Insights from the prospective multicentre observational study evaluating acute lower limb ischemia on the influence of patient characteristics on treatment strategy selection and outcomes

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ABSTRACT

Objective: Acute lower limb ischemia (ALI) is a vascular emergency requiring prompt intervention to prevent limb loss and mortality. Treatment strategies have evolved from open surgical revascularization (OSR) and thrombolysis-dominated endovascular therapy (EVT) with advanced thrombectomy devices and hybrid approaches, yet optimal management remains debated. PROMOTE-ALI (Prospective Multicentre Observational Study Evaluating Acute Lower Limb Ischaemia) evaluates contemporary treatment practices, factors influencing modality selection, and short-term outcomes in ALI across Europe.

Methods: The PROMOTE-ALI registry included patients from December 1, 2021, to August 31, 2023. The primary end point was identifying preoperative predictors influencing treatment choice. Secondary end points included 30-day and 90-day amputation-free survival (AFS), freedom from target limb reintervention, clinical outcomes, complications, and survival. Predictors of treatment were analyzed with generalized linear mixed model with random intercept for inclusion site. Kaplan-Meier analysis evaluated the probability for AFS, freedom from major amputation, and survival.

Results: Among 705 cases, OSR (55.7%) was the predominant treatment, followed by hybrid (20.9%) and EVT (19.1%). Completion angiography was performed in 50.1% of OSR cases, significantly reducing reintervention rates (6.16% vs 13.52%; $P = .02$). EVT and hybrid therapy were favored in patients with peripheral artery disease (60.0% and 60.5% vs 46.3% OSR; $P = .05$ and $P = .03$) and prior ipsilateral revascularizations (57.8% and 48.3% vs 32.1%; $P < .001$ and $P < .02$). OSR was preferred in patients with cardiac dysrhythmia (38.4% vs 16.3% EVT and 13.6% hybrid; $P = .004$ and $P = .002$). EVT patients had higher reintervention (32.6%) and bleeding rates (5.2%) compared with OSR (8.9%, 1.0%) and hybrid therapy (15.0%, 1.4%; $P < .001$ and $P = .01$).

Conclusions: This study highlights evolving ALI treatment patterns in Europe. Patient characteristics, disease etiology, and procedural factors significantly influence ALI treatment selection. Although OSR remains essential, hybrid techniques address complex lesions, and EVT is preferred in failed prior revascularizations, although with higher reintervention risks. Comparable AFS across modalities underscores the importance of individualized approaches and refinement of treatment protocols to optimize outcomes. (J Vasc Surg 2025;82:987-97.)

Key words: Acute limb ischemia; Amputation-free survival; Limb salvage; Endovascular; Hybrid; Open surgery

Acute lower limb ischemia (ALI) is a vascular emergency requiring prompt intervention to mitigate limb loss and mortality.[1,2] Historically, treatment strategies for ALI were studied in randomized trials comparing endovascular therapy (EVT) and open surgical revascularization (OSR),[3] which primarily assessed thrombolysis as

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A full list of collaborators with the European Vascular Research Collaborative (EVRC) is provided in the Appendix.

Additional material for this article may be found online at www.jvascsurg.org.

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the endovascular option. However, contemporary ALI treatment has evolved significantly, incorporating advanced thrombectomy devices and hybrid approaches. In current practice, thrombolysis is administered frequently with shorter infusion times and lower medication dosages to address residual clots, thereby complementing mechanical techniques.

Although ALI is defined as ischemia of <14 days, patients with ischemia durations of <24 to 48 hours often present differently compared with those with more prolonged symptoms (3-14 days), which significantly impacts treatment decisions and outcomes. Furthermore, time to revascularization, influenced by patient characteristics and center practices, plays a pivotal role in decision-making. A shift in etiology has also been observed over time, from embolization owing to rheumatic or congenital valve disease in relatively young patients to embolization owing to cardiac dysrhythmia or in situ thrombosis in older patients.[4,5] Patient-specific factors and available resources critically influence the choice between OSR, EVT, hybrid strategies, and medical therapy. OSR remains a cornerstone, but advancements in EVT and hybrid methods have expanded treatment possibilities. Although timely revascularization is critical, optimal management remains elusive, given the heterogeneity of patient presentations and etiologies.[6]

This analysis of the prospective, multicenter, observational PROMOTE-ALI (Prospective Multicentre Observational Study Evaluating Acute Lower Limb Ischaemia)[7,8] aims to evaluate contemporary treatment practices and short-term outcomes for ALI across Europe. It explores factors associated with the selection of OSR, EVT, hybrid, or medical therapies and examines how evolving technologies and patient characteristics influence treatment outcomes.

ARTICLE HIGHLIGHTS

- **Type of Research:** Multicenter, prospective, observational study
- **Key Findings:** Among 705 acute lower limb ischemia cases, open surgery (55.7%) predominated, followed by endovascular (19.1%) and hybrid techniques (20.9%). Comparable 30-day amputation-free survival rates (87.3%-88.9%) were achieved. Completion angiography reduced open surgery reinterventions (6.16% vs 13.52%; $P = .02$). Endovascular treatment had higher reintervention (32.6%) and bleeding rates (5.2%).
- **Take Home Message:** Treatment of acute lower limb ischemia is evolving, with open surgery remaining the predominant modality. Completion angiography improves open surgery outcomes by reducing reinterventions. Endovascular and hybrid techniques offer alternatives for complex cases, although endovascular treatment carries higher reintervention and bleeding risks. Individualized treatment approaches are essential to achieve comparable short-term outcomes.

METHODS

Study design. PROMOTE-ALI is a prospective, observational study registered at ClinicalTrials.gov (NCT05138679). Patients were included from December 1, 2021, to August 31, 2023. Ethical approval was obtained from the leading ethics committee at the Medical University of Innsbruck, Austria (EK Nr. 1220/2021), as well as from all participating centers in accordance with national regulations (full list of collaborators listed in Supplementary Table I, online only). The study adhered to the Declaration of Helsinki and the STROBE guidelines.[9] Outcomes and definitions followed reporting standards for ALI by Rutherford et al[2] and recommendations from the International Consortium of Vascular Registries.[10]

Inclusion and exclusion criteria. Eligible patients included those presenting consecutively with ALI (Rutherford category I-III)[2] in one or both lower limbs within 2 weeks of symptom onset. Exclusion criteria were age <18 years and a lack of informed consent.

End points. The primary end point was the identification of preoperative predictors influencing treatment modality choice. Secondary end points included 30-day and 90-day amputation-free survival (AFS), freedom from target limb reintervention, clinical outcomes (eg, limb salvage rates, discharge status), complications (eg, compartment syndrome, bleeding, acute kidney injury), and overall survival during follow-up. AFS was defined as freedom from major amputation (above-ankle) and death from any cause.

