

**XXI CORSO NAZIONALE DI
ULTRASONOLOGIA VASCOLARE
DIAGNOSI E TERAPIA**
Bertinoro, 20-22 aprile 2023



Aneurismi viscerali

INCIDENZA, ASSOCIAZIONI, RISCHI
D. Righi (Firenze)

TOTEM

comic



solo
3000
lire

VORREI UN
HAMBURGER,
PER FAVORE

PERCHE'
TANTO
ODIO?

® BY EDIKA

SVS Clinical Practice Guidelines on the Management of Visceral Aneurysms

Hepatic Artery

- Symptomatic
- Size >2cm
- Growth >0.5cm/year

Pancreaticoduodenal and Gastrooduodenal Arteries

Repair all aneurysms regardless of size

Superior Mesenteric Artery

Repair all aneurysms regardless of size

Gastric and Gastroepiploic Arteries

Repair all aneurysms regardless of size

Splenic Artery

- All pseudoaneurysms
- Size > 3cm
- All sizes in women of childbearing age

Celiac Artery

- All pseudoaneurysms
- Size > 2cm

Renal Artery

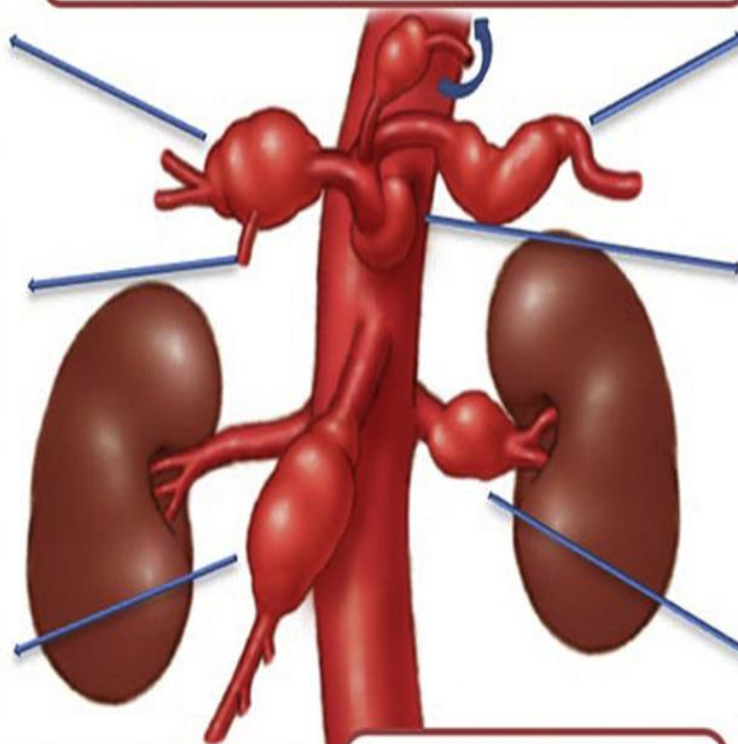
- Symptomatic
- Size > 3cm
- All sizes
 - in women of childbearing age
 - in patients with refractory hypertension and renal artery stenosis

Jejunal and Ileal Arteries

- Symptomatic
- Size >2cm

Colic Artery

Repair all aneurysms regardless of size



INCIDENZA

The Current Management of Visceral Artery Aneurysms

Bara Zuhaili, MD^a, James H. Black III, MD^{b,*}

Advances in Surgery 55 (2021) 57–73

BACKGROUND

An aneurysm is defined by a focal arterial dilatation 1.5 to 2.0 times greater than the diameter of a normal artery. Visceral artery aneurysm (VAA) is a rare entity. Although the true prevalence is unknown because most of VAA cases are asymptomatic, the estimated prevalence ranges between 0.01% and 2% [1].

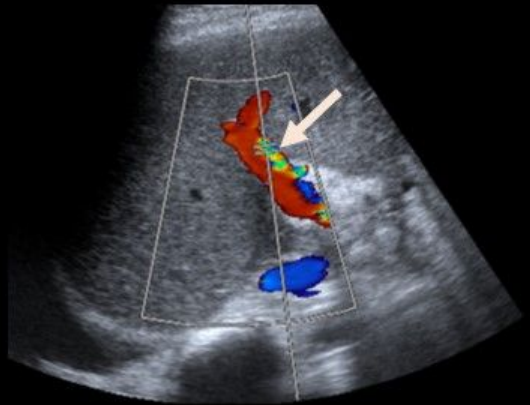
Anatomic distribution

Within the VAA cohort, splenic artery aneurysm is the most common entity, with a 60% prevalence. Hepatic artery (HA) has an estimated prevalence of 20%, followed by superior mesenteric artery (6%); celiac artery (4%); gastric and gastroepiploic arteries (4%); jejunal, ileal, and colic arteries (3%); pancreaticoduodenal artery (PDA) and pancreatic artery (2%); gastroduodenal artery (GDA; 1.5%); and inferior mesenteric artery (<1%) [2].

