# Top Ten Papers of 2025


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Western UNIVERSITY · CANADA

WINNIPEG VASCULAR & ENDOVASCULAR SYMPOSIUM 2026 22ND ANNUAL

I have no current relationships with commercial entities

# Paclitaxel-coated versus uncoated devices for infrainguinal endovascular revascularisation in chronic limb-threatening ischaemia (SWEDEPAD 1): a multicentre, participant-masked, registry-based, randomised controlled trial

*Mårten Falkenberg, Stef*
*Anna Hilbertson, Tal M H*
*Robert Olin, Birgitta Sigv*
*Jonas Wallinder, Andreas*

**ENDPOINT:**
IPSILATERAL MAJOR AMPUTATION DURING FOLLOW-UP

## Summary

**Background** Drug-c
amputation risk in
above-ankle amputa
revascularisation.

**Methods** The Swedi
multicentre, partici
with Rutherford category 4–6 peripheral artery disease scheduled for infrainguinal endovascular treatment were eligible for inclusion. Participants were randomly allocated in a 1:1 ratio after successful guidewire crossing to receive either paclitaxel-coated or uncoated balloons or stents. Randomisation was stratified by centre and performed using a computer-generated sequence with allocation concealment via a secure, registry-embedded web system. The primary efficacy endpoint was ipsilateral major amputation (above the ankle) during follow-up. All analyses were done in the intention-to-treat population. This trial is registered with ClinicalTrials.gov (NCT02051088) and the primary analysis is complete; further analyses are ongoing.

**Findings** From Nov 5, 2014, to Sept 29, 2023, 2400 patients were randomly assigned to treatment with paclitaxel-coated devices (n=1206) or with uncoated devices (n=1194). 2355 patients were included in the intention-to-treat analysis (1180 in the paclitaxel-coated group and 1175 in the uncoated group). The median age was 77 years (IQR 71–83), 1317 (55·9%) of 2355 patients were male and 1038 (44·1%) were female, and 1237 (52·6%) patients had preoperative diabetes. Median follow-up was 2·67 years (IQR 1·08–4·78). Most patients (1761 [74·9%] of 2351) had wounds or tissue loss (Rutherford stage 5 or 6). Treated lesions were located in the femoropopliteal vascular segment in 1241 (52·7%) of 2355 patients, in the infrapopliteal segment in 537 (22·8%) patients, and in both segments in 561 (23·8%) patients. Nearly all paclitaxel-coated devices (>99%) used paclitaxel as the coating agent (>99%). There was no significant difference in the rate of ipsilateral major amputation between using paclitaxel-coated or uncoated devices (hazard ratio [HR] 1·05 [95% CI 0·87–1·27]; p=0·61) with maximum of 5 years of follow-up. There was no difference in all-cause mortality (HR 1·04 [95% CI 0·92–1·17]; p=0·54).

**Interpretation** In patients with chronic limb-threatening ischaemia undergoing infrainguinal endovascular revascularisation, paclitaxel-coated devices did not reduce major ipsilateral amputations.

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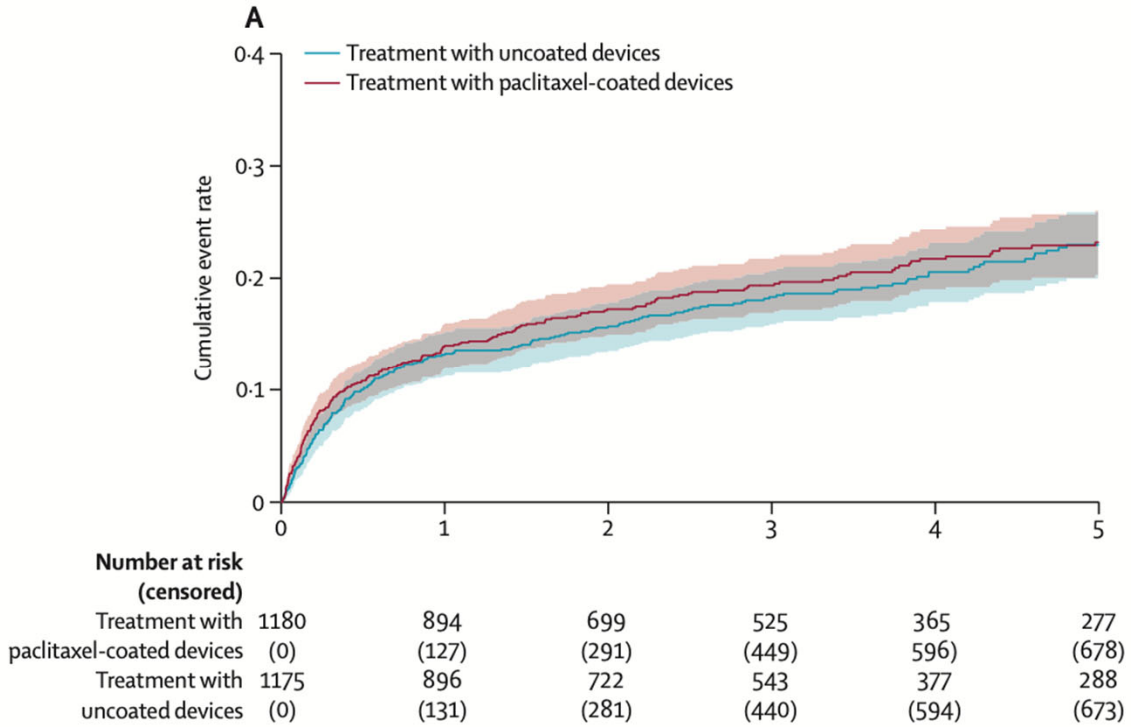
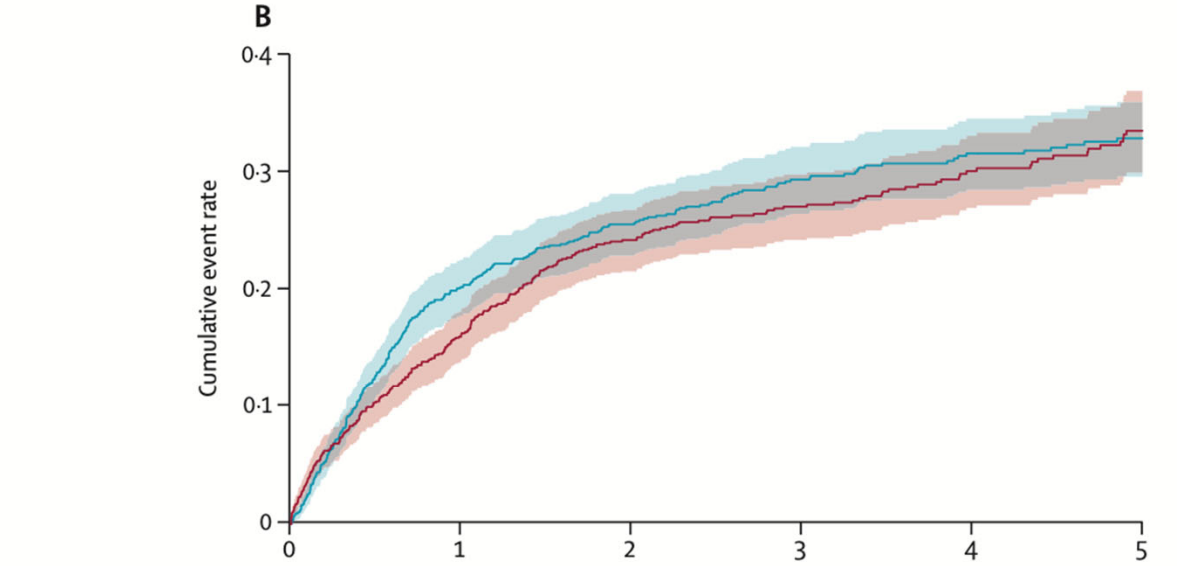
**n=2400 randomized**