Treatment modalities. Patients were managed using one of four revascularization strategies for re-establishing blood flow in the affected limb. OSR involved a cutdown with open surgical intervention, and comprised Fogarty embolectomy, bypass surgery, and thrombendarteriectomy. EVT referred to minimally invasive, percutaneous intravascular interventions, and included catheter-directed thrombolysis and percutaneous transluminal angioplasty (PTA) with or without stenting. Hybrid techniques integrated the use of endovascular procedures with open surgical methods; and medical therapy without revascularization entailed antithrombotic and anticoagulation management.[11]

Data collection and analysis. Data were recorded using an electronic case report form via Castor EDC's ePRO software (Amsterdam, the Netherlands). Normality was

Table I. Treatment modalities (n = 705)

Variables	No. (%)
Revascularization	675 (95.7)
OSR	393 (55.7)
Only embolectomy	231 (58.7)
Only endarterectomy	20 (5.1)
Only prosthetic bypass	32 (8.1)
Prosthetic bypass and open surgical adjuncts	24 (6.1)
Only vein bypass	23 (5.9)
Vein bypass and open surgical adjuncts	23 (5.9)
Composite bypass	4 (1)
Completion angiography	197 (50.1)
Hybrid procedure	147 (20.9)
PTA and open surgical adjuncts	44 (29.9)
Stent PTA and open surgical adjuncts	80 (54.4)
Catheter guided embolectomy/aspiration and open surgical adjuncts	26 (17.7)
Catheter directed thrombolysis and open surgical adjuncts	8 (5.4)
Catheter guided atherectomy and open surgical adjuncts	2 (1.4)
Prosthetic bypass and PTA or stent-PTA	18 (12.2)
Vein bypass and PTA or stent-PTA	4 (2.7)
Vein bypass and thrombolysis	3 (2)
EVT	135 (19.1)
PTA alone	29 (19.7)
PTA and stenting	53 (36.1)
Catheter guided embolectomy/aspiration	47 (32)
Catheter directed thrombolysis	75 (51)
Catheter guided atherectomy	12 (8.2)
No revascularization	30 (4.2)

EVT, Endovascular treatment; *Open surgical adjuncts*, with embolectomy or endarterectomy or both; *OSR*, open surgical repair; *PTA*, percutaneous transluminal angioplasty.
For each modality of revascularization strategy, the percent is calculated over the denominator of said category (not the total number of included patients).

tested with the Shapiro-Wilk test and continuous variables are presented as means ± standard deviations for variables with a parametric distribution, or as medians with interquartile ranges for nonparametric variables. Categorical variables are presented as frequencies and percentages. Predictors of treatment choice were analyzed using univariate logistic regression, followed by two generalized linear mixed models that incorporate a random intercept for inclusion site models, acknowledging recruitment heterogeneity, to investigate factors associated with the endovascular treatment only and hybrid treatment respectively. The treatment modality was modelled using the generalized logit link function to compare the relative odds of receiving each treatment compared with the reference category (OSR). The initial models included all relevant predictors based on clinical relevance and theoretical considerations. To refine the model, we used a backward elimination approach, iteratively removing nonsignificant predictors ($P \geq .05$) while monitoring changes in model performance. A sensitivity analysis was performed on the final models by excluding patients who received solely PTA or stent PTA without any further surgical adjuncts. Model performance was evaluated using the Akaike information criterion. In a subgroup analysis for centers that offered all three treatment modalities, a multinomial logistic regression analysis was conducted to assess the association between treatment modality and the predictors from the previous model. Kaplan-Meier survival curves evaluated AFS, overall survival, and freedom from major amputation. Intergroup comparisons used χ^2 and analysis of variance tests, with Bonferroni corrections applied for subgroup analyses where OSR was used as the reference treatment. Missing data were addressed by querying centers, and only complete datasets were analyzed. The follow-up index was defined as the ratio between the actual registered follow-up duration and the prespecified potential follow-up of 3 months after admission.[12] Statistical significance was set at a P value of <.05, and analyses were conducted using SAS software (SAS Institute, Cary, NC).

RESULTS

Treatment modalities and patient characteristics. Among 705 patients undergoing 675 revascularizations, OSR was the predominant modality (55.7%, with embolectomies in 58.7%), followed by hybrid techniques (20.9%, with stenting and open surgical adjuncts in 54.4%) and EVT (19.1%). Medical management alone was used in 4.2% of cases. The distribution of treatment modalities is summarized in Table I. Completion angiography occurred in 50.1% of OSR cases. There was no significant difference in AFS between patients with and without completion angiograms ($P = .91$). However, patients without completion angiograms had significantly higher reintervention rates compared with those with angiograms (13.52% vs 6.16%; $P = .02$).

Table II displays the demographic characteristics of patients by treatment modality. On univariate analysis, patients undergoing EVT and hybrid procedures had fewer heart rhythm disorders (16.3% and 13.6%, respectively, vs 38.4% for OSR; $P = .004$ and $P = .002$). They were more likely to have peripheral artery disease (PAD) (60.0% EVT, 60.5% hybrid, vs 46.3% OSR; $P = .05$ and $P = .03$) and prior ipsilateral revascularizations (57.8% EVT, 48.3% hybrid, vs 32.1% OSR; $P < .001$ and

Table II. Demographic characteristics

Variables	OSR (n = 393)	EVT (n = 135)	*P* value (vs OSR)	Hybrid (n = 147)	*P* value (vs OSR)	No revascularization (n = 30)	*P* value (vs OSR)
Age, years	70.2 ± 12.3	66.3 ± 12.7	.27	69.3 ± 12.6	.46	71.3 ± 14.2	.53
Male sex	236 (60.1)	88 (65.2)	.55	98 (66.7)	.29	19 (63.3)	.14
Hypertension	320 (81.4)	101 (74.8)	.38	104 (70.7)	.02[a]	25 (83.3)	.02[a]
Dyslipidemia	216 (55.0)	80 (59.3)	.48	88 (59.9)	.36	12 (40.0)	.52
COPD	80 (20.4)	18 (13.3)	.07	39 (26.5)	.06	8 (26.7)	.95
Diabetes mellitus	80 (20.4)	29 (21.5)	.83	25 (17.0)	.3	10 (33.3)	1
BMI							
Underweight <18.5 kg/m^2	8 (2.0)	6 (4.4)	1	12 (8.2)	.06	3 (10.0)	.003[a]
Obese (30 ≤ BMI < 35 kg/m^2)	73 (18.6)	20 (14.8)	.77	14 (9.5)	.05	6 (20.0)	.05
Morbidly obese (BMI ≥35 kg/m^2)	23 (5.9)	6 (4.4)	1	2 (1.4)	.07	0 (0.0)	.05[a]
Smoking							
Active smoker	130 (33.1)	51 (37.8)	.86	69 (46.9)	.01	9 (30.0)	.03[a]
Former smoker	107 (27.2)	49 (36.3)	.12	47 (32.0)	.7	11 (36.7)	.05
Heart condition							
CAD	146 (37.2)	36 (26.7)	.08	45 (30.6)	.49	8 (26.7)	.02[a]
Heart rhythm disorder	151 (38.4)	22 (16.3)	.004[a]	20 (13.6)	.002[a]	8 (26.7)	<.001[a]
CeVD	70 (17.8)	10 (7.4)	.02[a]	17 (11.6)	.37	3 (10.0)	<.001[a]
CKD (eGFR <30 mL/min/1.73 m^2)	25 (6.4)	5 (3.7)	.37	6 (4.1)	.46	4 (13.3)	.47
Hemodialysis	2 (0.5)	1 (0.1)	.98	3 (2.0)	.47	2 (6.7)	.16
Aneurysmal disease/dissection	61 (15.5)	18 (13.3)	.94	16 (10.9)	.29	3 (10.0)	.2
Arterial embolization in history	57 (14.5)	16 (11.9)	.56	23 (15.6)	.54	1 (3.3)	.59
Peripheral aneurysm in history	34 (8.7)	18 (13.3)	.09	12 (8.2)	.74	1 (3.3)	.65
PAD	182 (46.3)	81 (60.0)	.05[a]	89 (60.5)	.03[a]	16 (53.3)	<.001[a]
Previous revascularization of the ipsilateral arteries	126 (32.1)	78 (57.8)	<.001[a]	71 (48.3)	.02[a]	3 (10.0)	<.001[a]
PTA	61 (15.5)	56 (41.5)	<.001[a]	50 (34.0)	<.001[a]	1 (3.3)	<.001[a]
Open thrombectomy or TEA	44 (11.2)	29 (21.5)	.05[a]	37 (25.2)	.002[a]	0 (0.0)	<.001[a]
Vein bypass	20 (5.1)	21 (15.6)	<.001[a]	11 (7.5)	1	1 (3.3)	.01[a]
Prosthetic bypass	65 (16.5)	35 (25.9)	.04[a]	33 (22.4)	.33	3 (10.0)	.05[a]
Malignancy							
Previous malignancy	31 (7.9)	14 (10.4)	1	27 (18.4)	<.001[a]	0 (0.0)	.03[a]
Active malignancy	28 (7.1)	8 (5.9)	.59	11 (7.5)	1	5 (16.7)	.89
Thrombophilia	13 (3.3)	17 (12.6)	.02[a]	8 (5.4)	1	1 (3.3)	1
Current COVID infection	64 (16.3)	35 (25.9)	.004[a]	26 (17.7)	<.001[a]	6 (.2)	<.001[a]

BMI, Body mass index; *CAD*, coronary artery disease; *CeVD*, cerebrovascular disease; *CKD*, chronic kidney disease; *COPD*, chronic obstructive pulmonary disease; *COVID*, coronavirus disease; *eGFR*, glomerular filtration rate according to chronic kidney disease epidemiology collaboration equation; *EVT*, endovascular treatment; *OSR*, open surgical repair; *PAD*, peripheral arterial disease; *PTA*, percutaneous transluminal angioplasty; *TEA*, thrombendarteriectomy.
Continuous variables are shown as mean ± standard deviation and categoric data are shown as number (%).
[a]Statistically significant.