DOPPLER US

1. NORMAL HA

Hepatic artery (Intercostal approach)



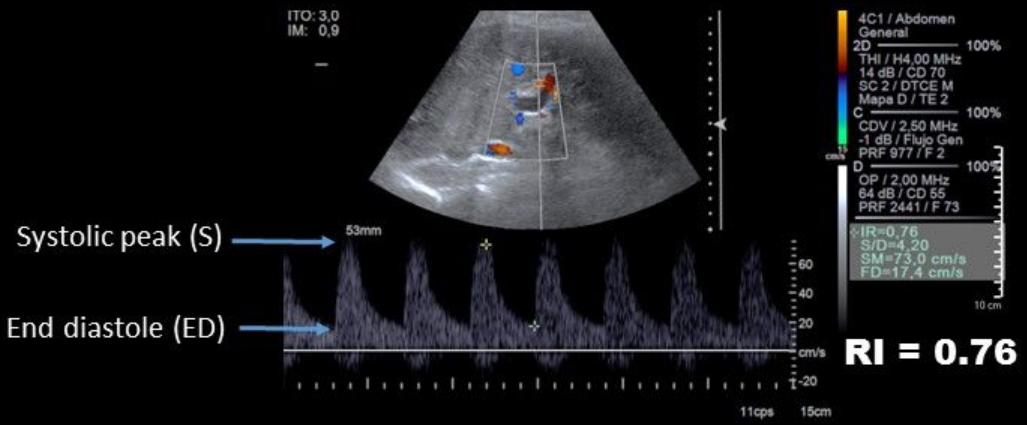
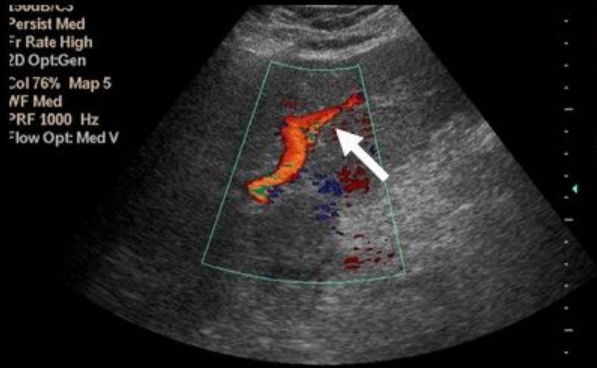
NORMAL VALUES	
Diameter	5 ± 1 mm
PSV*	70 ± 10 cm/sec
RI*	0.55 – 0.80
AT*	< 0.08 sec

- * PSV = peak systolic velocity
- * RI = resistive index
- * AT= acceleration time

Pourcelot's resistive index

$$RI = \frac{S - ED}{S}$$

Left hepatic artery (epigastric approach)



Original article • Rev. Col. Bras. Cir. 49 • 2022-1,235 patients were evaluated. As for the origin, the **splenic artery** appears in the celiac trunk in 99.11% of the individuals. Of these, 5.95% have a bifurcated celiac pattern, 92.17% trifurcated and 1.88% tetrafurcated. The mean arterial diameter was **5.92mm (±1.2)**, the highest one being in white men. As for the path, the splenic artery was unique in the entire sample. The suprapancreatic course was found in 75.63% of the individuals, with a higher occurrence in women, 78.87% (p<0.001).

Da 2 ogni cento a 1 ogni diecimila, in una carriera di centomila pazienti in quaranta anni,

Varia da:

10 in quaranta anni, o uno ogni quattro anni,

2000 in quaranta anni, o cinquanta ogni anno.

Una discreta differenza.

In pratica o si vede un paziente con un aneurisma viscerale ogni anno bisestile...

O si vede un paziente con un aneurisma viscerale ogni settimana...

Fortunatamente la stragrande maggioranza dei nostri esami coinvolge la parte superiore od inferiore all'addome, e la metodica di elezione per la diagnosi di aneurisma delle arterie vertebrali è al momento la Angio TC.

