Thoracic Endovascular Aortic Aneurysm Repair

Mauro Gargiulo

Vascular Surgery

University of Bologna - DIMEC

IRCCS - University Hospital Policlinico S.Orsola

Bologna, Italy

mauro.gargiulo2@unibo.it

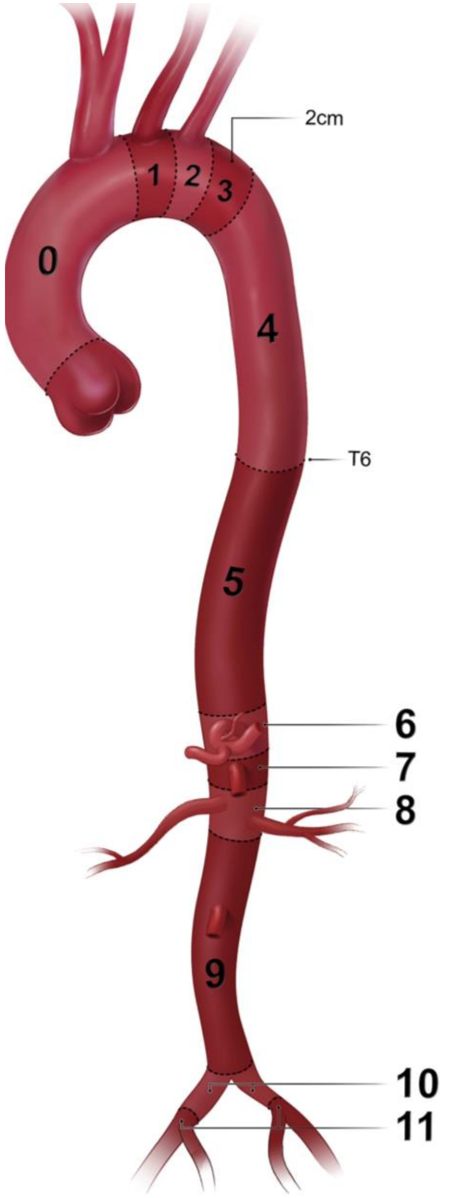
Thoracic Endovascular Aortic Aneurysm Repair

Disclosure

Speaker name: **Mauro Gargiulo**

I have the following potential conflicts of interest to report:

- ❑ Receipt of grants/research support
- ❑ Receipt of honoraria and travel support
- ❑ Participation in a company-sponsored speaker bureau
- ❑ Employment in industry
- ❑ Shareholder in a healthcare company
- ❑ Owner of a healthcare company
- X **Principal Invesigator Expand Registry VBX 17-04**
- X **Consulting : Cook Medical, WL Gore & Associates, Medtronic**



Eur J Vasc Endovasc Surg (2017) 53, 4—52

Editor's Choice — Management of Descending Thoracic Aorta Diseases

Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

update coming 2024

V. Riambau [a], D. Böckler [a], J. Brunkwall [a], P. Cao [a], R. Chiesa [a], G. Coppi [a], M. Czerny [a], G. Fraedrich [a], S. Haulon [a], M.J. Jacobs [a], M.L. Lachat [a], F.L. Moll [a], C. Setacci [a], P.R. Taylor [a], M. Thompson [a], S. Trimarchi [a], H.J. Verhagen [a], E.L. Verhoeven [a],
ESVS Guidelines Committee [b] P. Kolh, G.J. de Borst, N. Chakfé, E.S. Debus, R.J. Hinchliffe, S. Kakkos, I. Koncar, J.S. Lindholt, M. Vega de Ceniga, F. Vermassen, F. Verzini,
Document Reviewers [c] P. Kolh, J.H. Black III, R. Busund, M. Björck, M. Dake, F. Dick, H. Eggebrecht, A. Evangelista, M. Grabenwöger, R. Milner, A.R. Naylor, J.-B. Ricco, H. Rousseau, J. Schmidli

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

ESC European Society of Cardiology European Heart Journal (2024) 45, 3538–3700
https://doi.org/10.1093/eurheartj/ehae179

ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

Developed by the task force on the management of peripheral arterial and aortic diseases of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS), the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN), and the European Society of Vascular Medicine (ESVM)

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

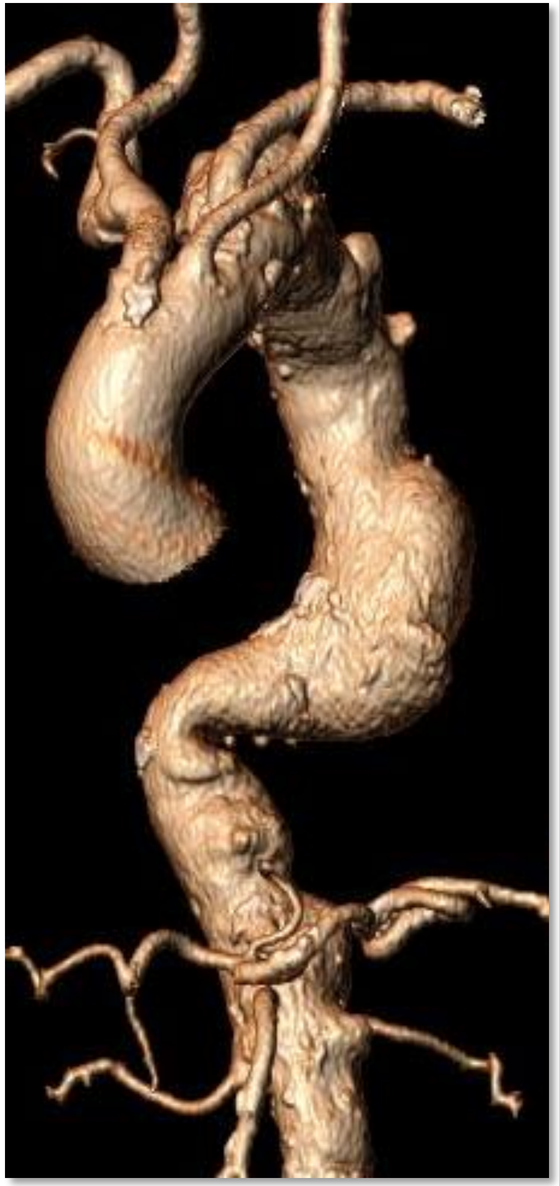
Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

Thoracic aortic histopathology

- **Thoracic aneurysm** and atherosclerotic disease
- Aortic vasculitides and inflammatory diseases
- PAU, IMH, and AD
- Mycotic aneurysms and aortoesophageal and aorto-bronchial fistulas
- Coartation
- Kommerell diverticulum
- Tumors



ESC
European Society of Cardiology
European Heart Journal (2024) 45, 3538–3700
https://doi.org/10.1093/eurheartj/ehae179
ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

Developed by the task force on the management of peripheral arterial and aortic diseases of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS), the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN), and the European Society of Vascular Medicine (ESVM)

- **Thoracic aortic aneurysms** occur in 5–10/100000 person-years

- Approximate predominance of root and/or ascending aorta of ∼60%, arch of ∼10%, and **descending aorta of ∼30%.**

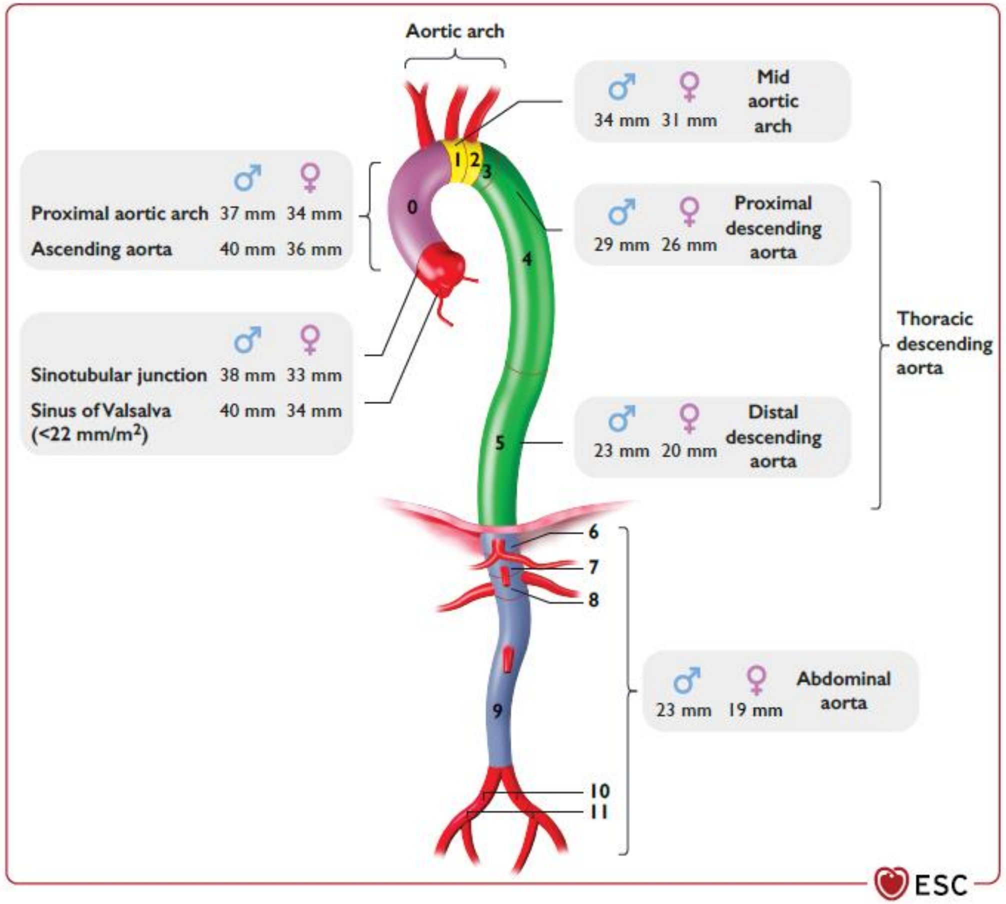
ESC European Society of Cardiology
European Heart Journal (2024) 45, 3538–3700
https://doi.org/10.1093/eurheartj/ehae179

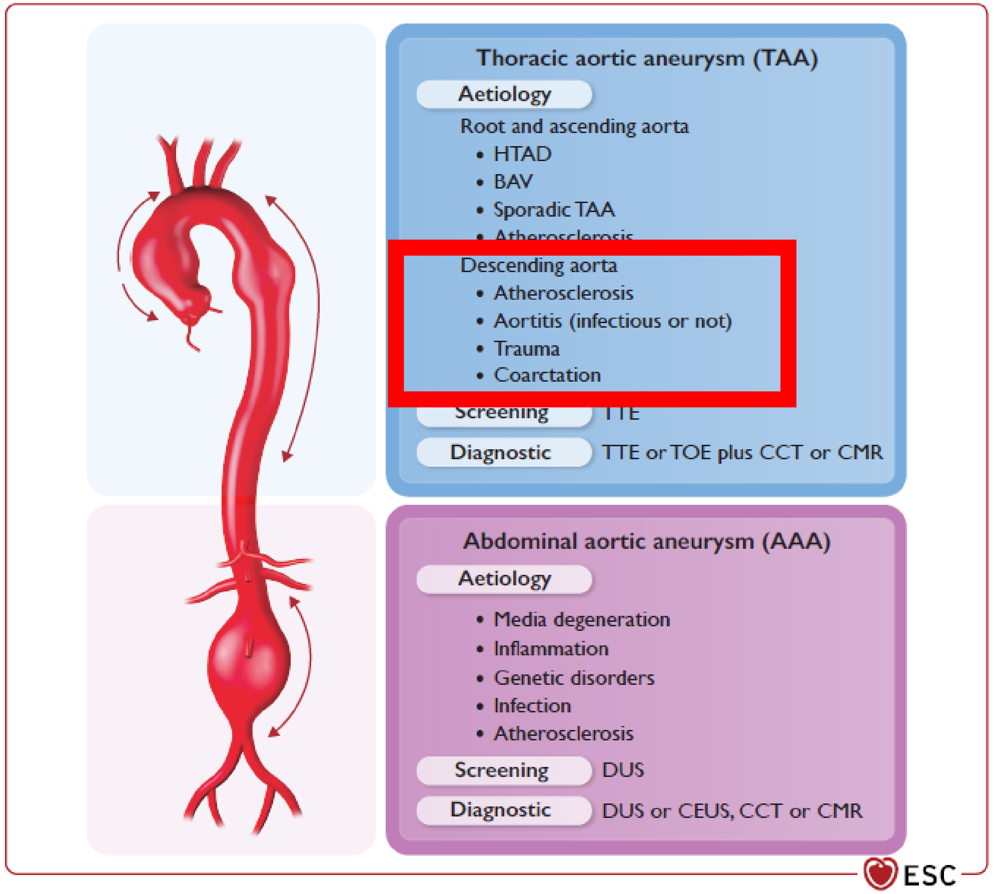
ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

Developed by the task force on the management of peripheral arterial and aortic diseases of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS), the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN), and the European Society of Vascular Medicine (ESVM)





Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

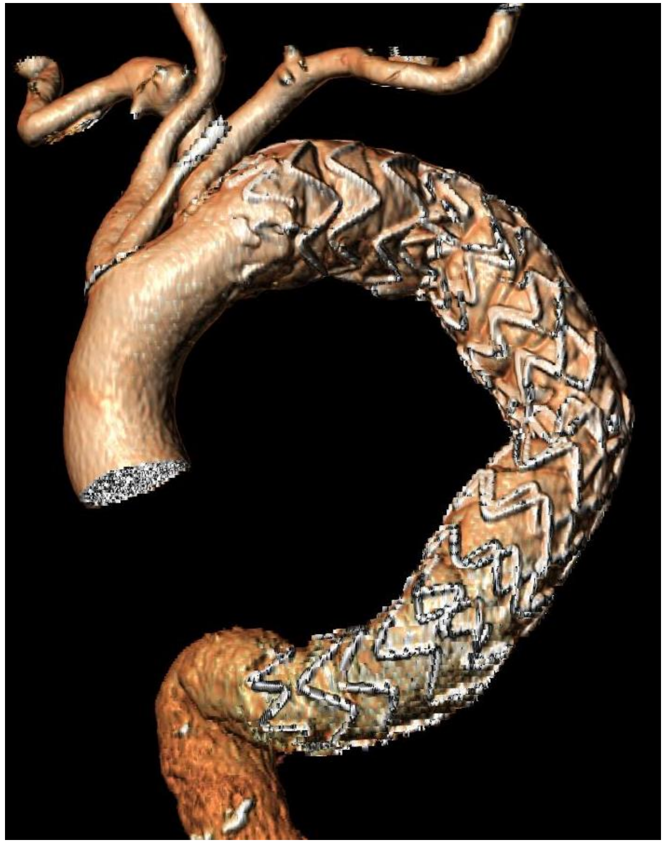
(J Vasc Surg 2021;73:55S-83S.)

Recommendation 10: In patients who could undergo either technique (within the criteria of the device's instructions for use), we recommend TEVAR as the preferred approach to treat elective DTA aneurysms, given its reduced morbidity and length of stay as well as short-term mortality. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: A (High)**

Thoracic Endovascular Aortic Aneurysm Repair

Agenda

- **Indication for TEVAR**
- TEVAR and proximal landing zone
- TEVAR and distal landing zone
- TEVAR and Access
- TEVAR and spinal cord ischemia
- TEVAR and Results



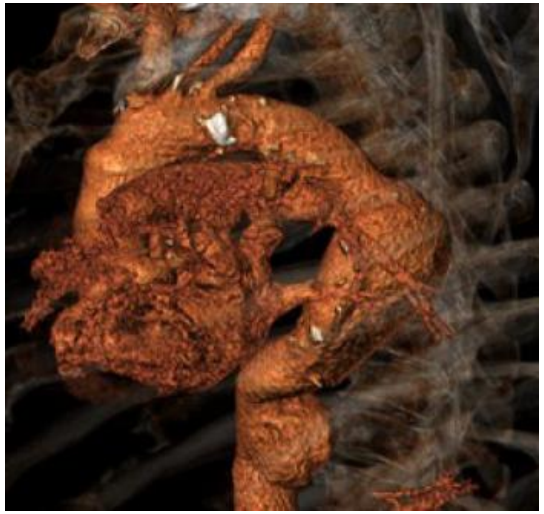
SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)



Indication for repair – TEVAR for TAA

Recommendation 11: We recommend TEVAR in asymptomatic patients with a descending TAA when the maximum aneurysm diameter exceeds 5.5 cm in "low-risk" patients with favorable aortic anatomy. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**

ESC
European Society of Cardiology
European Heart Journal (2024) 45, 3538–3700
https://doi.org/10.1093/eurheartj/ehae179
ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

Developed by the task force on the management of peripheral arterial and aortic diseases of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS), the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN), and the European Society of Vascular Medicine (ESVM)

Intervention at a diameter < 55 mm may not bring any further survival benefit except:

- women
- patients with connective tissue disorders
- patients with rapid growth (≥10 mm per year or ≥5 mm every 6 months)

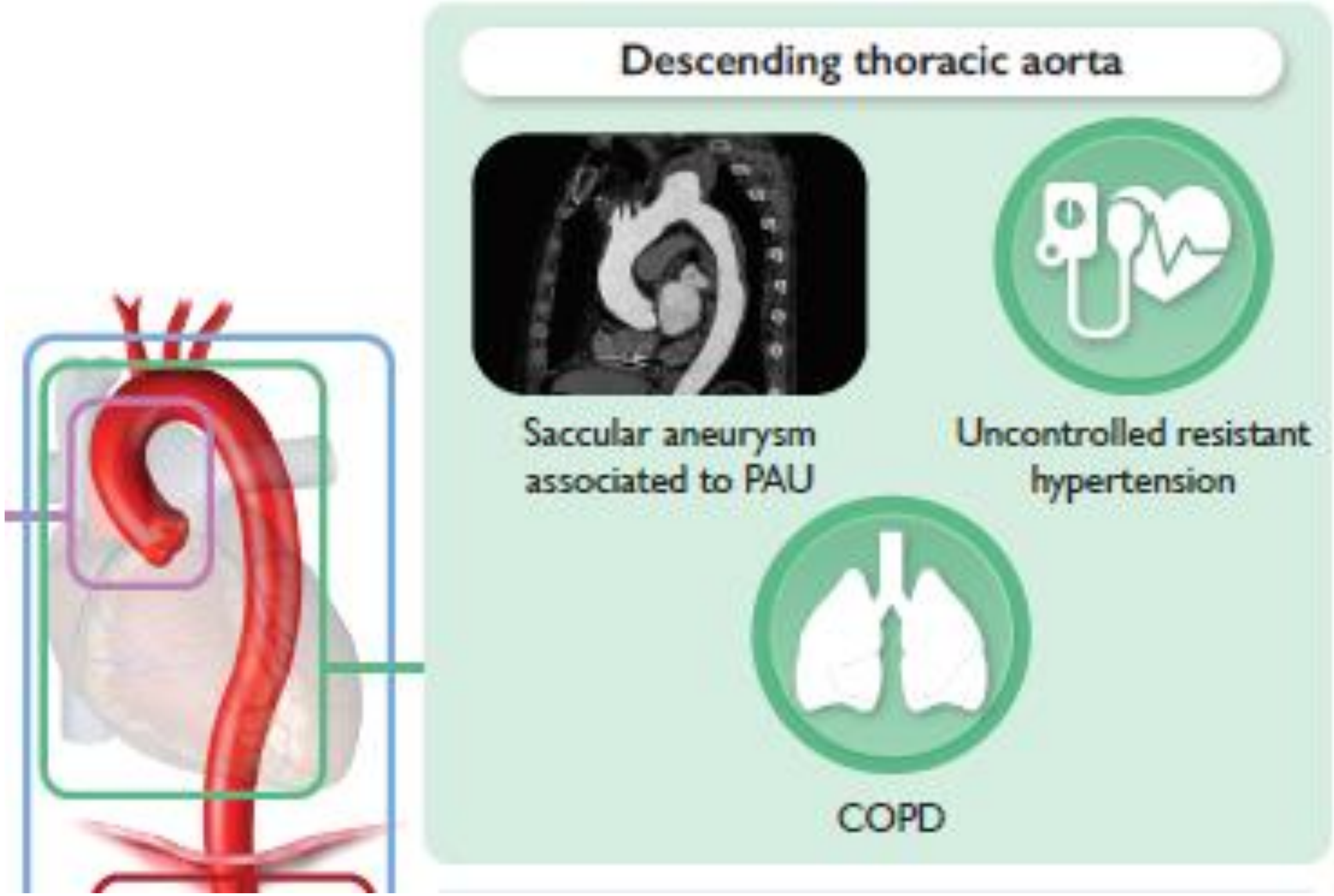
ESC
European Society of Cardiology
European Heart Journal (2024) 45, 3538–3700
https://doi.org/10.1093/eurheartj/ehae179
ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

Developed by the task force on the management of peripheral arterial and aortic diseases of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS), the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN), and the European Society of Vascular Medicine (ESVM)

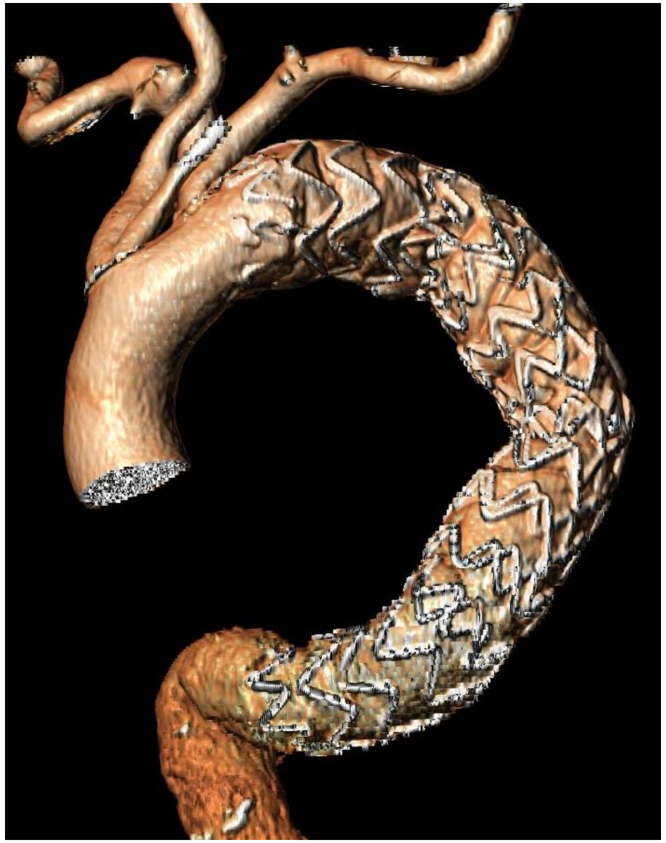
Risk factors for thoracic aneurysm rupture



Thoracic Endovascular Aortic Aneurysm Repair

Agenda

- Indication for TEVAR
- **TEVAR and proximal landing zone**
- TEVAR and distal landing zone
- TEVAR and Access
- TEVAR and spinal cord ischemia
- TEVAR and Results



Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d]
Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g]
R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

Table. Instructions for use of current thoracic devices

Manufacturer	Name	Iliac/femoral diameter, mm	Aortic outer diameter, mm	Proximal landing zone, mm	Distal landing zone, mm
W. L. Gore & Associates[91]	Conformable Thoracic Aortic Graft (c-TAG)	4-8.7, depending on sheath	16-42[a]	≥20	≥20
Medtronic[92]	Valiant Captivia	7.3-8.3, depending on sheath	18-42	≥20	≥20
Cook Medical[93]	Zenith Alpha[b]	6.0-7.7, depending on graft size	22-42	≥20	≥20
Bolton[c] Medical[94]	Relay	7.3-8.7, depending on sheath	19-42	15-25	15-25

[a]Gore measures inner aortic diameter for graft sizing.
[b]Cook recalled all Zenith Alpha TEVAR grafts with proximal or distal diameter of 18 to 22 mm and recalled the indication for blunt traumatic aortic injury on March 22, 2017.[95]
[c]Now Terumo.

European Journal of Cardio-Thoracic Surgery 58 (2020) 309–318
doi:10.1093/ejcts/ezaa115 Advance Access publication 21 May 2020

ORIGINAL ARTICLE

Cite this article as: Marrocco-Trischitta MM, de Beaufort HW, Piffaretti G, Bonardelli S, Gargiulo M, Antonello M *et al.* The Modified Arch Landing Areas Nomenclature predicts proximal endograft failure after thoracic endovascular aortic repair. Eur J Cardiothorac Surg 2020;58:309–18.

The Modified Arch Landing Areas Nomenclature predicts proximal endograft failure after thoracic endovascular aortic repair

Massimiliano M. Marrocco-Trischitta [a,*], Hector W. de Beaufort[a,b], Gabriele Piffaretti[c], Stefano Bonardelli[d], Mauro Gargiulo[e], Michele Antonello[f], Joost A. van Herwaarden[b], Sara Boveri [g], Raffaello Bellosta[h], and Santi Trimarchi [i,j], on behalf of the MALAN Collaborators[†]

CONCLUSIONS

- The MALAN classification identifies hostile proximal landing zones for TEVAR, namely 2/III and 3/III LAs, which are associated with dismal proximal endograft performance.

- - The MALAN appears to be an intuitive and valuable tool to improve the preoperative decision-making process

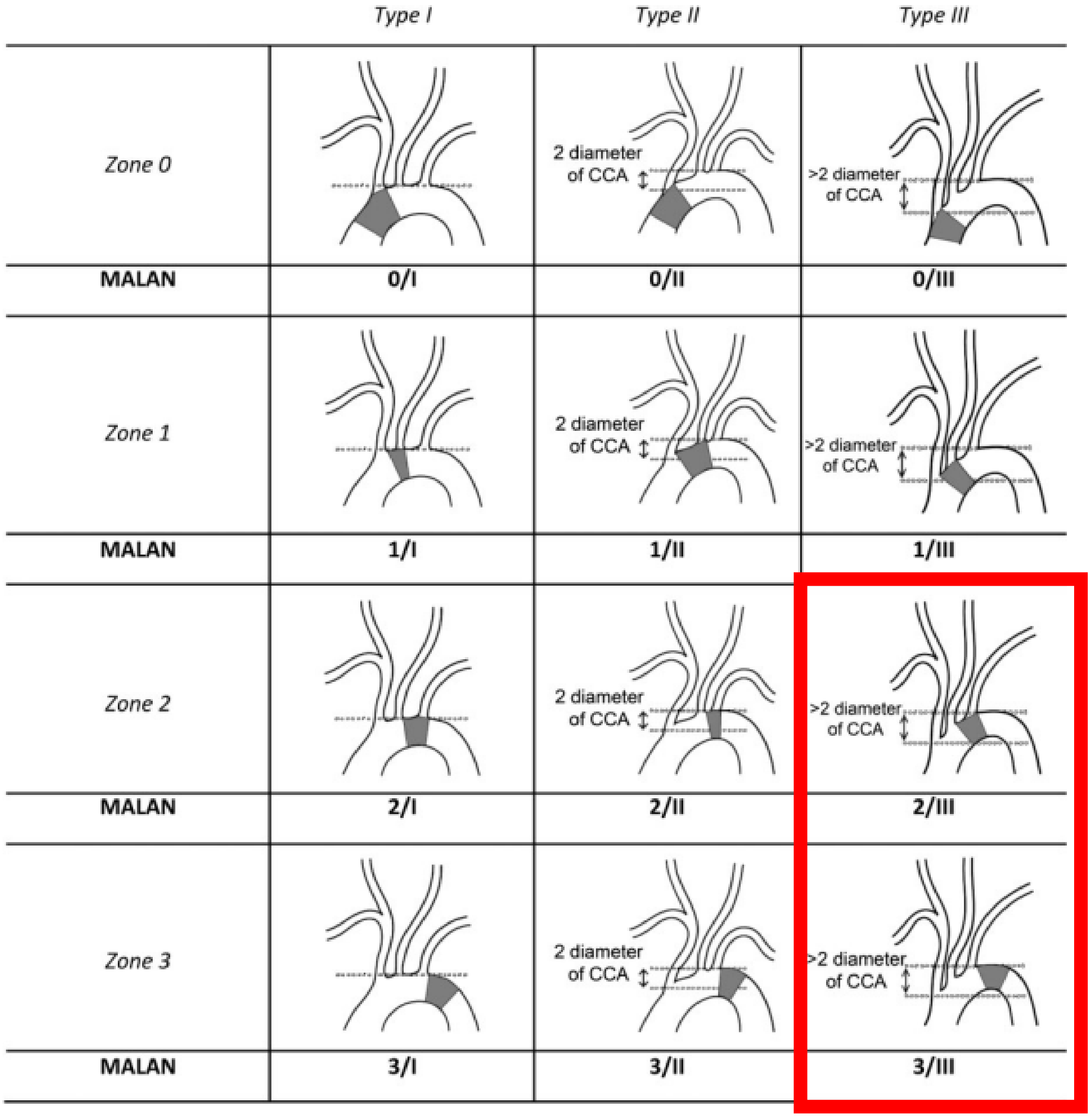


Figure 1: The MALAN, which comprises proximal landing zones according to Ishimaru's aortic arch map and types of arches according to the aortic arch classifi (reproduced from ref. [10] with permission from Elsevier Inc.). CCA: common carotid artery; MALAN: Modified Arch Landing Areas Nomenclature.

Eur J Vasc Endovasc Surg (2021) 62, 423–430

Determination of Optimal and Safest Proximal Sealing Length During Thoracic Endovascular Aortic Repair

Michele Piazza [†,*], Francesco Squizzato [†], Andrea Xodo, Gianna Saviane, Edoardo Forcella, Chiara Dal Pont, Franco Grego, Michele Antonello

Division of Vascular and Endovascular Surgery, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua, Padua, Italy

Table 2. Anatomical and procedural data of the 140 patients undergoing thoracic endovascular aortic repair

Variable	Patients (n = 140)
Aortic pathology	
Atherosclerotic aneurysm	84 (60.0)
Chronic dissection/aneurysm	12 (8.6)
PAU/IMH	15 (10.7)
Acute/subacute dissection	12 (8.6)
Trauma	10 (7.1)
Pseudo-aneurysm	4 (2.9)
Aneurysm rupture	3 (2.1)
Max. aortic diameter – mm	53.4 ± 16.2
Aortic arch type	
Type I	33 (23.6)
Type II	49 (35.0)
Type III	58 (41.4)
Proximal landing zone	
0	19 (13.6)
1	19 (13.6)
2	50 (35.7)
3	52 (37.1)
Actual proximal sealing length – mm	
Mean	29.2 ± 9.4
Median (range)	29 (15–50)
Proximal neck maximum diameter – mm	31.2 ± 5.4
Timing of the procedure	
Elective	99 (70.7)
Urgent	24 (17.1)
Emergency	17 (12.1)
Type of endograft	
Medtronic, Talent	7 (0.5)
Medtronic, Valiant	30 (21.4)
Medtronic, Navion	4 (2.8)
Gore CTAG	31 (22.1)
Bolton Relay	19 (13.5)
Cook Zenith TX2	22 (15.7)
Cook Zenith Alpha Thoracic	15 (10.7)
Jotec E-vita	6 (4.2)
Endospan Nexus	3 (2.1)
Terumo aortic	3 (2.1)
Proximal bare metal stent	110 (78.6)
Proximal stent graft diameter – mm	36.6 ± 6.1
Proximal oversizing – %	19 ± 9.4
Total aortic length of coverage – cm	19 ± 7.4

Data are presented as n (%) or mean ± standard deviation unless stated otherwise. PAU = penetrating aortic ulcer; IMH = intramural haematoma.

Figure 1. The proximal sealing length (between blue and red lines) is measured as the centreline (green) length of complete endograft to aortic wall apposition, using three dimensional reconstructions of the post-operative computed tomography angiogram.

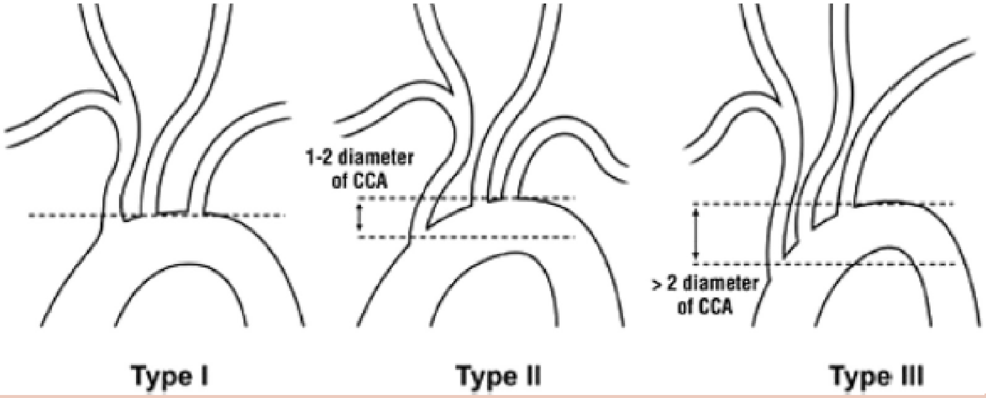


Fig 2. Classification of the aortic arch. *CCA*, Common carotid artery. (Reproduced from Madhwal S, Rajagopal V, Bhatt DL, Bajzer CT, Whitlow P, Kapadia SR. Predictors of difficult carotid stenting as determined by aortic arch angiography. J Invasive Cardiol 2008;20:200-4. Permission from HMP Global.)

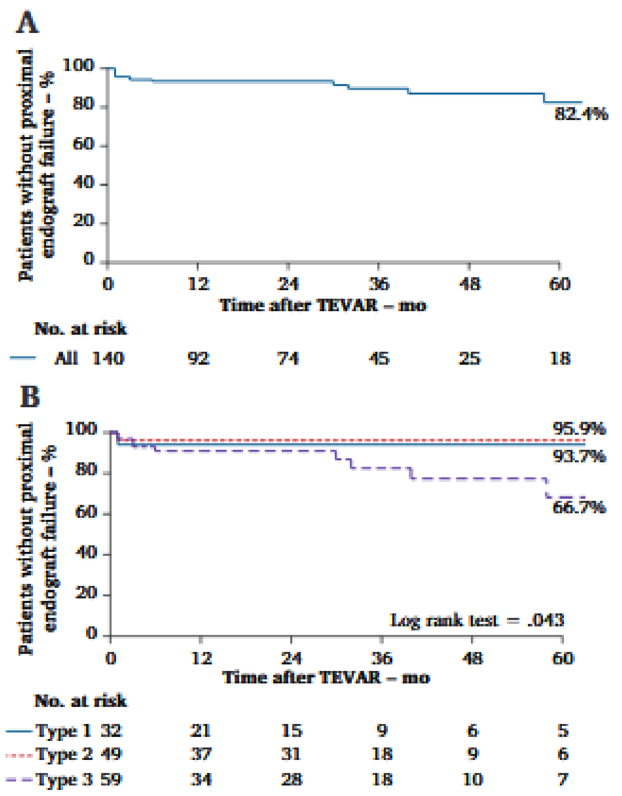


Figure 2. Cumulative Kaplan–Meier estimates of freedom from proximal endograft failure at five years from index thoracic endovascular aortic repair (TEVAR) in (A) the overall cohort and (B) stratified by aortic arch type. Standard error < 10%.