Major ipsilateral amputation




| Number at risk (censored) | | | | | | |
|---|---|---|---|---|---|---|
| Treatment with paclitaxel-coated devices | 1180 (0) | 894 (127) | 699 (291) | 525 (449) | 365 596) | 277 (678) |
| Treatment with uncoated devices | 1175 (0) | 896 (131) | 722 (281) | 543 (440) | 377 (594) | 288 (673) |

Target vessel reinterventions




| Number at risk (censored) | | | | | | |
|---|---|---|---|---|---|---|
| Treatment with paclitaxel-coated devices | 1180 (0) | 853 (148) | 611 (312) | 447 (455) | 285 (602) | 210 (665) |
| Treatment with uncoated devices | 1175 (0) | 808 (143) | 619 (281) | 445 (427) | 309 (551) | 234 (621) |

# Paclitaxel-coated versus uncoated devices for infrainguinal endovascular revascularisation in patients with intermittent claudication (SWEDEPAD 2): a multicentre, participant-masked, registry-based, randomised controlled trial

*Joakim Nordanstig, Stefan James, Manne Andersson, Mattias Andersson, Martin Delle, Jan Engström, Torbjörn Fransson, Peter Gillgren, Anna Hilbertson, Tal M Hö… Robert Olin, Birgitta Sigva… Jonas Wallinder, Andreas G…*

**ENDPOINT:**
QUALITY OF LIFE AT 1 YEAR USING VASCULAR QUALITY OF LIFE QUESTIONNAIRE (VQoL-6)

## Summary

**Background** Drug-coa… with peripheral artery… paclitaxel-coated devi… infrainguinal endova…

**Methods** The Swedish… multicentre, participa… Adults 18 years or olde… treatment and with no… for inclusion. Particip… paclitaxel-coated devic… computer-generated s… efficacy endpoint was… of Life Questionnaire (VascuQoL-6), a peripheral artery disease-specific quality of life instrument. The trial is registered at ClinicalTrials.gov (NCT02051088) and the primary analysis is complete; further analyses are ongoing.

**Findings** Between Nov 5, 2014, and Sept 27, 2023, a total of 1155 patients were enrolled and randomly assigned across 22 vascular centres in Sweden, of whom 1136 (98·3%) had follow-up data available for analysis. 577 patients were randomly assigned to paclitaxel-coated devices and 578 to uncoated devices, of whom 565 (97·9%) and 571 (98·7%) were included in the intention-to-treat population, respectively. The median age in the analysed cohort was 73·0 years (IQR 68·0–78·0). Of the 1136 patients, 612 (53·9%) were male and 524 (46·1%) were female; and 382 (33·7%) of 1135 had preoperative diabetes (one participant in the paclitaxel-coated device group was missing data). Most patients (677 [59·6%] of 1135) presented with severe claudication (Rutherford category 3). Femoropopliteal interventions were performed in 1092 patients (96·1%). At 1 year, VascuQoL-6 scores did not differ between groups (mean difference –0·02 [95% CI –0·66 to 0·62]; p=0·96). All-cause mortality did not differ over a median 7·1 years (IQR 3·9–8·2); hazard ratio (HR) 1·18 (95% CI 0·94–1·48); p=0·16, although 5-year mortality incidence was higher in patients randomly assigned to the paclitaxel-coated devices group (4·57 *vs* 3·28 per 100 person-years; HR 1·47 [95% CI 1·09–1·98]; p=0·010).

**Interpretation** In patients with Rutherford stage 1–3 peripheral artery disease undergoing infrainguinal endovascular revascularisation, paclitaxel-coated devices did not improve disease-specific quality of life at 1 year compared with uncoated devices. All-cause mortality was not different over the total follow-up time, but significantly higher over 5 years. These findings do not support routine use of paclitaxel-coated devices in this patient population.

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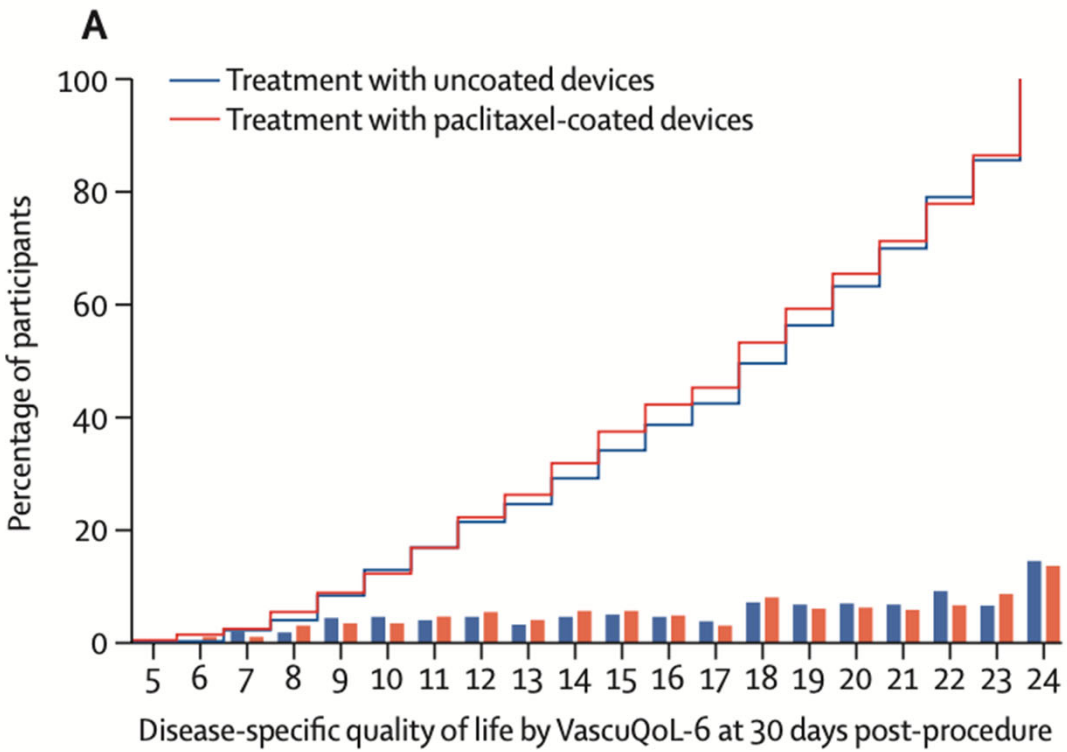