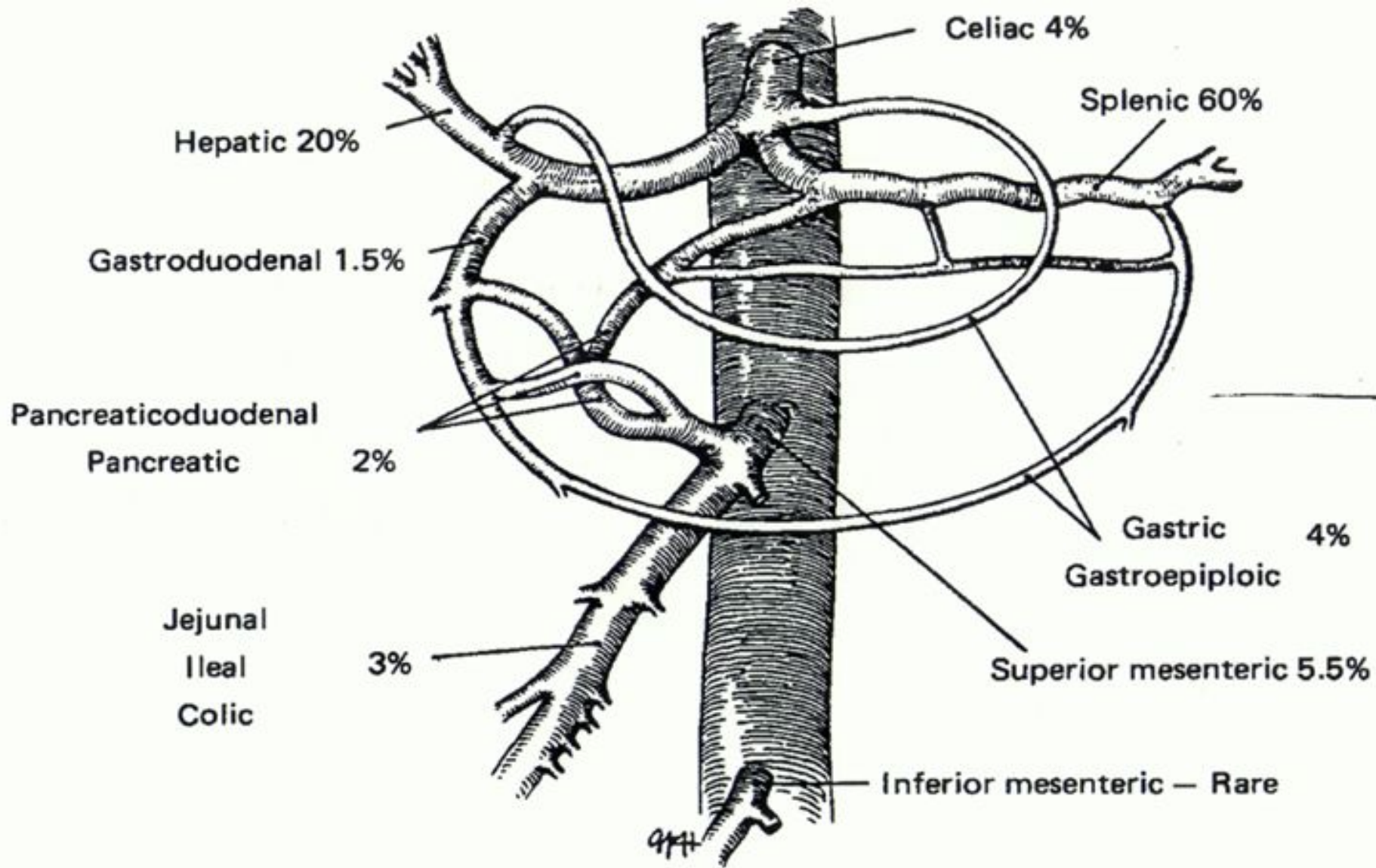
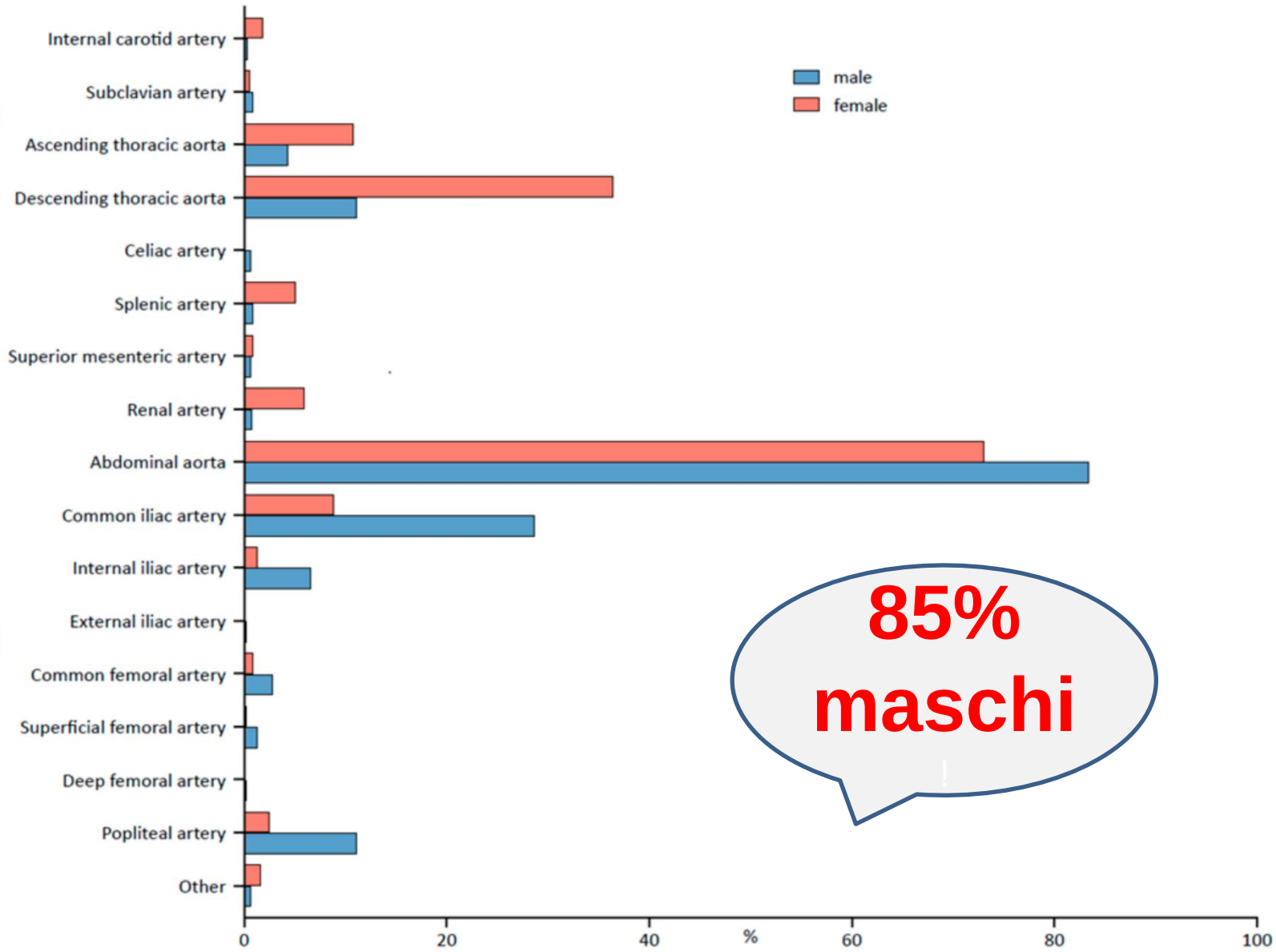
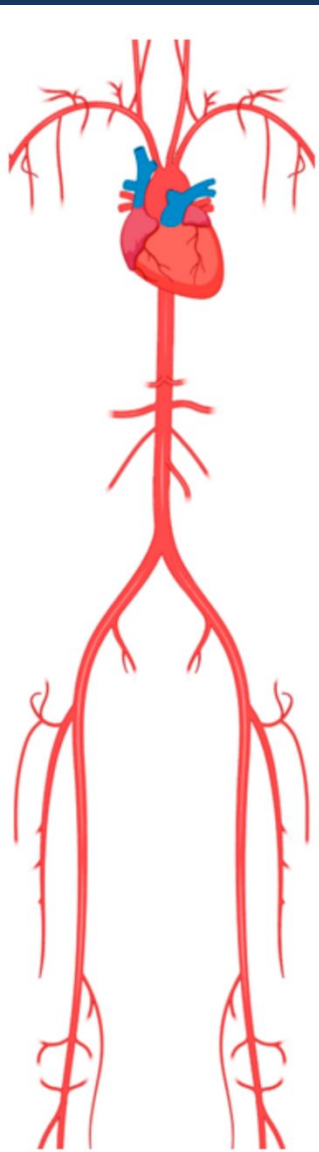


