilation to restore patency, and 1
symptomatic patient required bypass (the only side branch lost). Cumulative primary and
secondary patency estimates were 96.9% and 90.7% at 1 year. The cumulative side branch
patency was 96.1% and the freedom from all complications was 93.0% at 1 year. Complete
aneurysm thrombosis was recorded in 42 (93.3%) of 45 patients at 1 year. Percent diameter
reduction was 15.5%, 3.8%, and 11.0% at 1, 6, and 12 months (p<0.05), respectively.
Presence of mural thrombus did not influence the time course of shrinkage (p>0.05), while
complex lesion anatomy (presence of side branches) delayed shrinkage (p<0.05).

Conclusion: Results at 1 year show that CMFM can be safely used in the treatment of PAA
and VAA, with good results in terms of freedom from rupture, patency of the stents and side
branches, complete aneurysm thrombosis, shrinkage, and acceptable freedom from
morbidity and mortality.


MORTALITY @1 Y: 5.5%
PRIMARY PATENCY: 86.95
SECONDARY PATENCY: 90.7%
SIDE BRANCH PATENCY: 96.1%
COMPLETE ANEURYSM THROMBOSIS: 93.3%
% DIAMETER REDUCTION:
- 15.5% at 1 month
- 3.8% at 6 months
- 11.0% at 12 months
Conclusion – Endovascular techniques for visceral artery treatment

- Non-invasive imaging: CTA, MRA
- Indication evaluation - appropriate patient selection
- Safe access – tri axial
- Treatment options - aneurysms morphology
  - Stent grafts (feasible in ≈ 30%)
  - Coils
  - Plugs
  - SES + Coils
  - Flow diverter
  - Glue/Onyx
- In case of coiling - dense packing technique (>24%) required to avoid early reperfusion!
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