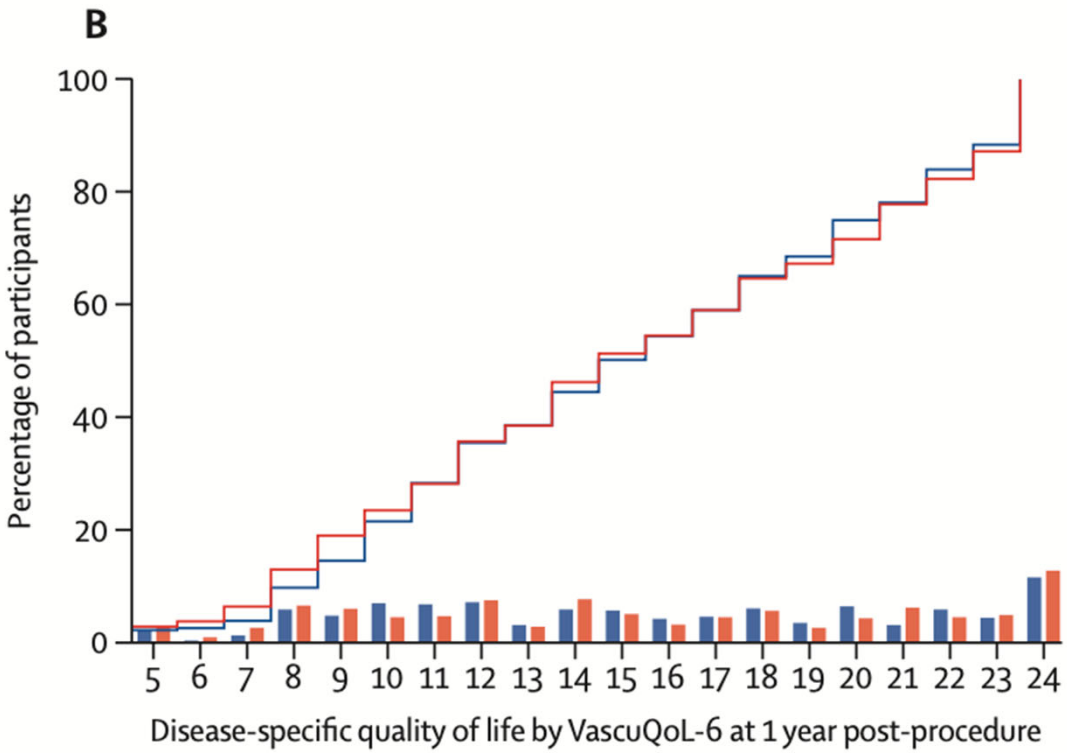


**n=1155 randomized**
**96% femoropopliteal interventions**


# A systematic review supporting the Society for Vascular Surgery guideline update on the management of intermittent claudication

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## ABSTRACT

**Objective:** This systematic review and meta-analysis evaluates the current evidence on the management of intermittent claudication (IC), a prevalent manifestation of peripheral arterial disease (PAD).

**Methods:** We conducted comprehensive searches of MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, and Scopus. We addressed six questions developed by a guideline committee from the Society for Vascular Surgery, addressing pharmacological treatments, exercise regimens, endovascular interventions, and predictors of major adverse cardiovascular, limb-related events, and mortality.

**Results:** The search resulted in 5333 citations, from which we included 73 studies (46 randomized trials). In patients with PAD and IC who had one or more high-risk comorbidities, low-dose rivaroxaban and aspirin were associated with lower risk of major adverse limb events and major adverse cardiovascular events than aspirin alone. In patients who have undergone surgical or endovascular interventions for PAD, the addition of low-dose rivaroxaban to aspirin may improve limb outcomes. Of note, rivaroxaban trials excluded patients at high risk of bleeding. Single antiplatelet agents showed no significant efficacy differences head-to-head in ambulatory patients with IC and had a lower bleeding risk compared with combination therapy or anticoagulation. Home exercise programs were feasible and may be an alternative to supervised exercise in ambulatory patients with IC and in those who had revascularization. Several comorbidities increased the risk of adverse outcomes after revascularization for IC, such as advanced age, diabetes, coronary artery disease, chronic obstructive pulmonary disease, previous interventions, congestive heart failure, infrapopliteal artery involvement, and longer lesion lengths. In patients with IC undergoing endovascular intervention for superficial femoral artery disease, plain balloon angioplasty was associated with worse outcomes than drug elution or stent implantation for intermediate or longer lesions (ie, >5 cm).

**Conclusions:** This systematic review summarizes the current evidence base for the management of IC, offering insights into the relative benefits and risks of various therapeutic strategies. The findings underscore the need for individualized patient care, considering both the potential benefits and risks associated with different interventions. (J Vasc Surg 2025;82:688-97.)