TABLE 1. CLINICAL CHARACTERISTICS OF SPECIFIC VAAs

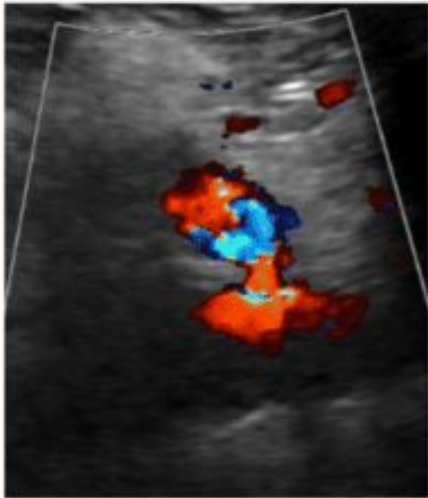
Aneurysmal Artery	% of All VAAs	Gender Predominance	Risk Factors	Rupture/Mortality Risk
Splenic artery	60% historically; 30%–36% based on recent data ⁴	4:1 female:male ⁵	Portal hypertension, segmental arterial mediolysis, postpancreatitis; found in multiparous women	When pregnant, 70% mortality; in others, 36% mortality ⁶
SMA	3%–9%	Male > female	Trauma, inflammation, infection	Tend to be more symptomatic than the other VAAs; rupture rate is 38%–50%; some authors say treat no matter what the size is ⁷
Renal artery	22%	Female > male	Fibromuscular dysplasia, vasculitis	Women of childbearing age should be treated as increased risk of rupture during pregnancy ⁸
Celiac artery	2%–46%; historically 4% but now increasing with increased imaging	Male > female; average age, 64 years	Tend to coexist with other VAAs (in up to 38% of cases); historically associated with syphilis	Treatment options very much depend on anatomic findings and SMA/cealic communications; mortality from rupture 50% ⁹
Hepatic artery	4%–30%	Male > female; 80% extrahepatic	No relationship with pregnancy; rising incidence due to iatrogenic (percutaneous transhepatic cholangiography, endoscopic)	Treat at 20 mm
Gastroepiploic	(1970: 2%–3%); more recently, 3.5% ¹⁰	Not enough data	Risk factors are the same as all VAAs: atherosclerosis, vasculitis	Risk of rupture as high as 90% ¹⁰
Pancreaticoduodenal	3%–9%	–	–	Higher risk of rupture regardless of pathology
Jejunal/ileal/colic	3%–6%	–	VOL. 19, NO. 4 APRIL 2020 ENDOVASCULAR TODAY 75	