P = .02). Thrombophilia was over-represented in EVT patients (12.6% vs 3.3% for OSR; *P* = .02), and these patients more frequently received antithrombotic therapy at presentation (*P* = .02) (Supplementary Table II, online only). Active coronavirus disease (COVID) infections were more common in the EVT group than in the OSR group (25.9% vs 16.3% for OSR; *P* = .004).

Etiology and clinical presentation. Table III outlines the causes of ALI, severity (Rutherford classification), and time to revascularization. Embolic events were most common in the OSR group (38.2% vs 12.6% EVT, 15.0% hybrid; *P* < .001). Conversely, stent occlusions and bypass graft occlusions were significantly higher in EVT patients (20.0% vs 6.9% OSR and 34.8% vs 15.8% OSR, respectively; *P* < .001). Native artery thrombosis was more frequently treated with hybrid (37.4%; *P* = .03) or no revascularization (56.7%; *P* = .001) compared with OSR (22.4%).

Patients treated with OSR were more likely to present with Rutherford IIb ischemia (46.1% vs 34.8% EVT, 36.1%

Table III. Etiology of acute limb ischemia (ALI) and status on arrival

Variables	OSR (n = 393)	EVT (n = 135)	*P* value (vs OSR)	Hybrid (n = 147)	*P* value (vs OSR)	No revascularization (n = 30)	*P* value (vs OSR)
Etiology							
Embolic event	150 (38.2)	17 (12.6)	<.001[a]	22 (15.0)	.001[a]	5 (16.7)	.03[a]
Iatrogenic	35 (5.0)	3 (2.2)	.02[a]	5 (3.4)	.05[a]	1 (3.3)	.47
Native artery thrombosis	88 (22.4)	37 (27.4)	.3	55 (37.4)	.03[a]	17 (56.7)	.001[a]
Occluded bypass	62 (15.8)	47 (34.8)	<.001[a]	30 (20.4)	.25	2 (6.7)	.3
Occluded stent	27 (6.9)	27 (20.0)	<.001[a]	23 (15.6)	.01[a]	1 (3.3)	.7
Thrombosed aneurysm	19 (4.8)	1 (0.7)	.06	9 (6.1)	.7	2 (6.7)	1
Traumatic	5 (1.3)	0 (0.0)	.42	1 (0.7)	.9	0 (0.0)	1
RC							
Grade I	48 (12.2)	24 (17.8)	.14	23 (15.6)	.36	3 (10.0)	.95
Grade IIa	131 (33.3)	51 (37.8)	.41	57 (38.8)	.28	11 (36.7)	.86
Grade IIb	181 (46.1)	47 (34.8)	.03[a]	53 (36.1)	.05[a]	6 (20.0)	.01[a]
Grade III	33 (8.4)	13 (9.6)	.79	14 (9.5)	.81	10 (33.3)	<.001[a]
Duration of symptoms, hours							
<24	237 (60.3)	60 (44.4)	.001[a]	79 (53.7)	.17	11 (36.7)	.01[a]
24-48	53 (13.5)	25 (18.5)	.15	15 (10.2)	.31	5 (16.7)	.63
>48	103 (26.2)	50 (37)	.02[a]	53 (36.1)	.03[a]	14 (46.7)	.02[a]
Heparin administration at presentation	246 (62.6)	92 (68.1)	.5	97 (66.0)	.96	24 (80.0)	.3

AFS, Amputation-free survival; *EVT,* endovascular treatment; *OSR,* open surgical repair; *RC,* Rutherford classification.
Categorical data are shown as number (%).
[a]Statistically significant.

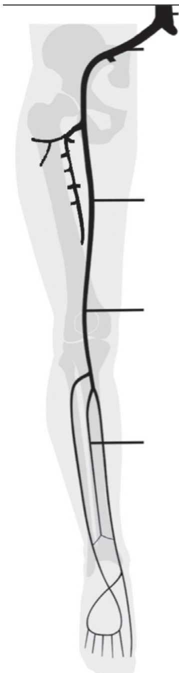
hybrid; $P = .01$). Shorter durations of ischemia were more common in the OSR group, with 60.3% of patients experiencing symptoms for <24 hours, compared with 44.4% in the EVT group ($P = .001$) and 36.7% in the no revascularization group ($P = .01$). In contrast, longer durations of ischemia (>48 hours) were observed more frequently in the EVT group (37%; $P = .02$), the hybrid group (36.1%; $P = .03$), and the no revascularization group (46.7%; $P = .02$) compared with the OSR group (26.2%).

Heparin was administered at presentation in only 62.6% to 80.0% of patients across all groups.

Level of occlusion. Fig 1 illustrates occlusion levels across groups. Femoral arteries were the most frequently affected sites across groups (50.0%-68.7%), with hybrid procedures addressing higher rates of iliac artery occlusions (46.3% vs 27.2% for OS; $P < .001$). Multilevel femoroiliac occlusions were also more common in hybrid cases (29.9% vs 13.2% OS; $P < .001$).

Predictors of treatment choice. Generalized linear mixed models with inclusion site as random effect revealed several factors that significantly influenced the choice of revascularization strategy. In the comparison of EVT vs OSR (Fig 2), the presence of an occluded stent (odds ratio [OR], 3.32; $P = .005$) or an occluded bypass graft (OR, 4.5; $P < .001$) strongly favored EVT. This finding suggests that EVT may be preferred in patients with previous revascularization attempts that have failed. Additionally, the presence of thrombophilia (OR, 2.89; $P = .02$) and active COVID infection (OR, 0.71; $P = .005$) were also associated with a higher likelihood of EVT. Conversely, a history of stroke (OR, 0.49; $P = .041$) or PAD (OR, 0.63; $P = .026$) significantly favored OSR. When comparing hybrid procedures to OSR (Fig 3), previous thrombendarteriectomy for revascularization (OR, 1.81; $P = .04$) was the only significant predictor of hybrid procedure utilization. In contrast, atrial fibrillation significantly favored OSR (OR, .42; $P = .003$). The estimates from the sensitivity analysis after removing patients treated solely with PTA or stent PTA, were consistent with those from the full models, suggesting that the associations were robust to the exclusion of these patients. Supplementary Figs 1 and 2 (online only) illustrate these results graphically, highlighting the consistency of the effect estimates across both analytical approaches.

In a subgroup analysis of patients treated at centers offering all three modalities, bypass and stent occlusion were significant predictors of the selection of EVT, with ORs of 4.07 ($P < .001$) and 3.74 ($P = .001$), respectively. A diagnosis of thrombophilia was also associated with increased odds of receiving EVT (OR, 3.7; $P = .005$). Conversely, patients with atrial fibrillation were more likely to be treated with OSR (Fig 4). Additionally, previous thrombendarteriectomy was linked to higher odds of undergoing hybrid procedures (OR, 2.3; $P = .014$).