Eur J Vasc Endovasc Surg (2021) 62, 423—430

Determination of Optimal and Safest Proximal Sealing Length During Thoracic Endovascular Aortic Repair

Michele Piazza [†,*], Francesco Squizzato [†], Andrea Xodo, Gianna Saviane, Edoardo Forcella, Chiara Dal Pont, Franco Grego, Michele Antonello

Division of Vascular and Endovascular Surgery, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua, Padua, Italy

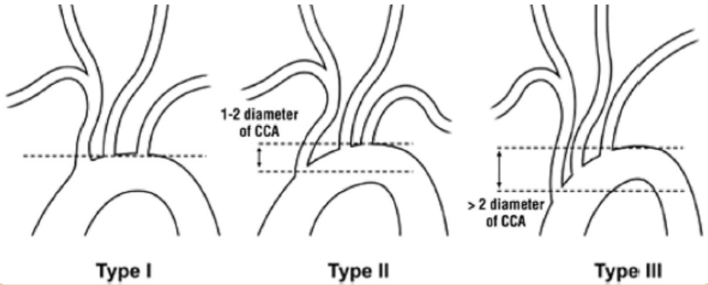


Fig 2. Classification of the aortic arch. *CCA,* Common carotid artery. (Reproduced from Madhwal S, Rajagopal V, Bhatt DL, Bajzer CT, Whitlow P, Kapadia SR. Predictors of difficult carotid stenting as determined by aortic arch angiography. J Invasive Cardiol 2008;20:200-4. Permission from HMP Global.)

Table 4. Univariable Cox proportional hazards for proximal endograft failure after thoracic endovascular aortic repair

Variable	Events — *n*	Univariable HR (95% CI)	*p* value
Year of treatment	12	1.02 (0.86—1.21)	.80
Timing of treatment			
Urgent/emergency	2	1.02 (0.30—2.92)	.97
Elective	10	Ref.	
Aortic arch type			.045
Type I	2	Ref.	
Type II	2	0.63 (0.09—4.49)	
Type III	8	2.80 (0.61—12.80)	
Proximal landing zone			.50
Zone 0	2	Ref.	
Zone 1	1	0.38 (0.04—4.23)	
Zone 2	5	0.98 (0.20—4.70)	
Zone 3	4	0.42 (0.08—2.32)	
Aortic pathology			.15
Aneurysm	10	2.57 (0.70—9.36)	
Other pathology	2	Ref.	
Maximum aortic diameter — cm	12	1.06 (1.02—1.10)	.003
Proximal sealing length — mm	12	0.90 (0.84—0.97)	.004
Proximal graft oversize — %	12	0.94 (0.84—1.06)	.31
Proximal bare stent/barbs	12	0.35 (0.05—2.65)	.31
Landing on a surgical graft	12	1.10 (0.30—4.01)	.88
Precision of deployment — mm	12	1.01 (0.89—1.32)	.76
Endograft type	12	1.23 (0.78—1.99)	.56

HR = hazard ratio; CI = confidence interval; Ref. = reference.

Table 5. Summary of the calculated proximal optimal and safest sealing length for thoracic endovascular aortic repair stratified by aortic arch type and sealing zone

Proximal sealing zone	Optimal sealing length — mm	Safest sealing length — mm	AUC (95% CI)
All arch types			
Overall	25	30	0.77 (0.60—0.89)
Zones 2—3 only	27	30	0.71 (0.53—0.87)
Type I arch			
Overall	22	28	0.58 (0.2—1)
Zones 2—3 only	22	30	0.72 (0.68—1.00)
Type II arch			
Overall	25	30	0.76 (0.60—0.88)
Zones 2—3 only	27	30	0.72 (0.62—1.00)
Type III arch			
Overall	27	30	0.74 (0.57—0.91)
Zones 2—3 only	27	30	0.70 (0.50—1)

AUC = area under the curve; CI = confidence interval.

Aorta and Major Branches

Eur J Vasc Endovasc Surg (2021) 62, 423—430

Determination of Optimal and Safest Proximal Sealing Length During Thoracic Endovascular Aortic Repair

Michele Piazza [†,*], Francesco Squizzato [†], Andrea Xodo, Gianna Saviane, Edoardo Forcella, Chiara Dal Pont, Franco Grego, Michele Antonello

Division of Vascular and Endovascular Surgery, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua, Padua, Italy

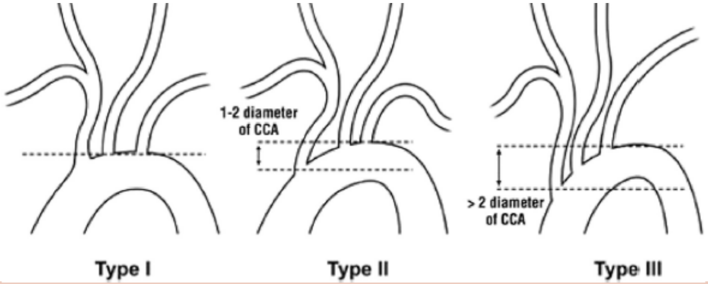
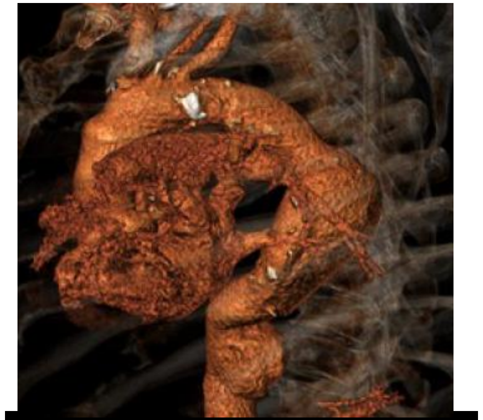
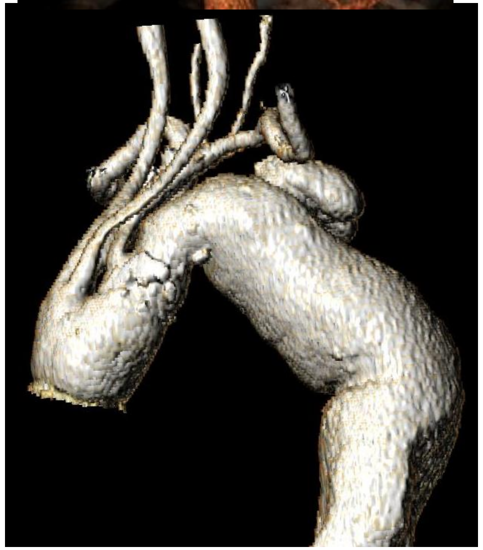


Fig 2. Classification of the aortic arch. *CCA*, Common carotid artery. (Reproduced from Madhwal S, Rajagopal V, Bhatt DL, Bajzer CT, Whitlow P, Kapadia SR. Predictors of difficult carotid stenting as determined by aortic arch angiography. J Invasive Cardiol 2008;20:200-4. Permission from HMP Global.)

Conclusion

The risk of proximal endograft failure after TEVAR seems to be related to aortic arch anatomy, LZ, and PSL. In this study, a 20 mm sealing length was sufficient only for type I aortic arches. However, a type II or III arch is present in most cases of TEVAR, and a 25 — 30 mm PSL may be required for safe and durable results. Although larger confirmatory studies are needed, this information may be useful during endovascular planning in order to improve TEVAR outcomes.





SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

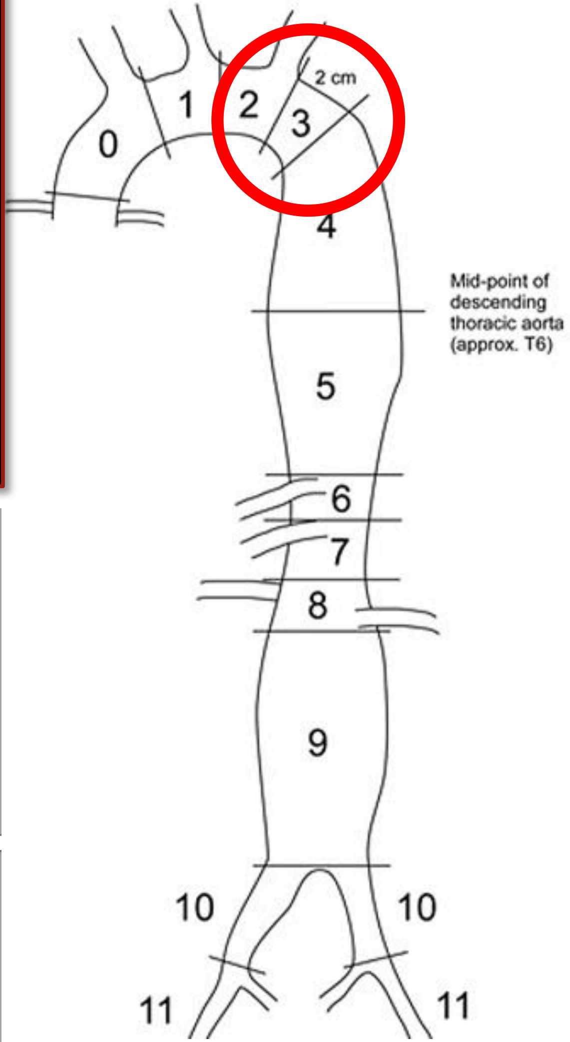
Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

Proximal landing zone and coverage of LSA

An adequate proximal landing zone requires coverage of the LSA in 26% to 40% of patients undergoing TEVAR.[109,126]



SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

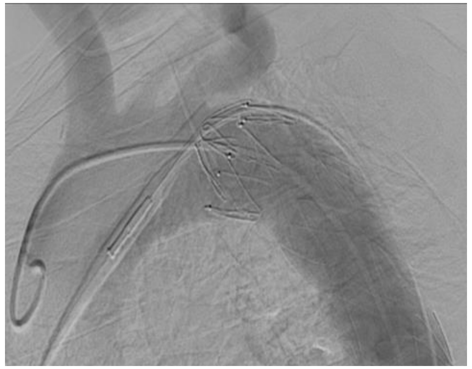
Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

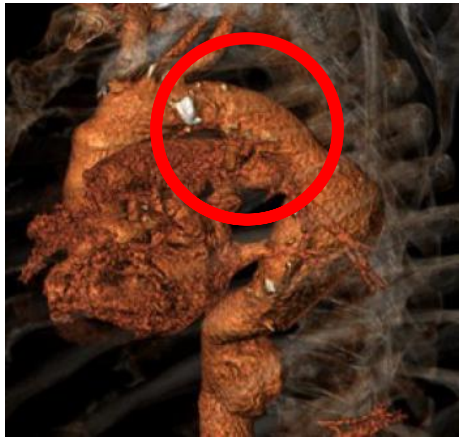
Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

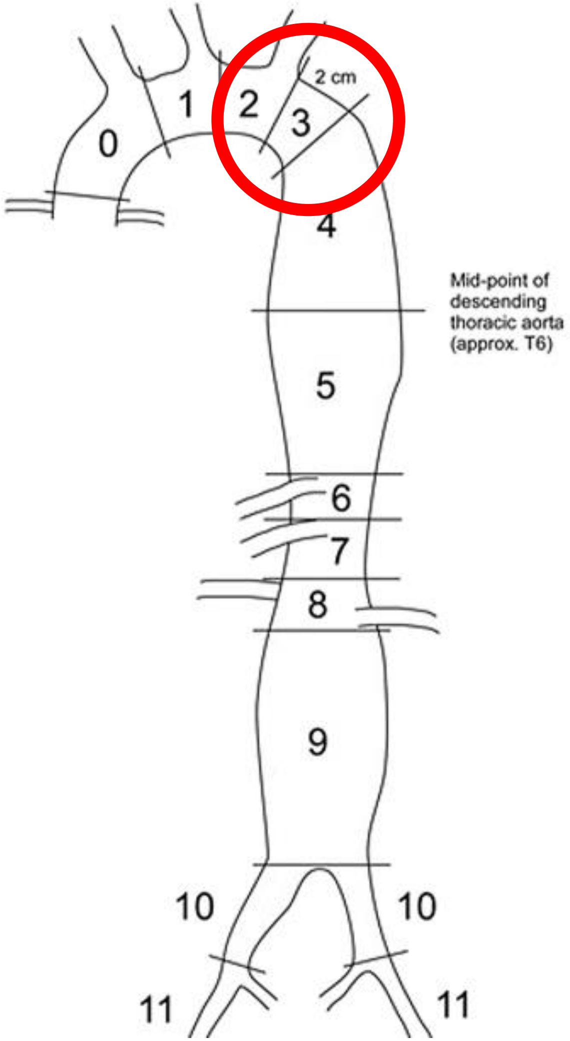
(J Vasc Surg 2021;73:55S-83S.)

Proximal landing zone and coverage of LSA

An adequate proximal landing zone requires coverage of the LSA in 26% to 40% of patients undergoing TEVAR.







Major Concerns:

- SCI
- stroke (3.2% - 6.2%)
- arm ischemia (12-20%)
- vertebro-basilar ischemia

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

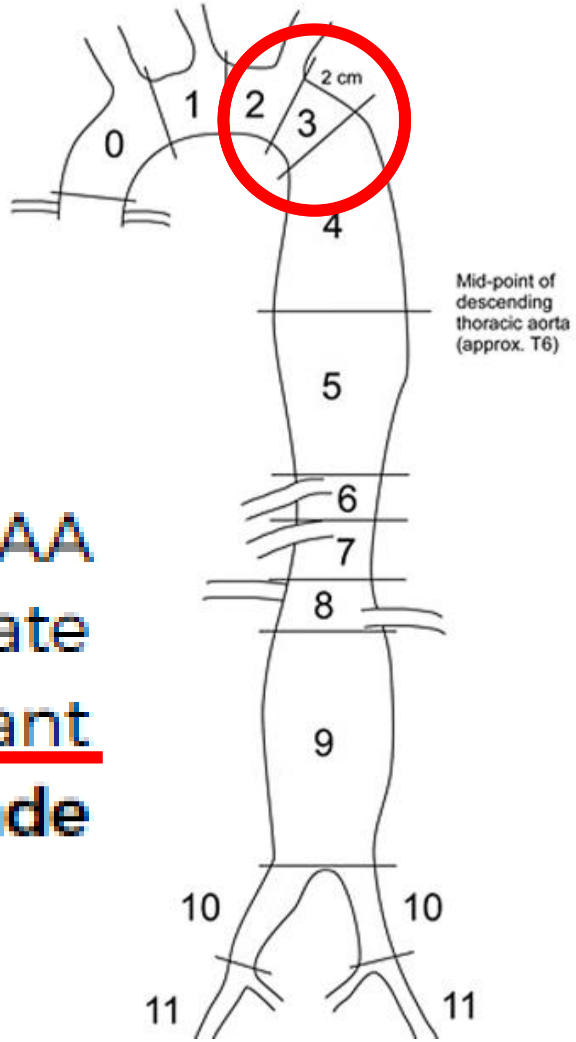
Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

Proximal landing zone and coverage of LSA

Recommendation 19: For elective TEVAR of a TAA where coverage of the LSA is necessary for adequate stent graft seal, we suggest preoperative or concomitant LSA revascularization. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**



Eur J Vasc Endovasc Surg (2018) 56, 644—651

REVIEW

Effect of Left Subclavian Artery Revascularisation in Thoracic Endovascular Aortic Repair: A Systematic Review and Meta-analysis

Qun Huang, Xiao M. Chen, Han Yang, Qiu N. Lin, Xiao Qin *

Conclusion: The results of this review reveal that LSA revascularisation was associated with significantly lower peri-operative stroke and SCI rates. LSA revascularisation should be recommended for patients with LSA coverage in TEVAR. High quality RCTs are needed to further validate the conclusion.

Meta-analysis of the outcomes of revascularization after intentional coverage of the left subclavian artery for thoracic endovascular aortic repair

Xiyang Chen, MD,[a] Jiarong Wang, MD,[a] Shyamal Premaratne, MD, PhD,[b] Jichun Zhao, MD, PhD,[a] *and* Wayne W. Zhang, MD,[c] *Chengdu, Sichuan, China; Richmond, Va; and Seattle, Wash*

(J Vasc Surg 2019;70:1330-40.)

Conclusions: Revascularization of the LSA is associated with decreased risks of cerebrovascular accident, spinal cord ischemia, and left upper limb ischemia in thoracic endovascular aortic repair with LSA coverage at the cost of higher local complications, such as possible vocal cord paresis.

Predicting the need for subclavian artery revascularization in thoracic endovascular aortic repair: A systematic review and meta-analysis

Tariq Alanezi, MBBS,[a] Abdulmajeed Altoijry, MD, MSc,[b] Sultan AlSheikh, MD,[b] Husain Al-Mubarak, MD,[b] Musaad Alhamzah, MD, MPH,[b] Faris Alomran, MD,[c] Omer Abdulrahim, MD, MCh,[c] Badr Aljabri, MD,[b] Elisa Greco, MD,[d,e] Mohamad A. Hussain, MD, PhD,[f,g] *and* Mohammed Al-Omran, MD, MSc,[c,d,e,h]

Riyadh, Saudi Arabia; Toronto, ON, Canada; and Boston, MA

(J Vasc Surg 2024;80:922-36.)

Study or Subgroup	Revascularized Events	Revascularized Total	Nonrevascularized Events	Nonrevascularized Total	Weight	Odds Ratio M-H, Random, 95% CI
Arnaoutakis et al., 2014	0	19	0	17		Not estimable
Baba et al., 2015	0	12	8	109	1.3%	0.48 [0.03, 8.79]
Bradshaw et al., 2017	1	54	6	42	2.1%	0.11 [0.01, 0.98]
Buth et al., 2007	0	40	5	119	1.3%	0.26 [0.01, 4.75]
Contrella et al., 2015	6	44	5	54	3.6%	1.55 [0.44, 5.46]
Delafontaine et al., 2019	104	1362	269	6411	5.9%	1.89 [1.49, 2.39]
Fairman et al., 2012	0	22	2	29	1.2%	0.24 [0.01, 5.36]
Fang et al., 2021	0	73	9	61	1.4%'	0.04 [0.00, 0.66]
Feezor et al., 2009	0	3	4	19	1.2%	0.49 [0.02, 11.41]
Guangqi et al., 2009	0	1	2	36	1.0%	4.60 [0.15, 144.68]
Holt et al., 2010	0	35	5	43	1.3%	0.10 [0.01, 1.85]
Kaya et al., 2009	0	1	2	13	1.0%	1.53 [0.05, 49.80]
Kotelis et al., 2009	1	22	2	66	1.7%	1.52 [0.13, 17.67]
Kotelis et al., 2012	8	34	4	85	3.6%	6.23 [1.73, 22.39]
Kruger et al., 2022	0	16	6	164	1.3%	0.74 [0.04, 13.71]
Lee et al., 2011	1	32	4	113	2.0%	0.88 [0.09, 8.15]
Luehr et al., 2019	3	55	9	121	3.4%	0.72 [0.19, 2.76]
Maldonado et al., 2013	11	143	5	111	4.0%	1.77 [0.60, 5.24]
Mariscalco et al., 2009	1	12	3	18	1.8%	0.45 [0.04, 4.98]
Melissano et al., 2012	2	75	2	68	2.3%	0.90 [0.12, 6.60]
Mesar et al., 2021	2	38	1	10	1.7%	0.50 [0.04, 6.15]
Natour et al., 2022	20	446	9	223	4.7%	1.12 [0.50, 2.49]
Natour et al., 2023	7	139	40	362	4.7%	0.43 [0.19, 0.98]
Parsa et al., 2010	0	13	0	25		Not estimable
Patel et al., 2006	0	3	0	13		Not estimable
Patterson et al., 2014.	7	135	29	318	4.6%	0.54 [0.23, 1.28]
Peterson et al., 2006	0	22	4	8	1.2%	0.02 [0.00, 0.49]
Preventza et al., 2008	0	13	2	56	1.2%	0.81 [0.04, 17.82]
Reece et al., 2007	1	7	2	20	1.6%	1.50 [0.11, 19.64]
Teixeira et al., 2017	26	299	25	209	5.3%	0.70 [0.39, 1.25]
Uchida et al., 2019	0	6	0	3		Not estimable
Ullery et al., 2012	7	128	13	402	4.4%	1.73 [0.68, 4.44]
Varkevisser et al., 2020	29	660	17	228	5.2%	0.57 [0.31, 1.06]
VIRTUE Registry et al., 2011.	1	23	2	25	1.7%	0.52 [0.04, 6.18]
Wilson et al., 2013	11	128	26	733	4.9%	2.56 [1.23, 5.31]
Woo et al., 2008	3	42	3	28	2.8%	0.64 [0.12, 3.43]
Xie et al., 2021	8	143	3	28	3.3%	0.49 [0.12, 1.99]
Zamor et al., 2015	2	60	6	20	2.7%	0.08 [0.01, 0.44]
Zha et al., 2022	2	124	44	226	3.3%	0.07 [0.02, 0.28]
Zhang et al., 2015	1	57	7	52	2.1%	0.11 [0.01, 0.97]
Zipfel et al., 2009	2	39	7	63	2.9%	0.43 [0.09, 2.20]
Total (95%CI)		**4580**		**10751**	**100.0%**	**0.67 [0.45, 0.98]**
Total events	267		592			

Heterogeneity: $Tau^2 = 0.63$; $Chi^2 = 107.63$, df = 36 (P < 0.00001); $I^2 = 67\%$
Test for overall effect: Z = 2.09 (P = 0.04)

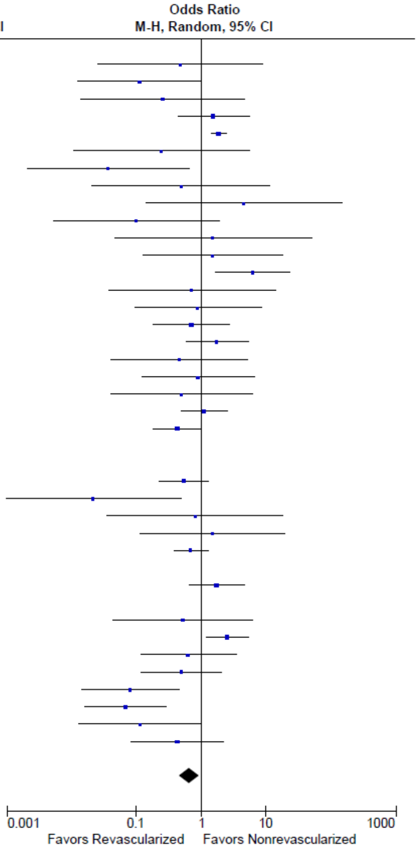


Fig 2. Forest plot of the random-model effect size of stroke. Squares are odds ratios (ORs) of individual studies, lines are 95% confidence intervals (*CIs*), the diamond represents the pooled effect, and the width of the diamond is the 95% CI of the pooled estimate. Studies are listed alphabetically. *df,* Degree of freedom; *M-H,* Mantel-Haenszel test.

Study or Subgroup	Revascularized Events	Revascularized Total	Nonrevascularized Events	Nonrevascularized Total	Weight	Odds Ratio M-H, Random, 95% CI
Arnaoutakis et al., 2014	0	19	0	17		Not estimable
Bradshaw et al., 2017	0	54	2	42	0.9%	0.15 [0.01, 3.18]
Contrella et al., 2015	0	44	1	54	0.8%	0.40 [0.02, 10.08]
Delafontaine et al., 2019	30	1362	122	6411	36.2%	1.16 [0.78, 1.74]
Holt et al., 2010	0	35	3	43	0.9%	0.16 [0.01, 3.26]
Kruger et al., 2022	1	16	4	164	1.6%	2.67 [0.28, 25.41]
Maldonado et al., 2013	6	143	5	111	5.2%	0.93 [0.28, 3.12]
Mesar et al., 2021	1	38	3	10	1.3%	0.11 [0.01, 1.34]
Natour et al., 2022	12	446	8	223	9.1%	0.74 [0.30, 1.84]
Natour et al., 2023	10	139	44	362	14.0%	0.56 [0.27, 1.15]
Patterson et al., 2014	2	135	13	318	3.5%	0.35 [0.08, 1.59]
Peterson et al., 2006	1	22	0	8	0.7%	1.19 [0.04, 32.08]
Teixeira et al., 2017	25	299	24	209	19.7%	0.70 [0.39, 1.27]
Uchida et al., 2019	0	6	0	3		Not estimable
Varkevisser et al., 2020	0	23	2	25	0.8%	0.20 [0.01, 4.39]
Wilson et al., 2013	0	128	3	733	0.9%	0.81 [0.04, 15.82]
Xie et al., 2021	2	143	3	28	2.3%	0.12 [0.02, 0.74]
Zamor et al., 2015	2	60	1	20	1.3%	0.66 [0.06, 7.64]
Zipfel et al., 2009	0	39	1	63	0.8%	0.53 [0.02, 13.27]
Total (95%CI)		**3151**		**8844**	**100.0%**	**0.75 [0.56, 0.99]**
Total events	92		238			

Heterogeneity: $Tau^2 = 0.02$; $Chi^2 = 16.67$, df = 16 (P = 0.41); $I^2 = 4\%$
Test for overall effect: Z = 2.01 (P = 0.04)

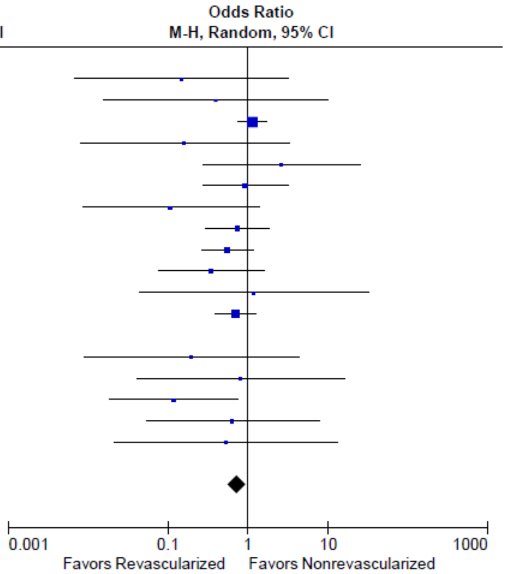


Fig 3. Forest plot of the random-model effect size of spinal cord ischemia. Squares are odds ratios (ORs) of individual studies, lines are 95% confidence intervals (*CIs*), the diamond represents the pooled effect, and the width of the diamond is the 95% CI of the pooled estimate. Studies are listed alphabetically. *df,* Degree of freedom; *M-H,* Mantel-Haenszel test.

Predicting the need for subclavian artery revascularization in thoracic endovascular aortic repair: A systematic review and meta-analysis

Tariq Alanezi, MBBS,[a] Abdulmajeed Altoijry, MD, MSc,[b] Sultan AlSheikh, MD,[b] Husain Al-Mubarak, MD,[b] Musaad Alhamzah, MD, MPH,[b] Faris Alomran, MD,[c] Omer Abdulrahim, MD, MCh,[c] Badr Aljabri, MD,[b] Elisa Greco, MD,[d,e] Mohamad A. Hussain, MD, PhD,[f,g] *and* Mohammed Al-Omran, MD, MSc,[c,d,e,h]
Riyadh, Saudi Arabia; Toronto, ON, Canada; and Boston, MA

(J Vasc Surg 2024;80:922-36.)

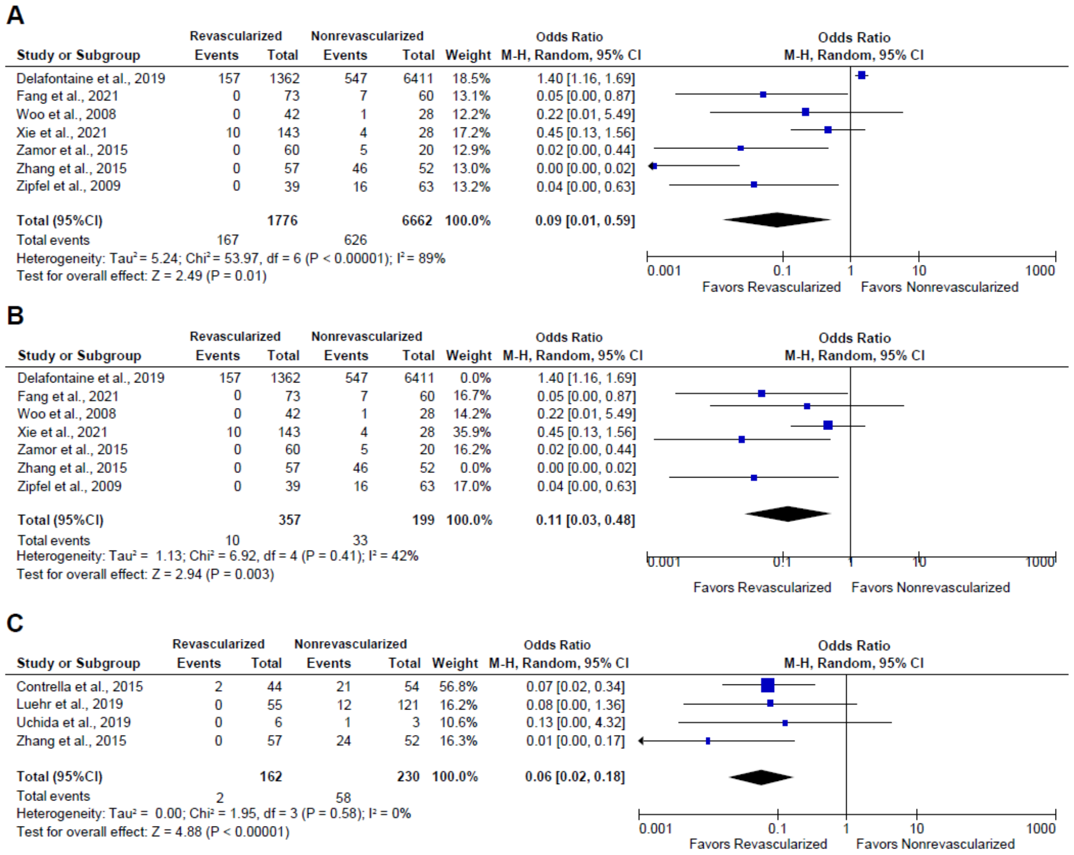


Fig 4. **A,** Forest plot of the random-model effect size of arm ischemia. **B,** Sensitivity analysis using the leave-one-out-analysis method of arm ischemia. **C,** Forest plot of the random-model effect size of arm claudication. In forest plots (**A** and **B**) squares are odds ratios (ORs) of individual studies, lines are 95% confidence intervals (CIs), the diamond represents the pooled effect, and the width of the diamond is the 95% CI of the pooled estimate.