| PICOS | Population | Intervention | Comparison | Outcomes | Planned subgroup analyses |
|---|---|---|---|---|---|
| 1 | Individuals with IC | NOAC | Aspirin or clopidogrel | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Major and minor bleeding | Specific comorbidities (CAD, DM, smoking) |
| | **Findings summary:**<br>• Patients who received rivaroxaban plus aspirin had lower risk of MALE and MACE compared with those who received aspirin alone.<br>• Patients who received rivaroxaban plus aspirin had an increased risk of major bleeding compared with those who received aspirin alone.<br>• Patients who received rivaroxaban alone had comparable rates of MACE and MALE with those receiving aspirin alone.<br>• Patients who had a history of DM, heart failure, renal insufficiency, or polyvascular disease had a significantly increased incidence of MACE.<br>• Patients with polyvascular disease were more likely to have major bleeding compared with patients with only lower extremity PAD. | | | | |
| 2 | Individuals with IC who had a revascularization | NOAC | Aspirin or clopidogrel | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Major and minor bleeding | Acute (post- procedural within 2 weeks) vs chronic<br>Endo vs open<br>Specific comorbidities (CAD, DM, smoking) |
| | **Findings summary:**<br>• Patients who received rivaroxaban plus aspirin were likely to have reduced reintervention or ALI when compared with those who received aspirin alone.<br>• Patients receiving anticoagulation alone had a significantly increased risk of bleeding when compared with those who received aspirin alone.<br>• The rates of mortality, amputation, reinterventions, and occlusions in patients receiving anticoagulation alone were comparable with those receiving aspirin alone.<br>• Patients who received anticoagulation plus aspirin had comparable risks of MI and stroke with those who received aspirin alone. | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Individuals with IC | Newer antiplatelet agents | Aspirin or clopidogrel | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Major and minor bleeding | Acute (post- procedural within 2 weeks) vs chronic<br>Endo vs open<br>Specific comorbidities (CAD, DM, smoking) |
| | **Findings summary:**<br>• Patients on ticagrelor had significantly lower risk of stroke compared with those who were on clopidogrel.<br>• The rates of reintervention might be comparable between ticagrelor and clopidogrel.<br>• There was no difference in risk for the development of MACE, MI, major bleeding, and/or mortality between ticagrelor and clopidogrel.<br>• Patients who were on vorapaxar plus aspirin had significantly lower rates of ALI and reintervention, but higher rates of bleeding when compared with those who were on aspirin alone.<br>• The rates of major amputation, MI, minor and major bleeding, mortality, and stroke were comparable between ticlopidine and aspirin.<br>• The rates of minor bleeding were comparable between ticlopidine and aspirin/dipyridamole. | | | | |
| 4 | Individuals with IC | Supervised exercise | Home-based exercise | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Major and minor bleeding<br>Functional status<br>Quality of life | |
| | **Findings summary:**<br>• Home-based high-intensity walking exercise program exhibited significantly greater 6-WMD, maximal treadmill walking times, and higher WIQ distance and speed scores when compared with the non-exercise control.<br>• Home-based exercise and SEP showed a significant improvement in 6-MWD from baseline. | | | | |
| 5 | Individuals with IC undergoing an exercise program | Vascular intervention post exercise regimen | Exercise only without subsequent procedures | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Major and minor bleeding<br>Functional status<br>Quality of life | Endo vs open |
| | **Findings summary:**<br>• The effect of revascularization + exercise was comparable to exercise alone in each of all the following outcomes: mortality, ALI, major and minor amputations, reintervention, stroke, MI, MWD, CD, and PRWD.<br>• Endovascular procedure + SEP showed significant improvement from baseline in each of the following outcomes: 6-MWT, MWD, PFWD, SF-36 physical function scores, CLAU-S Daily Life scores, and CLAU-S Psychological Well-being scores. | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Individuals who had revascularization for IC | Predictors of clinical improvement | Lack of each predictor | Amputation<br>Mortality<br>Freedom from MACE, MALE, and ALI events<br>Periprocedural events<br>Functional outcomes<br>Quality of life | Endo vs open<br>Type of medical treatment provided (adequate vs inadequate)<br>Anatomic level<br>Specific comorbidities (CAD, DM, smoking) |

**Findings summary:**

- Predictors of MACE after revascularization for IC were age, surgery type and history of DM, CAD, and COPD.
- The associations of MACE with sex, smoking, and CHF were not statistically significant.
- Patients who had uncontrolled DM (HbA1c ≥7), previous interventions, or operations in the infragenicular region might have significantly increased odds of MALE.
- A history of CHF or infrapopliteal artery involvement were significantly associated with major amputations.
- Patients with a history of DM had higher odds of major amputations.
- The associations of major amputations with sex, smoking history, history of CAD, and open vs endovascular surgery did not show a significant difference.
- Patients who were ≥80 years or male had lower odds of reintervention.
- Patients who had bilateral lesions, lesion length >10 cm, and infrapopliteal artery involvement had higher odds of reintervention compared with those with unilateral lesion, lesion length <10 cm, and femoropopliteal lesions, respectively.
- Patients who had a DCB ± BMS had significantly lower odds of reintervention compared with patients with BA ± BMS.
- Patients with lesion length >20 cm might have significantly higher odds of reintervention compared with patients with lesion length of ≤20 cm.
- Patients who received DES showed significantly lower odds of reintervention compared with BMS.
- Patients who received a DCB ± BMS had significantly lower odds of reintervention compared with BA ± BMS.
- Patients with a history of COPD, DM, or CAD had higher mortality compared with those with no history of COPD, DM or CAD, respectively.
- The associations of mortality with sex, smoking history, DES vs BMS, or DCB ± BMS vs BA ± BMS revealed no statistically significant differences.
- Patients who exercised had longer MWD on treadmill vs those who did not exercise.
- All quality-of-life measures were comparable for patients who exercised vs those who had no exercise and patients who received a stent vs a balloon.

# Society for Vascular Surgery Clinical Practice Guideline on the management of intermittent claudication: Focused update

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## ABSTRACT

Intermittent claudication (IC) is the most common symptom of peripheral artery disease, which is a growing public health burden in the United States and globally. Patients with IC present with a broad spectrum of risk factors, comorbid conditions, range of disability, and treatment goals. Informed shared decision-making hinges on a comprehensive evaluation of these factors, patient education, and knowledge of the latest available evidence. In 2015, the Society for Vascular Surgery published a clinical practice guideline on the management of asymptomatic peripheral artery disease and IC. An expert writing group was commissioned to provide a focused update to this guideline on the management of IC. Based on the available evidence from published research conducted since the prior guideline, six specific key questions were formulated spanning the areas of antithrombotic management, exercise therapy, and revascularization for IC. A systematic review and evidence synthesis of each question was conducted by a dedicated methodology team. The GRADE approach was employed to describe the strength of each recommendation and level of certainty of evidence. The review identified major gaps in evidence particularly in the arena of comparative effectiveness for interventions (exercise, revascularization) across defined clinical subgroups and employing meaningful patient-centered outcomes. Twelve recommendations, among which are two best practice statements, are provided in this focused update. They address the use of dual pathway antithrombotic strategies, the role and type of exercise therapy, endovascular interventions for femoropopliteal and infrapopliteal disease, and the identification of specific risk factors that should be incorporated into shared decision-making around revascularization. A comprehensive and individualized approach to the management of patients with IC, relying first on education, risk factor control, optimal medical therapy, and exercise, is emphasized. A rubric for decision-making that includes a thorough assessment of risk, benefits, degree of impairment, and treatment durability, is considered fundamental to a patient-centered approach in IC. Significant unmet research needs in this field are also enumerated. (J Vasc Surg 2025;82:303-26.)