	OSR (n=393)	EVT (n=135)	p-value (vs. OSR)	Hybrid (n=147)	p-value (vs. OSR)	No revascularization (n=30)	p-value (vs. OSR)
Aorta	18 (4.6)	3 (2.2)	.34	4 (2.7)	.47	4 (13.3)	.1
Iliac	107 (27.2)	39 (28.9)	.79	68 (46.3)	<.001*	8 (26.7)	1
Femoral	243 (61.8)	84 (62.2)	1	101 (68.7)	.17	15 (50.0)	.28
Popliteal	196 (49.9)	73 (54.1)	.46	81 (55.1)	.32	14 (46.7)	.88
Crural	82 (20.9)	34 (25.2)	.35	36 (24.5)	.43	9 (30.0)	.35
Multilevel occlusions							
Aorto-iliac	12 (3.1)	2 (1.5)	.5	4 (2.7)	1	3 (10.0)	.14
Femoro-iliac	52 (13.2)	16 (11.9)	.79	44 (29.9)	<.001*	4 (13.3)	1
Infrainguinal	38 (9.7)	13 (9.6)	1	19 (12.9)	.35	2 (6.7)	.83

Fig 1. Level of occlusion. Categorical data are shown as number (%).* Statistically significant. *EVT*, endovascular treatment; *OSR*, open surgical repair.

Clinical outcomes. Table IV summarizes outcomes. At 30 days, AFS was comparable between the OSR, EVT, and hybrid approaches (87.3%, 88.9%, and 87.8%, respectively). Patients without revascularization experienced significantly worse outcomes (AFS 66.7%; $P = .01$), with 26.7% requiring primary amputation ($P = .004$) and 13.3% experiencing multiorgan failure ($P = .007$). A Kaplan-Meier analysis showed no significant differences in AFS among OSR, EVT, and hybrid groups (Fig 5). Among the 675 treated patients, 489 (72.4%) had complete 30-day follow-up, and 281 (41.6%) had a follow-up of ≥3 months. The mean follow-up was 3.9 months and median follow-up index across all groups was 1. Supplementary Table III (online only) provides the causes of mortality.

EVT patients underwent more additional revascularizations (32.6% vs 8.9% OSR and 15.0% hybrid; $P < .001$), including thrombolysis (7.4%), PTA (6.7%), and aspiration thrombectomy (5.2%). Stepwise logistic regression identified PTA and PTA with stent implantation as significant

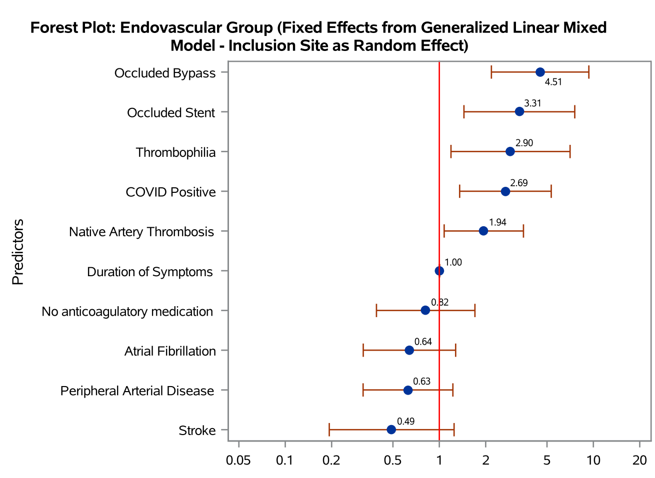


Fig 2. Forest plot with odds ratios (ORs) for influencers for endovascular treatment generalized linear mixed model with inclusion site as random effect. *COVID*, coronavirus disease; *OSR*, open surgical repair; *TEA*, thrombendarteriectomy.

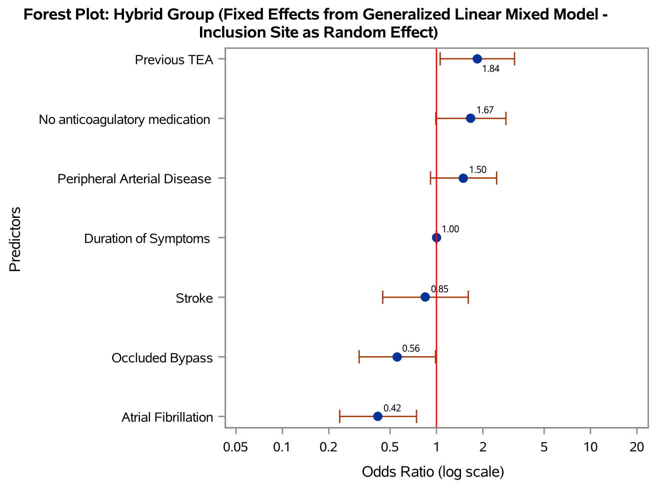


Fig 3. Forest plot with odds ratios (ORs) for influencers for hybrid procedures. Generalized linear mixed model with inclusion site as random effect. *COVID*, coronavirus disease; *OSR*, open surgical repair; *TEA*, thrombendarteriectomy.

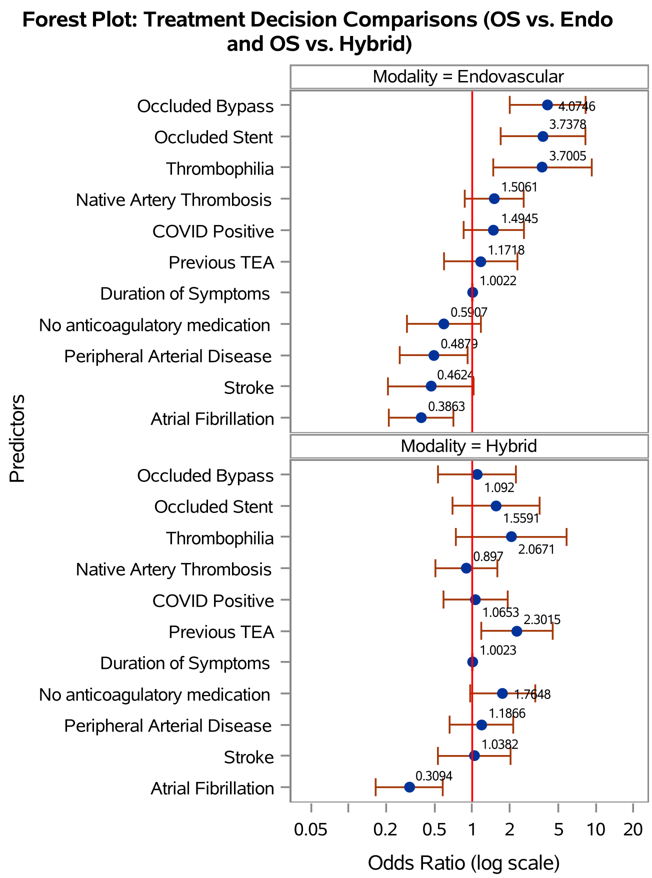


Fig 4. Kaplan-Meier analysis. *COVID*, coronavirus disease; *OSR*, open surgical repair; *TEA*, thrombendarteriectomy.

predictors of reintervention after EVT. Cases involving PTA had 3.56 times higher odds of reintervention (OR, = 3.56; 95% confidence interval [CI], 1.22-10.41; P = .02), whereas cases with PTA and stent implantation had 3.08 times higher odds of reintervention (OR, 3.08; 95% CI, 1.35-7.01; P = .007). Model discrimination was moderate (c-statistic = .667). Access site bleeding was also higher in EVT cases (5.2% vs 1.0% OSR; P = .01). Prophylactic fasciotomies were common in OSR and EVT patients (18.1% and 20.8%, respectively vs 6.7% hybrid; $P < .001$) and higher rates of wound-related reinterventions (7.5% and 9.4% vs 3.7%; P = .001) were observed, with additional procedures such as debridement, drainage, or secondary closure to manage complications, including infections, hematomas, seromas, delayed healing, or wound dehiscence.