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

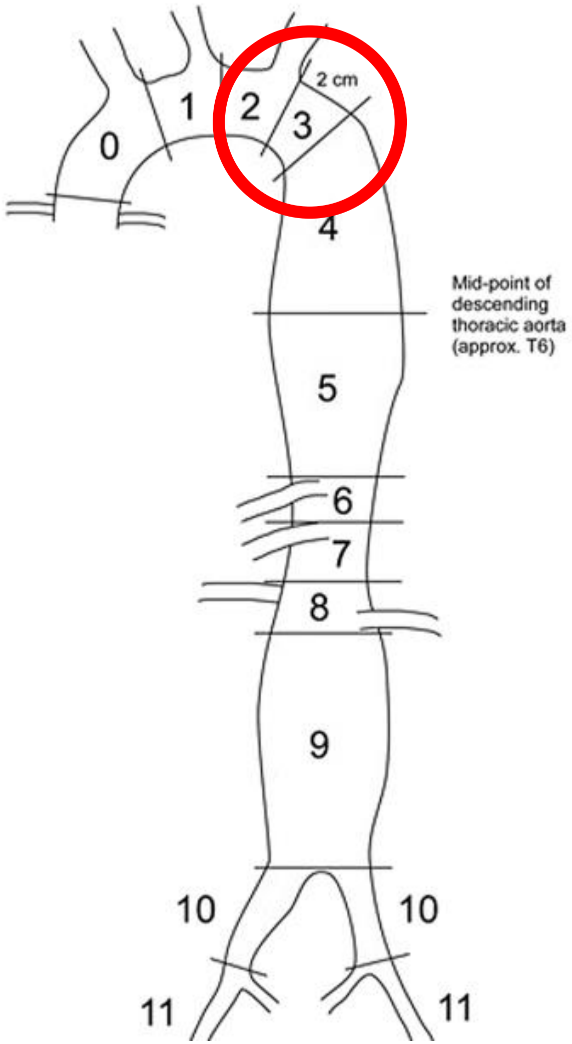
Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

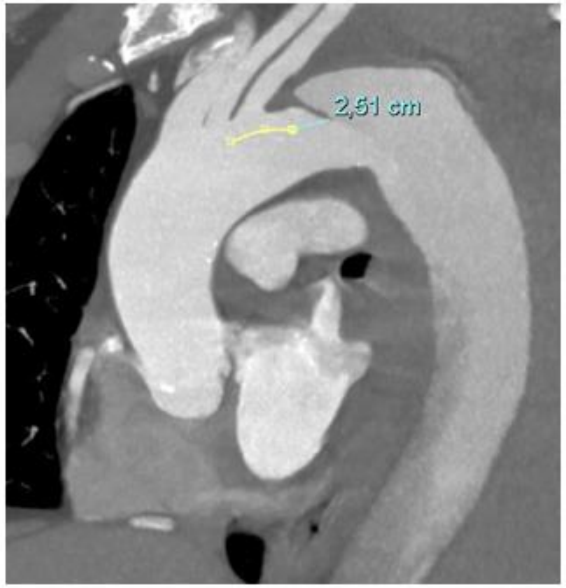
Proximal landing zone and coverage of LSA

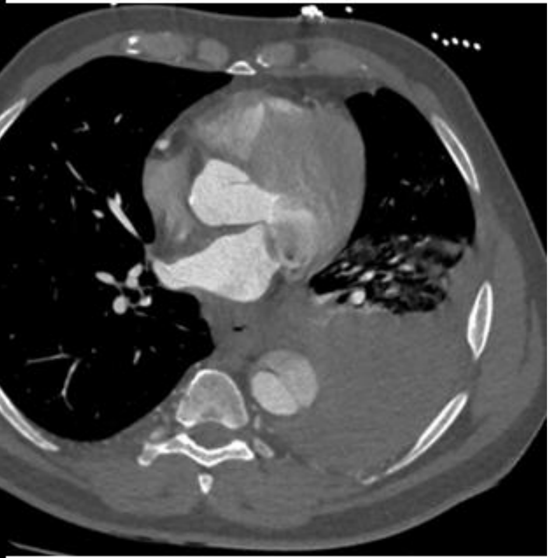
Recommendation 19: For elective TEVAR of a TAA where coverage of the LSA is necessary for adequate stent graft seal, we suggest preoperative or concomitant LSA revascularization. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**

Recommendation 21: For patients with acute thoracic emergencies, for whom TEVAR is required urgently and coverage of the LSA is necessary, it is suggested that revascularization be individualized and addressed on the basis of the patient's anatomy and urgency of the procedure. **Level of recommendation: Grade 2 (Weak), Quality of Evidence: B (Moderate)**

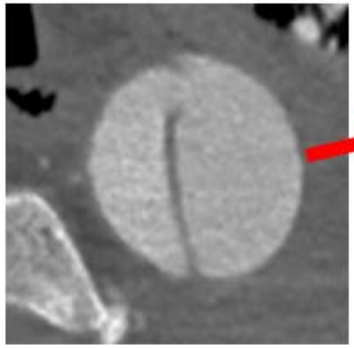


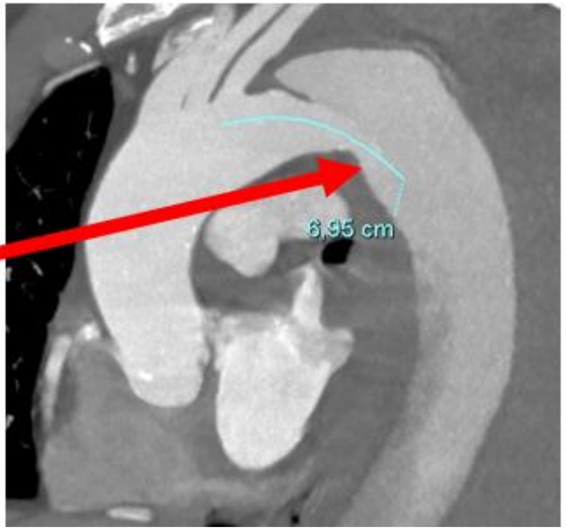
Type B AD



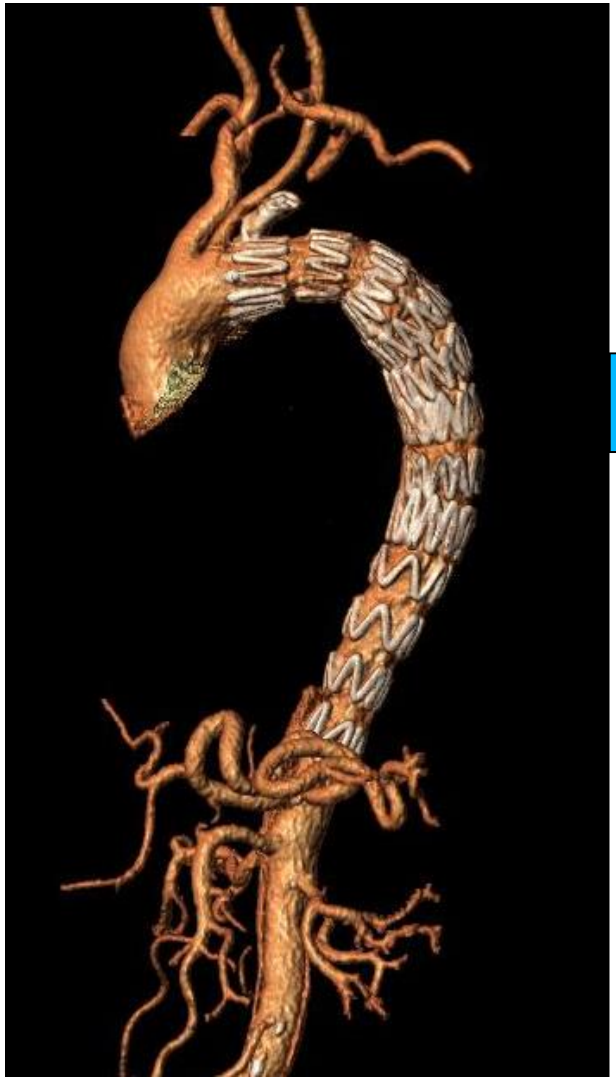


Proximal entry tear





Type B AD



12 hours after the endovascular procedure the patient presented Paraplegia !!!

TEVAR - LSA revascularization

- Surgical (Bypass)

- Endo

Case # 1

Arch Type III

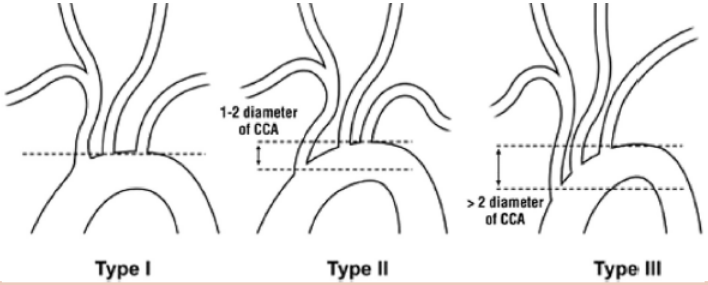
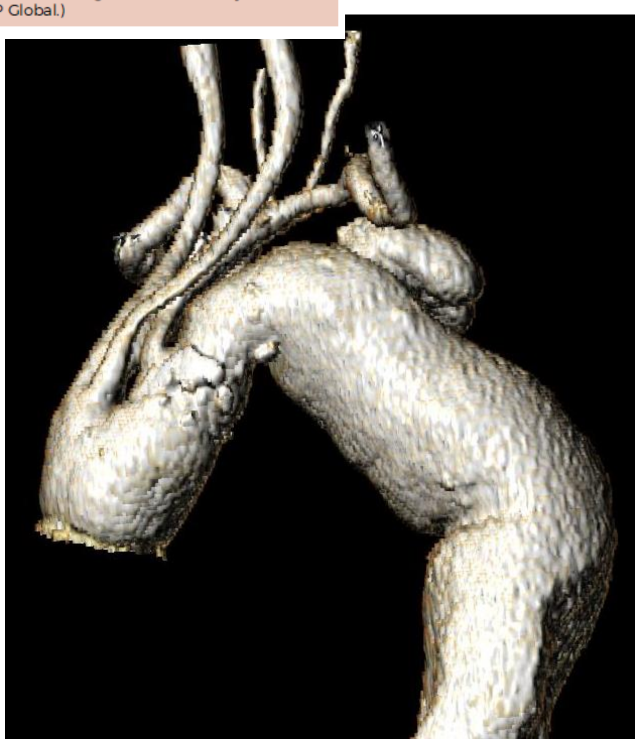
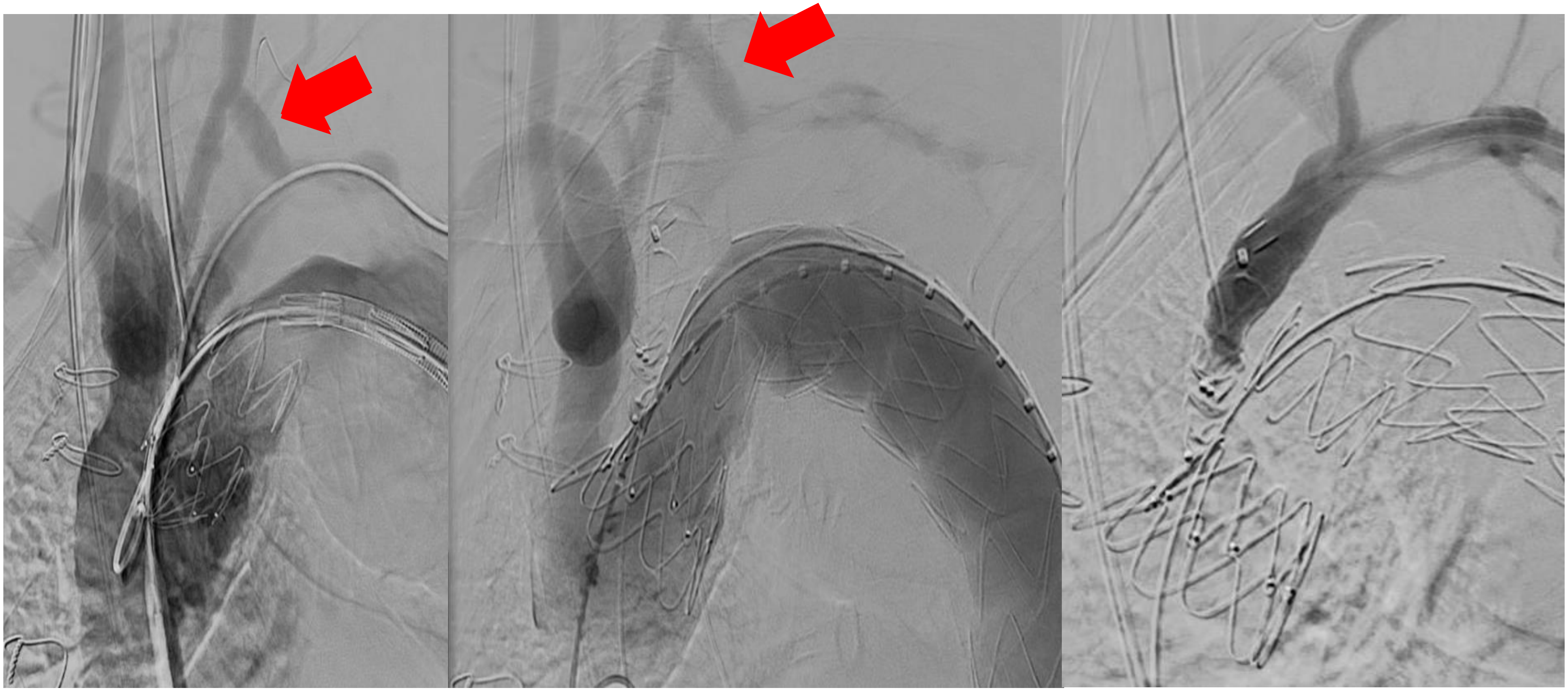
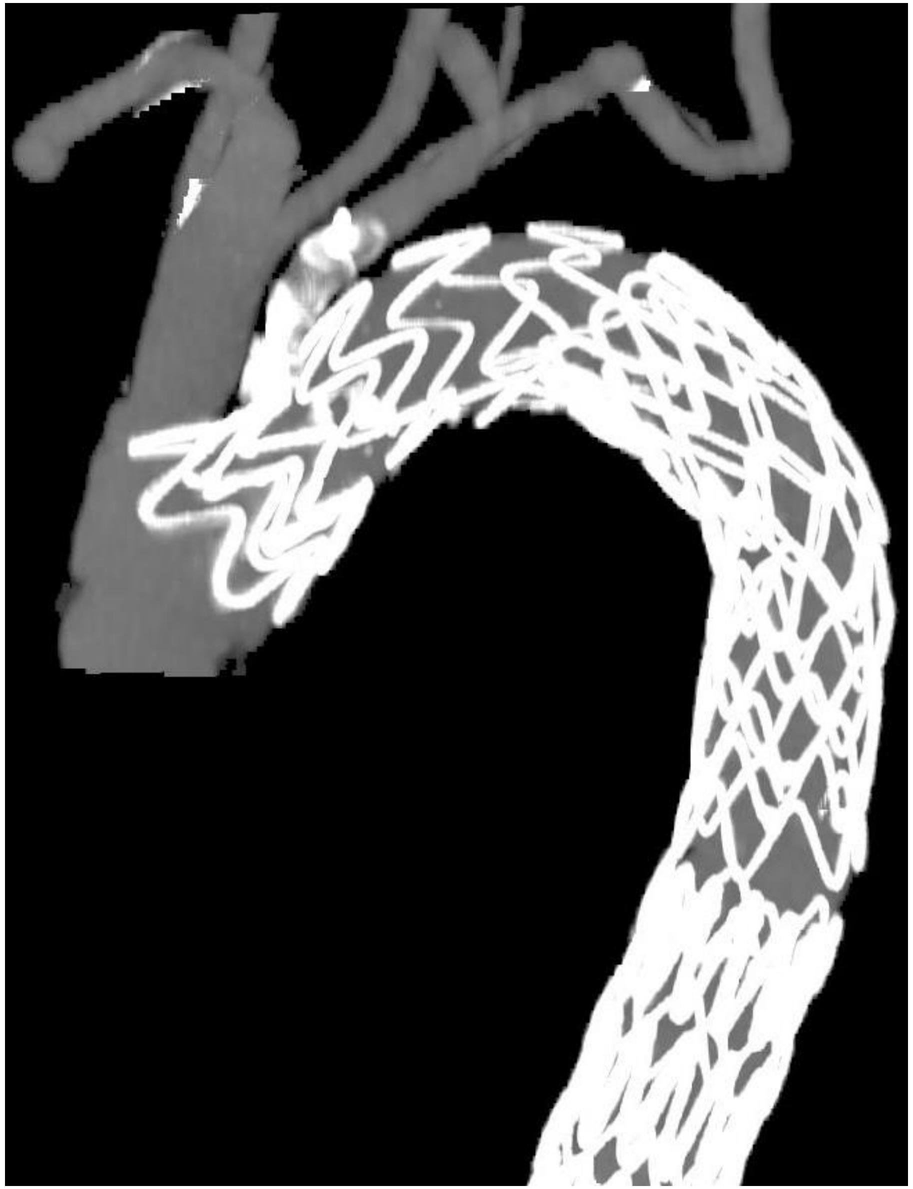
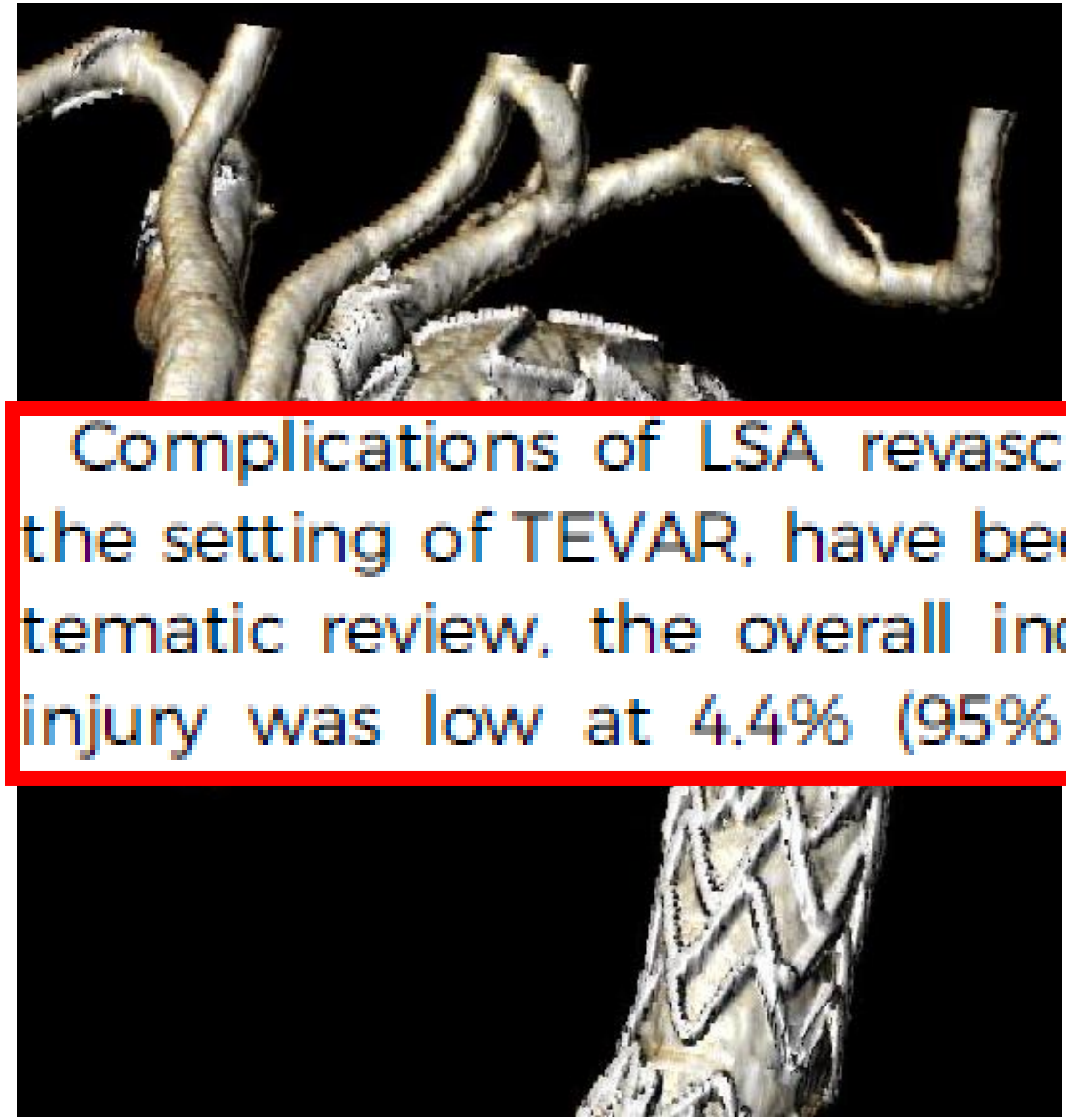


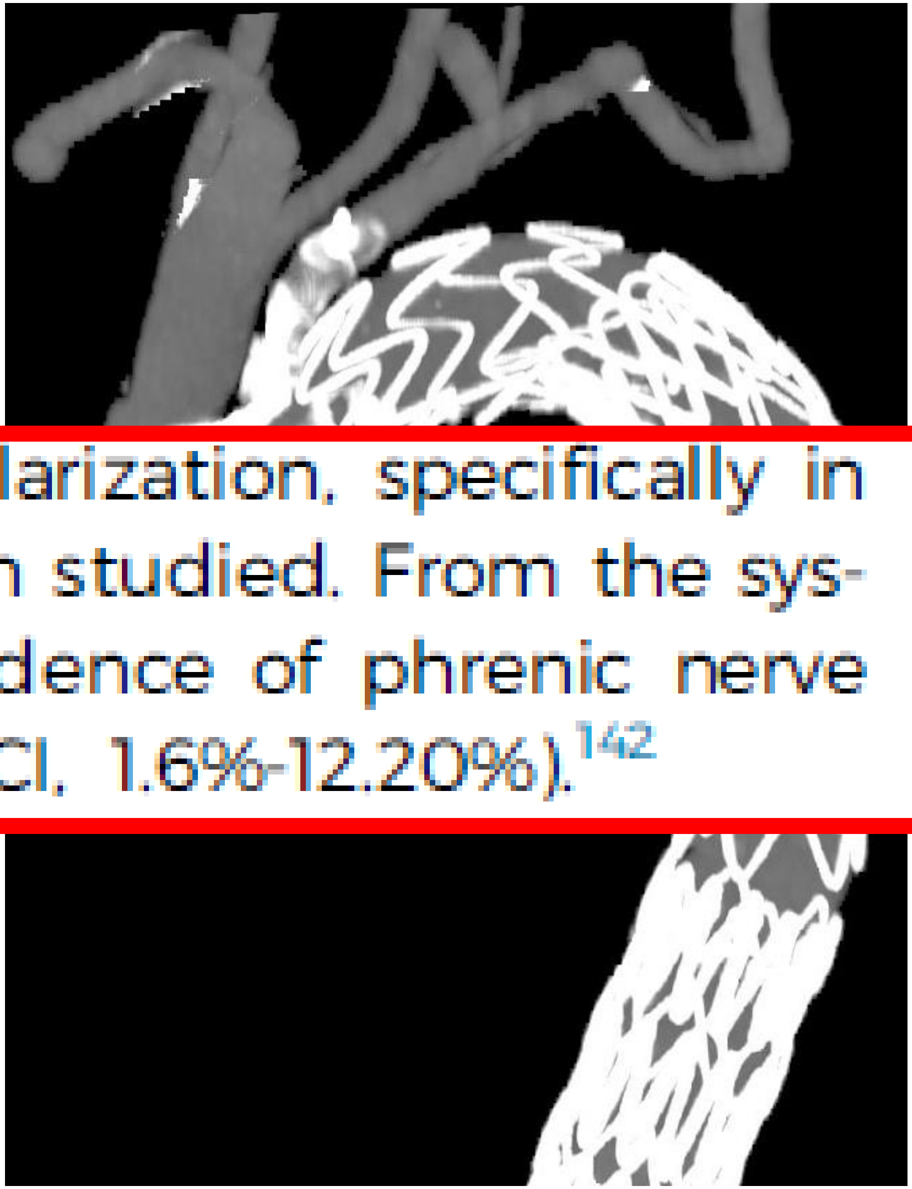
Fig 2. Classification of the aortic arch. *CCA*, Common carotid artery. (Reproduced from Madhwal S, Rajagopal V, Bhatt DL, Bajzer CT, Whitlow P, Kapadia SR. Predictors of difficult carotid stenting as determined by aortic arch angiography. J Invasive Cardiol 2008;20:200-4. Permission from HMP Global.)











Complications of LSA revascularization, specifically in the setting of TEVAR, have been studied. From the systematic review, the overall incidence of phrenic nerve injury was low at 4.4% (95% CI, 1.6%-12.20%).[142]

TEVAR - LSA revascularization

- Surgical (Bypass)

- Endo
  - Fenestrated endograft
  - Branched endograft

Eur J Vasc Endovasc Surg (2021) 62, 887–895

Pre-Loaded Fenestrated Thoracic Endografts for Distal Aortic Arch Pathologies: Multicentre Retrospective Analysis of Short and Mid Term Outcomes

Nikolaos Tsilimparis [a,*,†], Carlota F. Prendes [a,†], Guido Rouhani [b], Donald Adam [c], Nuno Dias [d], Jan Stana [a], Fiona Rohlffs [a], Kevin Mani [f], Anders Wanhainen [f,g], Tilo Kölbel [a]

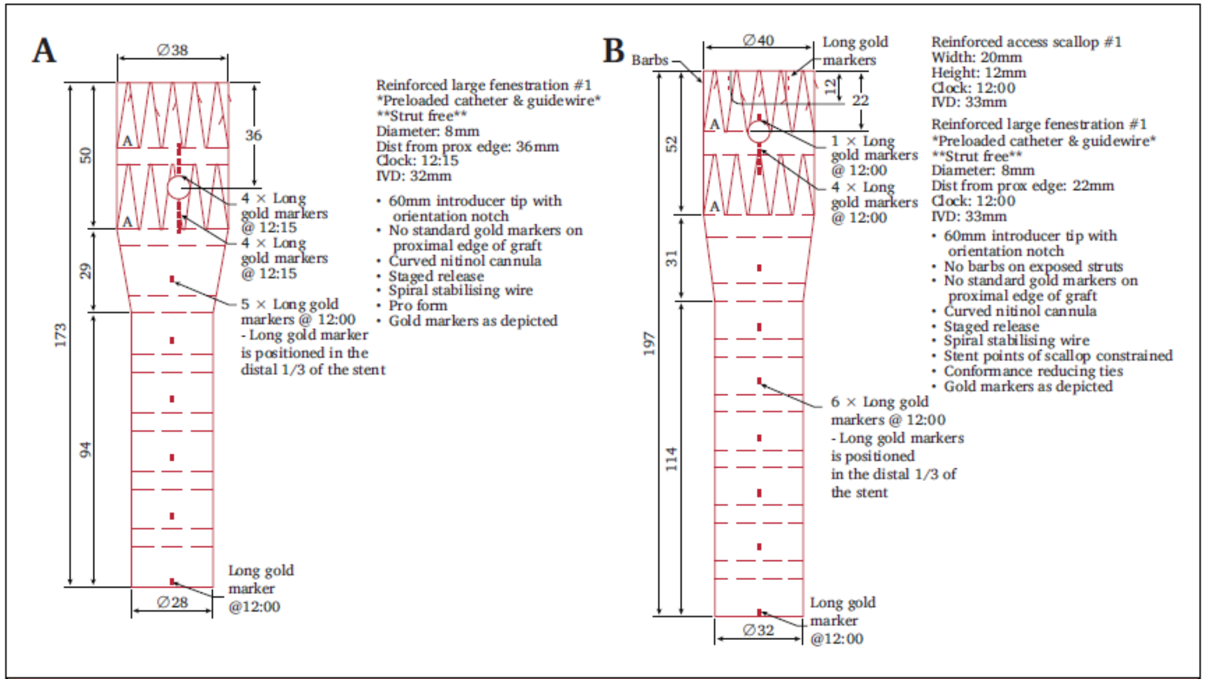


Figure 1. Fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft design plans: (A) stent graft with a fenestration and (B) stent graft with a scallop and a fenestration. Measurements are in millimetres.

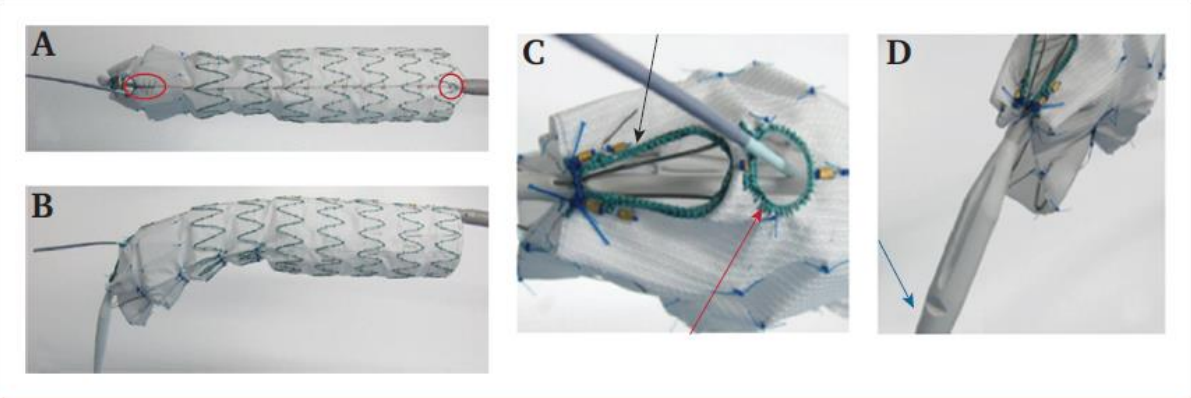
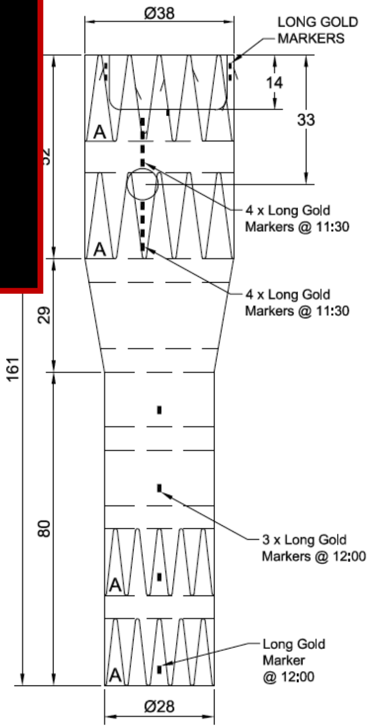


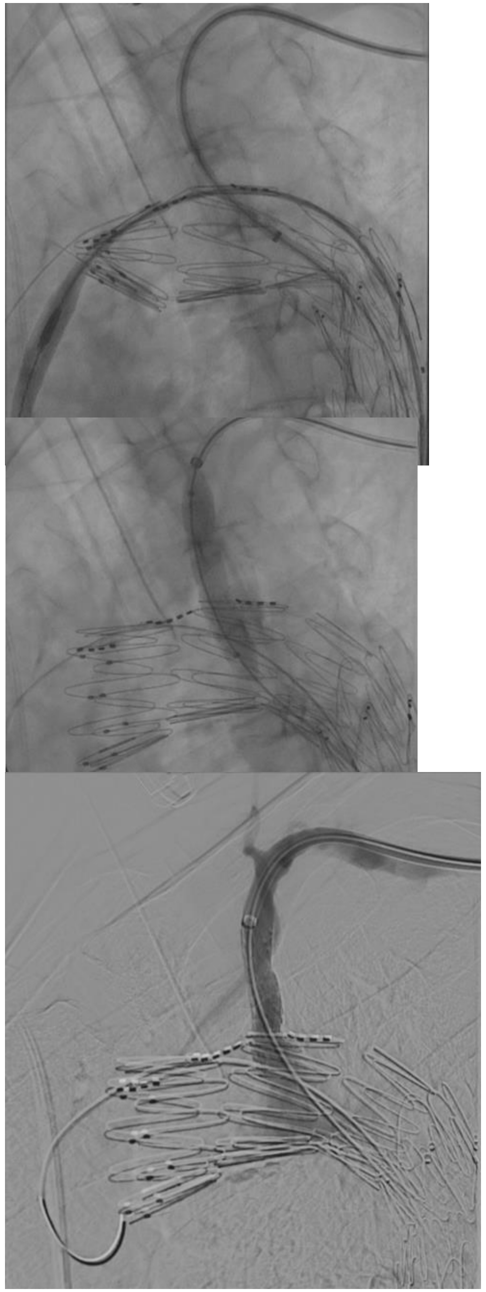
Figure 2. Fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft characteristics. (A) Stent graft loaded onto the delivery catheter. The long gold markers (red circles) serve to mark the end of the fenestration and for orientation, visualised also in Fig. 1. (B) Conformance reducing ties on the inner curvature of the graft and the pre-curved form of the delivery system. (C) Scallop (black arrow) at 12:00 and fenestration (red arrow) at 12:00. (D) Proximal attachment, improving the precision of the delivery. Blue arrow indicates notch in the tip.

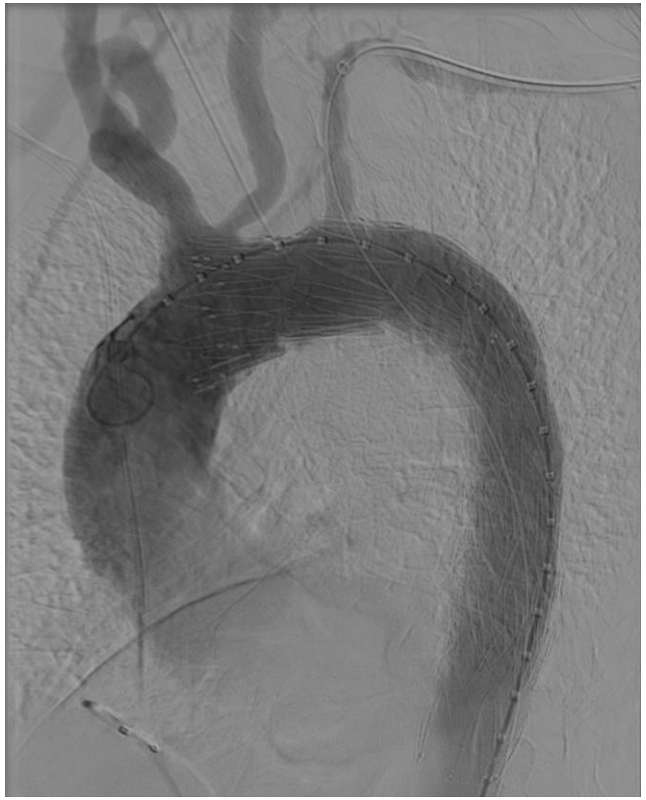


REINFORCED SCALLOP #1
WIDTH: 30mm
HEIGHT: 14mm
CLOCK: 12:15
IVD: 33mm

REINFORCED LARGE FENESTRATION #1
Preloaded Catheter & Guidewire
Strut Free
DIAMETER: 8mm
DIST FROM PROX EDGE: 33mm
CLOCK: 11:30
IVD: 32mm

- 60mm Introducer Tip with Orientation Notch
- **NO** Barbs on exposed struts
- **NO** Standard Gold Markers on Proximal edge of graft
- Curved Nitinol Cannula
- Staged Release
- Spiral Stabilising Wire
- Double Diameter Reducing Ties
- Gold Markers as depicted





- ✓ Uneventful for Vascular reasons
- ✓ No SCI
- ✓ No splanchnic ischemia
- ✓ No Neurological Events
- ✓ Discharged Home after 7 days
- ✓ Freedom from re-intervention at 3 Years follow-up

Eur J Vasc Endovasc Surg (2021) 62, 887–895

Pre-Loaded Fenestrated Thoracic Endografts for Distal Aortic Arch Pathologies: Multicentre Retrospective Analysis of Short and Mid Term Outcomes

Nikolaos Tsilimparis [a,*,†], Carlota F. Prendes [a,†], Guido Rouhani [b], Donald Adam [c], Nuno Dias [d], Jan Stana [a], Fiona Rohlffs [e], Kevin Mani [f], Anders Wanhainen [f,g], Tilo Kölbel [e]

	Patients (n = 108)	p value*
Aortic diameter – mm	59.2 ± 12.2	.23
Symptomatic	16 (14.8)	.56
Type of aortic pathology		.46
Degenerative aneurysm	39 (36.1)	
Post-dissecting aneurysm	42 (38.9)	
PAU / pseudoaneurysm	17 (15.7)	
Other	10 (9.3)	
Endograft design		.087
Fenestration only	44 (40.7)	
Fenestration + scallop	64 (59.3)	
Scallop target vessel		.092
LCA	43 (67.2)	
IA	18 (28.1)	
Bovine arch	3 (4.7)	
Fenestration target vessel		.32
LSA	87 (80.6)	
LCA	21 (19.4)	
Proximal landing zone		.048
Zone 0	21 (19.4)	
Zone 1	45 (41.7)	
Zone 2	42 (38.9)	
LCA stent graft		.28
Advanta V12	21 (100)	
Diameter – mm	8.7 ± 1	
Length (range) – mm	38.5 ± 5.4 (32 – 59)	
LSA stent graft		.67
Advanta V12	68 (77.3)	
BeGraft	3 (3.4)	
VBX	5 (5.7)	
Other	6 (9)	
Diameter – mm	9.15 ± 1.1	
Length (range) – mm	39.6 ± 8.4 (22 – 59)	
Low profile device	8 (7.8)	.55
Technical success	107 (99.1)	<.001

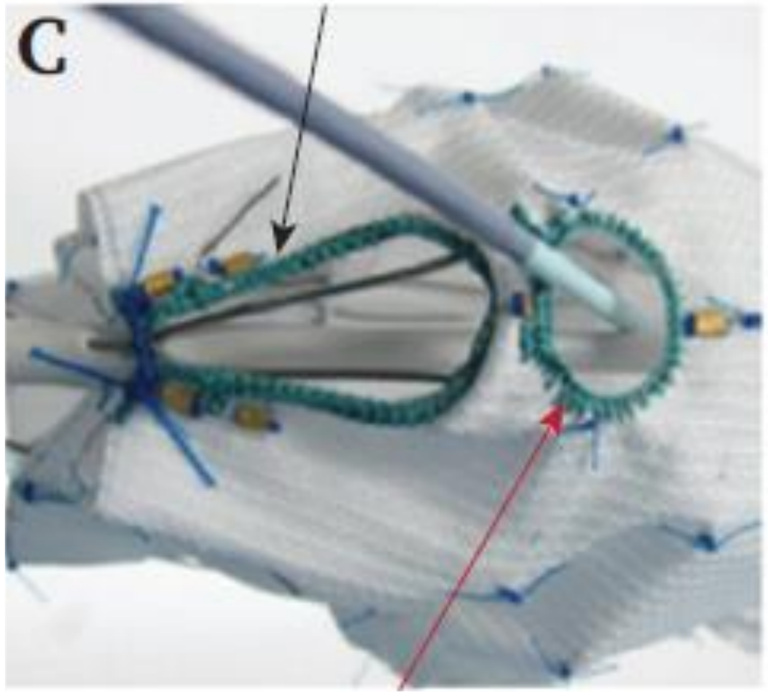


Table 3. Thirty day and midterm outcomes of 108 patients treated with fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft for distal aortic arch pathology

	Patients (n = 108)
30 day mortality	3.7
30 day post-operative complications	
Stroke	7.5
Major	5.6
Minor	1.9
[illegible]	[illegible]
Chronic heart failure	5.6
Acute kidney injury	4.6
Temporary dialysis	3.7
Permanent dialysis	.9
Spinal cord injury	3.7
Retrograde Type A dissection	2.8
SIRS	2.8
Myocardial infarctions	1.9
Vascular access complication	22.4
Intensive care unit stay – d	2 (1, 3)
Early re-intervention rate	9.4
Post-operative stay – d	6 (5, 9)
Discharge location	
Home	85.6
Another hospital	3.8
Rehabilitation centre	7.7
Median follow up – mo	12.8 (1, 96)
Late re-intervention rate	23.1
Late aortic related complications	
Aortic rupture	2.8
Conversion to open repair	1.9
Graft infection	.9
Rate of late endoleaks	
Type Ia	3.8
Type Ib	2.9
Type II	4.8
Type III	2.9
Changes in the aneurysm sac on last CTA	
Unchanged	48.1
> 5 mm enlargement	6.5
> 5 mm decrease	34.3
Primary target vessel patency	
IA	100
LCA	98.1
LSA	89.3

Eur J Vasc Endovasc Surg (2021) 62, 887–895

Pre-Loaded Fenestrated Thoracic Endografts for Distal Aortic Arch Pathologies: Multicentre Retrospective Analysis of Short and Mid Term Outcomes

Nikolaos Tsilimparis [a,*,†], Carlota F. Prendes [a,†], Guido Rouhani [b], Donald Adam [c], Nuno Dias [d], Jan Stana [a], Fiona Rohlffs [e], Kevin Mani [f], Anders Wanhainen [f,g], Tilo Kölbel [e]

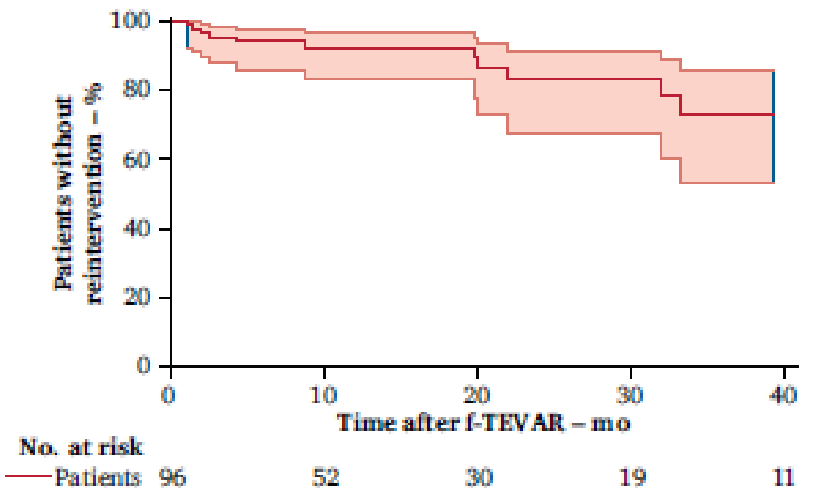


Figure 3. Cumulative Kaplan–Meier estimate of freedom from re-intervention in a multicentre retrospective cohort of 108 patients treated by fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft for distal aortic arch pathology. Only 96 patients are reported at time zero because nine patients had no follow up data and three patients had missing data regarding long term re-interventions and are therefore excluded from the survival estimates.