Abbreviations: SMA, superior mesenteric artery; VAA, visceral artery aneurysm.



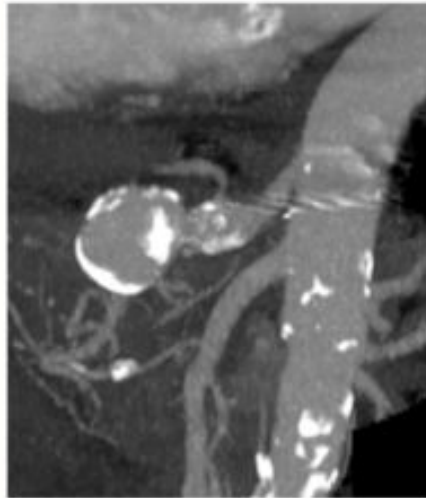
Arterial Aneurysm Localization Is Sex-Dependent
 by Daniel Körfer et al.
 J. Clin. Med. 2022, 11(9), 2450

Duplex Ultrasound



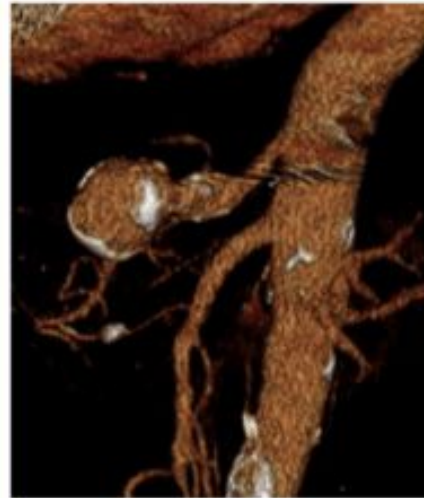
- Operator dependent
- Valuable in screening and surveillance
- No ionizing radiation
- Small aneurysms may be overlooked or inadequately visualized
- Perflutren intravenous ultrasound contrast can improve diagnostic accuracy.

CT Angiogram



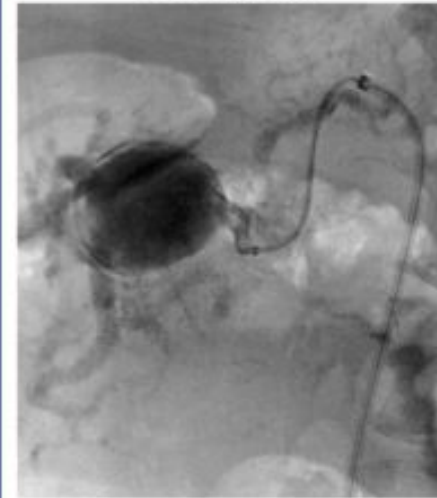
- High resolution
- Cross sectional imaging is required for procedural planning and treatment mapping.
- Rupture can be visualized as extravasation of contrast.
- Postoperative surveillance

3D Volume Rendered



- Understand 3d anatomy
- Recognize feeding and outflow branches
- Identify organ risk

Catheter Based Angiogram



- Gold standard
- Digital subtraction angiography (DSA) techniques commonly used.
- Used when intervention is planned.
- Identifies the location of aneurysm, source of bleeding, pattern of inflow and outflow, eccentricity, collateral circulation, as well as other visceral aneurysms

ASSOCIAZIONI

SOCIETY FOR VASCULAR SURGERY DOCUMENT

The Society for Vascular Surgery clinical practice guidelines on the management of visceral aneurysms



Introduction

Aneurysms of the visceral arteries are a rare but clinically important vascular condition. Of all intra-abdominal aneurysms, only approximately 5% affect the visceral arteries. Visceral artery aneurysms include both **true aneurysms** and **pseudoaneurysms**. Many true visceral artery aneurysms are **degenerative or atherosclerotic in nature**, with histologic specimens demonstrating reduced smooth muscle, disruption of elastic fibers, and deficiency of the arterial media.¹

Other common causes of visceral artery aneurysms include **fibromuscular dysplasia, collagen vascular diseases, inflammatory conditions**, and other rare inherited illnesses, such as the **Ehlers-Danlos syndrome**. As such, in patients with multiple aneurysms or aneurysms in different visceral beds, genetic testing is indicated for diagnostic and prognostic purposes. In contrast to the causes of true aneurysms of the visceral vessels, visceral artery **pseudoaneurysms** are most commonly related to **trauma, iatrogenic injury, local inflammatory processes, or infection**.