Claudication at discharge was most frequent in the EVT (40.0%) and no-revascularization (46.7%) groups compared with OSR (25.2%) and hybrid (21.8%; $P < .001$). Supplementary Table IV (online only) provides pairwise comparisons.

DISCUSSION

This study underscores the evolving landscape of ALI management in Europe,[13] revealing the nuanced interplay between patient-specific factors, such as ischemia duration, prior interventions, and treatment outcomes. PROMOTE-ALI data demonstrate a shift from surgical embolectomy as the traditional standard to the broader integration of endovascular and hybrid procedures.[14] The observed variation in treatment strategies based on patient presentation and institutional preferences underscores the importance of multidisciplinary expertise in both OSR and EVT,[11,14] and facilities equipped with both approaches may be better positioned to tailor treatment to individual patient needs.

Indeed, patient-specific factors, such as comorbidities (eg, arrythmias, history of PAD, thrombophilia), prior revascularizations, and duration of symptoms, significantly influenced treatment strategies. For example, arrhythmic patients with severe ischemia (Rutherford IIb) predominantly benefited from OSR, potentially owing to limited collateral circulation necessitating immediate intervention.[1] In contrast, milder symptoms in patients with stent or bypass occlusions were more frequently managed with endovascular or hybrid approaches, reflecting advancements in minimally invasive techniques and the importance of tailored strategies. This finding is consistent with a large-scale Japanese study[15] in which PAD was a factor responsible for reducing OSR efficacy in terms of major amputation and death rate in interaction analyses (with PAD, OR, 0.94, 95% CI, 0.68-1.29; without PAD, OR, 1.56; 95% CI, 1.34-1.82; P = .004).[15] These differences in treatment may also be attributed to the physician's choice based on the patient's background. It is important to note that, although baseline data indicated a greater prevalence of PAD in the EVT group, our multivariable analyses revealed that a history of PAD independently favored the selection of OSR. This apparent discrepancy likely reflects the influence of confounding

Table IV. Clinical outcomes

Variables	OSR (n = 393)	EVT (n = 135)	Hybrid (n = 147)	No revascularization (n = 30)	Overall *P* value
Primary outcome					
Amputation-free survival at 30 days	343 (87.3)	120 (88.9)	129 (87.8)	20 (66.7)	.001[a]
Secondary outcome					
Amputation-free survival at 90 days	334 (85.0)	119 (88.1)	123 (83.7)	19 (63.3)	<.001[a]
Major amputation	29 (7.4)	14 (10.4)	18 (12.2)	8 (26.7)	.004[a]
Mortality	37 (9.4)	4 (3.0)	10 (6.8)	6 (20)	.01[a]
Additional revascularization	35 (8.9)	44 (32.6)	22 (15.0)	n.a.	<.001[a]
Surgical embolectomy	20 (5.1)	12 (8.9)	11 (7.5)	n.a.	.17
Surgical endarterectomy	4 (1.0)	1 (0.7)	6 (4.1)	n.a.	.05
Catheter-directed thrombolysis	2 (0.5)	10 (7.4)	0 (0.0)	n.a.	<.001[a]
Catheter-guided atherectomy	0 (0.0)	2 (1.5)	1 (0.7)	n.a.	.13
Catheter-guided embolectomy/aspiration	2 (0.5)	7 (5.2)	3 (2.0)	n.a.	<.001[a]
PTA	3 (0.8)	9 (6.7)	3 (2.0)	n.a.	.01[a]
PTA with stent	11 (2.8)	5 (3.7)	10 (6.8)	n.a.	.18
Bypass, prosthetic	8 (2.0)	7 (5.2)	1 (0.7)	n.a.	.06
Bypass, vein graft	6 (1.5)	6 (4.4)	5 (3.4)	n.a.	.16
Access site bleeding	4 (1.0)	7 (5.2)	2 (1.4)	n.a.	.01[a]
Reintervention owing to bleeding	13 (3.3)	7 (5.2)	1 (0.7)	n.a.	.11
Blood transfusion	16 (4.1)	8 (5.9)	10 (6.8)	n.a.	.54
Fasciotomies					
Prophylactic	83 (20.8)	71 (18.1)	9 (6.7)	n.a.	<.001[a]
Secondary	13 (3.2)	9 (2.3)	6 (4.4)	n.a.	.26
Wound reintervention	30 (7.5)	37 (9.4)	5 (3.7)	n.a.	.001[a]
Wound infection	83 (20.8)	30 (7.6)	5 (3.7)	n.a.	.07
AKI	105 (26.2)	35 (8.9)	6 (4.4)	2 (6.7)	.33
Multiple organ failure	18 (4.5)	28 (7.1)	2 (1.5)	4 (13.3)	.007[a]
Clinical status at discharge					
Asymptomatic	231 (58.8)	59 (43.7)	87 (59.2)	4 (13.3)	<.001[a]
Claudication	99 (25.2)	54 (40.0)	32 (21.8)	14 (46.7)	<.001[a]
Rest pain	8 (2.0)	2 (1.5)	2 (1.4)	2 (6.7)	.27
Tissue loss	13 (3.3)	3 (2.2)	5 (3.4)	0 (0.0)	.69

AKI, Acute kidney injury; *EVT,* endovascular treatment; *MI,* myocardial infarction; *n.a.,* not applicable; *OSR,* open surgical repair; *PTA,* percutaneous transluminal angioplasty.
Categorical data are shown as number (%).
[a]Statistically significant.

factors, whereby patients with PAD and more severe disease manifestations were more likely to be managed with OSR. Furthermore, concerns regarding procedural risks—such as embolic or hemorrhagic complications during EVT in patients with a history of stroke and technical challenges in managing severely diseased vessels in patients with PAD—may have contributed to the preference for OSR in these subgroups.

Completion angiography was underused in OSR cases, contrary to guideline recommendations.[11] This imaging tool is essential to detect procedural complications, such as residual thrombus, dissections, and stenosis, and when considering adjunctive EVT.[11] Hence, more patients might have benefited from hybrid treatment. In our study, its use was associated significantly with lower reintervention rates, highlighting its potential to optimize surgical outcomes. However, its limited adoption may reflect institutional resource constraints, including cost, staffing, and access to hybrid facilities. Given the importance of timely ALI treatment, systematic intraoperative imaging protocols—tailored to available resources—may help to ensure optimal procedural assessment and mitigate the need for early reinterventions.

Heparin was administered at presentation in <80.0% of cases. This relatively low rate likely reflects real-world variability in institutional protocols and patient-specific considerations. In several centers, concerns about increased

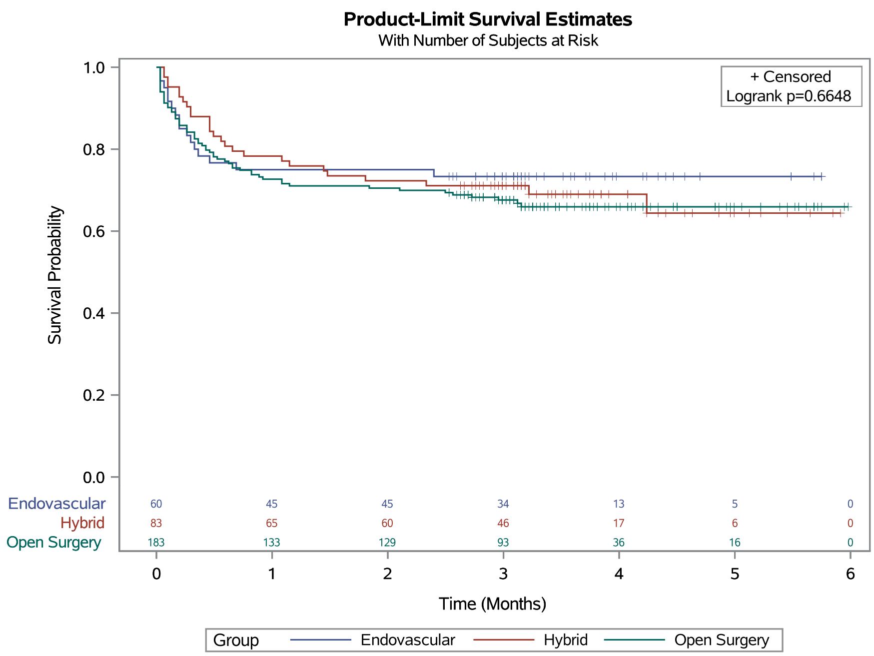


Fig 5. Forest plots with odds ratios (ORs) for influencers for endovascular and hybrid procedures in the subgroup of patients from centers offering all three modalities. Multinomial logistic regression. *COVID*, coronavirus disease; *OSR*, open surgical repair; *TEA*, thrombendarteriectomy.