| # | Patient Population / Scenario | Recommendation | Comparison | Goal / Outcome | Strength | Evidence |
|---|---|---|---|---|---|---|
| 1 | PAD + IC + high-risk comorbidities, low bleeding risk | Rivaroxaban 2.5 mg BID + aspirin | vs aspirin alone | ↓ CV death, stroke, MI | Grade 2 | B |
| 2 | Post revascularization for symptomatic PAD | Rivaroxaban 2.5 mg BID + aspirin | vs aspirin alone | ↓ CV death, stroke, MI, ALI, amputation | Grade 2 | B |
| 3 | PAD + IC without high-risk comorbidities OR high bleeding risk | Single antiplatelet (aspirin, clopidogrel, or ticagrelor) | — | Prevent CV events | Grade 1 | A |
| 4 | Post endovascular intervention for IC | DAPT (aspirin + clopidogrel ≥1 month) | vs single antiplatelet | Reduce thrombotic risk | Grade 2 | C |
| 5 | IC, unable/refuse supervised exercise | Home-based walking progr | | Improve symptoms/function | Grade 1 | B |
| 6 | IC (first-line therapy) | Supervised exercise (≥3x/w 60 min, ≥12 weeks) | | Improve walking/function | Grade 1 | A |
| 7 | Post revascularization for IC | Continue exercise therapy | | Maintain/improve outcomes | Grade 2 | C |
| 8 | Considering revascularization | Shared decision-making incl. risks/benefits (mortality, MACE, MALE, function, QoL) | — | Informed decisions | Best practice | — |
| 9 | Considering revascularization | Assess individual risk factors (comorbidities, anatomy, prior procedures, strategy) | — | Personalize decisions | Best practice | — |
| 10 | Asymptomatic PAD or IC only by imaging/hemodynamics | Avoid revascularization | — | No proven benefit | Grade 1 | C |
| 11 | IC without CLTI | Avoid infrapopliteal revascularization | — | Avoid harm, no benefit | Grade 2 | C |
| 12 | IC + femoropopliteal lesions >5 cm | Use BMS or drug-eluting devices | vs plain balloon angioplasty | ↓ restenosis/reintervention | Grade 1 | B |


# A Delphi-consensus of United States vascular surgeons on "OPioid prescripTION in VASCular surgery (OPTION-VASC)"

Nicholas Schaper, BS, MS,[a] Mario D'Oria, MD,[b] Laura M. Drudi, MD, MSc,[c] Amisha Paul, BS,[a] *and* Matthew R. Smeds, MD,[a] on behalf of the Collaborative OPTION-VASC Study Group, *St Louis, MO; Trieste, Italy; and Montreal, Quebec, Canada*

## ABSTRACT

**Objective:** The aim of this study was to report an expert-based Delphi consensus from United States physicians on good practice patterns for opioid prescriptions in the management of vascular surgery patients.

**Methods:** A modified three-round Delphi consensus was conducted between March and April 2024. Three senior vascular surgeons acting as facilitators generated statements regarding the topic. Questions were evaluated using a 4-point Likert scale with open comment fields, and a consensus recommendation was accepted only when grade A (>75% agree) and grade B (agree and somewhat agree >80%) endorsements were met. Statements that did not meet the above criteria were not included in the final report. The consistency of the answers from each round were also analyzed with the intraclass correlation coefficient, Cohen's kappa, and, in case of double resubmission, Fleiss kappa. Consistency was leveled according to Cohen's kappa: level I (0.81-1.0), level II (0.61-0.8), and level III (0.41-0.6).

**Results:** Thirty-four United States vascular surgeons completed the Delphi process. Voting was performed on 33 statements relating to postoperative opioid prescription (n = 15), medical management with opioids (n = 4), opioid prescribing habits (n = 12), and practice guidelines (n = 2). After three rounds, consensus was achieved in all statements. Of these, 16 were considered grade A consistency level I, six were considered grade A consistency level II, nine were considered grade B consistency level II, and two were considered grade B consistency level III.

**Conclusions:** Opioids serve a role in vascular surgery patient management in both operative and nonoperative scenarios. The statements included in this Delphi consensus may serve to guide future studies on opioid usage in these patients and help inform future guidelines in the management of opioid medications. (J Vasc Surg 2025;82:1870-7.)

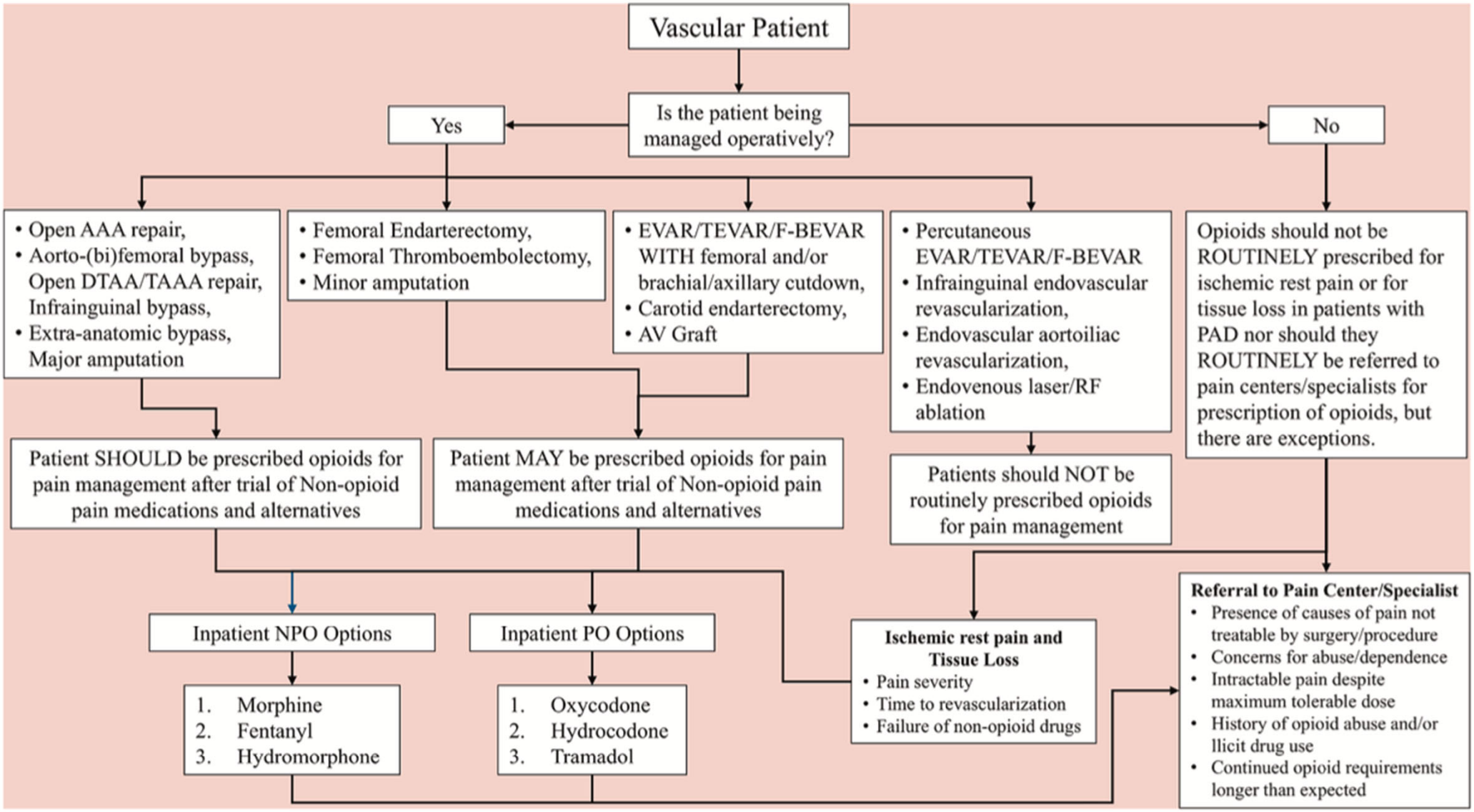


**Fig 1.** Flowchart for the pain management treatment pathway of the vascular patient based on various operative/nonoperative characteristics. *AAA*, Abdominal aortic aneurysm; *AV*, arteriovenous; *DTAA*, descending thoracic aortic aneurysm; *EVAR*, endovascular aortic repair; *F-BEVAR*, fenestrated-branched endovascular aortic repair; *NPO*, nothing by mouth; *PAD*, peripheral arterial disease; *PO*, oral; *RF*, radiofrequency; *TAAA*, thoracic abdominal aortic aneurysm; *TEVAR*, thoracic endovascular aortic repair.