SOCIETY FOR VASCULAR SURGERY DOCUMENT

The Society for Vascular Surgery clinical practice guidelines on the management of visceral aneurysms



Renal artery aneurysm (RAA)

RAAs occur in approximately 0.1% of the population, although the absolute incidence is unknown. Autopsy studies are likely to underestimate RAA incidence at 0.01% to 0.09%, whereas angiographic studies are likely to overestimate this at 0.73% to 0.97%.

Overall, RAAs are most commonly identified on imaging obtained for unrelated reasons. ... CTA (58%) ... non-contrast-enhanced CT (24%), MRA (6%), catheter angiography (5%), and ultrasound (4%).

RAAs are associated with fibromuscular dysplasia in up to 68% of cases and concomitant arterial aneurysms affecting the aorta and visceral and iliac vessels in 7% to 30% of cases. The natural history of RAAs appears to be that of slow or no growth.

Contemporary reports do not support historic series that described rupture rates as high as 14% to 30% with associated mortality of 80%. Modern-day rupture rates are estimated at 3% to 5%, with nongestational mortality improved to <10%. and maternal and fetal death in 55% and 85%, respectively.

Most ruptures are diagnosed at the time of presentation, and several series support no incidence of rupture during the surveillance of nonoperative RAAs out to 270 months. Most recent estimates suggest a median annualized growth rate of 0.06 to 0.6 mm.

SOCIETY FOR VASCULAR SURGERY DOCUMENT

The Society for Vascular Surgery clinical practice guidelines on the management of visceral aneurysms



Jejunal, ileal, and colic artery aneurysms

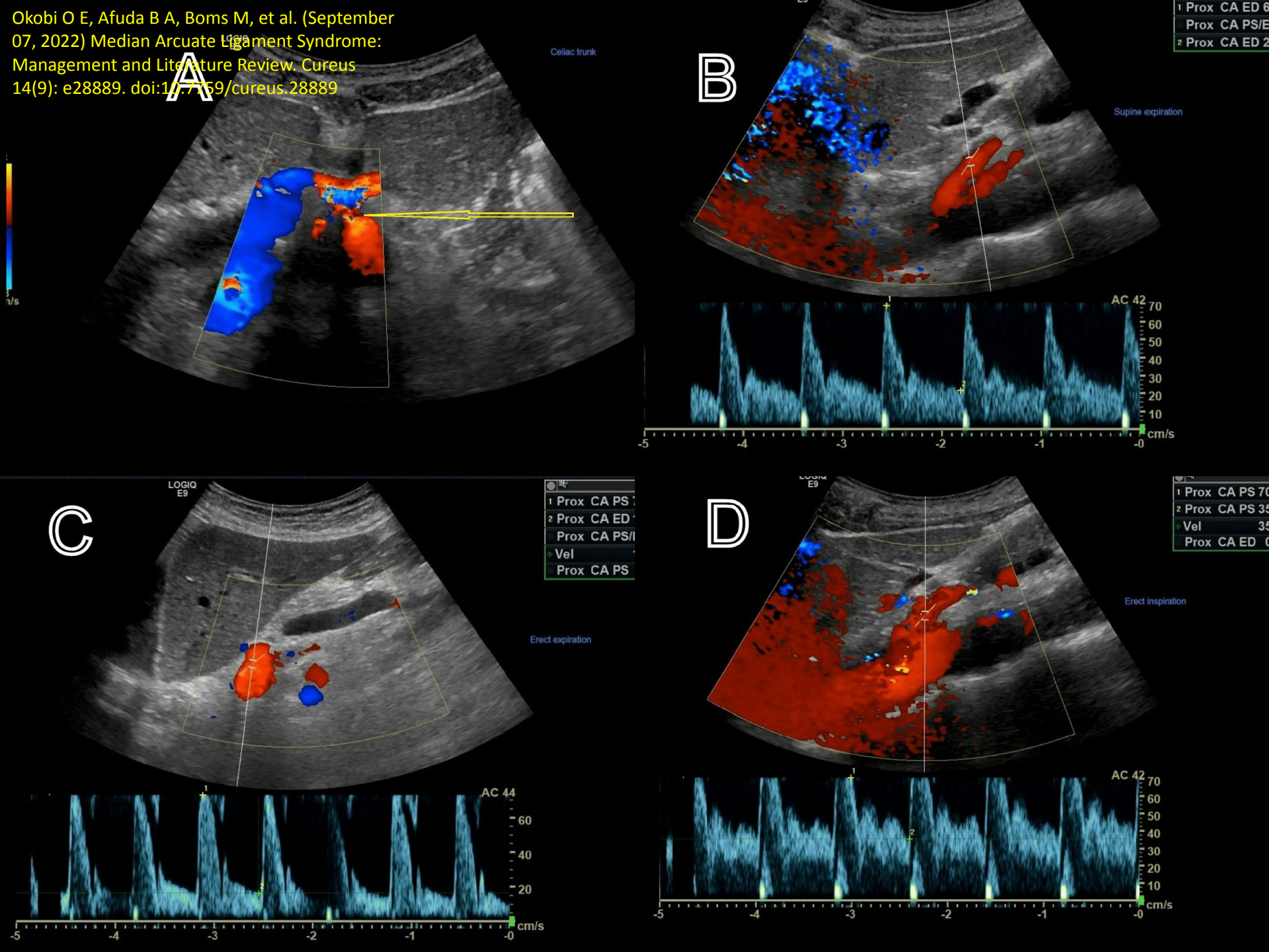
Aneurysms of the jejunal, ileal, and colic arteries account for <3% of all visceral aneurysms, affecting men and women equally beyond the sixth decade of life. Aneurysms of the jejunal, ileal, and colic arteries are associated with medial degeneration, infection, inflammation, various autoimmune diseases (ie, polyarteritis nodosa and Behçet disease), and connective tissue disorders. Multiple aneurysms are identified in approximately 10% of cases.