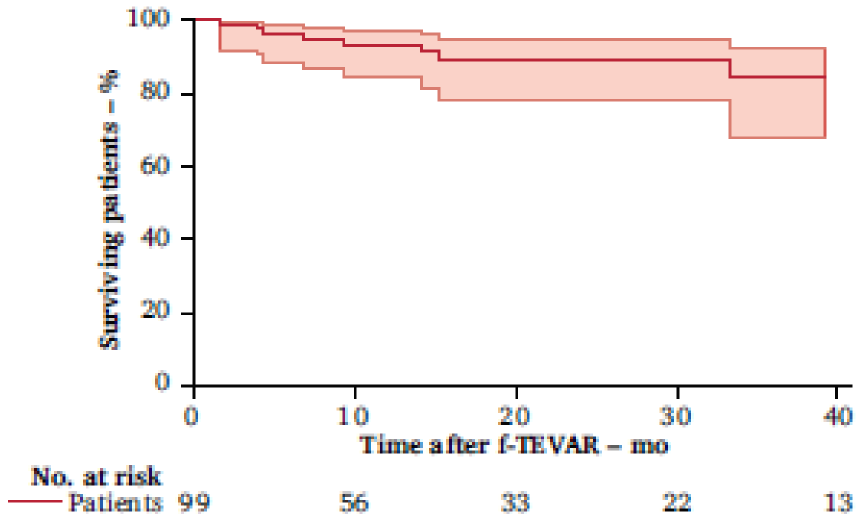


Figure 4. Cumulative Kaplan–Meier estimate of survival in a multicentre retrospective cohort of 108 patients treated by fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft for distal aortic arch pathology. Only 99 patients are reported at time zero because nine patients had no follow up data and were therefore excluded from this analysis.

Eur J Vasc Endovasc Surg (2021) 62, 887–895

Pre-Loaded Fenestrated Thoracic Endografts for Distal Aortic Arch Pathologies: Multicentre Retrospective Analysis of Short and Mid Term Outcomes

Nikolaos Tsilimparis [a,*,†], Carlota F. Prendes [a,†], Guido Rouhani [b], Donald Adam [c], Nuno Dias [d], Jan Stana [a], Fiona Rohlffs [e], Kevin Mani [f], Anders Wanhainen [f,g], Tilo Kölbel [e]

Conclusion: This multicentre study shows that treatment of the distal aortic arch by f-TEVAR is feasible, with promising 30 day mortality, stroke, and spinal cord ischaemia rates.

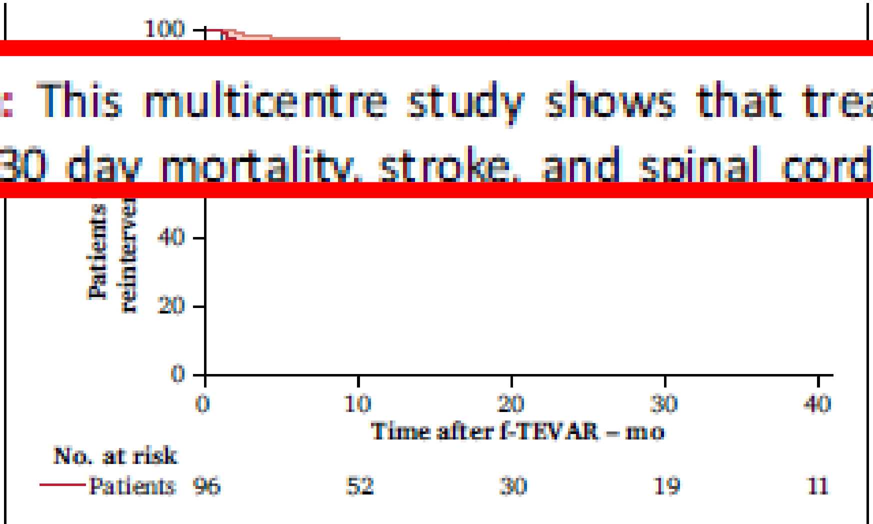


Figure 3. Cumulative Kaplan–Meier estimate of freedom from re-intervention in a multicentre retrospective cohort of 108 patients treated by fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft for distal aortic arch pathology. Only 96 patients are reported at time zero because nine patients had no follow up data and three patients had missing data regarding long term re-interventions and are therefore excluded from the survival estimates.

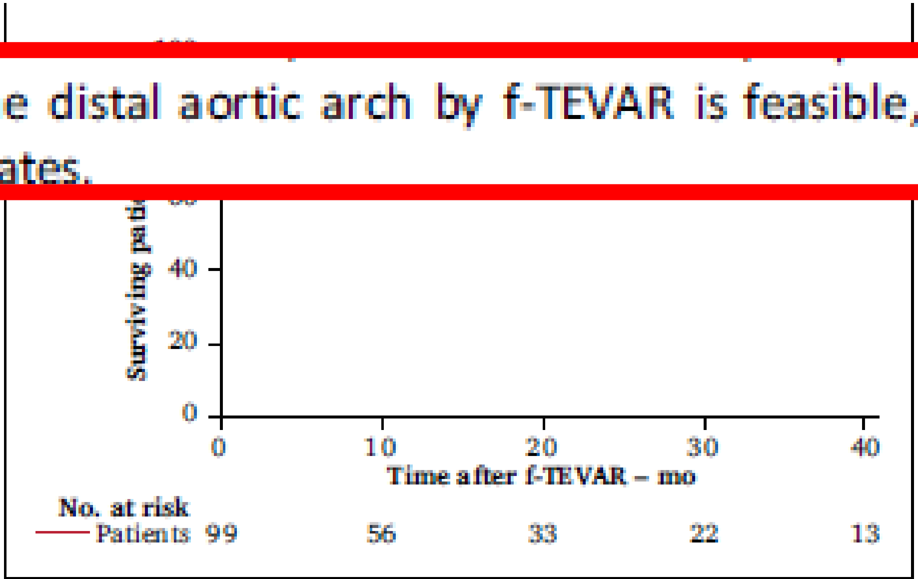


Figure 4. Cumulative Kaplan–Meier estimate of survival in a multicentre retrospective cohort of 108 patients treated by fenestrated thoracic endovascular aortic repair (f-TEVAR) stent graft for distal aortic arch pathology. Only 99 patients are reported at time zero because nine patients had no follow up data and were therefore excluded from this analysis.

Journal of Endovascular Therapy
OnlineFirst

https://doi.org/10.1177/15266028231215779

Sage Journals

Clinical Investigation

Zone 2 Aortic Arch Repair With Single-Fenestrated Physician-Modified Endografts, at Least 3 Years of Follow-up

Christoph Bacri, MD [1], Baris Ata Ozdemir, FRCS, PhD [2], Kheira Hireche, MD [1,3], Pierre Alric, MD, PhD [1,3], and Ludovic Canaud, MD, PhD [1,3]

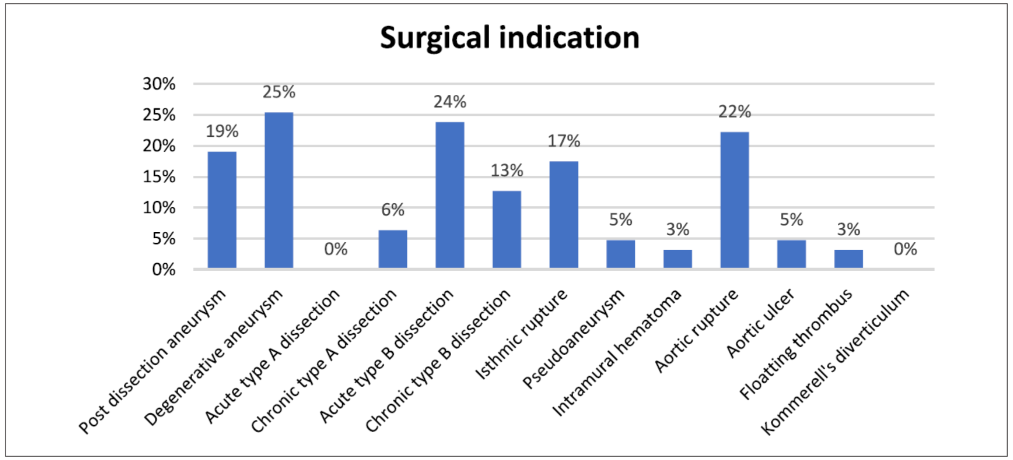
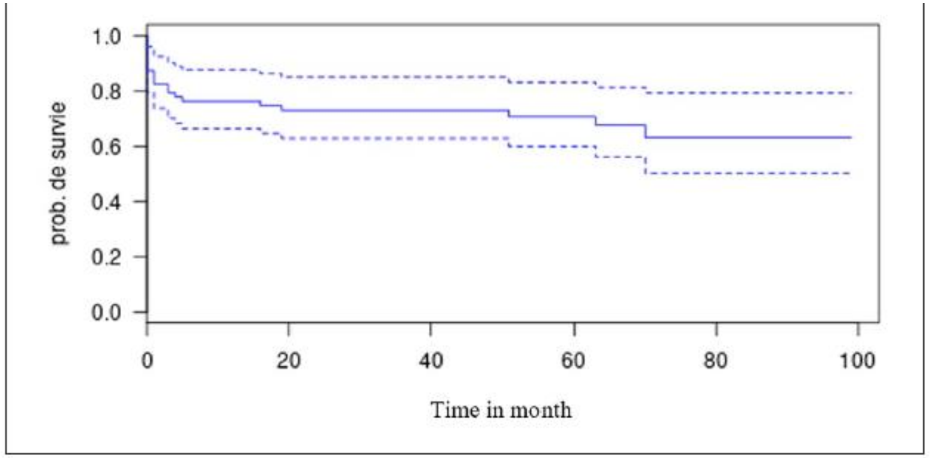


Figure 3 . Surgical indications of the 63 patients treated by single-fenestrated physician-modified endografts (PMEGs), in percentage.

Table 3. 30 Days of Follow-up of 63 Patients Treated With Single-Fenestrated PMEG.

Variables	Total (n=63)
30 Days of follow-up, n (%)	
Type 1 endoleak	0 (0%)
Type 2 endoleak requiring reintervention	0 (0%)
Type 3 endoleak requiring reintervention	0 (0%)
Stroke	2 (3%)
Death	6 (10%)
Access relate complication	4 (6%)
Retrograde dissection	1 (2%)
Proximal migration	0 (0%)
Technical failure	1 (2%)
Reintervention	2 (3%)
In-hospital stay (days), median [Q1; Q3]	5 [4; 9]



Journal of Clinical Medicine

MDPI

Article

Comparative Retrospective Cohort Study of Carotid-Subclavian Bypass versus In Situ Fenestration for Left Subclavian Artery Revascularization during Zone 2 Thoracic Endovascular Aortic Repair: A Single-Center Experience

Evren Ozcinar, Nur Dikmen *, Cagdas Baran, Onur Buyukcakir, Melisa Kandemir and Levent Yazicioglu

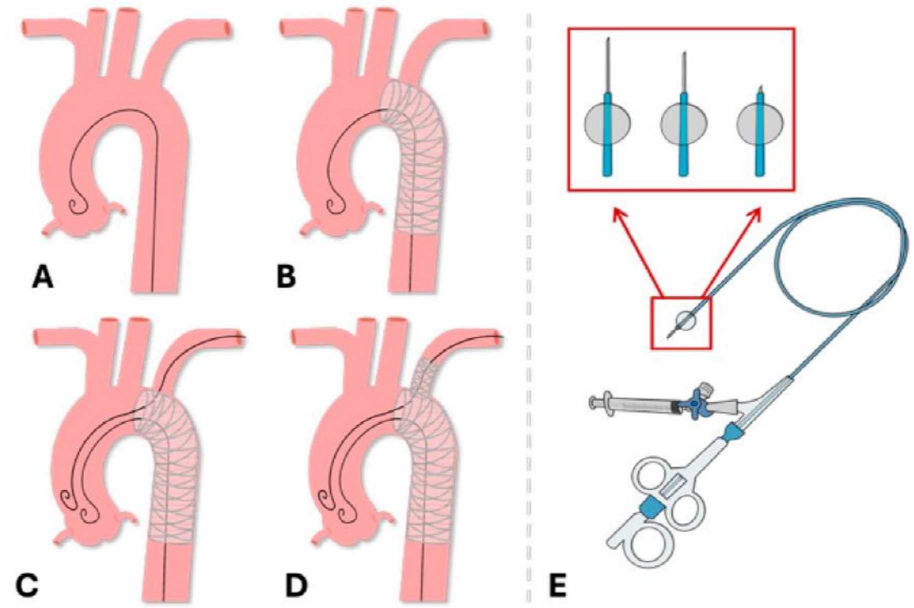


Table 2. Outcomes.

		ISF	Carotid–LSA Bypass	
Mean Operation Time(min)		78 (52–124)	138 (64–248)	0.034
0–30 Days Mortality	5	2	3	0.603
1–24 Months Mortality	4	0	4	0.556
Total Hospital Duration	13.86 ± 22.97	10.36 ± 10.27	15.03 ± 25.75	0.116
Pre-op Hemoglobin Level (g/dL)	11.66 ± 1.89	12.27 ± 2.36	11.42 ± 1.66	0.452
Post-op Hemoglobin Level (g/dL)	10.42 ± 1.79	10.66 ± 2.07	10.32 ± 1.70	0.351
Pre-op Creatinine Level (mg/dL)	1.02 ± 0.50	1.04 ± 0.33	1.01 ± 0.56	0.140
Post-op Creatinine Level (mg/dL)	1.09 ± 0.58	1.23 ± 0.50	1.03 ± 0.61	0.68
Major Adverse Events in 30 days				
Stroke	3	1	2	0.807
Transient Ischemic Attack	1	1	0	0.273
Spinal Cord Ischemia	1	0	1	0.536
Endoleaks				
Type 1	3	0	3	0.551
Type 2	0	0	0	*
Type 3	0	0	0	*
Type 4	0	0	0	*
Patency During 24 Months	49	19	30	0.624
Necessity of Reintervention	5	2	3	0.915

*: There is no difference since both groups are zero. Statistical significance cannot be calculated.

TEVAR - LSA revascularization

- Surgical (Bypass)
- Endo
  - Fenestrated endograft
  - Branched endograft

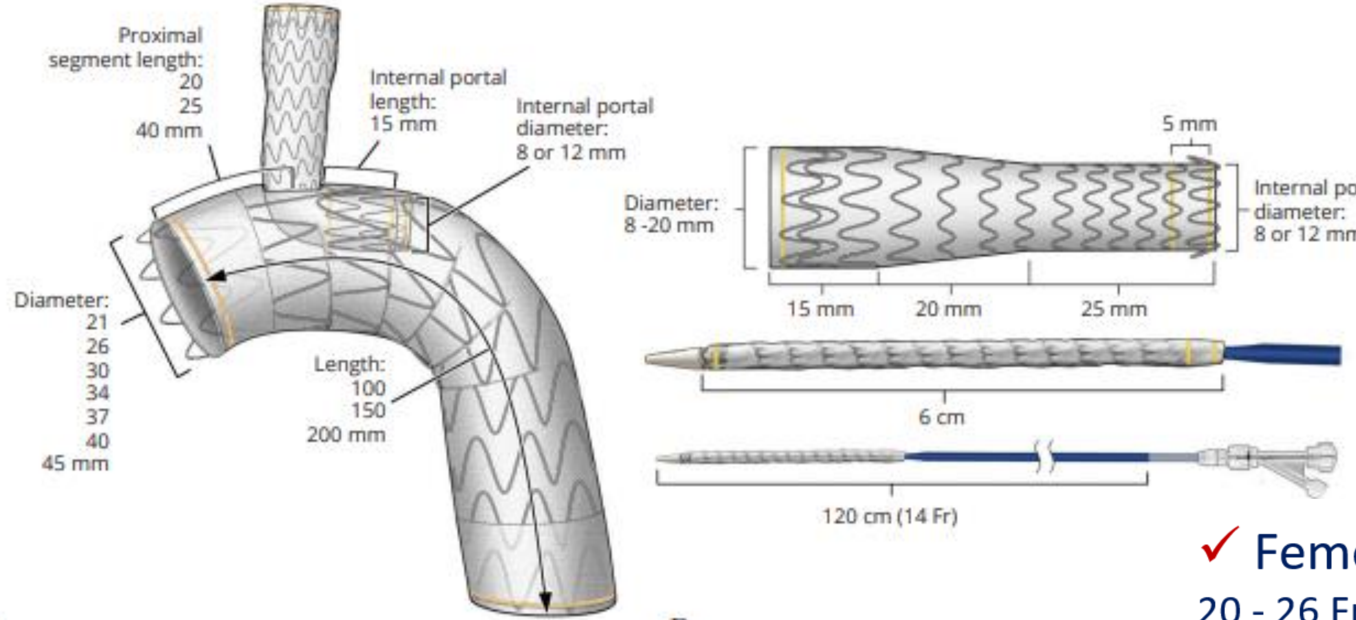
The Journal of Cardiovascular Surgery 2023 February;64(1):18-25
DOI: 10.23736/S0021-9509.22.12564-4

REVIEW

AORTIC ARCH

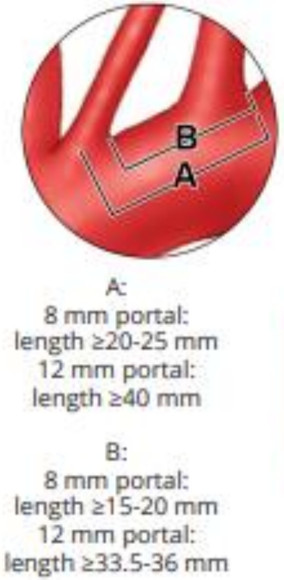
Technical tips and clinical experience with the Gore Thoracic Branch Endoprosthesis®

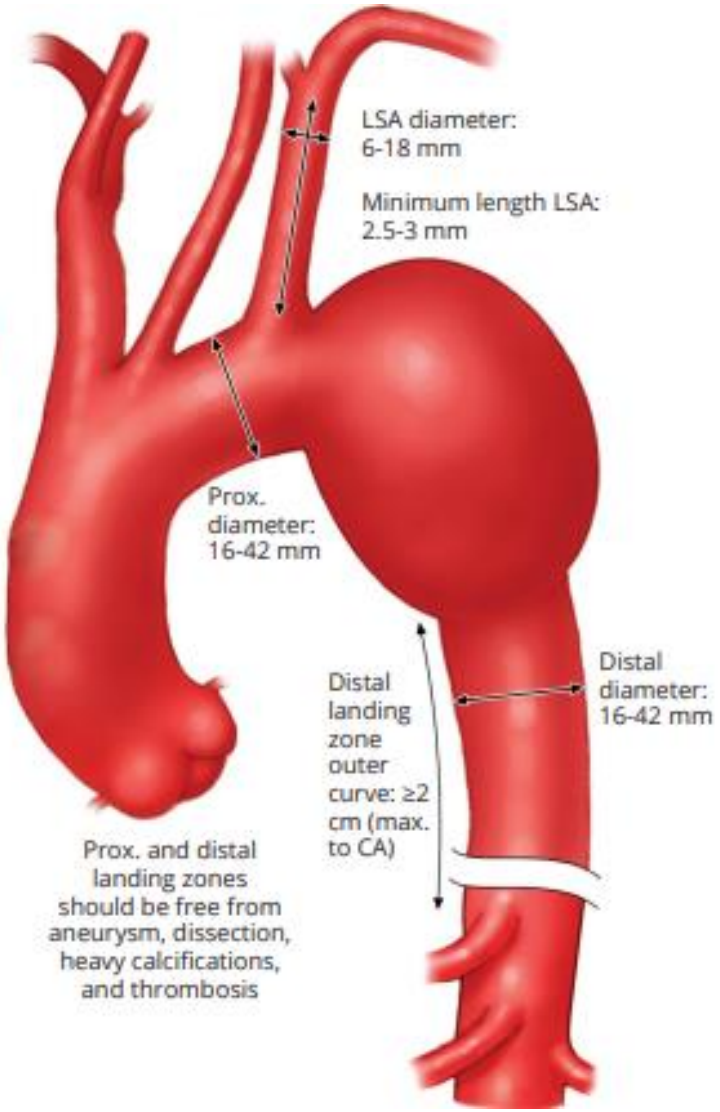
Andrea VACIRCA, Emanuel R. TENORIO, Thomas MESNARD, Titia SULZER,
Aidin BAGHBANI-OSKOUEI, Aleem K. MIRZA, Ying HUANG, Gustavo S. ODERICH *



A

B





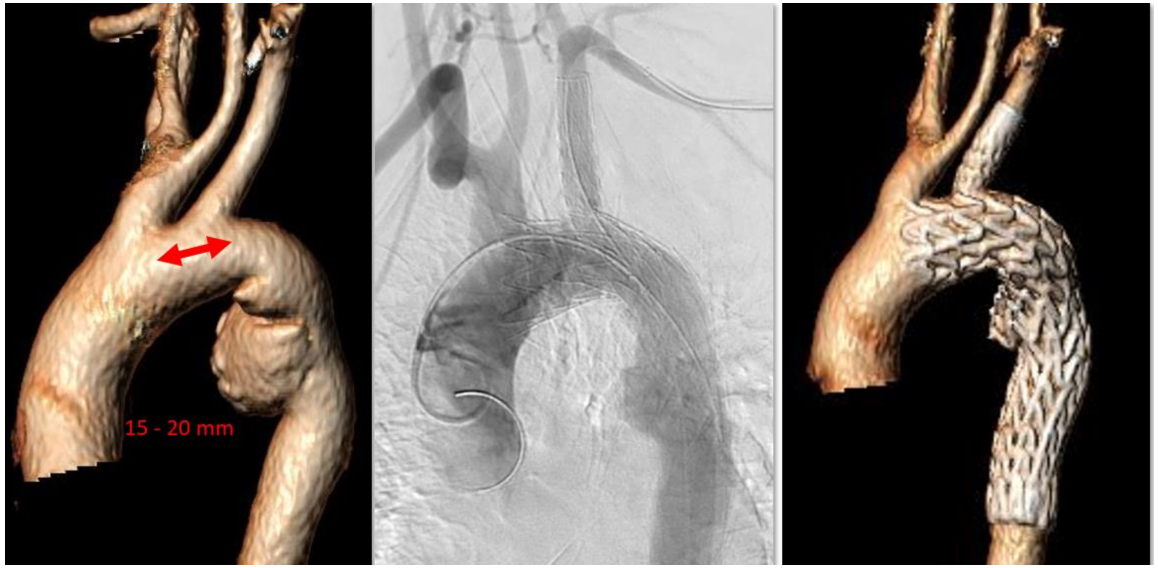
✓ **Femoral iliac access**

20 - 26 Fr

✓ **Sealing zone**

20 mm length, OS 10 - 15%

2024 CE mark approval


15 - 20 mm


33 -36 mm

Evaluation of the Gore TAG thoracic branch endoprosthesis in the treatment of proximal descending thoracic aortic aneurysms

Michael D. Dake, MD,[a] Michael P. Fischbein, MD, PhD,[b] Joseph E. Bavaria, MD,[c] Nimesh D. Desai, MD, PhD,[c] Gustavo Oderich, MD,[d] Michael J. Singh, MD,[e] Mark Fillinger, MD,[f] Bjoern D. Suckow, MD,[f] Jon S. Matsumura, MD,[g] *and* Himanshu J. Patel, MD,[h] *Tuscon, Ariz; Palo Alto, Calif; Philadelphia and Pittsburgh, Pa; Rochester, Minn; Lebanon, NH; and Madison and Ann Arbor, Wis*

JVS 2021

Aorta and Major Branches

Eur J Vasc Endovasc Surg (2022) 64, 639—645

Midterm Outcomes of Endovascular Repair of Aortic Arch Aneurysms with the Gore Thoracic Branch Endoprosthesis

Nathan L. Liang [a,*], Michael D. Dake [b], Michael P. Fischbein [c], Joseph E. Bavaria [d], Nimesh D. Desai [d], Gustavo S. Oderich [e], Michael J. Singh [a], Mark Fillinger [f], Bjoern D. Suckow [f], Jon S. Matsumura [g], Himanshu J. Patel [h], Michel S. Makaroun [a]

[a] Division of Vascular Surgery, University of Pittsburgh Medical Centre, Pittsburgh, PA, USA
[b] Department of Medical Imaging, University of Arizona Health System, Tucson, AZ, USA
[c] Department of Cardiothoracic Surgery, Stanford University Hospitals, Palo Alto, CA, USA
[d] Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, USA
[e] Department of Cardiothoracic and Vascular Surgery, The University of Texas Health Science Centre at Houston, McGovern Medical School, Houston, TX, USA
[f] Section of Vascular of Surgery, Dartmouth-Hitchcock Medical Centre, Lebanon, NH, USA
[g] Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison WI, USA
[h] Department of Cardiac Surgery, University of Michigan Frankel Cardiovascular Centre, Ann Arbor, MI, USA

Early outcomes of endovascular repairs of the aortic arch using thoracic branch endoprosthesis

Haley J. Pang, BS,[a,c] Andrew S. Warren, BS, BA,[a,d] Kirsten D. Dansey, MD, MPH,[a] Christopher Burke, MD,[b] Scott DeRoo, MD,[b] Matthew P. Sweet, MD,[a] Matthew Smith, MD, PhD,[a] *and* Sara L. Zettervall, MD, MPH,[a] *Seattle and Yakima, WA*

JVS 2022

Early experience with the Gore TAG thoracic branch endoprosthesis for treatment of acute aortic pathology

Kathryn DiLosa, MD, MPH, Cara Pozolo, MD, Thomas Heafner, MD, Misty Humphries, MD, MAS, Mimmie Kwong, MD, MAS, *and* Steven Maximus, MD, *Sacramento, CA*

JVS 2024

Applicability of a standardized thoracic endograft with a single branch for the left subclavian artery to treat aortic disease involving the distal arch

Check for updates

Justine Mougin, MD,[a] Jonathan Sobocinski, MD, PhD,[b] Jarin Kratzberg, PhD,[c] Dominique Fabre, MD, PhD,[a] *and* Stéphan Haulon, MD, PhD,[a] *Le Plessis-Robinson and Lille, France; and West Lafayette, Ind*

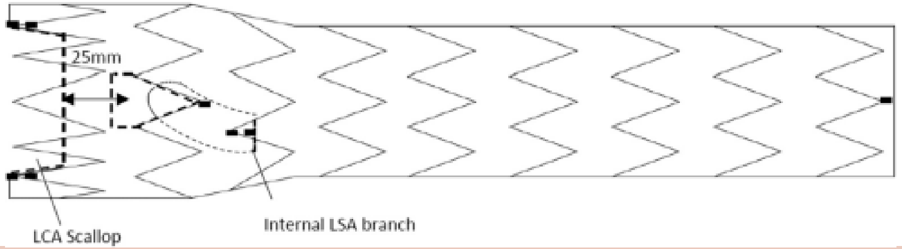


Fig 3. Proposed off-the-shelf (OTS) thoracic endograft for subclavian perfusion. *LCA*, Left carotid artery; *LSA*, left subclavian artery.

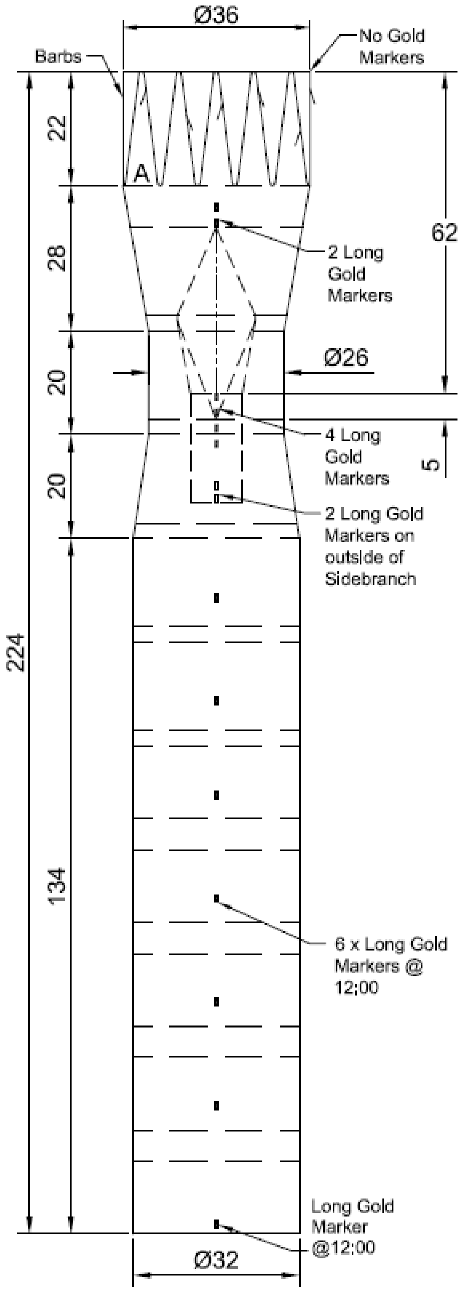
Table I. Percentile repartition of the orientation and distance of the left subclavian artery (*LSA*) in relation to the left common carotid artery (*LCCA*)

	Centiles				
	5	25	50	75	90
Dissection					
LSA orientation, hours:minutes	11:15	11:30	12:00	12:00	13:00
LCCA-LSA distance,[a] mm	14.6	17.9	21.6	27.0	35.4
Aneurysm					
LSA orientation, hours:minutes	11:15	11:37	11:45	12:00	12:30
LCCA- LSA distance,[a] mm	11.4	15.2	18.9	22.6	34.7
All					
LSA orientation, hours:minutes	11:15	11:30	11:50	12:00	12:30
LCCA-LSA distance,[a] mm	13.7	16.6	20.8	25.4	35.2

LSA orientation is determined using LCCA as reference.
[a]Distance is from the distal edge of the LCCA to the distal edge of the LSA.

CONCLUSIONS

The low variability of LSA and LCCA position in patients with distal aortic arch disease offers wide applicability of a new standardized thoracic branched endograft. The availability of an OTS single-branch device with a simple delivery sequence will allow extension of the proximal landing zone to zone 2 even in emergency cases. Further studies are required to assess the applicability and safety of this endograft.