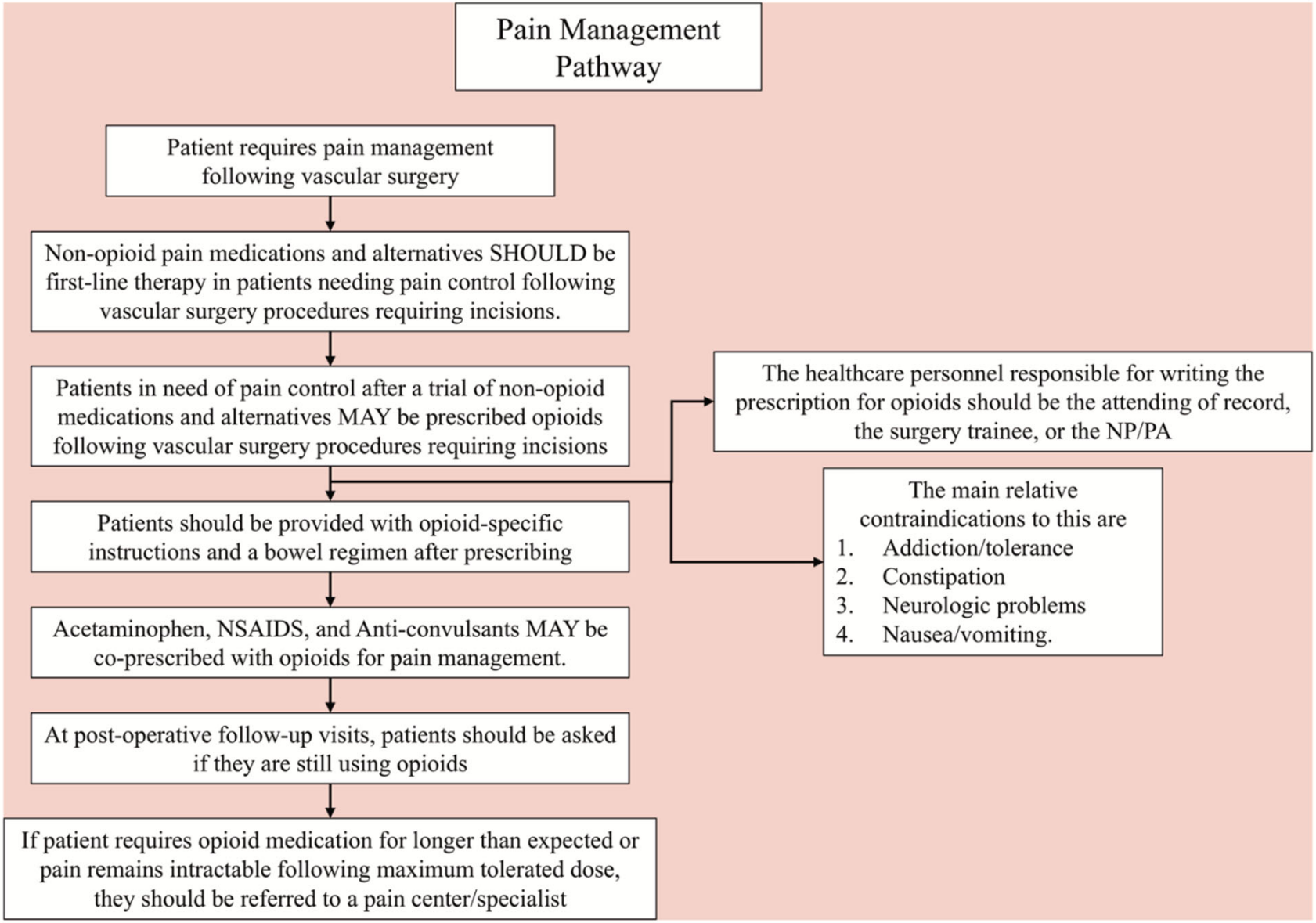


**Fig 2.** Flowchart for the typical course of a patient requiring pain management and steps to be considered before and after prescription of opioid analgesics. *NP*, Nurse practitioner; *NSAID*, nonsteroidal anti-inflammatory drugs; *PA*, physician assistant.

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# Intensive care after vascular surgery: systematic review

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## Abstract

**Background:** The optimal use of ICU resources in patients undergoing vascular surgery is unclear. The aim of this systematic review was to evaluate the impact of ICU admission on clinical outcomes and costs after elective and emergency vascular surgery.

**Methods:** MEDLINE, Embase, the Cochrane Library, Cochrane Collaboration Central Register of Controlled Trials (CENTRAL), and trial registry databases were searched in July 2024. Studies comparing ICU care with intermediary or ward-based care for major vascular surgery patients were included.

**Results:** Thirteen studies (11 elective only and 2 including emergencies) involving 157 932 patients met the inclusion criteria. ICU admission was associated with higher adjusted 30-day or in-hospital mortality (OR 4.14 (95% c.i. 1.65 to 10.41), $P = 0.003$; Grading of Recommendations Assessment, Development, and Evaluation (GRADE) certainty: moderate). Unadjusted analyses found ICU admission was associated with increased major adverse cardiovascular events (risk ratio (RR) 1.45 (95% c.i. 1.04 to 2.01), $P = 0.030$; GRADE certainty: very low), acute kidney injury (RR 1.98 (95% c.i. 1.49 to 2.63), $P < 0.001$; GRADE certainty: moderate), dialysis (RR 1.76 (95% c.i. 1.13 to 2.74), $P = 0.010$; GRADE certainty: low), readmission (RR 1.93 (95% c.i. 1.20 to 3.12), $P = 0.007$; GRADE certainty: moderate), and major bleeding (RR 1.37 (95% c.i. 1.03 to 1.81), $P = 0.030$; GRADE certainty: moderate). Respiratory failure requiring mechanical ventilation and infection were higher in patients admitted to ICU compared with ward-based care specifically. Hospital-associated costs were higher for ICU admission across all procedures.

**Conclusion:** No clear clinical benefit was associated with ICU admission after vascular surgery. This may be due to residual confounding and insufficient risk stratification.