intraoperative bleeding have led anesthesiologists to delay or withhold heparin administration until the perioperative period, particularly in patients deemed at higher bleeding risk. Although the European Society for Vascular Surgery guidelines recommend the use of heparin to reduce embolism and clot propagation, as well as to provide an anti-inflammatory effect in patients with acute limb ischemia awaiting revascularization,[11] no recent randomized controlled trials have definitively confirmed the benefit of preoperative unfractionated heparin.[16]

Endovascular treatments were associated with higher reintervention rates, which may be explained by the more complex vascular disease in patients selected for EVT. In our study, the EVT group exhibited significantly higher rates of PAD and prior ipsilateral revascularizations, including stent occlusions and bypass graft occlusions. Furthermore, a longer duration of ischemia was more common. This finding is in line with other studies indicating comparable efficacy of endovascular and open approaches but an increased risk of reintervention with EVT, primarily through catheter-directed embolectomies or catheter-guided thrombolysis.[17] Indeed, a French study highlighted regional variations in revascularization approaches, with 76.7% undergoing OSR and 23.3% EVT.[18] Supporting these findings, a German study also confirmed the performance of OSR (n = 150 [38%]), EVT (n = 147 [37.2%]), and hybrid procedures (n = 98 [24.8%]).[19] Reintervention rates did not differ significantly between groups; however, patients treated endovascularly were most often Rutherford class IIa (50.3%), whereas Rutherford class IIb was most common in the OSR (54%) and hybrid groups (48%; $P < .001$).[19] Moreover, significantly more patients presented with a de novo lesion in the OSR and hybrid groups (79.3% and 64.3%, respectively) compared with EVT (53.7%; $P < .001$).

In PROMOTE-ALI, EVT was also associated with increased access site bleeding, likely influenced by antiplatelet or anticoagulant use. This finding is consistent with the results of TOPAS (Thrombolysis Or Peripheral Arterial Surgery),[20] but in opposition with those of a propensity score-matched cohort study using National Inpatient Sample data from the United States,[21] which reported significantly lower major bleeding rates after EVT compared with OSR. Interestingly, in STILE (Surgical vs Thrombolysis for Ischemia of the Lower Extremity), thrombolysis improved the AFS rate and reduced hospital stay for patients with acute ischemic symptoms within 14 days while OSR was more effective and safer after 14 days.[22] This difference may be attributed to different rates of thrombolysis in the EVT groups depending on the availability of aspiration or mechanical thrombectomy devices, as well as the amount or type of thrombolytic agent available. These findings reflect the challenges of managing anatomically demanding cases with minimally invasive techniques. The expanded use of thrombolytic agents in EVT, particularly in severe ischemia (Rutherford class IIb) and various presentations (including native artery occlusions, bypass and stent thrombosis, and embolic occlusions), also warrants optimization through updated trials on dosing regimens and agent selection.[23]

Hybrid techniques emerged as particularly valuable for addressing complex anatomical lesions, such as multilevel femoroiliac occlusions, offering an effective alternative when neither OSR nor EVT alone sufficed. The European Society for Vascular Surgery 2020 guidelines suggested that a hybrid approach, combining EVT and OSR, yields better clinical outcomes than OSR or EVT alone.[11] Consistent with other studies,[24-26] hybrid interventions in PROMOTE-ALI demonstrated efficacy by combining thrombo-embolectomy with endovascular techniques (eg, thrombolysis or PTA/stenting) to address complex anatomical issues, residual stenosis or poor outflow. Despite their increasing use, long-term outcomes and cost effectiveness require further investigation to establish their prognostic benefits comprehensively.[27]

All treatment modalities achieved high 30-day AFS, affirming the effectiveness of contemporary approaches in preserving limb viability. Nonetheless, prior studies have reported inconsistent results. Wang et al[3] reviewed 26 articles and reported no statistically significant differences in short term outcomes between EVT and Fogarty thromboembolectomy. In a German's study multivariable analysis, EVT showed significantly better AFS during follow-up (hazard ratio [HR], 1.89; 95% CI, 1.2-2.9; $P < .001$ vs OSR and HR, 1.73; 95% CI, 1.1-3.1; $P < .001$ vs hybrid) and mortality was significantly lower (HR, 2.21; 95% CI,1.31-3.74; $P = .003$ vs OSR and HR, 2.04; 95% CI, 1.17-3.56; $P = .012$ vs hybrid).[19] In contrast, a Japanese study[15] found OSR to be a significantly more effective primary treatment for ALI than EVT in terms of limb salvage (OR, 1.43; 95% CI, 1.19-1.72; $P < .001$), survival (OR, 1.33; 95% CI, 1.11-1.59; $P = .002$), and costs. This finding highlights the importance of additional research to clarify the comparative benefits of OSR, EVT, and hybrid approaches.

Finally, frail patients (eg, low body mass index, indicative of sarcopenia) were more prevalent in the nonrevascularized group, which underscores the consideration of frailty and realistic treatment goals in decision-making.

Limitations. Limitations of this study include short-term follow-up and the heterogeneity of treatment protocols across European centers, which may affect generalizability.[13] A central source of bias arises from clustering owing to hospital and operator expertise. Indeed, a significant factor influencing treatment modality selection, which our study could not address fully, is the variability in training and skill sets among attending physicians. OSR and hybrid procedures are generally performed by physicians with specialized training in open vascular surgery, while EVT is more commonly performed across a broader range of specialties. Moreover, the variability in available institutional resources like access to mechanical thrombectomy devices, thrombolytic agents, and intraoperative imaging may influence clinical decisions. To reduce these potential biases, we performed a subgroup analysis of centers offering all three treatment modalities. The consistency of our findings in this subgroup suggests that patient-specific factors remain the primary determinants of treatment modality in centers where attending physicians' skill sets and institutional resources are relatively homogeneous. In such environments, the adoption of refined treatment protocols—such as the expanded use of hybrid techniques and systematic completion angiography and heparin administration at admission—seems to be sufficient to drive improvements in outcomes. However, when significant variability exists in both physician expertise and the availability of advanced treatment resources, a formal patient triage system might be worth investigating. Under such circumstances, patients with straightforward acute embolic events could be managed effectively at less sophisticated institutions, whereas those with more complex clinical presentations could benefit from timely transfer to high-resource centers where complex EVT or hybrid procedures can be performed to align treatment strategies with institutional capabilities and optimize patient outcomes. Future studies should explore the implementation and impact of such a triage system in heterogeneous health care settings.

In addition, the heterogeneity of patient recruitment across participating centers suggests that it may have been nonconsecutive, introducing selection bias, and treatment choices were at the discretion of attending physicians, potentially influencing outcomes. Moreover, the inherent differences in the underlying etiologies of acute limb ischemia may confound direct comparisons of outcomes based solely on treatment modality. These variations in clinical presentation and disease mechanisms might result in differential responses to treatment, complicating the interpretation of outcome comparisons. Finally, a substantial proportion of patients presented with active COVID infection and available data prevented us from establishing causality between COVID infection and the ALI event.