INTERNAL LOW PROFILE SIDEBRANCH #1

Preloaded Catheter & Guidewire

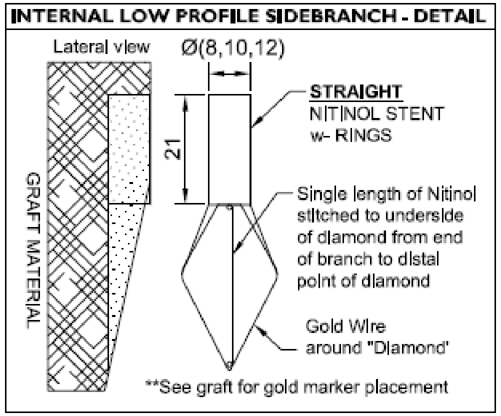
Upwards Facing

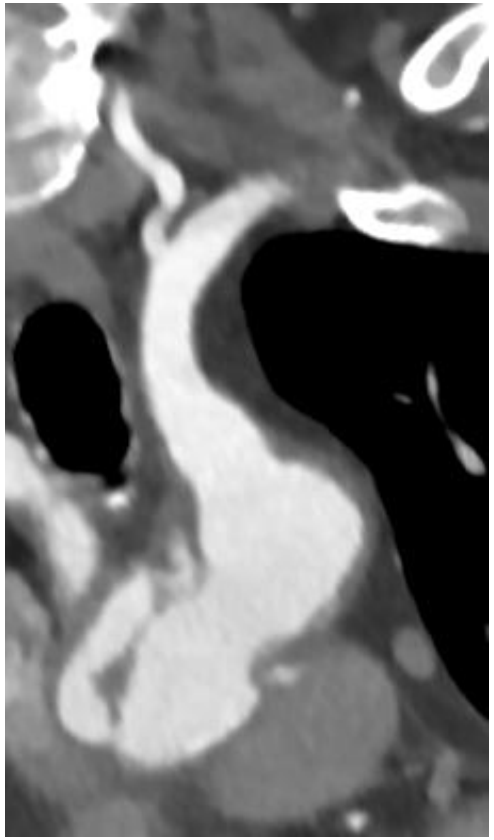
DIAMETER: 10mm
LENGTH: 21mm
DIST FROM PROX EDGE: 62mm
CLOCK: 12:00

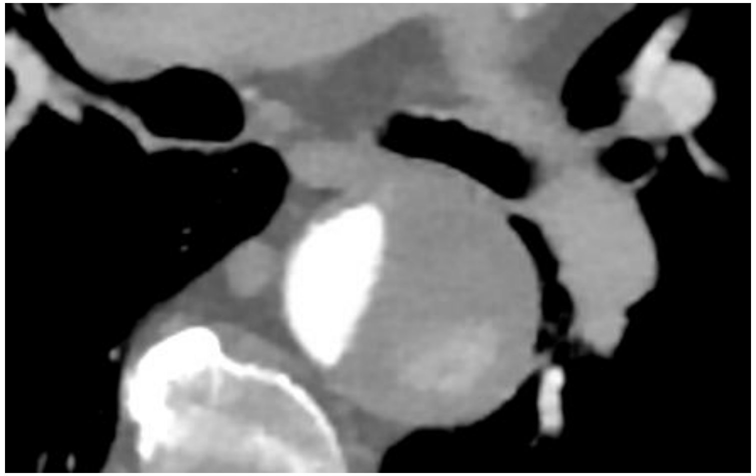
- 60mm INTRODUCER TIP WITH ORIENTATION NOTCH
- **NO** STANDARD GOLD MARKERS ON PROXIMAL EDGE OF GRAFT
- CURVED NITINOL CANNULA
- STAGED RELEASE
- SPIRAL STABILISING WIRE
- 2 SETS OF DIAMETER REDUCING TIES
- GOLD MARKERS AS DEPICTED

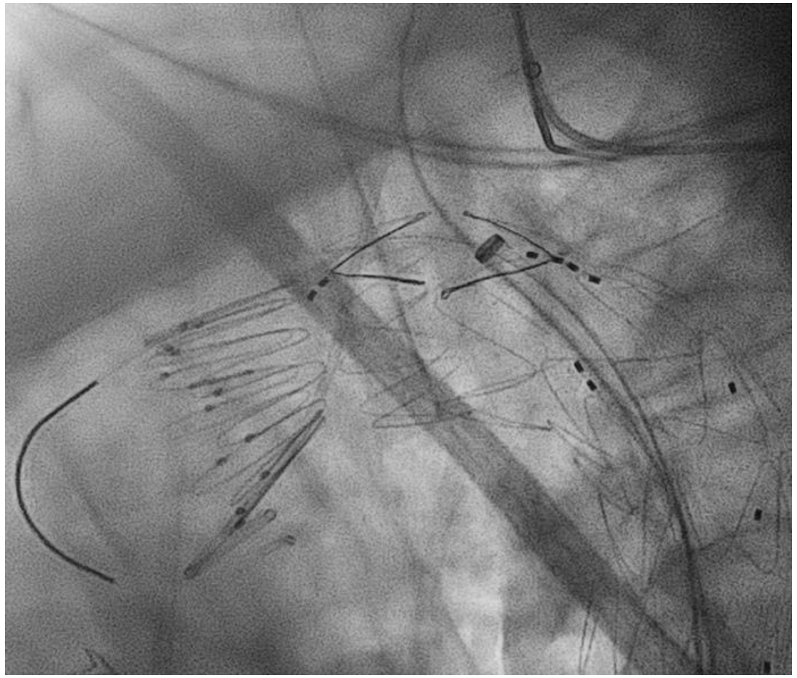
Plus:

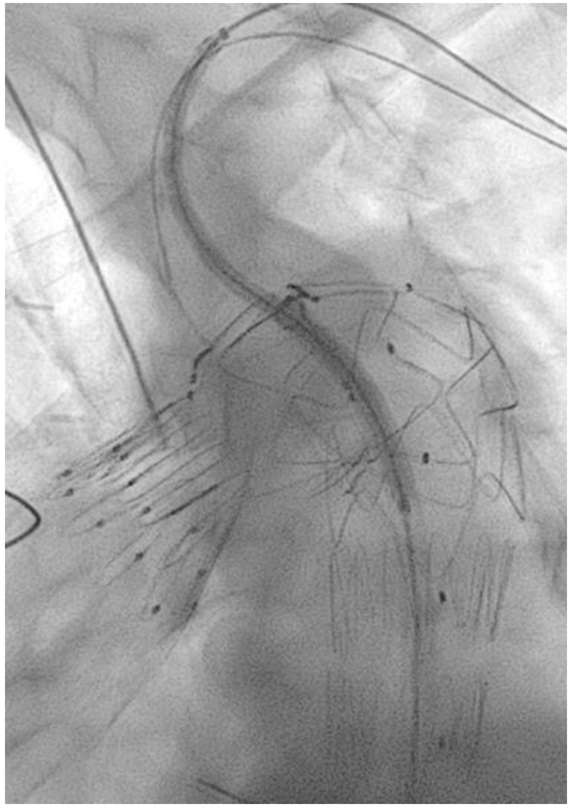
ZTA-PT-36-32-161

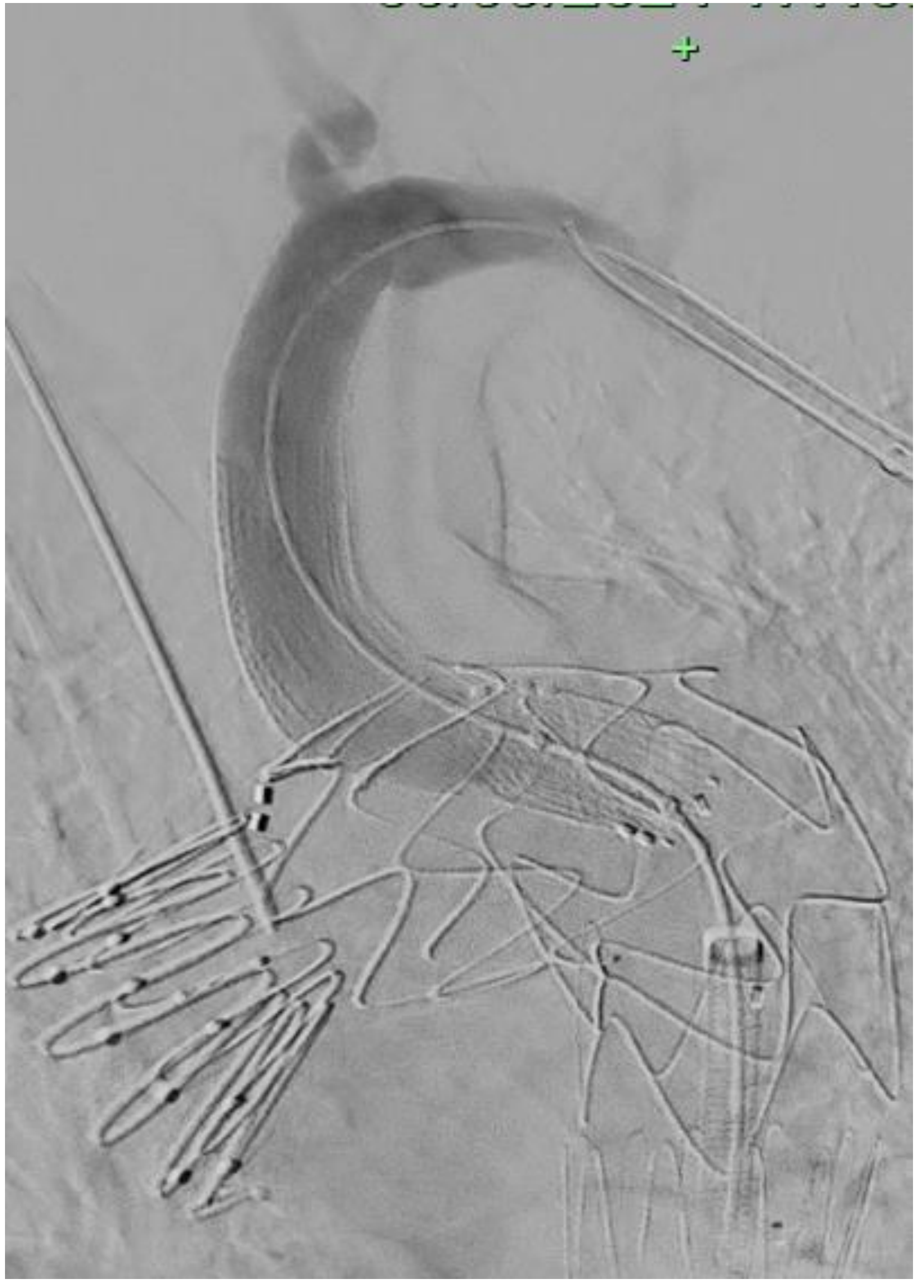






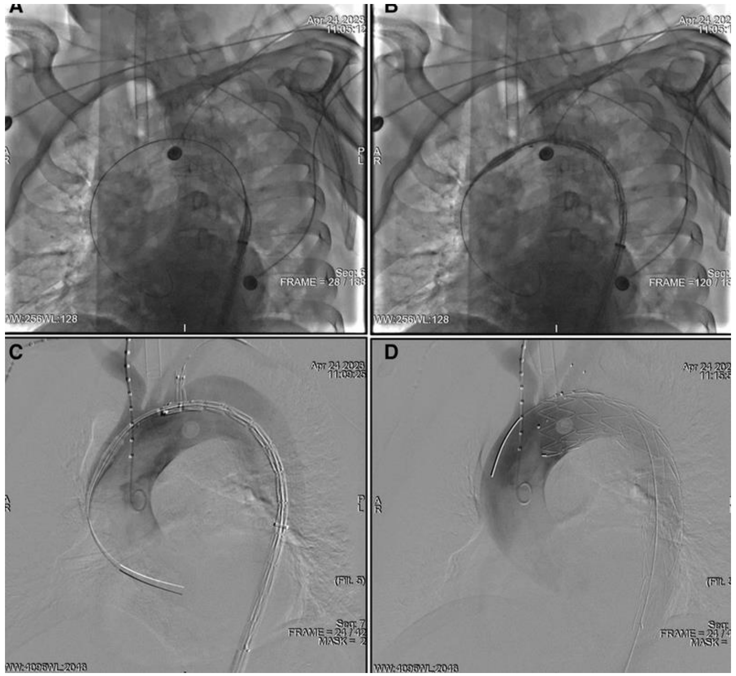






Clinical outcomes and aortic remodeling after Castor single-branched stent-graft implantation for type B aortic dissections involving left subclavian artery

Zihui Yuan[1‡], Lihua Zhang[2‡], Fei Cai[1‡] and Jian Wang[1*]



Variables	$n = 29$
Ages, years	50.2 ± 12.0
Male, *n* (%)	25 (86.2%)
Comorbidities, *n* (%)	
Hypertension	28 (96.6%)
Diabetes	3 (10.3%)
Chronic kidney disease, CKD	1 (3.4%)
Coronary artery disease, CAD	1 (3.4%)
Peripheral artery disease	0 (0.0%)
Chronic obstructive pulmonary disease, COPD	0 (0%)
Prior stroke	3 (10.3%)
Active smoker	11 (37.9%)
Alcohol user	11 (37.9%)
Distance from the intimal tear to the LSA ostium, mm	6.3 (2.4; 12.0)
Distance from the intimal tear to the LCCA ostium, mm	23.4 ± 8.1
Distance between the LSA ostium and the LCCA ostium, mm	12.8 (7.7; 15.2)
Distal diameter of the LSA at 25 mm from ostium, mm	9.2 ± 0.7
Distance from the origin of the LVA to the LSA ostium, mm	42.5 ± 6.1
Proximal landing zone diameter, mm	30.1 ± 3.1
Proximal stent-graft diameter, mm	32.0 (30.0; 36.0)
Oversizing rate (%)	8.8 ± 2.8
Distance from the proximal end of the main body to the branch, mm	10.0 (5.0; 10.0)
Diameter of the distal end of the branch section, mm	10.0 (10.0; 10.0)
Diameter of the distal end of the stent, mm	26.0 (24.0; 30.0)

Variables	$n = 29$
In-hospital outcomes	
Surgical success, *n* (%)	28 (96.6%)
Surgical time, minutes	106.7 ± 38.4
Length of stay, days	
Preoperative in-hospital, days	13.9 ± 7.4
Postoperative in-hospital, days	7.5 ± 3.1
Access route complications, *n* (%)	1 (3.4%)
Perioperative mortality, *n* (%)	0 (0%)
Paraplegia, *n* (%)	0 (0%)
New-onset stroke, *n* (%)	0 (0%)
Left upper limb ischemia, *n* (%)	0 (0%)
Follow-up outcomes	
Follow-up, months	3.0 (1.5; 10.1)
Follow-up of <12 months, *n* (%)	22 (75.9%)
Follow-up of ≥12 months, *n* (%)	7 (24.1%)
Endoleak, *n* (%)	1 (3.4%)
Proximal new entry tear, *n* (%)	1 (3.4%)
Recurrent type A dissection, *n* (%)	1 (3.4%)
Distal new entry tear, *n* (%)	4 (13.8%)
Stent migration, *n* (%)	0 (0%)
Branch patency, *n* (%)	29 (100%)

Front Cardiovas Med 2024

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

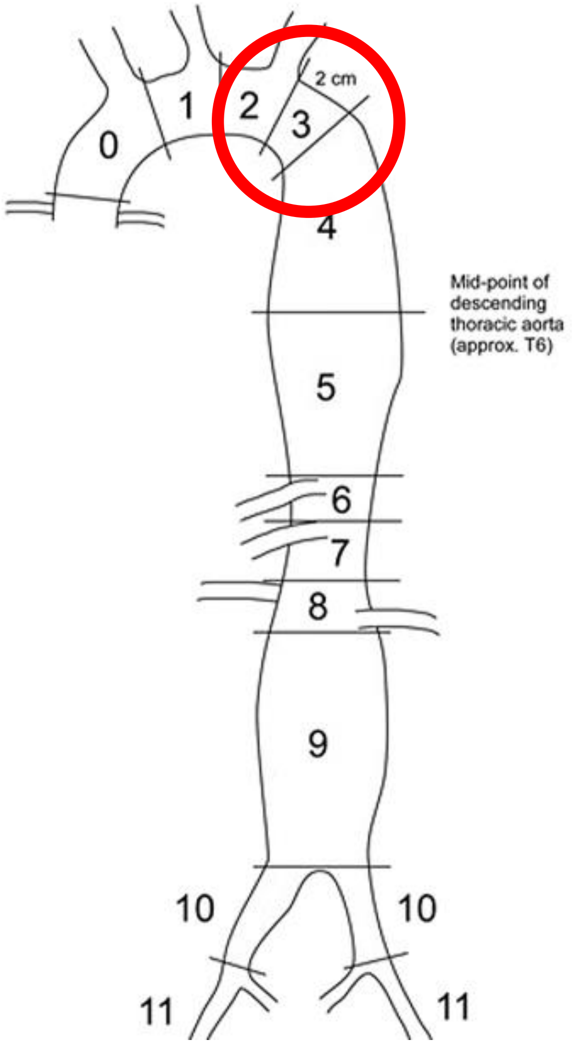
Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d]
Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g]
R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

Proximal landing zone and coverage of LSA

Recommendation 19: For elective TEVAR of a TAA where coverage of the LSA is necessary for adequate stent graft seal, we suggest preoperative or concomitant LSA revascularization. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**

Recommendation 21: For patients with acute thoracic emergencies, for whom TEVAR is required urgently and coverage of the LSA is necessary, it is suggested that revascularization be individualized and addressed on the basis of the patient's anatomy and urgency of the procedure. **Level of recommendation: Grade 2 (Weak), Quality of Evidence: B (Moderate)**



Comparison of open and endovascular left subclavian artery revascularization for zone 2 thoracic endovascular aortic repair

Tim J. Mandigers, MD,[a,b,c] Sara Allievi, MD,[a] Gabriel Jabbour, MS,[a] Jorge L. Gomez-Mayorga, MD,[a] Elisa Caron, MD,[a] Kristina A. Giles, MD,[d] Grace J. Wang, MD,[e] Joost A. van Herwaarden, MD, PhD,[c] Santi Trimarchi, MD, PhD,[b,f] Salvatore T. Scali, MD,[g] *and* Marc L. Schermerhorn, MD,[a] *Boston, MA; Milan, Italy; Utrecht, The Netherlands; Portland, ME; Philadelphia, PA; and Gainesville, FL*

(J Vasc Surg 2024;-:1-12.)

Table IV. Univariable and multivariable outcomes of in-hospital complications and perioperative mortality in 2489 patients undergoing zone 2 thoracic endovascular aortic repair (TEVAR) stratified by open surgical or endovascular left subclavian artery (*LSA*) revascularization

Variable	Open LSA (n = 1842)	Endovascular LSA (n = 647)	*P* value[a]	aOR [95% CI] (Ref: Open LSA)	*P* value
Stroke	88 (4.8)	17 (2.6)	**.026**	0.50 [0.25-0.90]	**.030**
Stroke type (brain location)			.23	-	-
Right carotid ischemic stroke	7 (0.4)	0 (0)		-	-
Left carotid ischemic stroke	18 (1.0)	2 (0.3)		-	-
Right vertebrobasilar ischemic stroke	8 (0.4)	1 (0.2)		-	-
Left vertebrobasilar ischemic stroke	11 (0.6)	2 (0.3)		-	-
Bilateral ischemic stroke	39 (2.1)	9 (1.4)		-	-
Hemorrhagic stroke	5 (0.3)	3 (0.5)		-	-
SCI	64 (3.5)	19 (2.9)	.60	0.64 [0.31-1.22]	.20
Perioperative mortality	60 (3.3)	20 (3.1)	.94	0.71 [0.34-1.37]	.33
Any complication	497 (27)	128 (20)	**<.001**	0.64 [0.49-0.83]	**<.001**
Acute kidney injury	172 (9.3)	62 (9.6)	.91	0.96 [0.65-1.39]	.82
Reintubation	134 (7.3)	20 (3.1)	**<.001**	0.41 [0.22-0.71]	**.003**
Pneumonia	61 (3.3)	14 (2.2)	.18	0.78 [0.35-1.58]	.51
Bowel ischemia	13 (0.7)	7 (1.1)	.51	-	-
Leg ischemia	19 (1.0)	9 (1.4)	.60	-	-
Myocardial infarction	25 (1.4)	7 (1.1)	.74	-	-
Congestive heart failure	15 (0.8)	2 (0.3)	.29	-	-
Postoperative dialysis	27 (1.4)	17 (2.6)	.14	-	-
In-hospital reintervention	217 (12)	53 (8.2)	**.014**	0.60 [0.40-0.86]	**.007**
Length of stay, ICU	3 [2-5]	3 [2-5]	.28	-	-
Length of hospital stay	8 [4-13]	7 [4-12]	**<.001**	-	-

ICU, Intensive care unit; *Ref.*, reference; *SCI*, spinal cord ischemia. Boldface entries indicate statistical significance.
[a]Wilcoxon rank sum test, or Pearson's χ^2 test where appropriate. Data are reported as median [interquartile range] for continuous variables and as number (%) for categorical variables. Models were adjusted for age (continuous/year), sex (male/female), race (White/Black/Asian/Hispanic/other), aortic diameter (continuous/mm), renal function (estimated glomerular filtration rate [eGFR] <30, eGFR 30-45, eGFR 45-60, eGFR >60), overall thoracic endovascular aortic repair center volume (low/medium/high), treatment urgency (elective/urgent/emergent), aortic coverage length (number of aortic zones covered), and surgery year.

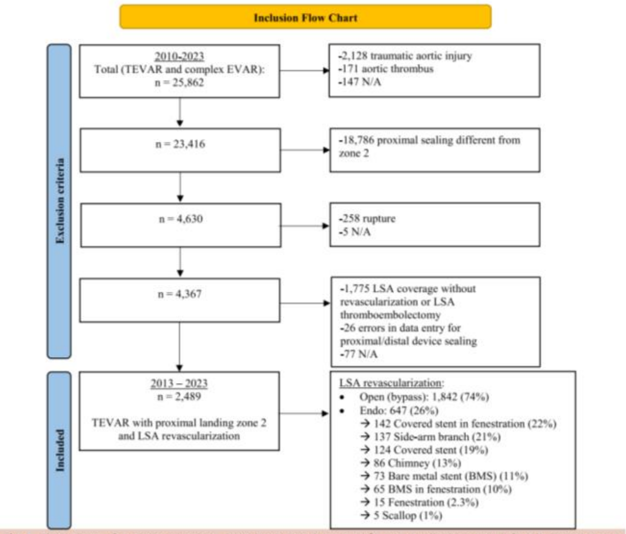


Fig 1. Flow chart of patient selection. *BMS*, bare metal stent; *N/A*, not applicable; *LSA*, left subclavian artery; *TEVAR*, thoracic endovascular aortic repair.

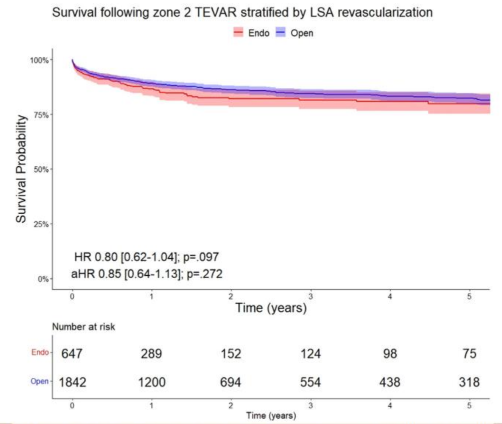


Fig 2. Estimated 5-year survival for patients undergoing zone 2 thoracic endovascular aortic repair (TEVAR) stratified by open or endovascular left subclavian artery (LSA) revascularization. *aHR*, adjusted hazard ratio.

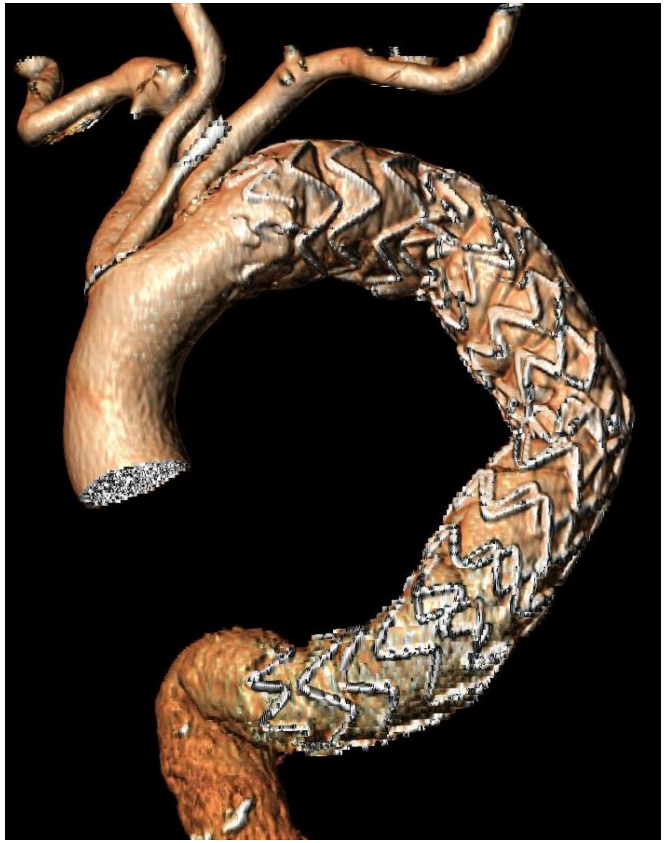
CONCLUSIONS

In patients undergoing TEVAR starting in zone 2, endovascular LSA revascularization had lower rates of postoperative stroke and overall composite in-hospital complications, but similar SCI, perioperative mortality, and 5-year mortality rates compared with open LSA revascularization. Future comparative studies are

Thoracic Endovascular Aortic Aneurysm Repair

Agenda

- Indication for TEVAR
- TEVAR and proximal landing zone
- **TEVAR and distal landing zone**
- TEVAR and Access
- TEVAR and spinal cord ischemia
- TEVAR and Results

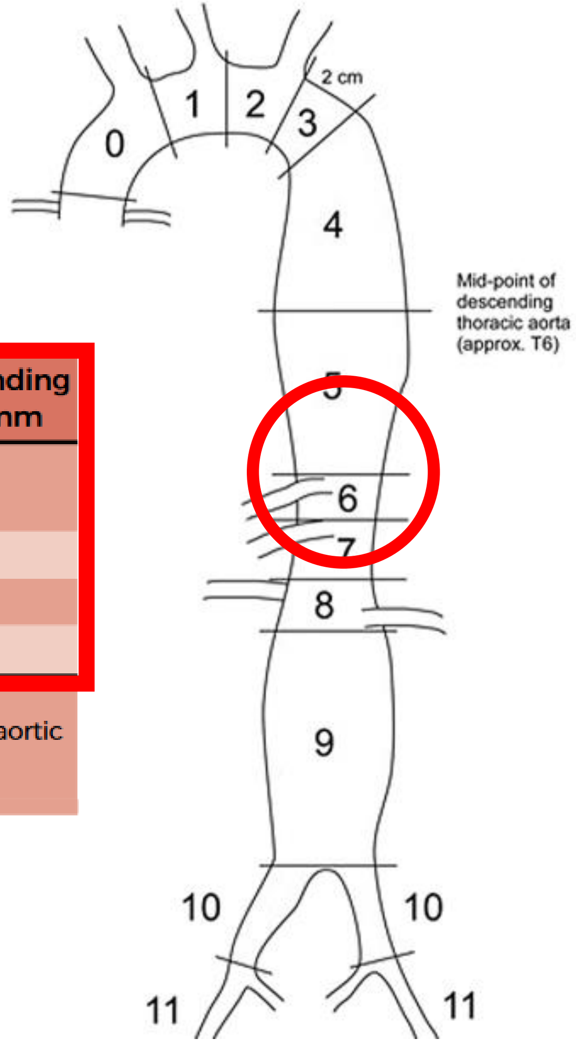


TEVAR and Distal landing zone

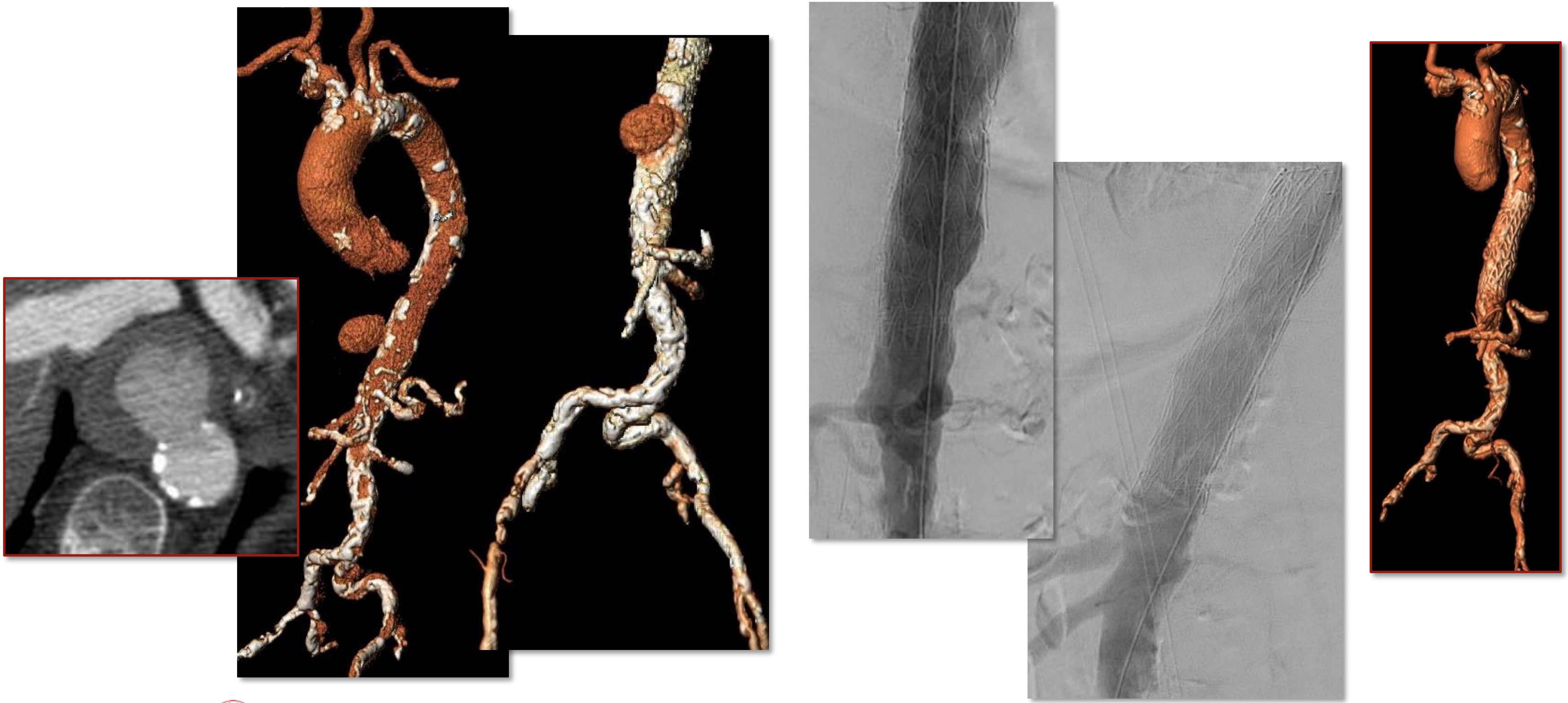
Table. Instructions for use of current thoracic devices

Manufacturer	Name	Iliac/femoral diameter, mm	Aortic outer diameter, mm	Proximal landing zone, mm	Distal landing zone, mm
W. L. Gore & Associates[91]	Conformable Thoracic Aortic Graft (c-TAG)	4-8.7, depending on sheath	16-42[a]	≥20	≥20
Medtronic[92]	Valiant Captivia	7.3-8.3, depending on sheath	18-42	≥20	≥20
Cook Medical[93]	Zenith Alpha[b]	6.0-7.7, depending on graft size	22-42	≥20	≥20
Bolton[c] Medical[94]	Relay	7.3-8.7, depending on sheath	19-42	15-25	15-25

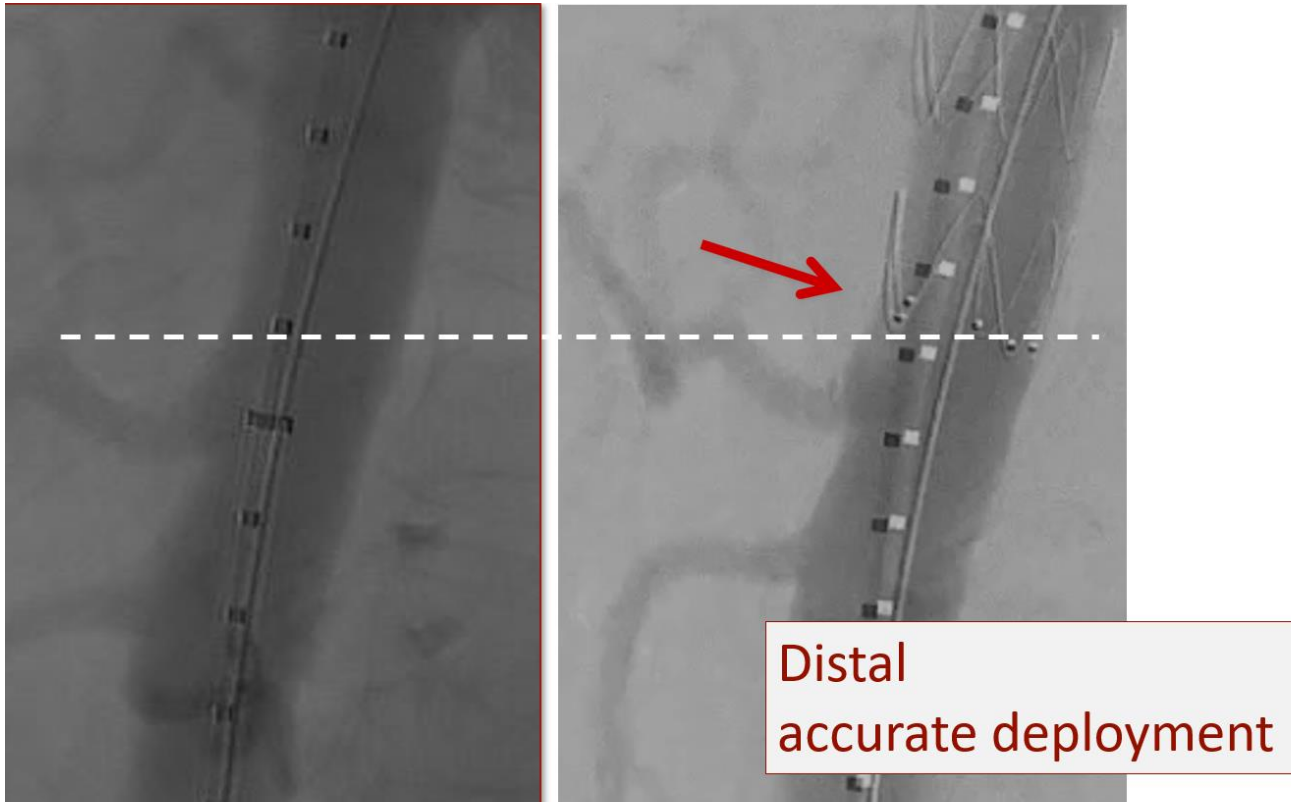
[a]Gore measures inner aortic diameter for graft sizing.
[b]Cook recalled all Zenith Alpha TEVAR grafts with proximal or distal diameter of 18 to 22 mm and recalled the indication for blunt traumatic aortic injury on March 22, 2017.[95]
[c]Now Terumo.

