

This is a pre print version of the following article:

Understanding Patho-physiology of the Superior Mesenteric Artery Endarterectomy / Manenti, Antonio; Farinetti, Alberto; Manco, Gianrocco; Mattioli, Anna Vittoria. - In: ANNALS OF VASCULAR SURGERY. - ISSN 0890-5096. - 70:(2021), pp. e4-e5. [10.1016/j.avsg.2020.09.001]

Terms of use:

The terms and conditions for the reuse of this version of the manuscript are specified in the publishing policy. For all terms of use and more information see the publisher's website.

23/07/2024 11:06

(Article begins on next page)

Table I. Comparative analysis of a study cohort of 76 extremity vascular injuries with ischemic time data for composite outcome in accordance with regional anatomy

Injury profiles	Brachial	Femoral	Popliteal	P value
Time delay mean (SD) min (numerical)	370.2 (191.0)	333.7 (169.2)	292.1 (126.5)	0.261 ^a
Ischemia index (graded)				0.239 ^b
I. No ischemia	0 (0.0)	0 (0.0)	1 (5.3)	
II. Partial ischemia	14 (77.8)	8 (44.4)	11 (57.9)	
III. Total ischemia	4 (22.2)	10 (55.6)	7 (36.8)	
Composite outcome (dichotomous)				0.184 ^b
Salvaged	22 (95.6)	25 (89.3)	20 (80.0)	
Amputated	1 (4.4)	3 (10.7)	5 (20.0)	

SD, standard deviation.

^aOne-way analysis of variance.

^bFisher's exact test.

collateral flow should be absent, that is a totally ischemic limb, to expose the effect of ischemic time.^{5,6} Both these criteria need to be appreciated, defined, and studied to further improve our knowledge in limb salvage.

Amila Ratnayake
Military Hospital Narahenpita
Colombo, Sri Lanka

Achala U. Jayatilke
Postgraduate Institute of Medicine
University of Colombo
Colombo, Sri Lanka

Tamara J. Worlton
Department of General Surgery
USU Walter Reed National Military Medical Center
Bethesda MD
E-mail: taworlto@yahoo.com

REFERENCES

- Asensio JA, Kessler JJ, Miljkovic SS, et al. Brachial artery injuries operative management and predictors of outcome. *Ann Vasc Surg* 2020. <https://doi.org/10.1016/j.avsg.2020.05.049>.
- Vuoncino M, Soo Hoo AJ, Patel JA, et al. Epidemiology of upper extremity vascular injury in contemporary combat. *Ann Vasc Surg* 2019;62:98–103.
- Ratnayake AS, Jayatilke AU, Worlton TJ. Examination of mechanism of injury is sine qua non in combat vascular trauma. *Ann Vasc Surg* 2020;65:e303–4.
- Ratnayake AS, Bala M, Fox CJ, et al. A critical appraisal of impact of compounding factors in limb salvage decision making in combat extremity vascular trauma. *BMJ Mil Health* 2020. <https://doi.org/10.1136/bmj-military-2020-001508>.
- Ratnayake AS, Samarasinghe B, Wijeyaratne M, et al. 26 - Asia: Sri Lanka. In: Rasmussen TE, Tai NRM, editors. *Rich's Vascular Trauma*. 3rd ed. Elsevier; 2016. p. 287–92. <https://doi.org/10.1016/B978-1-4557-1261-8.00026-6>.
- Hafez HM, Woolgar J, Robbs JV. Lower extremity arterial injury: results of 550 cases and review of risk factors associated with limb loss. *J Vasc Surg* 2001;33:1212–9.

<http://dx.doi.org/10.1016/j.avsg.2020.08.092>

Understanding Patho-physiology of the Superior Mesenteric Artery Endarterectomy



To the Editor

The interesting paper by Xu et al.¹ underlines the place of endarterectomy in superior mesenteric artery (SMA) surgery. About this, we consider interesting some pathophysiological observations. At first we remark the SMA characteristic of “feeding,” rather than of “conduit” artery. This agrees with its large network of ileal branches, consisting in numerous vascular arcades originating straight terminal vessels, and with its important role in the celiac–mesenteric arteries system, as proved by the efficient network of collaterals with the pancreato-duodenal arcades. Differently, the distal connections with the corresponding colonic vessels develop mainly, and sometimes only, through the ileocolic branch, itself one of its middle collaterals. Of note, its acute angle branching from the abdominal aorta is hemodynamically favorable in normal conditions, deriving its blood supply from the aortic stream, minimally changed in its vector direction; however, in case of arteriosclerotic parietal stiffening this anatomy can transform the physiological laminar blood flow into a turbulent and less efficient one, as a result of a high Reynolds number. Furthermore, in course of tachyarrhythmias, the SMA flow loses its pulsating waveform, becoming continuous and weaker, in agreement with an augmented Womersley number; this gets worse in case of sudden drop in splanchnic blood supply, because of increased resistances induced by a peripheral vasospasm.^{2,3}

In pathology, these data invite to distinguish a proximal from a middle-distal SMA obstruction: the first typically involving its ostium and/or its first tract, while the second concerns its middle-distal part, provided of many collaterals. Moreover, considering that plaques, mainly if “vulnerable,” or more extended atheromatous lesions decrease the blood flow proportionally to the length and severity of the stenosis and to the velocity of their evolution, a chronic and sometimes subclinical ischemia can become critical, also at short term. Similarly, we remark

that a better abdominal aorta outflow, as restored after an aorto-bis-iliac bypass, can make clinically evident a SMA stenosis, previously latent. We do not consider this complication as a proper “steal syndrome,” but rather as a blood flow “redirection,” given the higher pressure still present in the aorta, its large size, and the possible rapid vasoconstriction of the SMA branches in response to a sudden decrease in their blood supply.