# Summary

‘In this systematic review of low-quality data, no clear clinical advantages were observed with direct ICU admission after vascular surgery and it was associated with increased costs.’

- Consider specialty-specific ‘step-down’ care for majority of post-operative vascular surgery patients

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# Medical Management and Revascularization for Asymptomatic Carotid Stenosis

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## ABSTRACT

### BACKGROUND

Improvements in medical therapy, carotid-artery stenting, and carotid endarterectomy call into question the preferred management of asymptomatic carotid stenosis. Whether adding revascularization to intensive medical management would provide greater benefit than intensive medical management alone is unclear.

### METHODS

We conducted two parallel, observer-blinded clinical trials that enrolled patients with high-grade (≥70%) asymptomatic carotid stenosis across 155 centers in five countries. The stenting trial compared intensive medical management alone (medical-therapy group) with carotid-artery stenting plus intensive medical management (stenting group); the endarterectomy trial compared intensive medical management alone (medical-therapy group) with carotid endarterectomy plus intensive medical management (endarterectomy group). The primary outcome was a composite of any stroke or death, assessed from randomization to 44 days, or ipsilateral ischemic stroke, assessed during the remaining follow-up period up to 4 years.

### RESULTS

A total of 1245 patients underwent randomization in the stenting trial and 1240 in the endarterectomy trial. In the stenting trial, the 4-year incidence of primary-outcome events was 6.0% (95% confidence interval [CI], 3.8 to 8.3) in the medical-therapy group and 2.8% (95% CI, 1.5 to 4.3) in the stenting group (P=0.02 for the absolute difference). In the endarterectomy trial, the 4-year incidence of primary-outcome events was 5.3% (95% CI, 3.3 to 7.4) in the medical-therapy group and 3.7% (95% CI, 2.1 to 5.5) in the endarterectomy group (P=0.24 for the absolute difference). From day 0 to 44, in the stenting trial, no strokes or deaths occurred in the medical-therapy group and seven strokes and one death occurred in the stenting group; in the endarterectomy trial, three strokes occurred in the medical-therapy group and nine strokes occurred in the endarterectomy group.

### CONCLUSIONS

Among patients with high-grade stenosis without recent symptoms, the addition of stenting led to a lower risk of a composite of perioperative stroke or death or ipsilateral stroke within 4 years than intensive medical management alone. Carotid endarterectomy did not lead to a significant benefit. (Funded by the National Institute of Neurological Disorders and Stroke and others; CREST-2 ClinicalTrials.gov number, NCT02089217.)

The authors' full names, academic degrees, and affiliations are listed at the end of the article. James F. Meschia can be contacted at meschia.james@mayo.edu or at the Mayo Clinic, 4500 San Pablo Rd., Jacksonville, FL 32224.

*A list of the CREST-2 investigators is provided in the Supplementary Appendix, available at NEJM.org.

Thomas G. Brott and George Howard contributed equally to this article.

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CME

**Table 2. Analysis of Primary Outcome and Components.**

| Variable | Stenting Trial | | Endarterectomy Trial | |
|---|---|---|---|---|
| | Medical Therapy Alone | Stenting | Medical Therapy Alone | Endarterectomy |
| **Primary 4-yr composite outcome*** | | | | |
| Event rate (95% CI) — % | 6.0 (3.8 to 8.3) | 2.8 (1.5 to 4.3) | 5.3 (3.3 to 7.4) | 3.7 (2.1 to 5.5) |
| Absolute difference (95% CI) — percentage points† | 3.2 (0.6 to 5.9) | | 1.6 (–1.1 to 4.3) | |
| P value for difference | 0.02 | | 0.24 | |
| Relative risk (95% CI)† | 2.13 (1.15 to 4.39) | | 1.43 (0.78 to 2.72) | |
| **Components of primary outcome** | | | | |
| Periprocedural period: stroke or death | | | | |
| No. of events/no. of patients | 0/629 | 8/616 | 3/623 | 9/617 |
| Percent of patients with event (95% CI) | 0.0 (0.0 to 0.6) | 1.3 (0.6 to 2.5) | 0.5 (0.1 to 1.4) | 1.5 (0.7 to 2.8) |
| Difference (95% CI) — percentage points | –1.3 (–2.2 to 0.4) | | –1.0 (–2.1 to 0.1) | |
| Postprocedural period: ipsilateral ischemic stroke | | | | |
| No. of person-yr | 1686 | 1714 | 1761 | 1823 |
| No. of events/no. of patients | 28/600 | 7/582 | 23/600 | 10/596 |
| Annual event rate per person-yr (95% CI) — % | 1.7 (1.1 to 2.4) | 0.4 (0.2 to 0.9) | 1.3 (0.9 to 2.0) | 0.5 (0.3 to 1.0) |
| Relative risk (95% CI) | 4.07 (1.78 to 9.31) | | 2.38 (1.13 to 5.00) | |

* The primary outcome was a composite of any stroke or death in the periprocedural period (randomization through 44 days) or ipsilateral ischemic stroke in the postprocedural period (the remaining portion of the 4-year follow-up).

† These 95% confidence intervals for the 4-year composite outcome were adjusted to 95.3% to account for the reduction in the P value from the interim analysis (i.e., to represent the 2.35% and 97.65% thresholds of the bootstrap distribution).

EDITORIAL

Check for updates

# Commentary by the Society for Vascular Surgery regarding Carotid Revascularization and Medical Management for Asymptomatic Carotid Stenosis Trial-2

Ali AbuRahma, MD,[a] Marc Schermerhorn, MD,[b] *and* Keith Calligaro, MD,[c] *Charleston, WV; Boston, MA; and Philadelphia, PA*

- Real world medical management likely not improving
- No TCAR included
- Results of other trials (TF-CAS > stroke than CEA)
- Highly selected interventionalists (50% rejected for TF-CAS, 10% surgeons rejected for CEA)
- Different outcomes in each medical arm

Clinical Practice Guidelines

Eur J Vasc Endovasc Surg (2025) 70, 153—218


CLINICAL PRACTICE GUIDELINE DOCUMENT

# Editor's Choice – European Society for Vascular Surgery (ESVS) 2025 Clinical Practice Guidelines on the Management of Diseases of the Mesenteric and Renal Arteries and Veins☆

Mark J. Koelemay, (Chair) *, Robert H. Geelkerken, (Co-chair), Jussi Kärkkäinen, (Co-chair), Nicola Leone, (Co-chair), George A. Antoniou, Jorg L. de Bruin, Alexander Gombert, Anders Gottsäter, Elena Iborra, Sonia Ronchey, Konstantinos Spanos, Jos C. van den Berg, Sabine Wipper, Frederico Bastos Gonçalves, Martin Björck, Raphael Coscas, Sandro Lepidi, Timothy A. Resch, Jean-Baptiste Ricco, Riikka Tulamo, Anders Wanhainen, Olivier Corcos, Thomas S. Huber, Alexander Oberhuber, Annika Reintam Blaser, Matti Tolonen †

**Objective:** The European Society for Vascular Surgery (ESVS) has developed clinical practice guidelines for the care of patients with diseases of the mesenteric and renal arteries and veins, in succession to the first 2017 guidelines, with the aim of assisting physicians and patients in selecting the best management strategy.