CONCLUSIONS

PROMOTE-ALI provides a detailed evaluation of contemporary treatment strategies and outcomes for ALI in Europe, highlighting novel findings such as the evolving use of endovascular techniques for specific etiologies (eg, stent and bypass occlusions) and the implications of center-level variability on treatment outcomes. OSR remains the predominant modality, particularly in arrhythmic patients and those presenting with severe ischemia (Rutherford class IIb), whereas hybrid approaches address complex lesions, such as multilevel femoroiliac occlusions.

EVT was associated with higher reintervention rates and access site bleeding, reflecting its application in anatomically complex cases, whereas completion angiography in OSR significantly reduced reintervention rates, underscoring its potential role in optimizing outcomes. Despite these procedural differences, AFS at 30 days was comparable across OSR, EVT, and hybrid approaches, demonstrating the effectiveness of individualized strategies.

These findings highlight opportunities to refine treatment protocols further, particularly through the expanded adoption of hybrid techniques and completion angiography. Addressing variations in practice patterns and integrating advanced imaging and decision support tools may enhance outcomes and reduce complications in diverse ALI populations.

AUTHOR CONTRIBUTIONS

Conception and design: PD, FE, KN, LT, AB, PT, AP, JR, AG, CC
Analysis and interpretation: PD, CC
Data collection: PD, FE, KN, LT, AB, PT, AP, JR, AG, CC
Writing the article: PD, CC
Critical revision of the article: PD, FE, KN, LT, AB, PT, AP, JR, AG, CC
Final approval of the article: PD, FE, KN, LT, AB, PT, AP, JR, AG, CC
Statistical analysis: PD
Obtained funding: Not applicable
Overall responsibility: PD, CC

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None.

DISCLOSURES

None.

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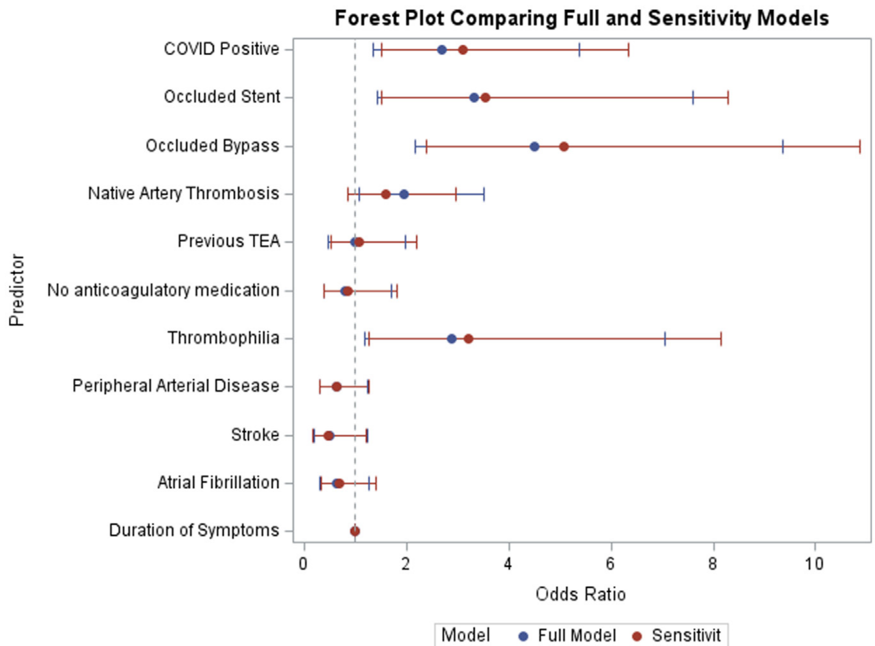
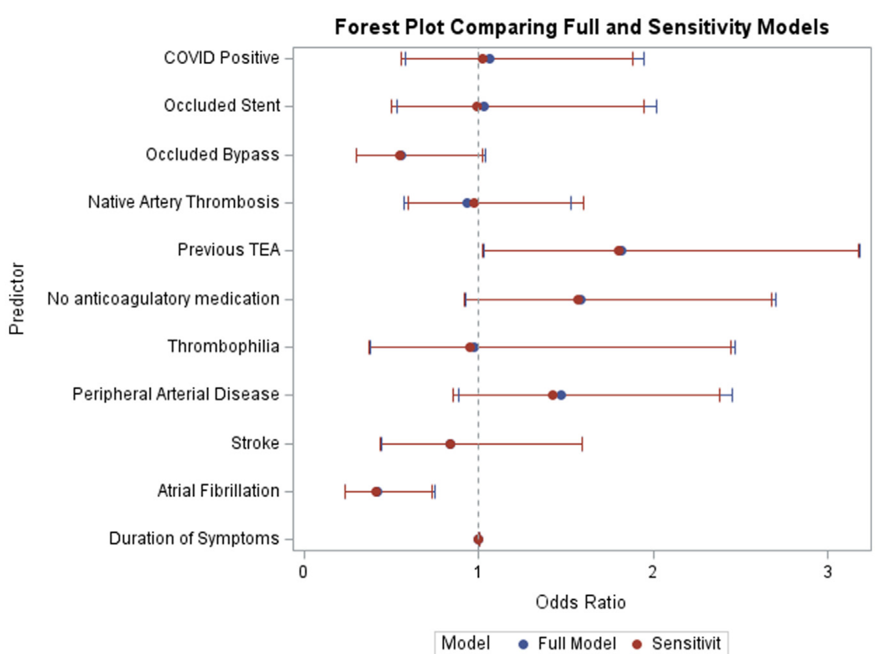


Supplementary Fig 1 (online only). Forest plots with odds ratios (ORs) for influencers for endovascular procedures. Comparison between full and sensitivity model excluding patients treated solely with percutaneous transluminal angioplasty (PTA) or stent-PTA. *COVID*, coronavirus disease; *TEA*, thrombendarteriectomy.



Supplementary Fig 2 (online only). Forest plots with odds ratios (ORs) for influencers for hybrid procedures. Comparison between full and sensitivity model excluding patients treated solely with percutaneous transluminal angioplasty (PTA) or stent-PTA. *COVID*, coronavirus disease; *TEA*, thrombendarteriectomy.

Supplementary Table I (online only). List of participating centers and collaborators