In clinics, all these possible conditions require a precise preoperative study, today based on a computed tomography angiography, eventually ameliorated with a maximum intensity projection and a 3-dimensional reconstruction.⁴ In surgery they suggest a careful choice between the different therapeutic strategies today possible. In particular, a limited stenosis, mainly of the SMA ostium or of its proximal tract, upstream important collaterals, allow different solutions, such as an endovascular treatment, functionally equivalent to the already experienced procedure of mesenteric–aortic reimplantation, or antegrade or retrograde aorto-mesenteric bypasses. However, discriminant element for their good outcome is represented by a good runoff, consisting in a large network of peripheral collaterals. Differently, more peripheral stenoses would indicate procedures of endarterectomy, given the advantage of dis-obstructing collateral branches.^{5–8} Clearly, a bypass can be associated to an endarterectomy, allowing to reduce the discrepancy in size between the graft and the recipient vessel, possible origin of a turbulent inflow, to increase the runoff and to enlarge the revascularized territory: this strategy follows a corresponding current trend in coronary surgery.^{9,10} However, a warning still remains actual, regarding, as a possible complication, the onset of a “competition” between the native and the restored flow, with a risk of thrombosis at short term. This invites to carefully select each case; in prospective, we would expect technological improvements, that, associated with pharmacodynamic tests, will help to recognize different conditions, such as SMA stenosis, that, although morphologically not severe, are followed by critical pressure gradients, so suggesting an endarterectomy, differently from others, more limited but with a normal distal arterial network, suitable of an endovascular treatment.¹¹

Antonio Manenti
Alberto Farinetti
Gianrocco Manco
Department of Surgery
University of Modena
Polyclinic Hospital, Modena, Italy

Annavittoria Mattioli
Department of Cardiology
University of Modena
Polyclinic Hospital
Modena, Italy
E-mail: antonio.manenti@unimore.it

REFERENCES

1. Xu C, Tolaymat B, Taylor M, et al. Distal superior mesenteric artery endarterectomy remains an excellent option for mesenteric revascularization in the

- endovascular era. *Ann Vasc Surg* 2020. <https://doi.org/10.1016/j.avsg.2020.06.065>.
2. Terlouw LG, Moelker A, Abrahamson J, et al. Mesenteric Ischemia Study group clinical guidelines on the diagnosis and treatment of patients with chronic mesenteric ischaemia. *United Eur Gastroenterol J* 2020;8:371–95.
3. Gnanapandithan K, Feuerstadt P. Review article: Mesenteric ischemia. *Curr Gastroenterol Rep* 2020;22:17.
4. Pérez-García C, de Miguel Campos E, Fernández Gonzalo A, et al. Non-occlusive mesenteric ischaemia: CT findings, clinical outcomes and assessment of the diameter of the superior mesenteric artery. *Br J Radiol* 2018;91:20170492.
5. Manenti A, Melegari G, Manco G, et al. Re-implanting the superior mesenteric artery on the infra-renal aorta. *Surgery* 2017;163:970.
6. Bakoyiannis C, Mylonas KS, Davakis S, et al. Superior mesenteric artery endarterectomy for chronic mesenteric ischemia: a viable alternative in poor candidates for endovascular interventions. *Vascular* 2020;28:126–31.
7. van Dijk LJ, van Noord D, de Vries AC, et al. Clinical management of chronic mesenteric ischemia. *United European Gastroenterol J* 2019;7:179–88.
8. Gupta PK, Horan SM, Turaga KK, et al. Chronic mesenteric ischemia: endovascular versus open revascularization. *J Endovasc Ther* 2010;17:540–9.
9. Qiu Z, Auchoybur Merveesh L, Xu Y, et al. The midterm results of coronary endarterectomy in patients with diffuse coronary artery disease. *J Cardiothorac Surg* 2018;13:90.
10. Modi BN, De Silva K, Rajani R, et al. Physiology-guided management of serial coronary artery disease. A Review. *JAMA Cardiol* 2018;3:433–8.
11. Acosta S, Björgell O, Ekberg O. Prospective study on diagnostic performance of Color Doppler Ultrasound using trans-stenotic mean arterial pressure gradient as a reference in stented superior mesenteric artery. *Ann Vasc Surg* 2019;56:294–302.

<http://dx.doi.org/10.1016/j.avsg.2020.09.001>

Determining Predictors of Long-term Renal Function Degradation after Aortic Aneurysm Surgical Repair: Methodological Issues Should be Emphasized



To the Editor:

With great interest we read the recent article by Rouer et al.¹ assessing the predictive ability of early postoperative renal dysfunction for long-term renal function degradation after type IV thoracoabdominal aortic aneurysm surgical repair. By the univariate and multivariate logistic regression analyses, they showed that an

Re: Rouer M, et al. Early Postoperative Renal Dysfunction Predicts Long-term Renal Function Degradation after Type IV Thoracoabdominal Aortic Aneurysm Surgical Repair. *Ann Vasc Surg*. 2020 May 18; <https://doi.org/10.1016/j.avsg.2020.04.072>.

We have screened our manuscript for plagiarism using the Plagiarism Checker (www.duplhecker.com) and no plagiarism is found.

Authors' Contributions: All authors had carefully read the manuscript of Rouer et al., analyzed their methods and data. ZJX and FSX suggested comment points and drafted this manuscript. YC and YJY revised comment points and this manuscript. All authors read and approved the final manuscript.