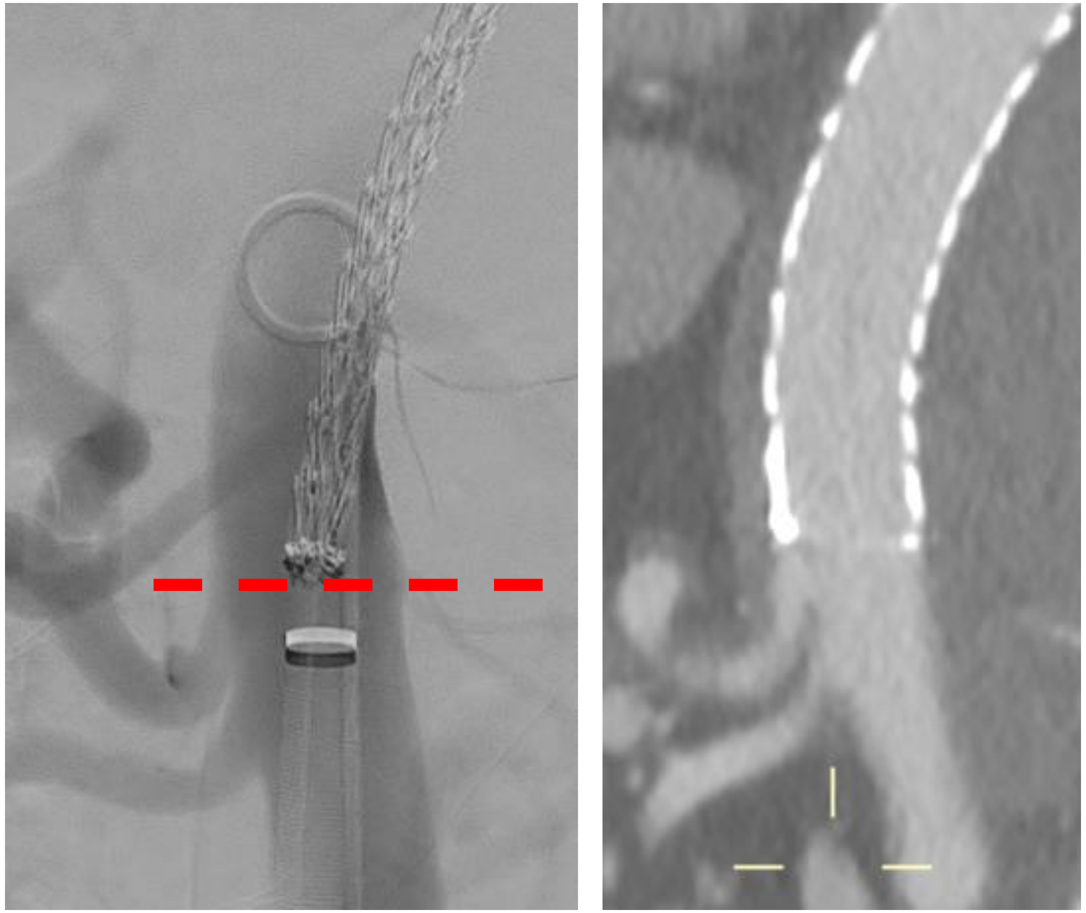


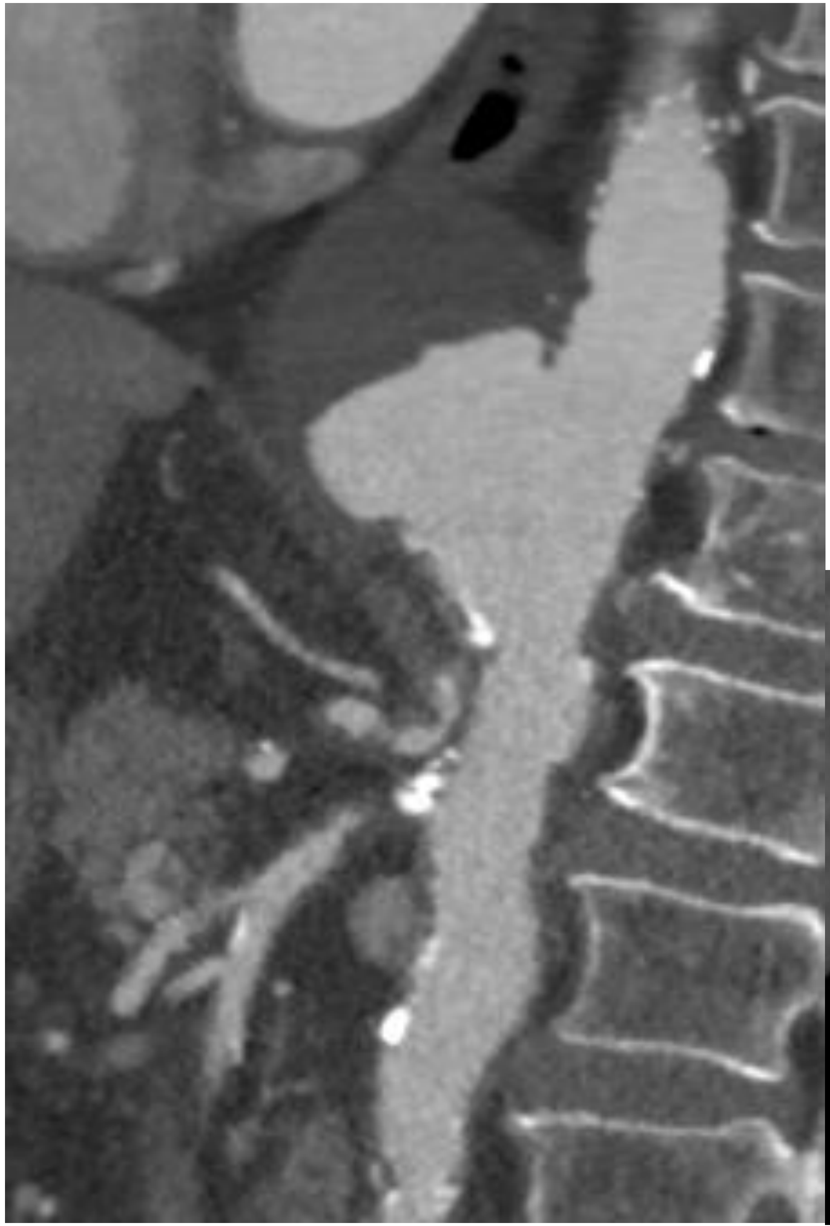
Thoracic Endovascular Aortic Aneurysm Repair

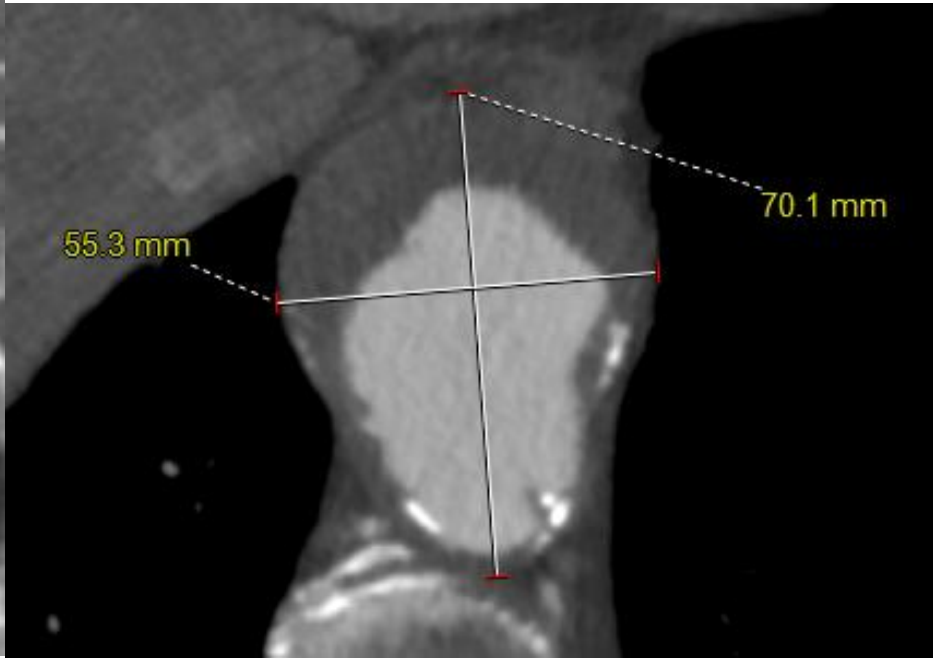


Distal Precision





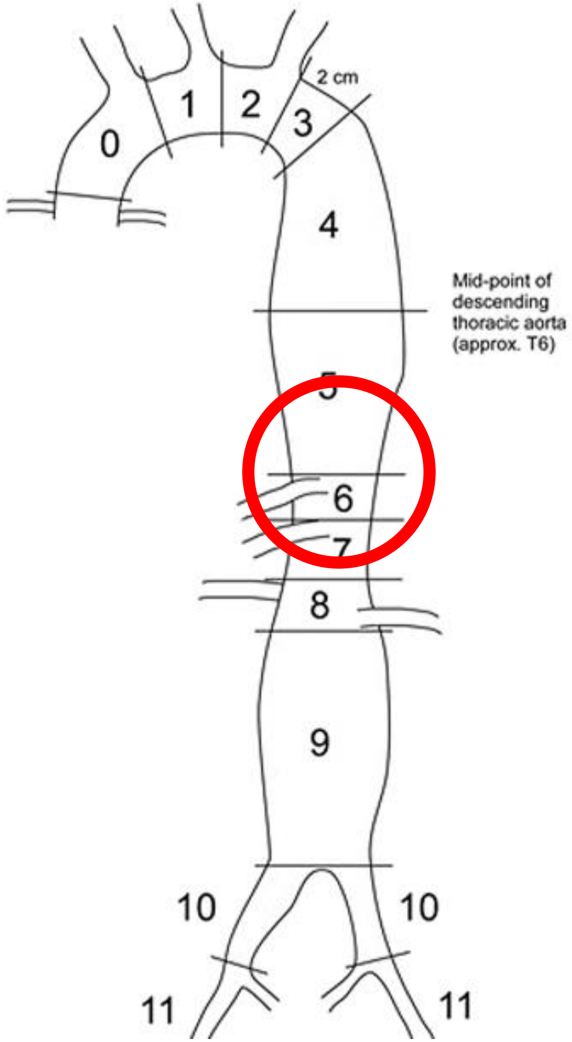



55.3 mm
70.1 mm

TEVAR and Distal landing zone

- Coverage or occlusion of CA

- Outcomes



Journal of Endovascular Therapy
Volume 30, Issue 4, August 2023, Pages 499-509

https://doi.org/10.1177/15266028221090443

SAGE journals

Reviews

Celiac Artery Coverage After Thoracic Endovascular Aortic Procedure: A Meta-Analysis of Early and Late Results

Luca Mezzetto, MD [1], Davide Mastrorilli, MD [1], Giulia Bravo, PhD [2], Lorenzo Scorsone, MD [1], Stefano Gennai, MD [3], Nicola Leone, MD [3], Mario D'Oria, MD [4], Edoardo Veraldi, MD [1], and Gian Franco Veraldi, MD [1]

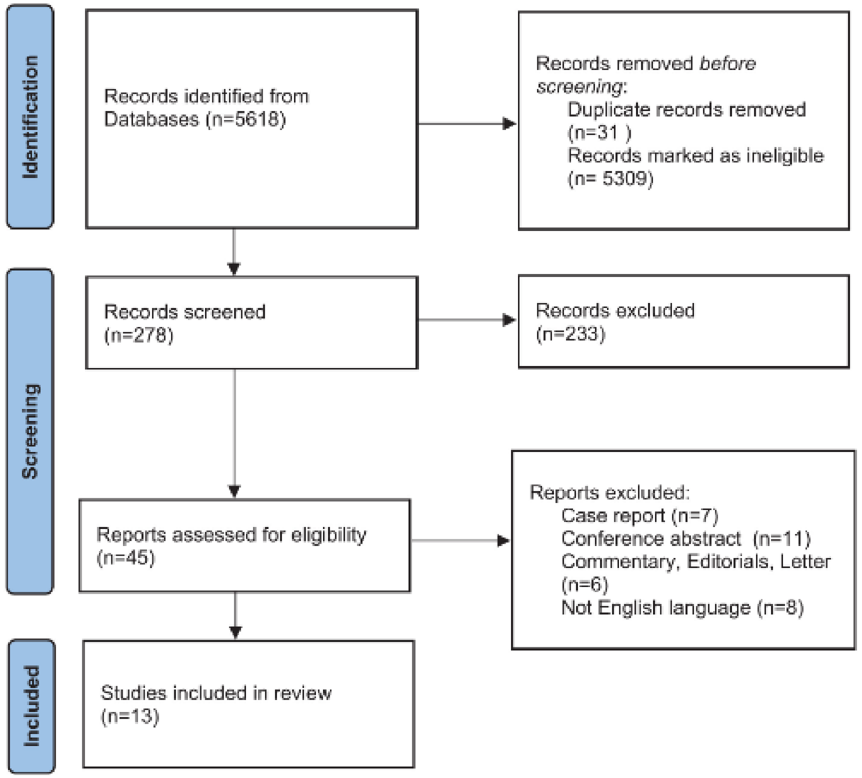


Figure 1. Flowchart of study selection process.

Table 1 shows that 178 CAs were covered during 2653 TEVAR procedures (7%).

Table 1. Demographic Data of Patients and Intraoperative Findings.

Author	Year of publication	Country	Period	No. of TEVAR	No. Covered CA (%)	Age (years)	Male (No.)	Aortic graft	Collateral patency before coverage	Adjunct treatment for SMA stenosis	Selective embolization of CA	Technical success (%)
Vaddineni et al[8]	2007	United States	2005–2006	46	7 (15)	74	5 (71%)	7 TAG	5 (71%)	0	0	100
Waldenberger et al[20]	2007	Austria	1998–2006	NA	5 (NA)	67	NA	3 Talent 2 TAG	5 (100%)	0	5 (100%)	100
Belenky et al[21]	2009	Israel	2001–2007	NA	7 (NA)	74	5 (71%)	7 Talent	7 (100%)	0	7 (100%)	100
Hyhlik-Durr et al[22]	2009	Germany	1997–2008	202	5 (2)	73	NA	1 TAG 2 Zenith TX2 2 Valiant	3 (60%)	0	0	100
Mehta et al[5]	2010	Albany	2004–2009	228	31 (14)	74	11 (35%)	TAG Talent	31 (100%)	11 (35%)	0	100
Brinster et al[19]	2010	United States	2005–2009	305	4 (1)	76	2 (50%)	TAG Zenith TX2	4 (100%)	0	0	100
Delle et al[23]	2010	Sweden Denmark	2001–2007	120	8 (7)	73	NA	Talent TAG Valiant Zenith TX2	5 (63%)	0	NA	100
Endo et al[24]	2013	Japan	2008–2011	77	5 (6)	76	3 (60%)	NA	5 (100%)	0	5 (100%)	100
Li et al[25]	2013	China	2007–2011	324	13 (4)	61	10 (77%)	8 Zenith 5 Talent	NA	0	0	100
Rose et al[7]	2015	United States	2005–2013	366	18 (5)	69	NA	NA	18 (100%)	1 (5%)	NA	78
Banno et al[18]	2020	Japan	2008–2018	357	15 (4)	72	15 (100%)	3 TAG 7 Zenith TX2 5 Valiant	12 (80%)	NA	7 (47%)	100
Fukushima et al[17]	2020	Japan	2010–2017	NA	16 (NA)	78	12 (75%)	16 Zenith TX2	16 (100%)	2 (13%)	11 (69%)	100
King et al[26]	2020	United States	2012–2018	628	44 (7)	73	22 (50%)	NA	NA	NA	NA	NA

Abbreviations: CA, celiac artery; NA, not available; SMA, superior mesenteric artery; TEVAR, thoracic endovascular aneurysm repair.

Journal of Endovascular Therapy
Volume 30, Issue 4, August 2023, Pages 499-509

https://doi.org/10.1177/15266028221090443

SAGE journals

Reviews

Celiac Artery Coverage After Thoracic Endovascular Aortic Procedure: A Meta-Analysis of Early and Late Results

Luca Mezzetto, MD [1], Davide Mastrorilli, MD[1], Giulia Bravo, PhD[2], Lorenzo Scorsone, MD[1], Stefano Gennai, MD[3], Nicola Leone, MD [3], Mario D'Oria, MD [4], Edoardo Veraldi, MD[1], and Gian Franco Veraldi, MD[1]

Figure 2. Pooled prevalence of early visceral ischemia (A), reintervention (B), any endoleak (C) and type IB endoleak (D) after celiac artery coverage during thoracic endovascular aneurysm repair.

Table 2. Early Outcome (30 Days) After Coverage of CA During TEVAR.

Author	No. of death (%)	Cause of death	No. of stroke/TIA (%)	No. of any EL (%)	No. of type IB EL (%)	No. of SCI (%)	No. of any visceral ischemia (%)	Type of complication	No. of redo (%)	Type of redo
Vaddineni et al[9]	0	No death	0	0	0	0	1 (14)	1 Abdominal pain	0	No redo
Waldenberger et al[20]	1 (20)	1 Mycotic aneurysm	0	0	0	0	5 (100)	4 Enzymes elevation 1 Abdominal pain	1	1 SMA stenting
Belenky et al[21]	0	No death	0	0	0	0	0	No complication	0	No redo
Hyhlik-Durr et al[22]	1 (20)	1 MOF (in rupture)	0	0	0	0	2 (40)	1 Enzyme elevation 1 MOF	0	No redo
Mehta et al[5]	2 (6)	1 Liver shock 1 IMA	0	0	0	2 (6)	2 (6)	1 Liver shock 1 Cholecystitis	2 (6)	1 Hepatorenal bypass 1 Cholecystectomy
Brinster et al[19]	0	No death	0	0	0	0	0	No complication	0	No redo
Delle et al[23]	0	No death	0	0	0	0	0	No complication	0	No redo
Endo et al[24]	0	No death	0	0	0	0	0	No complication	0	No redo
Li et al[25]	0	No death	O	5 (38)	0	0	0	5 Type II EL	0	No redo
Rose et al[7]	1 (5)	1 DIC (in rupture)	1 (6)	1 (6)	0	2 (11)	2 (11)	1 Weight loss 1 Pain and lactic acidosis	2 (11)	1 Conversion for type IA EL 1 SMA stenting
Banno et al[18]	0	No death	0	1 (7)	1 (7)	2 (13)	1 (7)	1 Splenic infarction	0	No redo
Fukushima et al[17]	0	No death	0	0	0	1 (6)	6 (37)	1 SMA embolization 5 Enzyme elevation	1 (6)	1 Laparotomy
King et al[26]	5 (11)	NA	7 (16)	NA	NA	4 (9)	4 (9)	NA	NA	NA

Abbreviations: CA, celiac artery; DIC, disseminate intravascular coagulation; EL, endoleak; IMA, ischemic myocardial attack; MOF, multi-organ failure; NA, not available; SCI, spinal cord ischemia; SMA, superior mesenteric artery; TEVAR, thoracic endovascular aortic repair; TIA, transient ischemic attack.

Journal of Endovascular Therapy
Volume 30, Issue 4, August 2023, Pages 499-509

https://doi.org/10.1177/15266028221090443

SAGE journals

Reviews

Celiac Artery Coverage After Thoracic Endovascular Aortic Procedure: A Meta-Analysis of Early and Late Results

Luca Mezzetto, MD [1], Davide Mastrorilli, MD [1], Giulia Bravo, PhD [2], Lorenzo Scorsone, MD [1], Stefano Gennai, MD [3], Nicola Leone, MD [3], Mario D'Oria, MD [4], Edoardo Veraldi, MD [1], and Gian Franco Veraldi, MD [1]

Table 3. Late Results After Coverage of CA During TEVAR.

Author	No. of available patients (%)	Mean follow-up (months)	No. of death (%)	No. of TEVAR-related death (%)	Cause of death	No. of any EL (%)	No. of type IB EL (%)	No. of type II EL from CT (%)	No. of visceral ischemia (%)	No. of TEVAR-related redo (%)	No. of redo at distal sealing (%)	Type of TEVAR redo
Vaddineni et al[9]	7 (100)	12	1 (17)	0	1 IMA at 4 m	0	0	0	0	0	0	No redo
Walderberger et al[20]	4 (100)	NA	1 (25)	0	1 Cancer at 8 m	1 (25)	1 (25)	0	0	0	0	NA
Belenky et al[21]	7 (100)	NA	1 (14)	0	1 IMA at 7 m	3 (43)	1 (14)	0	0	3 (43)	1 (14)	2 Mid TEVAR 1 Distal TEVAR
Hyhlik-Durr et al[22]	4 (75)	25	1 (25)	0	1 IMA at 2 m	0	0	0	0	0	0	No redo
Mehta et al[5]	29 (94)	15	0	0	No death	7 (24)	4 (14)	3 (10)	0	7 (24)	7 (24)	5 Coil embolization 2 Distal TEVAR
Brinster et al[19]	4 (100)	30	0	0	No death	2 (50)	1 (25)	0	0	2 (50)	1 (25)	1 Proximal TEVAR 1 Distal TEVAR
Delle et al[23]	8 (100)	35	4 (50)	1 (13)	1 AAA rupture at 25 m 1 TAA rupture at 30 m 1 IMA at 41 m 1 Cancer at 44 m	3 (38)	3 (38)	0	0	3 (38)	3 (38)	3 Distal TEVAR (uncovered stent)
Endo et al[24]	5 (100)	12	0	0	0	0	0	0	0	0	0	No redo
Li et al[25]	13 (100)	25	0	0	0	0	0	0	0	0	0	No redo
Rose et al[7]	17 (94)	38	3 (18)	0	1 Sepsis at 2 m 1 IMA at 4 m 1 Heart failure at 21 m	2 (12)	1 (6)	0	1 (6)	1 (6)	1 (6)	1 SMA stenting
Banno et al[18]	15 (100)	42	2 (7)	0	1 Sepsis 1 AAA rupture	2 (13)	2 (13)	0	0	1 (7)	1 (7)	1 Distal TEVAR and bypass
Fukushima et al[17]	16 (100)	40	0	0	0	1 (6)	0	0	0	1 (6)	0	1 Proximal TEVAR
King et al[26]	39 (87)	12	9 (23)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Abbreviations: AAA, abdominal aortic aneurysm; CT, computed tomography; CA, celiac artery; EL, endoleak; I[illegible] m, months; NA, not available; SMA, superior mesenteric artery; TAA, thoracic aortic aneurysm; TEVAR, thoracic endovascular aneurysm repair.

Journal of Endovascular Therapy
Volume 30, Issue 4, August 2023, Pages 499-509

https://doi.org/10.1177/15266028221090443

SAGE journals

Reviews

Celiac Artery Coverage After Thoracic Endovascular Aortic Procedure: A Meta-Analysis of Early and Late Results

Luca Mezzetto, MD [1], Davide Mastrorilli, MD[1], Giulia Bravo, PhD[2], Lorenzo Scorsone, MD[1], Stefano Gennai, MD[3], Nicola Leone, MD [3], Mario D'Oria, MD [4], Edoardo Veraldi, MD[1], and Gian Franco Veraldi, MD[1]

Conclusions

Based on the results of the present systematic review, CA coverage during TEVAR for DTAPs can be an infrequent but feasible additional procedure when an inadequate distal sealing zone is present. This should be regarded as a "bailout" procedure especially in urgent/emergent settings but requires caution in elective cases. Even if transient visceral ischemia is frequent, life-threatening complications are rare. Early and late mortality rates are similar to standard TEVAR although the risk of type IB endoleak and reintervention may be an issue.

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

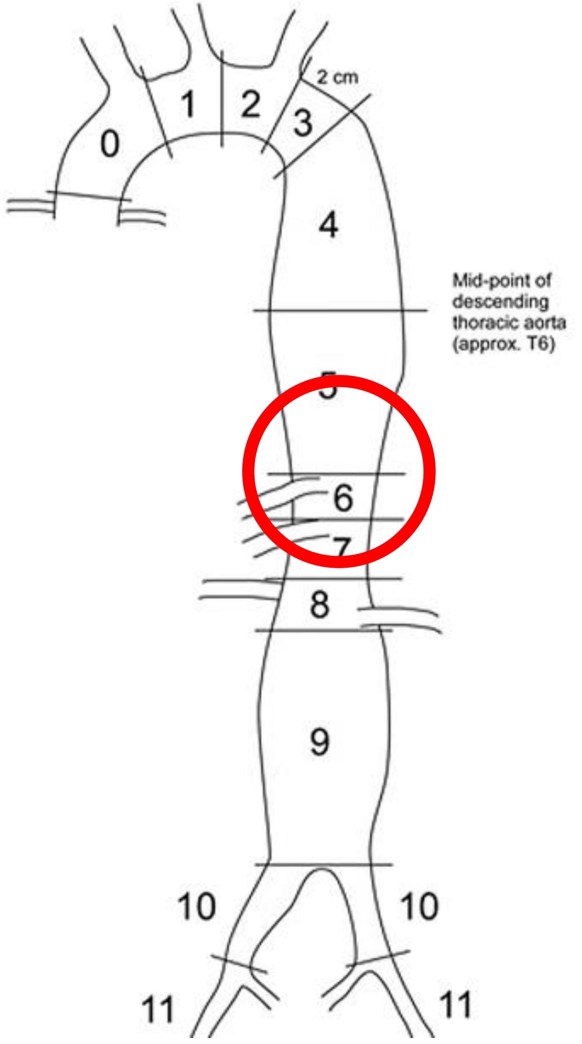
Coverage or occlusion of CA

- Incidence: 4-6%
- Preoperative evaluation of :
  - SMA
  - IMA
  - Pancreatico-duodenal and dorsal pancreatic branches

CA revascularization

- Bypass

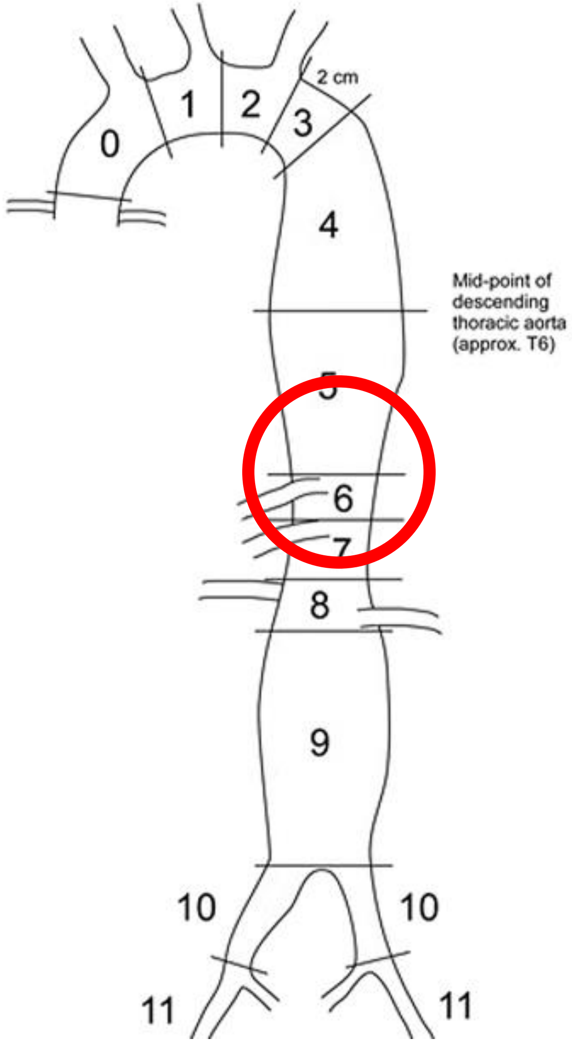
- Endo (Parallel stent or fenestration)



TEVAR and Distal landing zone

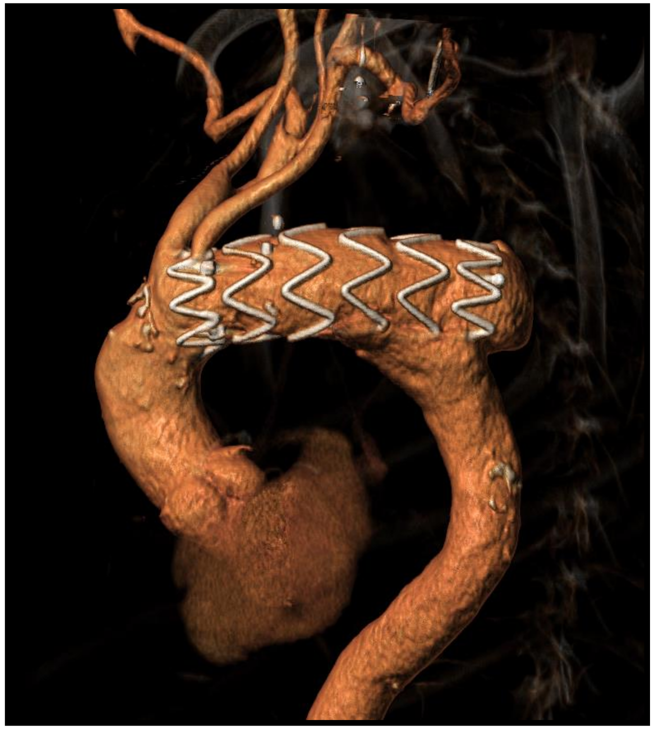
- Coverage or occlusion of CA

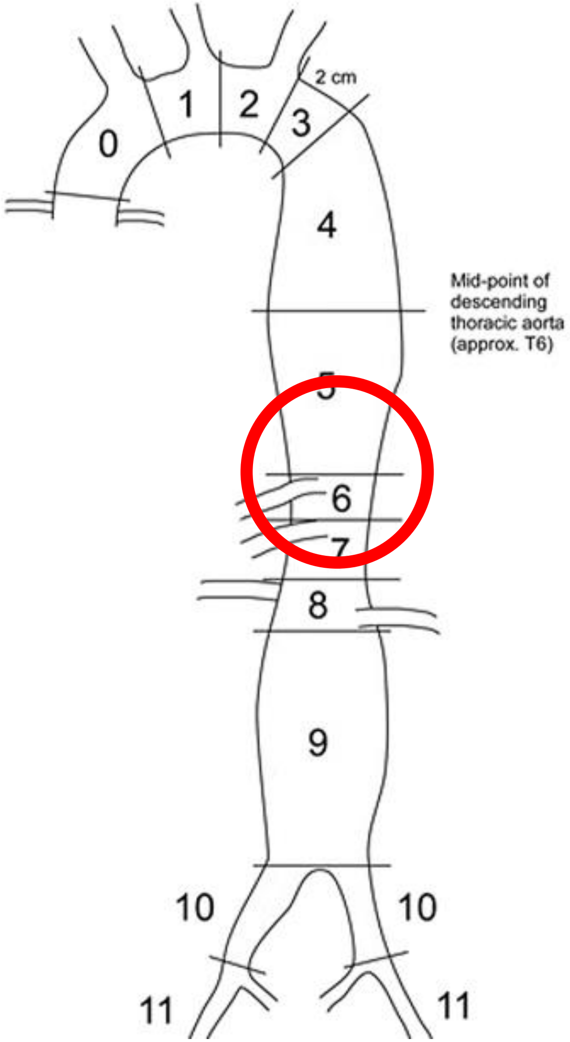
- Outcomes

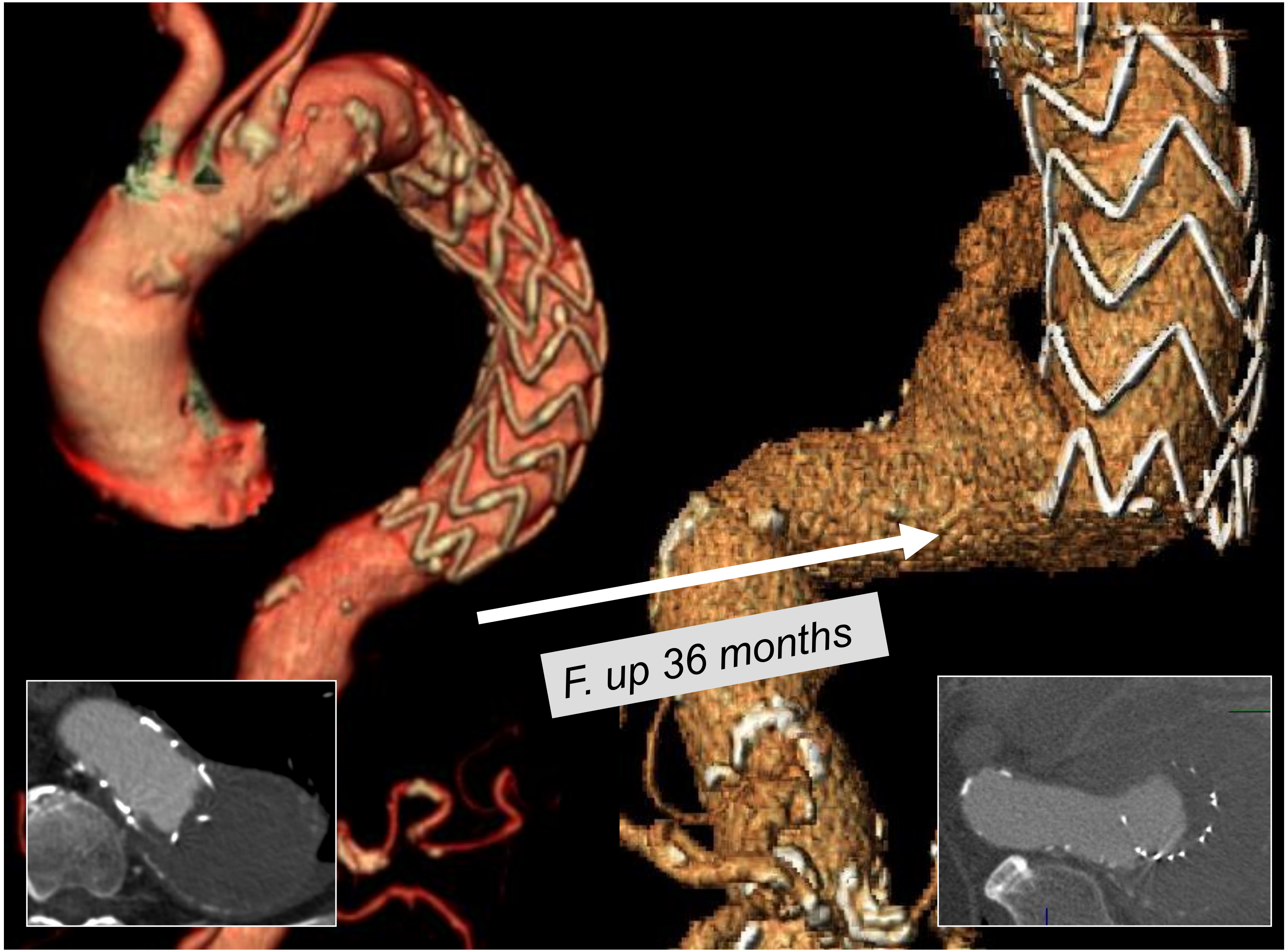


TEVAR and Distal landing zone

Outcomes






F. up 36 months

International Angiology 2022 February;41(1):24-32
DOI: 10.23736/S0392-9590.21.04718-0

ORIGINAL ARTICLE
AORTIC DISEASE

Distal landing zone outcomes in thoracic endovascular aortic aneurysm repair with challenging morphology: a propensity-matched comparison of distal active fixation *versus* standard stent-graft

Stefano GENNAI [1], Nicola LEONE [1] *, Angelos KARELIS [2], Andrea XODO [3], Luca MEZZETTO [4], Aaron FARGION [5], Michele ANTONELLO [3], Gian F. VERALDI [4], Nuno V. DIAS [2], Björn SONESSON [2], Carlo PRATESI [5], Roberto SILINGARDI [1], on behalf of the study collaborators

Background: To evaluate the distal landing zone (LZ) outcomes in adverse morphology after thoracic endovascular repair (TEVAR) with distal active fixation (DAF) stent-grafts compared with standard endografts.