Country	Name of center	Included patients (No.)	Name of collaborator(s)
Austria	Department of Vascular Surgery, Medical University of Innsbruck	63	Florian Enzmann, PhD, MD; Alexandra Gratl, MD; Michaela Kluckner, MD
Austria	Department of Vascular Surgery, Clinic Ottakring, Vienna	6	Maria-Elisabeth Leinweber, MD
Austria	Department of Cardiac and Vascular Surgery, Clinic of Floridsdorf, Vienna	2	Ivan Matia, MD
Finland	Department of Vascular Surgery, Helsinki University Central Hospital	18	Katariina Noronen, MD
France	Department of Vascular Surgery, Bordeaux University Hospital	63	Caroline Caradu, MD, PhD
France	Department of Vascular Surgery and Angiology, Reims University Hospital Centre	38	Ambroise Duprey, MD; Nicolas Massiot, MD; François Guimo MD
France	Department of Vascular Surgery, University Hospital of Strasbourg	20	Nabil Chakfé MD, PhD; Salome Kuntz, MD; Adeline Schwein, MD;
France	Department of Vascular Surgery, Bichat Hospital Paris	13	Jean Sénémaud, MD, PhD, Yves Castier, MD, PhD
France	Department of Vascular and Endovascular Surgery, Hospices Civils de Lyon	5	Leila Dehina, MD; Antoine Millon, MD
France	Department of Vascular Surgery, Dijon University Hospital	13	Alexandre Pouhin, MD; Eric Steinmetz MD, PhD
France	Department of Vascular Surgery, Henri Mondor University Hospital	3	Joseph Touma, MD; Pascal Desgranges, MD, PhD
France	Department of Vascular and Endovascular Surgery, Brest University Hospital	8	Bahaa Nasr, MD
France	Department of Vascular and Endovascular Surgery, Nancy University Hospital, Université de Lorraine	5	Nicla Settembre, MD, PhD; Rabie Ali Belkorissat MD
France	Department of Vascular and Endovascular Surgery, Nantes University Hospital	9	Blandine Maurel, MD; Justine Mougin MD; Tom Le Corvec MD
France	Department of Vascular and Interventional Surgery, Ambroise Paré University Hospital, Paris	2	Jeremie Jayet, MD; Raphael Coscas, MD
France	Department of Vascular Surgery and Vascular Medicine, Hospital of Antibes	2	Fabien Lareyre, MD; Juliette Raffort MD, PhD
Germany	Department of Vascular Surgery, European Vascular Centre Aachen-Maastricht, RWTH Aachen	48	Panagiotis Doukas, MD; Alexander Gombert, PhD, MD
Germany	Division of Vascular and Endovascular Surgery, Department for Visceral-, Thoracic and Vascular Surgery, Technical University of Dresden and University Hospital Carl-Gustav Carus	38	Albert Busch, PhD, MD
Germany	Department of Vascular and Endovascular Surgery, University Hospital of Muenster	13	Alexander Oberhuber, Prof, MD
Germany	Department of Vascular and Endovascular Surgery, University Hospital Cologne, University of Cologne	12	Ursula Werra, MD
Germany	Department of Vascular Surgery, Charité-Universitätsmedizin Berlin	3	Jan Paul Bernhard Frese, MD; Jan Carstens, MD
Germany	Department of Vascular and Endovascular Surgery, University Hospital of Duesseldorf	1	Markus Wagenhäuser, Prof, MD
Hungary	Heart and Vascular Center, Semmelweis University Hospital	14	Marton Berczeli, MD, PhD; Zoltan Szeberin, MD, PhD
Moldova	Division of Vascular Surgery, Department of General Surgery, Institute of Emergency Medicine, Nicolae Testemitanu State University of Medicine and Pharmacy, Chisinau	69	Alexandru Predenciuc, MD; Dumitru Casian, MD, PhD

(Continued on next page)

Supplementary Table I (online only). Continued.

Country	Name of center	Included patients (No.)	Name of collaborator(s)
Netherlands	Department of Vascular Surgery, University Medical Center Amsterdam	14	Vincent Jongkind, PhD, MD; Lan Tran
Netherlands	Department of Vascular Surgery, University Medical Center Utrecht	6	Martin Teraa, PhD, MD
Poland	Department of Cardiac, Vascular and Endovascular Surgery and Transplantology, Medical University of Silesia in Katowice, Silesian Centre for Heart Diseases, Zabrze	6	Leszek Kukulski, PhD, MD
Serbia	Clinic for Vascular and Endovascular Surgery, University Clinical Center of Serbia, Belgrade	49	Petar Zlatanovic, MD
Serbia	Clinic for Vascular and Endovascular Surgery, Clinical Center Novi Sad	23	Nebojsa Budakov, MD
Serbia	Clinic for Vascular Surgery, Clinical Center Nis	9	Nemenja Stepanovic, MD
Sweden	Vascular Center, Department of Thoracic Surgery and Vascular Diseases, Skåne University Hospital, Malmö	32	Angelos Karelis, MD, PhD
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Switzerland	Department of Vascular Surgery, University Hospital Zurich	17	Anna-Leonie Menges, MD
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Supplementary Table II (online only). Medication at admission

Variables	OSR (n = 393)	EVT (n = 135)	*P* value (vs OSR)	Hybrid (n = 147)	*P* value (vs OSR)	No revascularization (n = 30)	*P* value (vs OSR)
Anticoagulation at admission							
None	110 (28.0)	21 (15.6)	.02*	43 (29.3)	.46	13 (43.3)	.37
Apixaban	25 (6.4)	12 (8.9)	.62	12 (8.2)	.87	4 (13.3)	.24
Argatroban	2 (0.5)	0 (0.0)	.91	0 (0.0)	.86	1 (3.3)	1
Rivaroxaban	31 (7.9)	17 (12.6)	.07	7 (4.8)	.17	0 (0.0)	1
Rivaroxaban low dose	3 (0.8)	6 (4.4)	.06	2 (1.4)	1	0 (0.0)	.11
Vitamin K antagonists	36 (9.2)	14 (10.4)	.4	8 (5.4)	.23	0 (0.0)	.38
Low molecular weight heparin	15 (3.8)	7 (5.2)	.65	5 (3.4)	.8	2 (6.7)	.8
Unfractionated heparin	18 (4.6)	2 (1.5)	.14	7 (4.8)	.83	2 (6.7)	.61
Other	5 (1.3)	0 (0.0)	.5	1 (0.7)	1	0 (0.0)	.34
Antiplatelet therapy							
Aspirin	164 (41.7)	67 (49.6)	.22	74 (50.3)	.13	9 (30.0)	.11
Clopidogrel	42 (10.7)	22 (16.3)	.14	18 (12.2)	1	4 (13.3)	.21
Dabigatran	3 (0.8)	6 (4.4)	.06	1 (0.7)	.65	0 (0.0)	.18
Ticagrelor	1 (0.3)	0 (0.0)	1	0 (0.0)	1	0 (0.0)	1
Recent anticoagulation discontinuation	78 (19.8)	23 (17.0)	.8	21 (14.3)	.21	6 (20.0)	.23

EVT, Endovascular treatment; *OSR*, open surgical repair.
Values are number (%).

Supplementary Table III (online only). Causes of mortality

Causes of mortality	OSR (n = 37)	EVT (n = 4)	Hybrid (n = 10)	No revascularization (n = 6)
Cardiac	5 (13.5)	1 (25)	3 (30)	0 (0)
Stroke	4 (10.8)	0 (0)	0 (0)	0 (0)
Respiratory	3 (8.1)	0 (0)	2 (20)	2 (33.3)
Multiorgan failure	17 (45.9)	1 (25)	1 (10)	3 (50)
Others	6 (16.2)	1 (25)	3 (30)	1 (16.6)
Unknown	2 (5.4)	1 (25)	1 (10)	0 (0)

EVT, Endovascular treatment; *OSR,* open surgical repair.
Values are number (%).

Supplementary Table IV (online only). Pairwise comparisons for outcomes after Bonferroni correction (significant differences only)

Outcome	Treatment comparison	*P* value	Significance: Significant at α = 0.0083?
AFS at 30 days	No revascularization vs OSR	.008	Yes
	No revascularization vs EVT	.007	Yes
AFS at 90 days	No revascularization vs OSR	.001	Yes
	No revascularization vs EVT	.004	Yes
Asymptomatic at discharge	No revascularization vs OSR	<.001	Yes
	No revascularization vs hybrid	<.001	Yes
Claudication at discharge	EVT vs hybrid	.007	Yes
Outcome	**Treatment comparison**	***P* value**	**Significant at α = 0.0167?**
Additional revascularization	OSR vs EVT	<.001	Yes
	EVT vs hybrid	.002	Yes
Catheter-directed thrombolysis	OSR vs EVT	<.001	Yes
	EVT vs hybrid	.002	Yes
Catheter-guided embolectomy/aspiration	OSR vs EVT	.005	Yes
PTA	OSR vs EVT	.001	Yes
Access Site Bleeding	OSR vs EVT	.02	Yes
Prophylactic fasciotomy	OSR vs EVT	.004	Yes
	EVT vs hybrid	.003	Yes
Wound reintervention	EVT vs hybrid	<.001	Yes

AFS, Amputation-free survival; *EVT,* endovascular treatment; *OSR,* open surgical repair; *PTA,* percutaneous transluminal angioplasty.