Whereas patients may present with abdominal pain, most jejunal and ileal artery aneurysms are asymptomatic. Colic artery aneurysms, however, cause symptoms, primarily abdominal pain, in nearly 90% of patients.

Pancreaticoduodenal artery aneurysm (PDAA) and gastroduodenal artery aneurysm (GDAA)

Duplex ultrasound is one of the most common diagnostic techniques used to evaluate the celiac axis for **median arcuate ligament syndrome**.

It can provide real-time inspiratory and expiratory data, helping elucidate the cause of the GDAA or PDAA and its treatment.



Surface
Ex: 15202

Se:2
Volume Rendering No cut

DFOV 46.5 cm
STND No Image Filter

Calcif. included

R

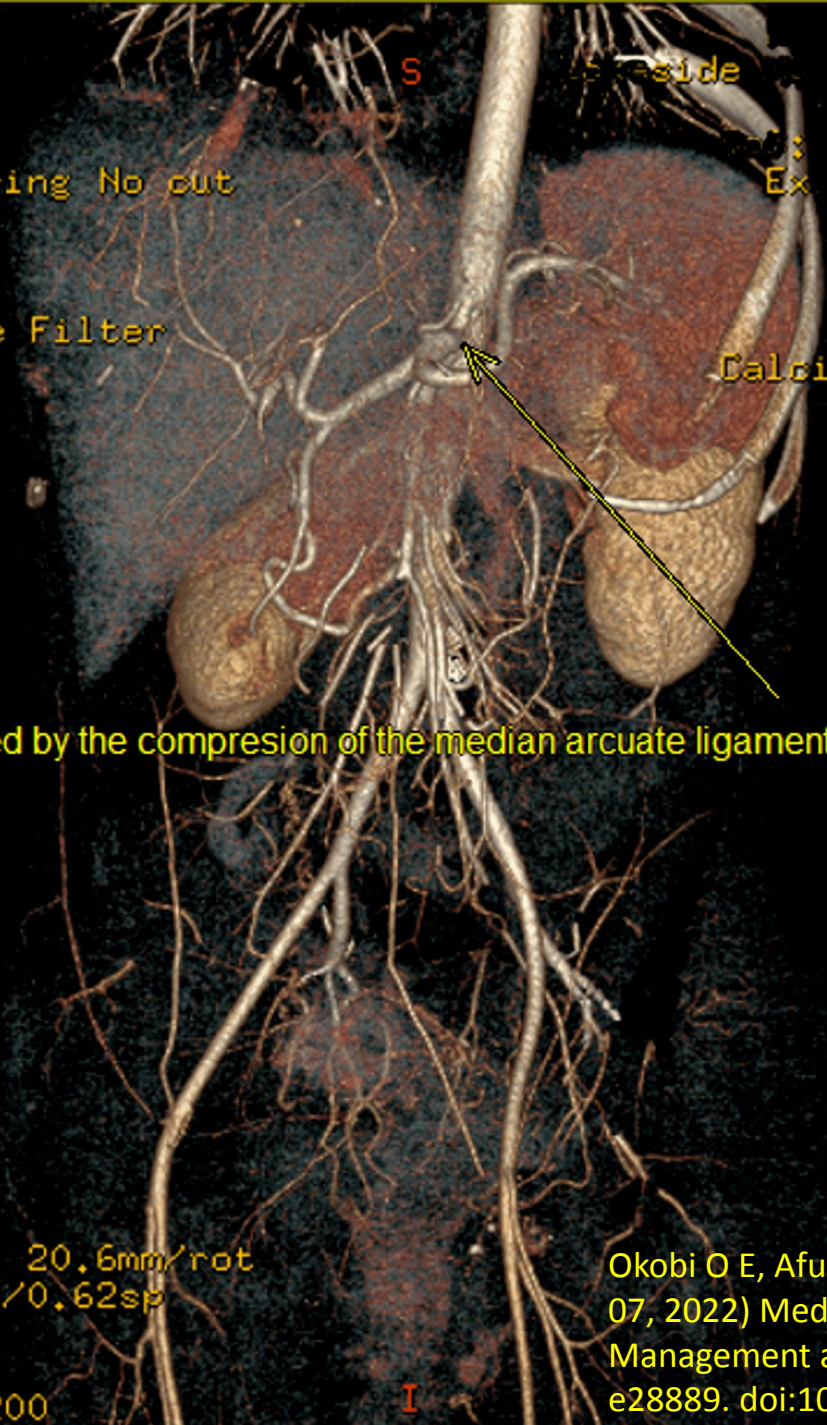
A Indentation caused by the compression of the median arcuate ligament on the celiac artery