Methods: between 2006 and the 31st December 2020, sixty-nine DAFs (study group) and sixty-nine standard stent-grafts (control group) were enrolled in a multi-center, retrospective, case-control study. The primary outcomes were the distal endoleak and reintervention. The secondary outcomes were: distal segment migration, wedge apposition and related complications. A univariate and multivariate logistic regression followed by a propensity-scored model (1:1) were performed.

Results: The results were reported for the DAF vs control group. The mean follow-up was 3.3 ± 2.1 vs 3.7 ± 3.4 years. The distal endoleak rate was 7.3% vs 27.5% (P=0.011). The freedom from distal endoleak was 95%, 95% and 91% vs 85%, 76%, and 73% at 1, 3 and 5 years respectively (Log-rank P=0.011). Tortuosity index and distal thoracic aorta angulation were predictors of endoleak (P=0.012 and P=0.029 respectively). The distal reinterventions rate was 7.3% vs 20.3% (P=0.026). The freedom from distal reinterventions was 95%, 95% and 91% vs 92%, 75% and 75% at 1, 3 and 5 years respectively (Log-rank P=0.041). The wedge apposition was 5.8 vs 13.0-mm (P<0.000). The distal segment migration was upward directed in all cases and was significant (>10- mm) in 13.0% vs 39.1% (P=0.000).

Conclusions: The DAF stent-graft showed a significant reduction of the distal endoleak rates and other specific outcomes of the distal LZ in patients with an adverse anatomy.

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

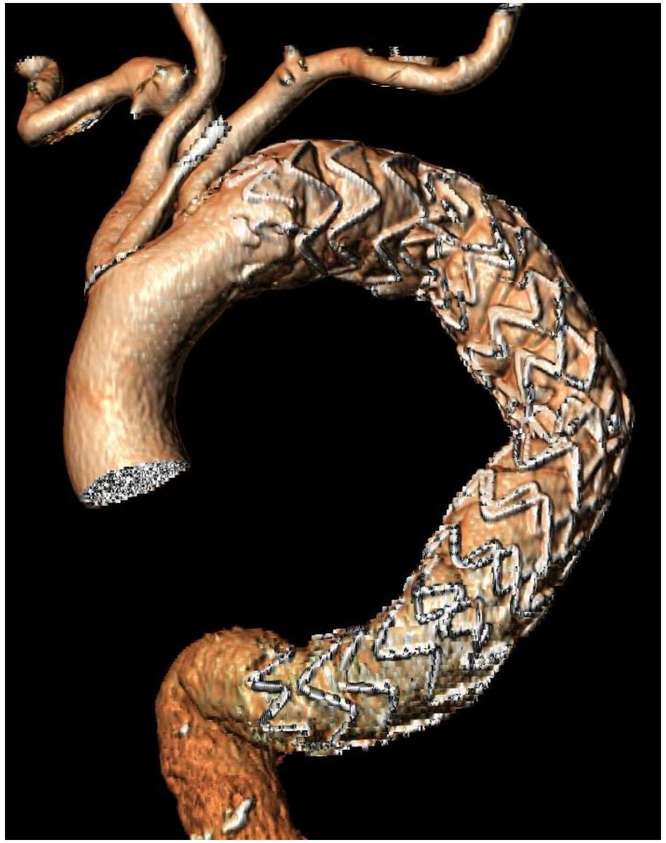
(J Vasc Surg 2021;73:55S-83S.)

Recommendation 36: We recommend contrast-enhanced CT scanning at 1 month and 12 months after TEVAR and then yearly for life, with consideration of more frequent imaging if an endoleak or other abnormality of concern is detected at 1 month. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**

Thoracic Endovascular Aortic Aneurysm Repair

Agenda

- Indication for TEVAR
- TEVAR and proximal landing zone
- TEVAR and distal landing zone
- **TEVAR and Access**
- TEVAR and spinal cord ischemia
- TEVAR and Results



SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

TEVAR and Access

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

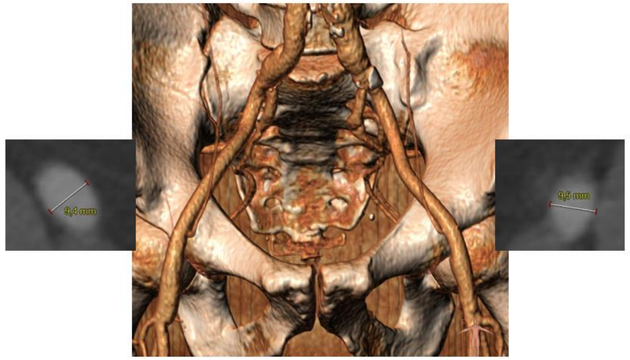


Table. Instructions for use of current thoracic devices

Manufacturer	Name	Iliac/femoral diameter, mm	Aortic outer diameter, mm	Proximal landing zone, mm	Distal landing zone, mm
W. L. Gore & Associates[91]	Conformable Thoracic Aortic Graft (c-TAG)	4-8.7, depending on sheath	16-42[a]	≥20	≥20
Medtronic[92]	Valiant Captivia	7.3-8.3, depending on sheath	18-42	≥20	≥20
Cook Medical[93]	Zenith Alpha[b]	6.0-7.7, depending on graft size	22-42	≥20	≥20
Bolton[c] Medical[94]	Relay	7.3-8.7, depending on sheath	19-42	15-25	15-25

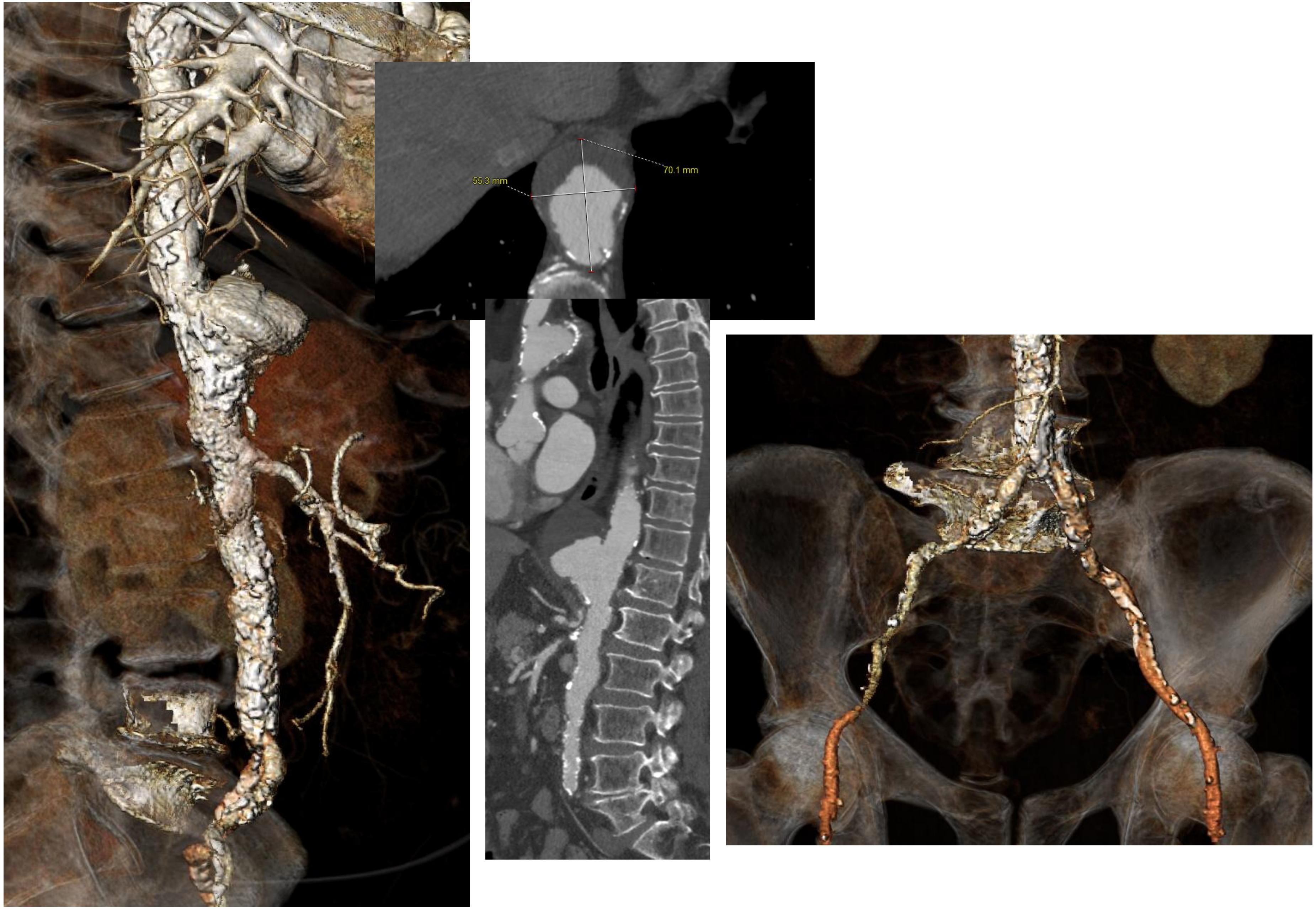
[a]Gore measures inner aortic diameter for graft sizing.
[b]Cook recalled all Zenith Alpha TEVAR grafts with proximal or distal diameter of 18 to 22 mm and recalled the indication for blunt traumatic aortic injury on March 22, 2017.[95]
[c]Now Terumo.

Hostile iliac artery anatomy

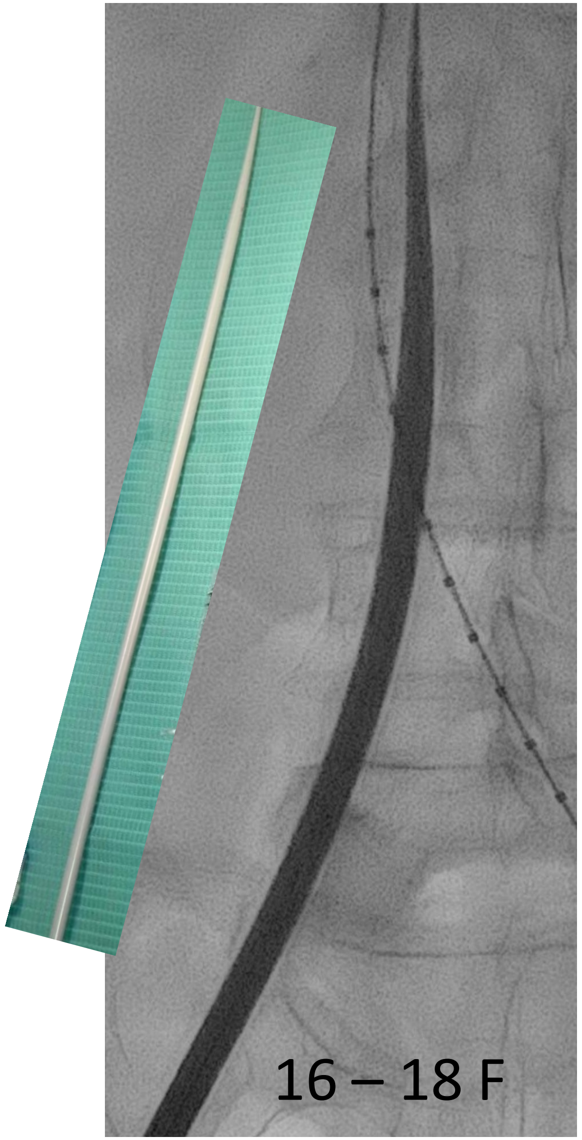
- ✓ Iliac artery obstructive disease
  - extensive & circumferential calcification (50%)
  - hemodynamic iliac stenosis or obstruction
  - external iliac artery diameter < 7mm

- ✓ Severe angle (>90°)

- ✓ Previous aortic-iliac-femoral surgical graft

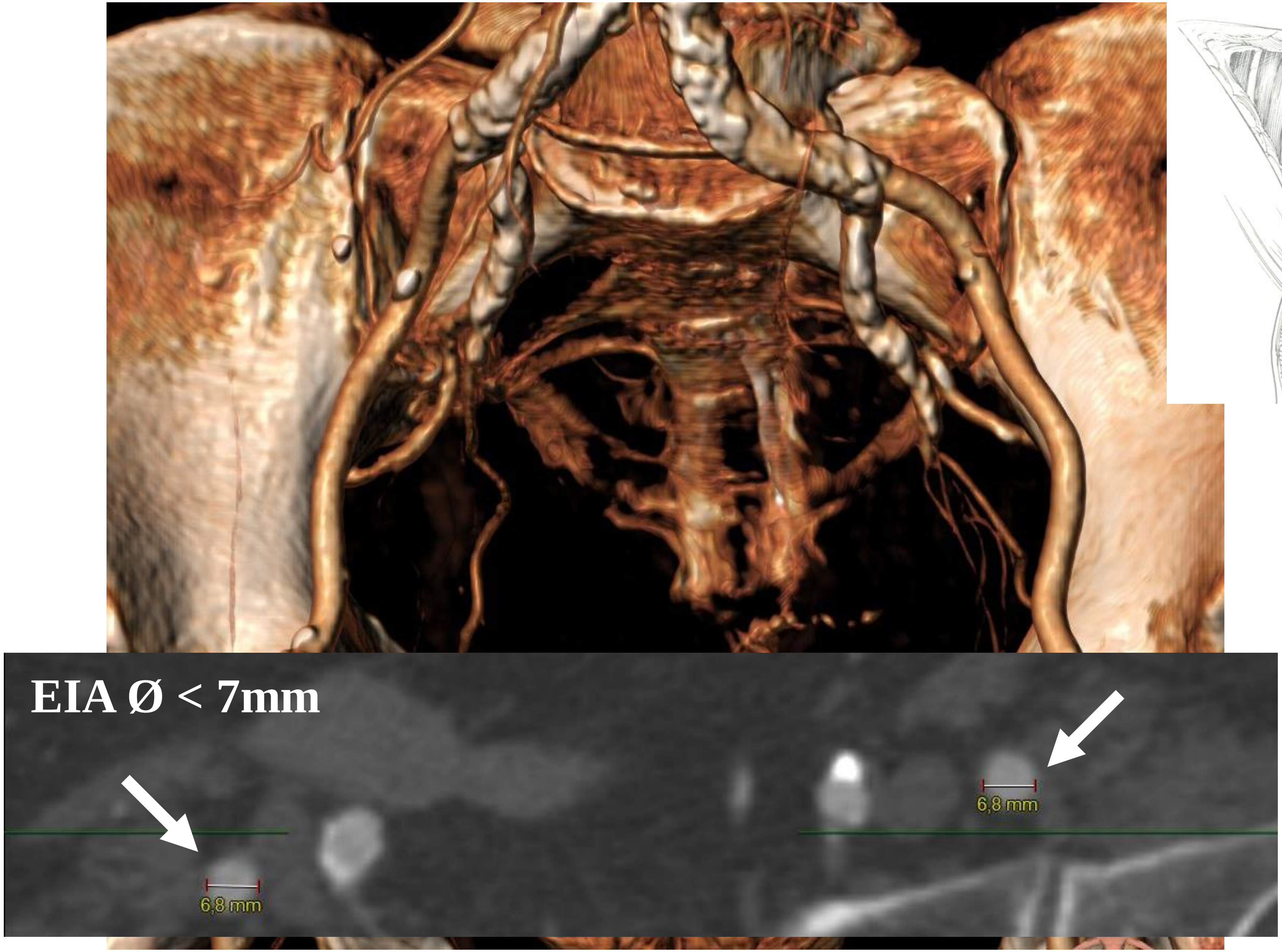

55.3 mm
70.1 mm

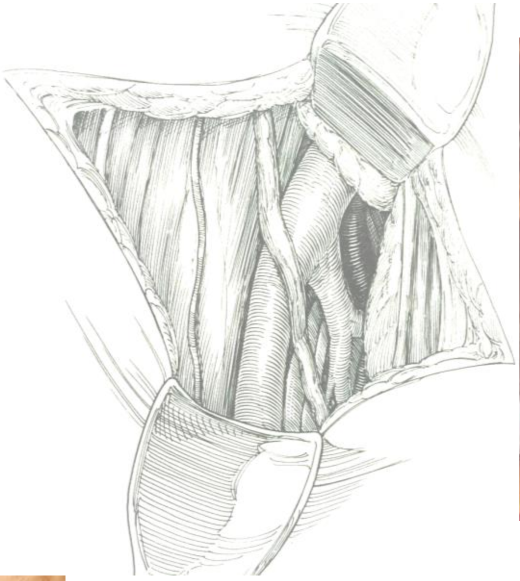

Endovascular Dilator Set
JCDS-1618-EDS-HC
16Fr / 45cm
18Fr / 45cm
COOK

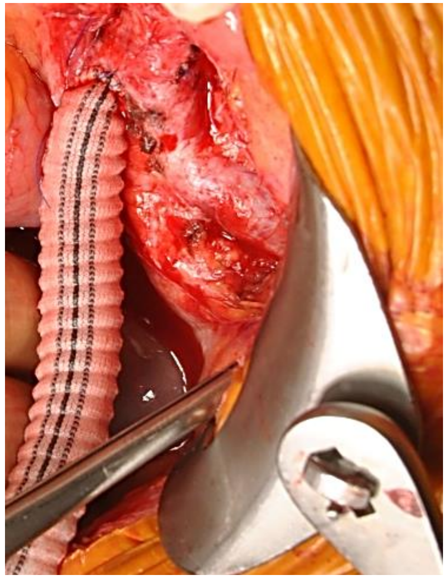

16 – 18 F


20 – 22 F


7 – 8 – 9 mm PTA


EIA Ø < 7mm
6,8 mm
6,8 mm





Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d] Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g] R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] and Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

Recommendation 33: We recommend the use of iliac conduits or direct iliac or aortic punctures for TEVAR delivery to facilitate access in patients with small (relative to the chosen device), tortuous, or calcified iliac vessels. The decision to perform a conduit should be made in the preoperative setting, when possible. **Level of recommendation: Grade 1 (Strong), Quality of Evidence: B (Moderate)**

Impact of iliac artery anatomy on the outcome of fenestrated and branched endovascular aortic repair

Enrico Gallitto, MD, PhD, Mauro Gargiulo, MD, Gianluca Faggioli, MD, Rodolfo Pini, MD, Chiara Mascoli, MD, Antonio Freyrie, MD, Stefano Ancetti, MD, *and* Andrea Stella, MD, *Bologna, Italy*

(J Vasc Surg 2017;66:1659-67.)

Table IV. Risk factors for intraoperative adjunctive maneuvers (IAMs) on multivariate analysis

Multivariate analysis	OR	95% CI	*P*
Diameter of external iliac artery <7 mm	12.5	2.2-71.4	**.01**
External iliac artery calcification	4.1	0.5-33.4	.18
Common and external iliac artery calcification	8.3	1.4-50.0	**.02**
Stenosis-obstructive disease	.8	0.1-4.4	.85
Severe angle	1.1	0.2-4.3	.90
Previous graft	0.3	0.6-1.9	.08
TAAA	2.3	0.8-6.7	.12

CI, Confidence interval; *OR,* odds ratio; *TAAA,* thoracoabdominal aortic aneurysm.
Boldface indicates statistically significant difference.

F-up 27±14months

Survival

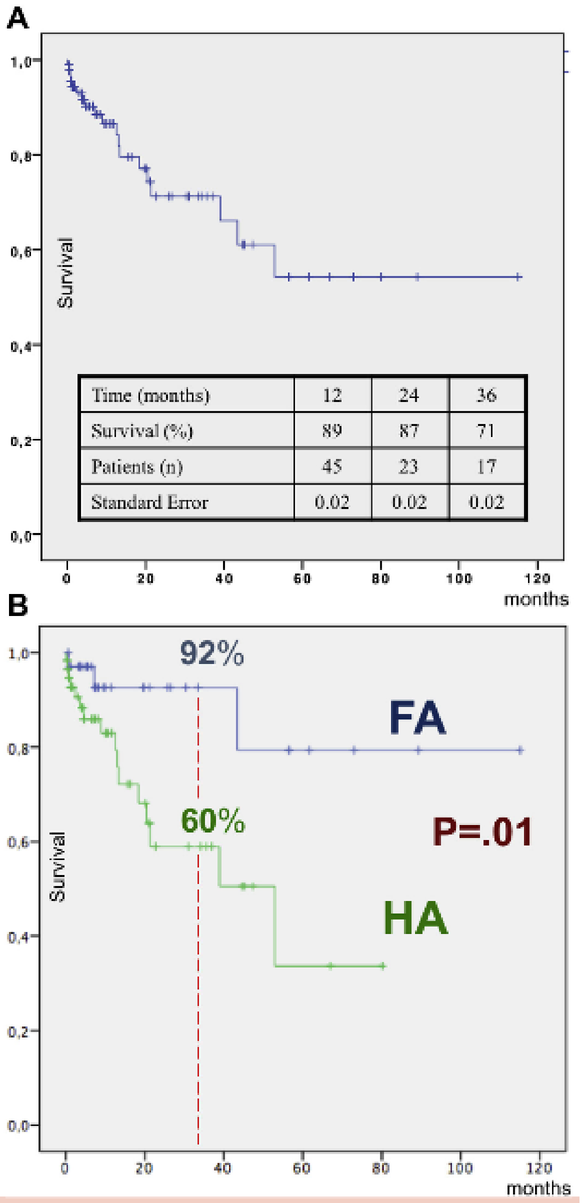


Fig 4. Survival according to Kaplan-Meier analysi **A,** Overall survival. **B,** Survival in hostile iliac artery anatom (*HA*) vs friendly iliac artery anatomy (*FA*). In FA, survival wa 92% ± 5% at 12, 24, and 36 months, respectively. In H survival was 83% ± 5%, 60% ± 9%, and 60% ± 9% at 12, 2 and 36 months, respectively (log-rank *P* = .01).

Vascular Access Challenges in Thoracic Endovascular Aortic Repair: A Literature Review

Tim J. Mandigers,[1,2] Chiara Lomazzi,[1] Maurizio Domanin,[1,3] Stefano Pirrelli,[4] Gabriele Piffaretti,[5] Joost A. van Herwaarden,[2] and Santi Trimarchi,[1,3] Milan, and Varese, Italy and Utrecht, the Netherlands

Ann Vasc Surg 2023

Alternative Antegrade TEVAR Access

- Upper extremity access
- Carotid access
- Ascending aortic access
- Transapical
- Transcaval

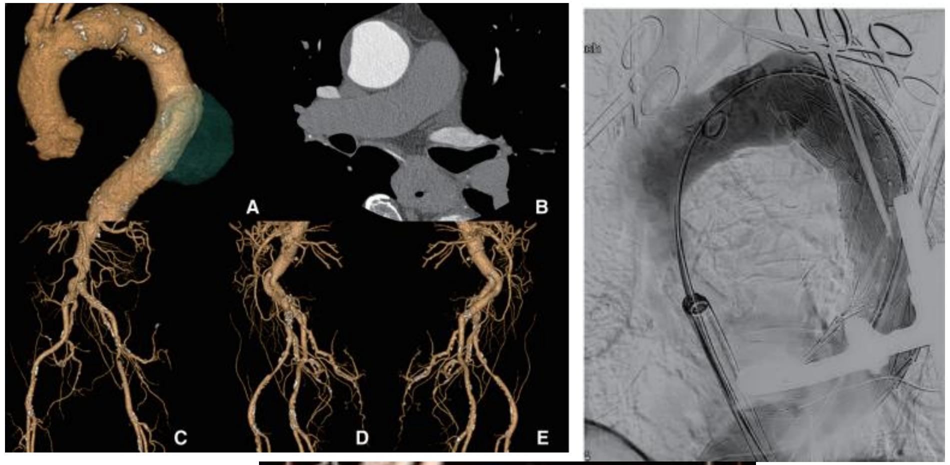
Ann Vasc Dis Vol. 17, No. 3; 2024; pp 309–312

Online June 29, 2024
doi: 10.3400/avd.cr.24-00033

Case Report

A Case of Transapical Thoracic Endovascular Repair for Thoracic Aortic Aneurysm with a Complicated Access Route

Yuhei Tokuda, Munehiro Saiki, Tomoya Inoue, Yusuke Kinugasa, Kentaro Tamura, Atsushi Tateishi, Yu Oshima, Kunikazu Hisamochi, and Keiji Yunoki



Multicenter Study > Eur J Cardiothorac Surg. 2024 May 3;65(5):ezae185.
doi: 10.1093/ejcts/ezae185.

Multicentre experience of antegrade thoracic endovascular aortic repair for the treatment of thoracic aortic diseases

Lorenzo Gibello [1], Michele Antonello [2], Efrem Civilini [3], Quentin Pellenc [4] [5], Raffaello Bellosta [6], Luciano Carbonari [7], Stefano Bonardelli [8], Antonio Freyrie [9], Vincent Riambau [10], Gianfranco Varetto [1], Fabio Verzini [1]

The survival rate: 100%, 84% and 67% at 12, 24 and 36 months
Freedom from reintervention: 92%, 56% and 56% at 12, 24 and 36 months,

Multicentric experience of antegrade thoracic endovascular aortic repair for the treatment of thoracic aortic diseases

Summary

Study population includes consecutive patients with arch and descending aorta disease, undergoing urgent or elective thoracic endografting with antegrade access.

Evaluated outcomes are early and mid-term survival and reintervention rate

14 → 5 (36%) urgent procedure

EARLY OUTCOMES
14 (100%) technical success
4 (28%) mortality -> all urgent setting
0 type I-III EL or access complications

LATE OUTCOMES
1 (10%) aorta-related death
2 (20%) aorta-related re-interventions

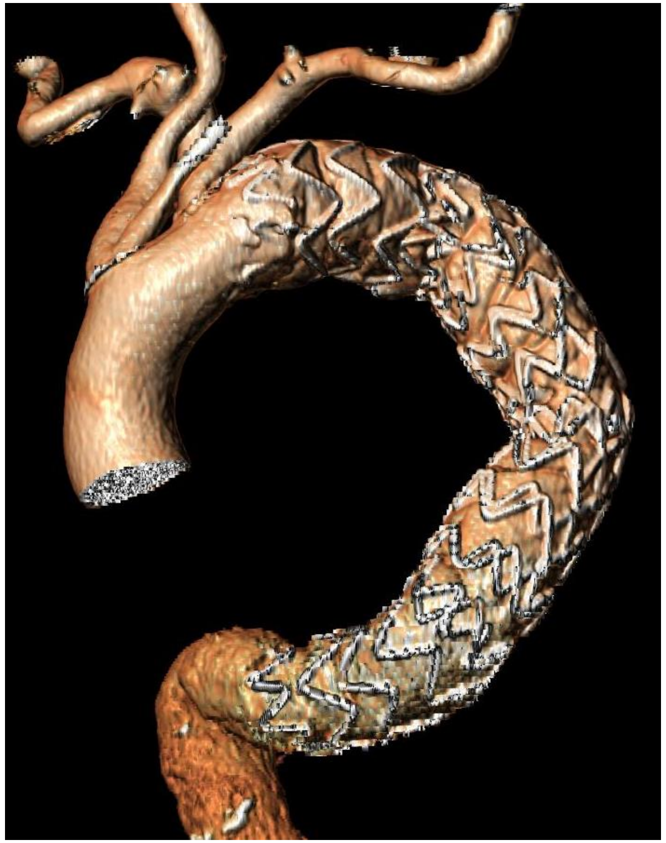
Despite good technical success & no access-site complications, this study demonstrates high rates of late type I EL & aortic-related reintervention

Conclusions: Antegrade TEVAR can seldom be considered an alternative when traditional retrograde approach is not feasible. Despite good technical success and few access-site complications, this study demonstrates high rates of late type I endoleak and aortic-related reinterventions.

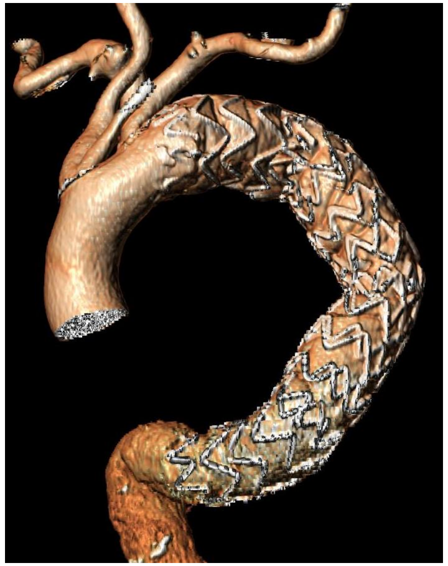
Thoracic Endovascular Aortic Aneurysm Repair

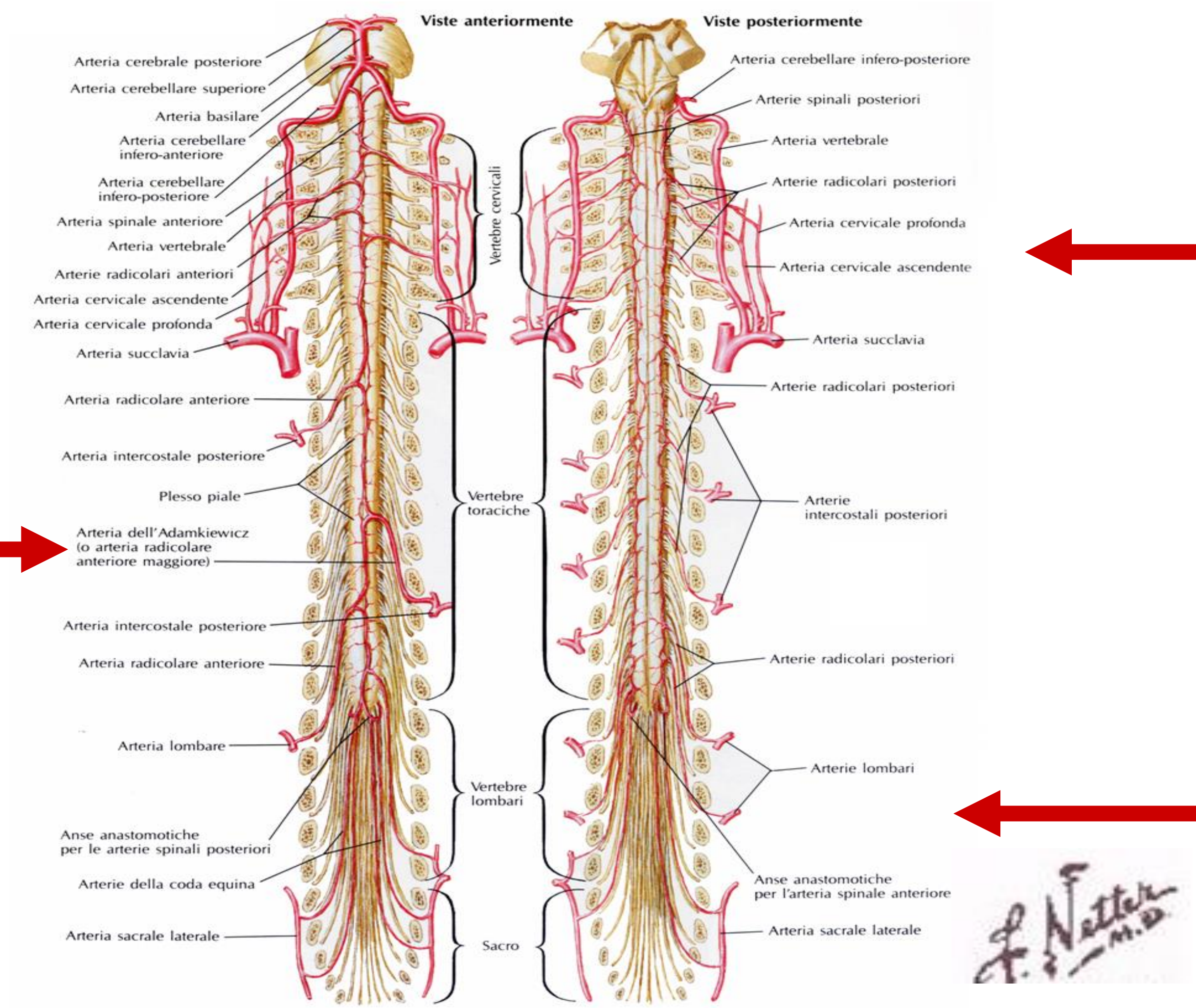
Agenda

- Indication for TEVAR
- TEVAR and proximal landing zone
- TEVAR and distal landing zone
- TEVAR and Access
- **TEVAR and spinal cord ischemia**
- TEVAR and Results



TEVAR and Spinal Cord Protection – Spinal Cord Blood Supply





- Subclavian aa
- Vertebral aa
- Hypogastric aa

SOCIETY FOR VASCULAR SURGERY PRACTICE GUIDELINES

Check for updates

Society for Vascular Surgery clinical practice guidelines of thoracic endovascular aortic repair for descending thoracic aortic aneurysms

Gilbert R. Upchurch Jr, MD,[a] Guillermo A. Escobar, MD,[b] Ali Azizzadeh, MD,[c] Adam W. Beck, MD,[d]
Mark F. Conrad, MD,[e] Jon S. Matsumura, MD,[f] Mohammad H. Murad, MD,[g]
R. Jason Perry, MD,[h] Michael J. Singh, MD,[i] Ravi K. Veeraswamy, MD,[j] *and* Grace J. Wang, MD,[k] *Gainesville, Fla; Atlanta, Ga; Los Angeles, Calif; Birmingham, Ala; Boston, Mass; Madison, Wisc; Rochester, Minn; Seattle, Wash; Pittsburgh and Philadelphia, Pa; and Charleston, SC*

(J Vasc Surg 2021;73:55S-83S.)