L

No VOI
kV 100
mA Mod.
Rot 0.90s/HE+ 20.6mm/rot
1.2mm 0.516:1/0.62sp
Tilt: 0.0
10:16:07 AM
W = 700 L = 200

203/5

Okobi O E, Afuda B A, Boms M, et al. (September 07, 2022) Median Arcuate Ligament Syndrome: Management and Literature Review. Cureus 14(9): e28889. doi:10.7759/cureus.28889



RISCHI





San Michele che schiaccia il demonio
(Moncalvo, fine XVI secolo)

Visceral Artery Aneurysms: Diagnosis and Percutaneous Management

Meghna Chadha, M.D.,¹ and Chaitanya Ahuja, M.D.¹

SEMINARS IN INTERVENTIONAL RADIOLOGY/VOLUME 26, NUMBER 3 2009

Keywords: Visceral artery aneurysms, endovascular, surgery, aneurysmal rupture

Visceral artery aneurysms (VAAs) are rare with a reported incidence of 0.01 to 0.2% on routine autopsies. However, VAAs are clinically important and potentially lethal; 22% of all visceral artery aneurysms present as clinical emergencies; 8.5% result in death.

SOCIETY FOR VASCULAR SURGERY DOCUMENT

The Society for Vascular Surgery clinical practice guidelines on the management of visceral aneurysms



The clinical significance of visceral artery aneurysms is mainly related to their potential for rupture and the extreme challenge of emergent diagnosis and treatment of these uncommon aneurysms once rupture has occurred. Nearly one-fourth of visceral artery aneurysms reported in the literature have presented with rupture, and the reported mortality rate of these diagnosed ruptures is at least 10% and is likely to be much higher.

Reported deaths after ruptured celiac artery aneurysms and ruptured splenic artery aneurysms in pregnant women approach 100%. Because of the increased use of sophisticated forms of intra-abdominal imaging, including magnetic resonance imaging (MRI), magnetic resonance angiography (MRA), computed tomography (CT), and CT angiography (CTA), occult visceral artery aneurysms are being diagnosed with increased frequency. These detailed imaging studies are allowing an improved ability for vascular surgeons to identify asymptomatic lesions and an enhanced potential for preoperative or preprocedural planning and elective treatment of these aneurysms. Improvements in endovascular therapies have also allowed an enhanced ability for treatment of these often anatomically complex lesions with a large variety of individualized and precise catheter-based

WHAT CAUSES

A Visceral Artery Aneurysm?

Several conditions can lead to developing a visceral artery aneurysm. These include:

- Hardening of the arteries
- Trauma
- A side effect of an abdominal surgery
- A connective tissue disorder such as Ehlers-Danlos or Marfan syndrome
- An infection



Is a visceral artery aneurysm dangerous?

A visceral artery aneurysm, if left untreated, can lead to very serious health risks. If the artery wall bursts, you may suffer life-threatening internal bleeding. Early surgical intervention or close monitoring of the condition can be critical for protecting your health and wellbeing.

CONTACT US

Criteria for which it is safe to observe visceral arterial aneurysms have not been clearly established. In the study of Abbas et al, of 21 patients with a mean follow-up interval of 68.4 months and mean diameter of 2.3 cm, none required intervention during the follow-up period.



Managing incidental findings on abdominal and pelvic TC and MRI. J Am Coll Radiol 2013



QUIÉN SABE?

REGIA DI
DAMIANO DAMIANI

GIAN MARIA VOLONTÉ · KLAUS KINSKI · MARTINE BESWICK · LOU CASTEL

CON **JAIME FERNANDEZ** UN FILM REALIZZATO DA **BIANCO MANINI** PER LA **M.C.M. TECHNICOLOR TECHNISCOPÉ**

PRODOTTO DA **SALVATORE LAURANI** DIRIGENTE GENERALE **FRANCO SOLINAS** MONTAGNA **LUIS E. BACALOV** CON LA SUPERVISORE DI **ENNIO MORRICONE** LABORATORIO GEM