TEVAR and Spinal Cord Protection

Risk Factors for Spinal Cord Ischemia

- lenght of aortic coverage (> 15 cm)
- infrarenal aortic disease
- subclavian and hypogatric arteries disease
- CRF

TEVAR and Spinal Cord Protection

- Cerebrospinal Fluid drainage

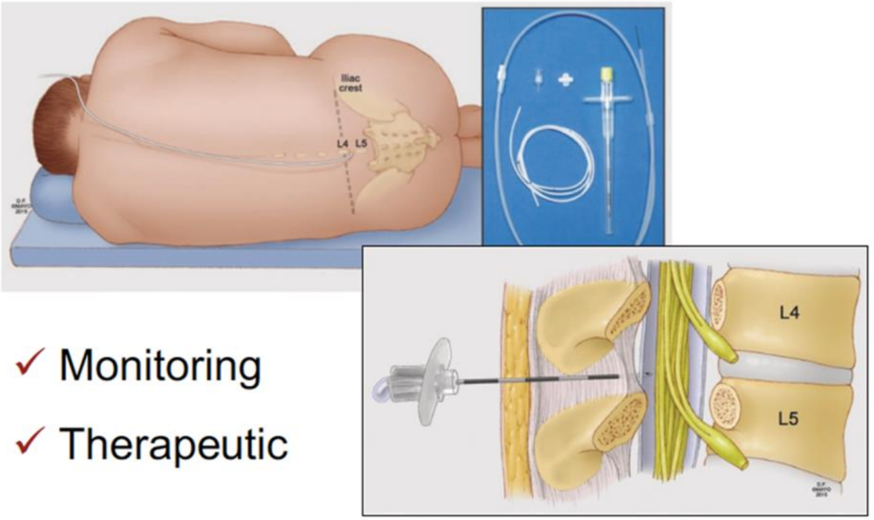
(10 cm H_20, 72 h)

- Elevated mean arterial pressure

(>100 mmHg)

- Avoid anemia

Cerebral Spinal Fluid drainage



✓ Monitoring

✓ Therapeutic

Arterial Pressure Assessment

Katsargyris, JVS 2015

✓Hypotensive drugs (Ca / Angiotensin Inhibitors)
Stop 7days before – 4/6weeks after operation

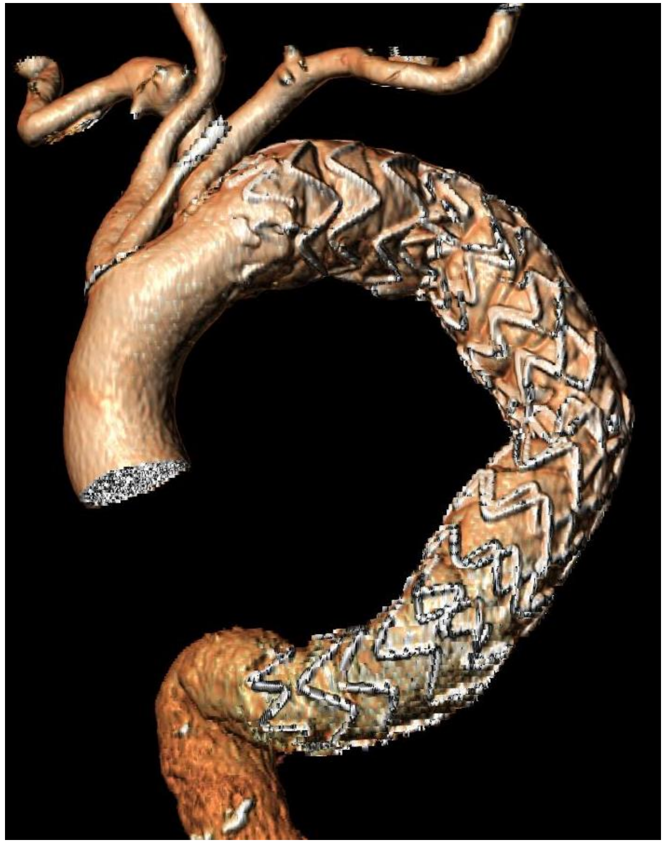
✓Mean AP ≥ 80 mmHg
72 post-op hours

✓Hemoglobin ≥10 mg/dL
Blood infusion 48 post-op hours

Thoracic Endovascular Aortic Aneurysm Repair

Agenda

- Indication for TEVAR
- TEVAR and proximal landing zone
- TEVAR and distal landing zone
- TEVAR and Access
- TEVAR and spinal cord ischemia
- **TEVAR and Results**



The Journal of Cardiovascular Surgery 2024 April;65(2):139-46
DOI: 10.23736/S0021-9509.23.12648-6

REVIEW
VASCULAR SECTION

Long-term outcomes of thoracic endovascular aortic repair for the treatment of descending thoracic aortic aneurysms: a systematic review and meta-analysis

Georgios I. KARAOLANIS [1] *, Efstratios GEORGAKARAKOS [2], Agathi KARAKOSTA [3], Georgios K. GLANTZOUNIS [4], Konstantinos G. MOULAKAKIS [5], Bernhard DORWEILER [6], Spyridon N. MYLONAS [7]

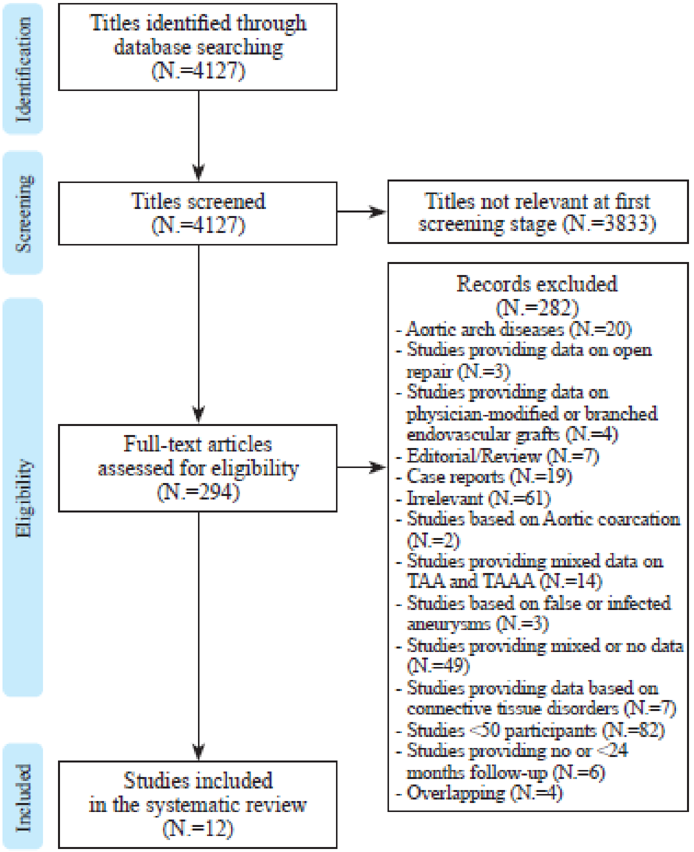


Figure 1.—Study flow chart.

TABLE II.—*Demographics and baselines characteristics of the analyzed patients.*

Parameters	Value	95% CIs
N. patients	1976	
Age (years)	72.5	70.3-74.7
Gender, (% male)	63.2	40.3-81.4
Comorbidities (%)		
HTN	89.8	85.3-93.1
Nicotine consumption	63.0	18.1-92.9
CAD	40.1	25.7-56.4
CVD	18.3	4.0-54.5
COPD	33.3	28.4-38.5
CKD	17.7	13.4-23.0
PAD	22.0	7.9-48.3
Prior aortic procedure	40.9	33.6-48.7
DTAA max diameter (mm)	59.6	55.2-63.9
Procedure mode (% elective)	78.3	72.5-83.1
Length of aortic coverage (cm)	158.9	106.6-211.33
Adjunctive procedures (%)	23.7	13.9-37.5

Online version at https://www.minervamedica.it

The Journal of Cardiovascular Surgery 2024 April;65(2):139-46
DOI: 10.23736/S0021-9509.23.12648-6

REVIEW
VASCULAR SECTION

Long-term outcomes of thoracic endovascular aortic repair for the treatment of descending thoracic aortic aneurysms: a systematic review and meta-analysis

Georgios I. KARAOLANIS [1] *, Efstratios GEORGAKARAKOS [2],
Agathi KARAKOSTA [3], Georgios K. GLANTZOUNIS [4],
Konstantinos G. MOULAKAKIS [5], Bernhard DORWEILER [6], Spyridon N. MYLONAS [7]

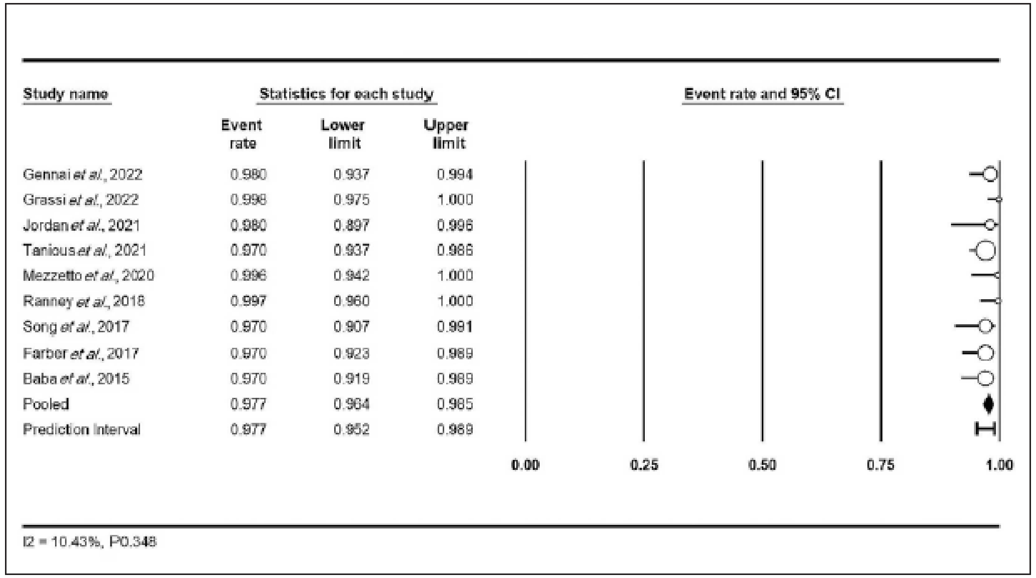


Figure 2.—Forest plot for technical success.[14-18, 21, 23-25] **97.7%**

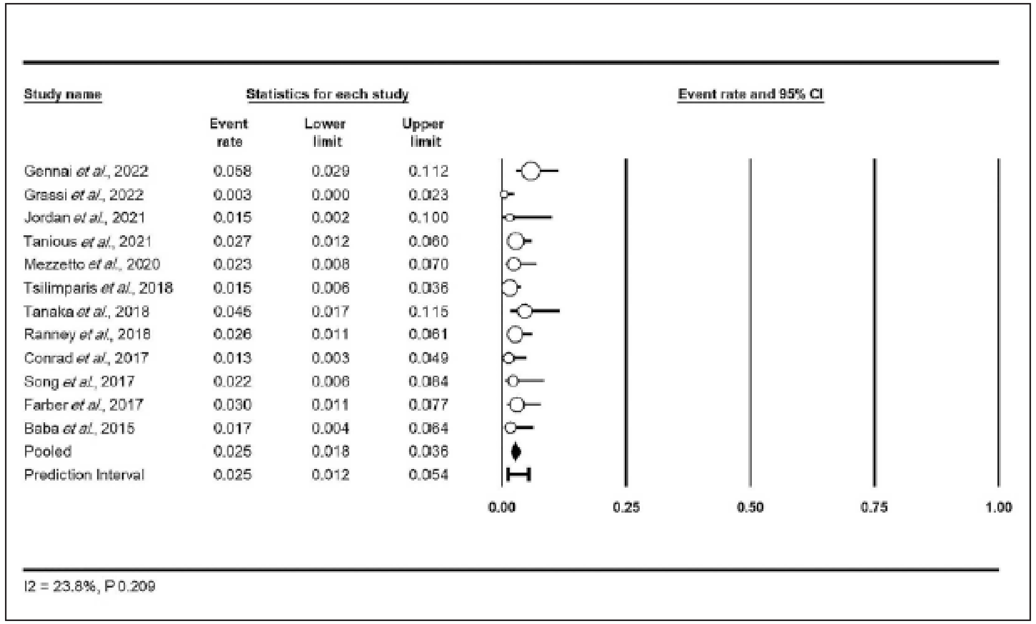


Figure 3.—Forest plot for permanent paraplegia.[14-25] **2.5%**

The Journal of Cardiovascular Surgery 2024 April;65(2):139-46
DOI: 10.23736/S0021-9509.23.12648-6

REVIEW
VASCULAR SECTION

Long-term outcomes of thoracic endovascular aortic repair for the treatment of descending thoracic aortic aneurysms: a systematic review and meta-analysis

Georgios I. KARAOLANIS [1] *, Efstratios GEORGAKARAKOS [2], Agathi KARAKOSTA [3], Georgios K. GLANTZOUNIS [4], Konstantinos G. MOULAKAKIS [5], Bernhard DORWEILER [6], Spyridon N. MYLONAS [7]

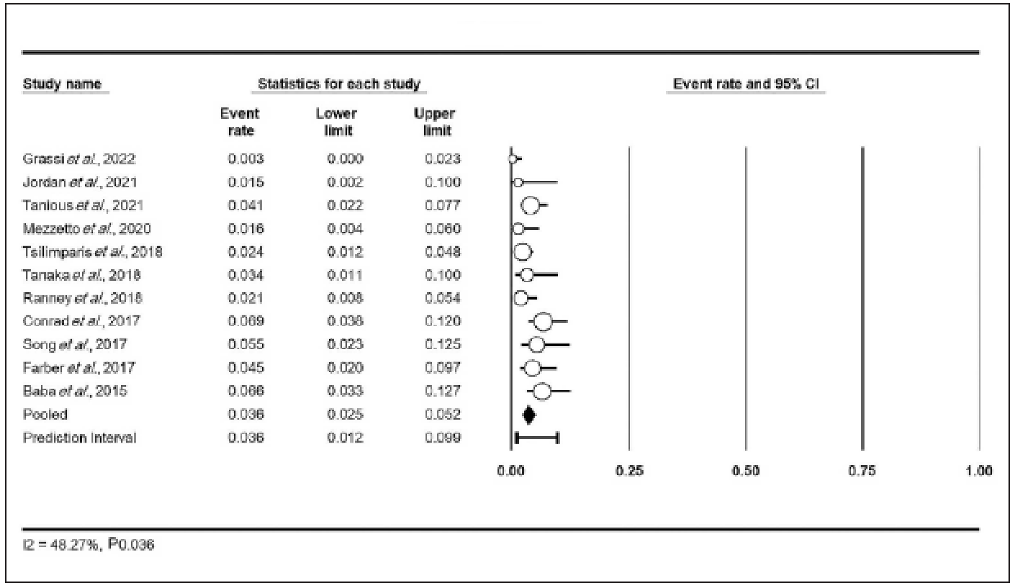


Figure 4.—Forest plot for stroke.[15-25] **3.6%**

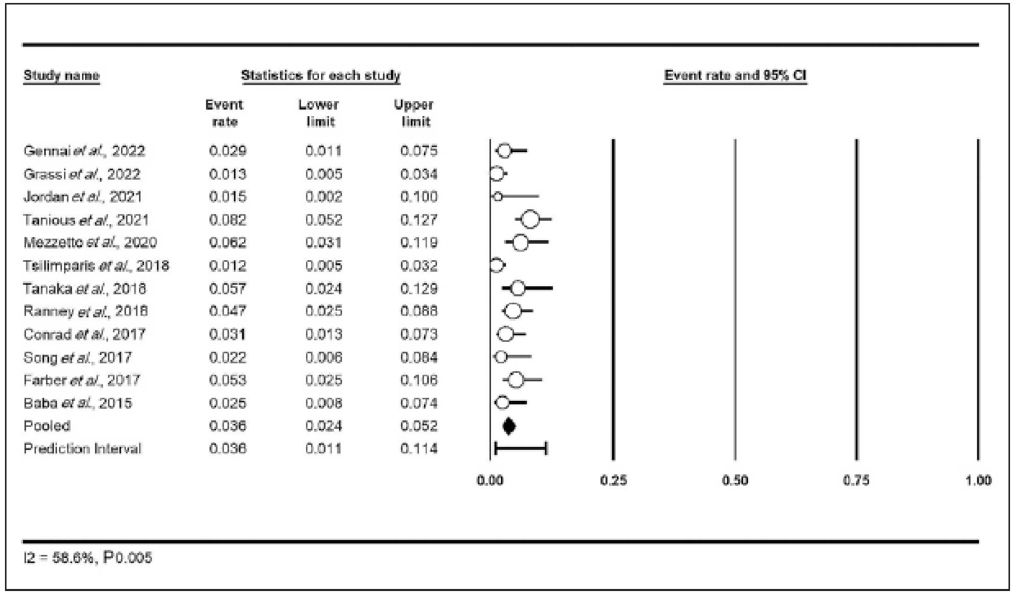


Figure 5.—Forest plot for 30-day/in-hospital mortality.[14-25] **3.6%**

© 2023 EDIZIONI MINERVA MEDICA
Online version at https://www.minervamedica.it

The Journal of Cardiovascular Surgery 2024 April;65(2):139-46
DOI: 10.23736/S0021-9509.23.12648-6

REVIEW
VASCULAR SECTION

Long-term outcomes of thoracic endovascular aortic repair for the treatment of descending thoracic aortic aneurysms: a systematic review and meta-analysis

Georgios I. KARAOLANIS [1] *, Efstratios GEORGAKARAKOS [2],
Agathi KARAKOSTA [3], Georgios K. GLANTZOUNIS [4],
Konstantinos G. MOULAKAKIS [5], Bernhard DORWEILER [6], Spyridon N. MYLONAS [7]

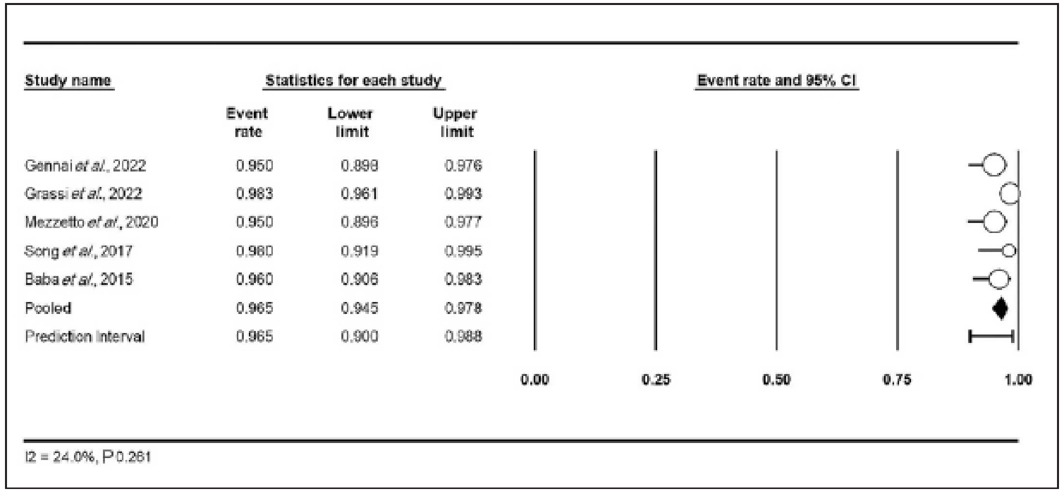


Figure 9.—Forest plot for freedom from reintervention at 1 year.[14, 15, 18, 23, 25]

96.5%

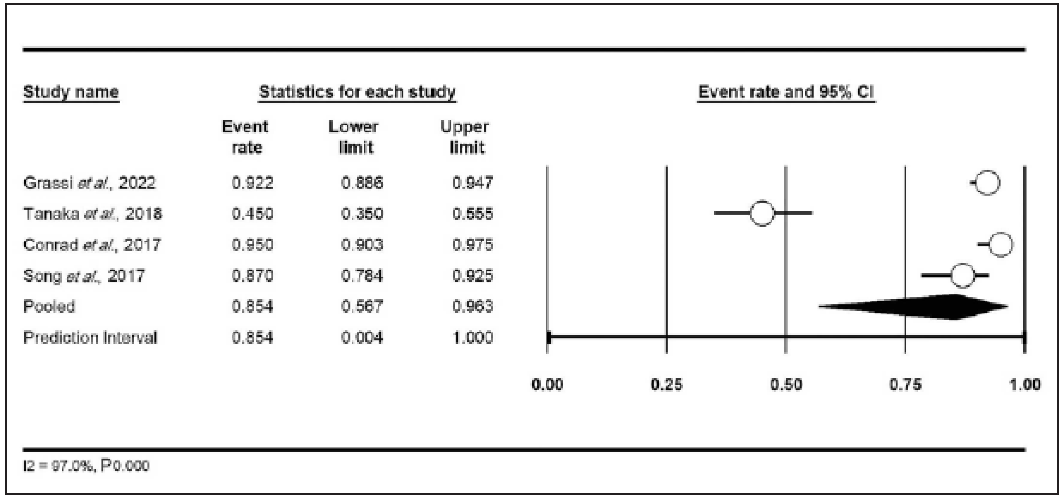


Figure 10.—Forest plot for freedom from reintervention at 5 years.[15, 20, 22, 23]

85.4%

The Journal of Cardiovascular Surgery 2024 April;65(2):139-46
DOI: 10.23736/S0021-9509.23.12648-6

REVIEW
VASCULAR SECTION

Long-term outcomes of thoracic endovascular aortic repair for the treatment of descending thoracic aortic aneurysms: a systematic review and meta-analysis

Georgios I. KARAOLANIS [1] *, Efstratios GEORGAKARAKOS [2],
Agathi KARAKOSTA [3], Georgios K. GLANTZOUNIS [4],
Konstantinos G. MOULAKAKIS [5], Bernhard DORWEILER [6], Spyridon N. MYLONAS [7]

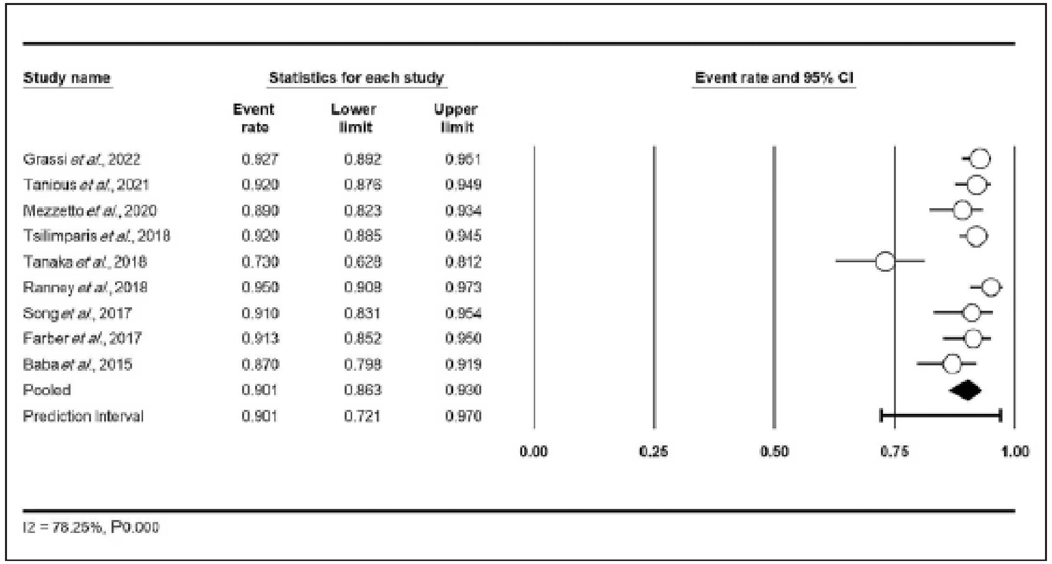


Figure 6.—Forest plot for 1-year survival.[15, 17-25]

90.1%

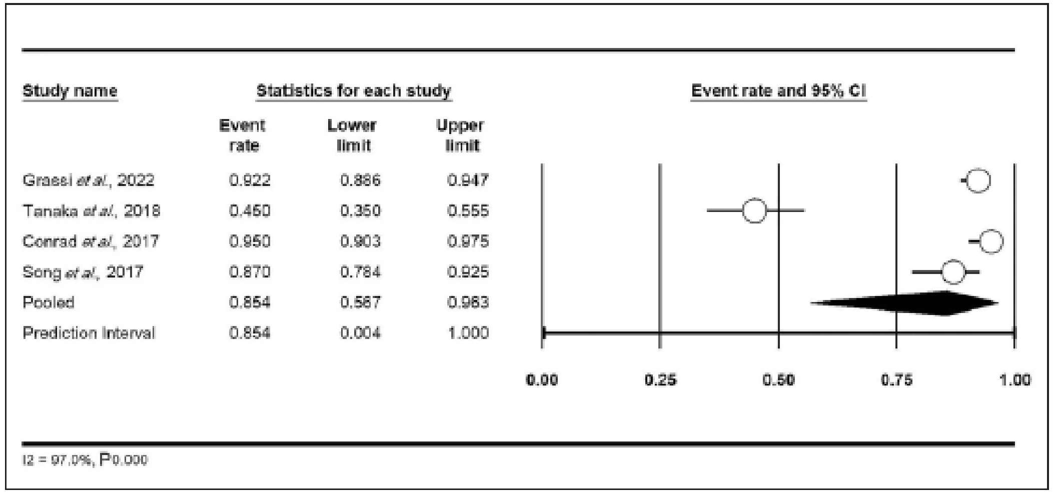


Figure 10.—Forest plot for freedom from reintervention at 5 years.[15, 20, 22, 23]

73.2%

TEVAR and 30 days mortality

Prediction of thirty-day mortality risk after thoracic endovascular aortic repair for intact descending thoracic aortic aneurysms: Derivation of risk calculator in the Vascular Quality Initiative

Isaac N. Naazie, MD, MPH,[a] Jaideep Das Gupta, MD,[a] Ali Azizzadeh, MD,[b] Cassra Arbabi, MD,[b] Devin Zarkowsky, MD,[c] *and* Mahmoud B. Malas, MD, MHS,[a] *La Jolla and Los Angeles, Calif; and Aurora, Colo*

(J Vasc Surg 2022;75:833-41.)

Table III. Thirty-day mortality risk prediction model

Predictor	Beta (β_i) coefficient	Odds ratio (95% CI)	*P* value
Age, years			
<75	0	1 (ref)	
≥75	0.8217	2.27 (1.50-3.44)	<.001
CAD			
No	0	1 (ref)	
Yes	0.4683	1.60 (1.03-2.47)	.036
ASA class			
I/II/III	0	1 (ref)	
IV or V	0.8711	2.39 (1.39-4.10)	.002
Urgency			
Elective	0	1 (ref)	
Urgent	1.2450	3.47 (1.90-6.33)	<.001
Emergent	1.6629	5.27 (2.36-11.75)	<.001
Prior carotid endarterectomy or stenting			
No	0	1 (ref)	
Yes	1.1752	3.24 (1.64-6.39)	.001
Proximal landing zone			
≥3	0	1 (ref)	
<3	0.9186	2.51 (1.65-3.81)	<.001
Intercept (β_0)	−5.1245	–	–

ASA, American Society of Anesthesiologists; *CAD*, coronary artery disease; *CI*, confidence interval.
The final sample size with complete data for this analysis was 2083.

TEVAR and Long Term Reintervention / Survival

Predictors for reintervention and survival during long-term follow-up after thoracic endovascular aortic repair for descending thoracic aortic aneurysm

Oroa Salem, MD,[a] Hazem El Beyrouti, MD,[b] Joscha Mulorz, MD,[c] Hubert Schelzig, MD,[c,d] Abdelhakim Ibrahim, MD,[e] Alexander Oberhuber, MD,[e] and Bernhard Dorweiler, MD,[a] *Cologne, Mainz, Düsseldorf, and Muenster, Germany*

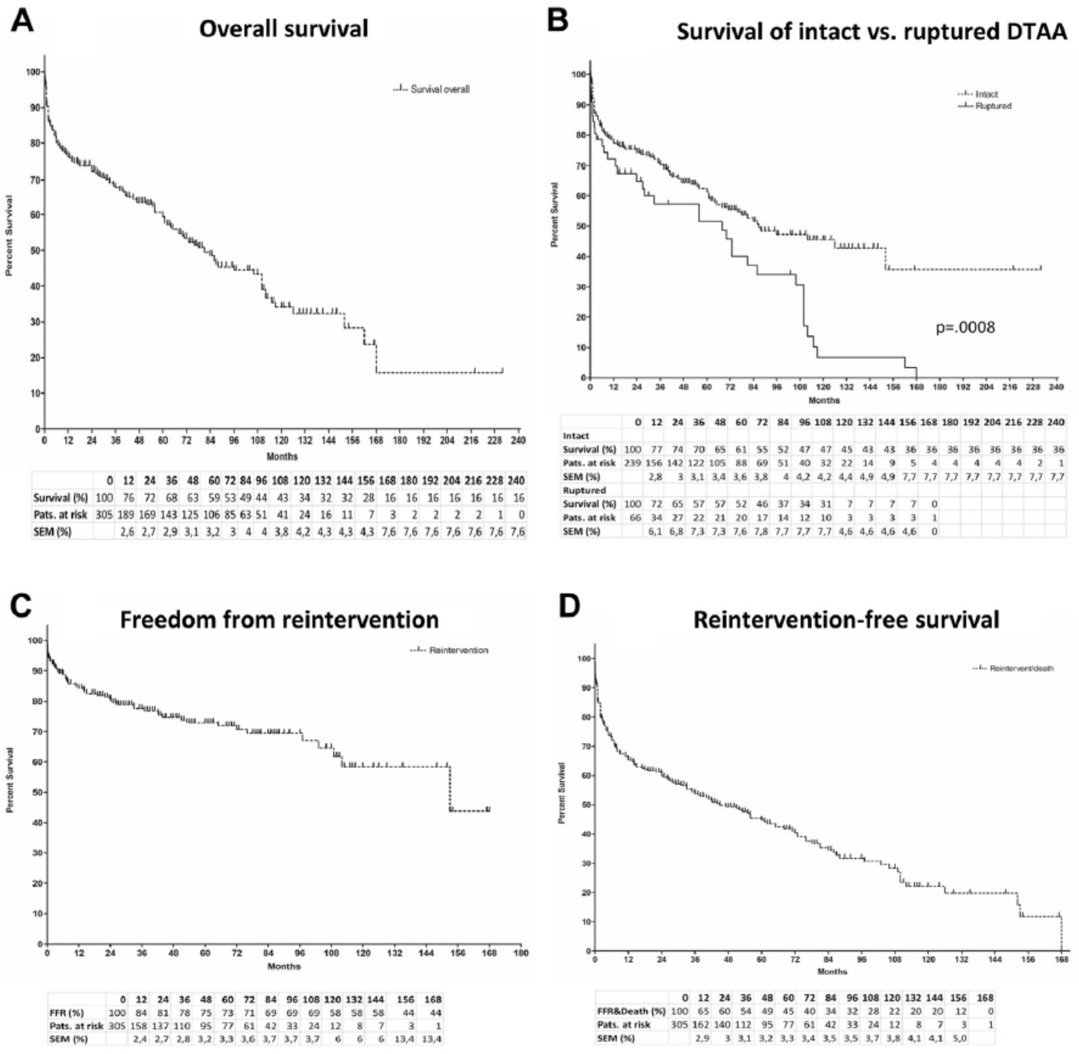
J Vasc Surg 2024 in press

305 patients (mean age, 72 ± 10 years)

Table V. Predictors for death and reinterventions after thoracic endovascular aortic repair (*TEVAR*)

	Univariate analysis				Multivariate analysis[a]			
	Odds ratio	95% CI lower	95% CI upper	*P* value	Odds ratio	95% CI lower	95% CI upper	*P* value
Death								
ASA grade 3-5	2035	1087	3809	**.026**	1999	1039	3848	**.038**
Nonelective case	2170	1367	3444	**.001**	1892	1174	3048	**.009**
Older age	1046	1019	1074	**.001**	1038	1010	1066	**.007**
COPD	1992	1029	3856	**.041**				
Aortic arch type I	0.426	0233	0.779	**.006**				
Diameter proximal landing zone	1059	1008	1114	**.023**				
Total aortic coverage	1004	1001	1006	**.003**				
Length of stay	1023	1002	1043	**.028**				
Operative time	1006	1002	1011	**.003**				
Reintervention								
Fusiform TAA	2778	1341	5753	**.006**	3177	1465	6890	**.003**
Landing zone 2	3148	1705	5813	**<.001**	2806	1471	5354	**.002**
Total aortic coverage	1003	1001	1006	**.020**				
TEVAR First-generation	3200	1104	9278	**.032**				
Hypertension	2981	1135	7828	**.027**	2811	1036	7628	**.042**
Older age					0.969	0941	0.998	**.034**
Chronic renal insufficiency	0.325	0112	0.943	**.039**	0.299	0099	0.900	**.032**
GFR >60 mL/min/1.73 m^2	1013	1001	1025	**.028**				

ASA, American Society of Anesthesiologists; CI, confidence interval; *COPD*, chronic obstructive pulmonary disease; *GFR*, glomerular filtration rate; *TAA*, thoracic aortic aneurysm.
Boldface entries indicate statistical significance.
[a]Only variables with *P* < .5 are reported.



Thoracic Endovascular Aortic Aneurysm Repair

Conclusion

- Guidelines
- TEVAR is the first choice for Thoracic Aortic Aneurysm Repair
- Planning for proximal and distal landing zone
- Stent Graft appears to maintain favorable perioperative and mid-long term results