**Methods:** These guidelines are based on scientific evidence and expert opinion. By summarising and evaluating the best available evidence, recommendations for the diagnosis and treatment of patients have been formulated. The recommendations are graded according to the new ESVS clinical practice guidelines class of recommendation grading system, where the strength (class) of each recommendation is graded from I to III, and the letter A to C marks the level of evidence.

**Results:** A total of 102 recommendations have been issued on the management of chronic arterial mesenteric ischaemia, median arcuate ligament syndrome, acute arterial mesenteric ischaemia, non-occlusive mesenteric ischaemia, venous mesenteric thrombosis and ischaemia, occlusive disease of the renal arteries and veins, visceral artery aneurysms, and spontaneous isolated dissection of the visceral arteries.

**Conclusion:** These 2025 ESVS clinical practice guidelines provide comprehensive and up to date advice to physicians and patients on the management of diseases of the mesenteric and renal arteries and veins.

# 102 recommendations

**Table 1. New and updated recommendations included in the European Society for Vascular Surgery (ESVS) 2025 clinical practice guidelines on the management of diseases of the mesenteric and renal arteries and veins compared with the 2017 ESVS guidelines. Numbers correspond to the numbers of the recommendations in the current guideline document.**

| **New Class I recommendations** |
|---|
| 7. It is recommended to assess the cardiovascular risk profile of patients with asymptomatic atherosclerotic mesenteric artery disease and to offer secondary prevention. |
| 8. It is recommended to counsel patients with asymptomatic multivessel mesenteric artery occlusive disease regarding abdominal symptoms related to mesenteric ischaemia. |
| 23. Computed tomography angiography is recommended as second level imaging after duplex ultrasound diagnosis of re-stenosis in patients after revascularisation for chronic mesenteric ischaemia. |
| 27. Duplex ultrasound of the mesenteric arteries during inspiration and expiration is recommended as the first line examination in patients suspected of median arcuate ligament syndrome. |
| 28. Multidisciplinary management at specialised centres is recommended for patients suspected of having median arcuate ligament syndrome. |
| 32. Clinicians are recommended to mention the suspicion of acute mesenteric ischaemia in the referral for computed tomography angiography. |
| 34. It is recommended to treat patients with acute mesenteric ischaemia in centres with 24/7 multidisciplinary services and experience in both open and endovascular mesenteric artery revascularisation. |
| 57. Duplex ultrasound is recommended as the first line imaging investigation for patients with suspected renal artery stenosis. |
| 59. Computed tomography angiography or magnetic resonance angiography are recommended over catheter angiography for the establishment of diagnosis and treatment planning for patients with suspected renal artery stenosis. |
| 60. Pharmacological treatment of hypertension with the same blood pressure targets as in other hypertensive patients is recommended for patients with a renal artery stenosis with blood pressure $\geq$140/90 mmHg, provided these levels are without side effects: $<$130/80 mmHg in patients aged $<$65 years, $<$140/80 mmHg in patients aged 65 $-$ 79 years, and systolic blood pressure 140 $-$ 150 mmHg in patients $\geq$80 years of age. |
| 61. Inhibitors of the renin–angiotensin system (angiotensin converting enzyme inhibitors [ACEIs] and angiotensin II receptor blockers [ARBs]) are recommended as first line therapy for patients with unilateral renal artery stenosis and hypertension. Calcium channel blockers and thiazide diuretics are recommended as first line additional therapies. |
| 69. Conservative management is recommended for patients with an established diagnosis of nutcracker syndrome who have mild symptoms. |
| 95. Conservative management, including blood pressure and pain control and bowel rest, is recommended as first line strategy for patients with asymptomatic or uncomplicated symptomatic isolated dissection of the superior mesenteric or coeliac arteries. |
| 100. Conservative management with blood pressure control and antiplatelet therapy is recommended as first line strategy for patients with asymptomatic or uncomplicated symptomatic renal artery dissection. |
| 101. Endovascular revascularisation is recommended for patients with symptomatic renal artery dissection and hypertension not responding to medical management. |

From the SVS-APSA Pediatric Vascular Surgery Task Force


# Management strategies for the treatment of iatrogenic vascular injuries in infants and children

John V. White, MD,[a] Mohammed Moursi, MD,[b] Sateesh Babu, MD,[c] *and*
Timothy Schaub, MD,[d] *Park Ridge, IL; Little Rock, AR; Mount Kisco, NY; and Los Angeles, CA*

## ABSTRACT

**Background:** The care of ill children, from extremely premature infants to late adolescents, increasingly involves the use of invasive monitoring and percutaneous diagnostic and therapeutic interventions. Premature infants, neonates, and small children are at greatest risk for iatrogenic vascular injury. Given the often small diameter of the blood vessels and the ability to develop severe spasm, iatrogenic vascular injury is increasing. The very nature of their hemostatic mechanisms, small vascular diameters, tolerance of severe ischemia, and the potential for rapid growth and remodeling of collateral beds alters decision-making significantly from adults. Surgery, when required, may involve microsurgery and subtle changes in the methods of vascular dissection and arterial repair. There is little information available for the vascular surgeon to understand the risks and nature of these injuries and the options for treatment. This review addresses the mechanisms of and management strategies for the most common iatrogenic injuries.

**Methods:** The National Task Force on Pediatric Vascular Care established jointly by the Society for Vascular Surgery and the American Pediatric Surgery Association appointed a working group with expertise in managing pediatric iatrogenic vascular injuries to develop a support document for vascular surgeons. To do this, the published literature was reviewed on pediatric iatrogenic injuries that vascular surgeons might be called to manage. Intracranial injuries and those associated with extracorporeal membrane oxygenation were excluded. The majority of injuries reported in the literature involved femoral and brachial artery cannulation sites. The literature was reviewed by the writing group and the most important of these selected. In addition, consensus expert opinion from the writing group was used when support from the literature was scant.

**Results:** There were six major types of pediatric iatrogenic vascular injury identified: arteriovenous fistula, pseudoaneurysm, hemorrhage, arterial and venous thrombosis, and pharmacological ischemia. There is little uniform documentation on the diagnosis and treatment of these. Using the available literature and consensus expert opinion of the working group, each of the major categories of iatrogenic injury was defined and management strategies devised.

**Conclusions:** There is often a nonsurgical approach to the management of the six major types of iatrogenic injury. It is important for the vascular consultant to understand and incorporate these approaches to develop comprehensive management strategies for children with iatrogenic vascular injuries. When treatment of even the smallest of pediatric patients is undertaken with a clear understanding of the etiology and treatment options, a very high rate of success can be expected. (J Vasc Surg 2025;82:359-74.)

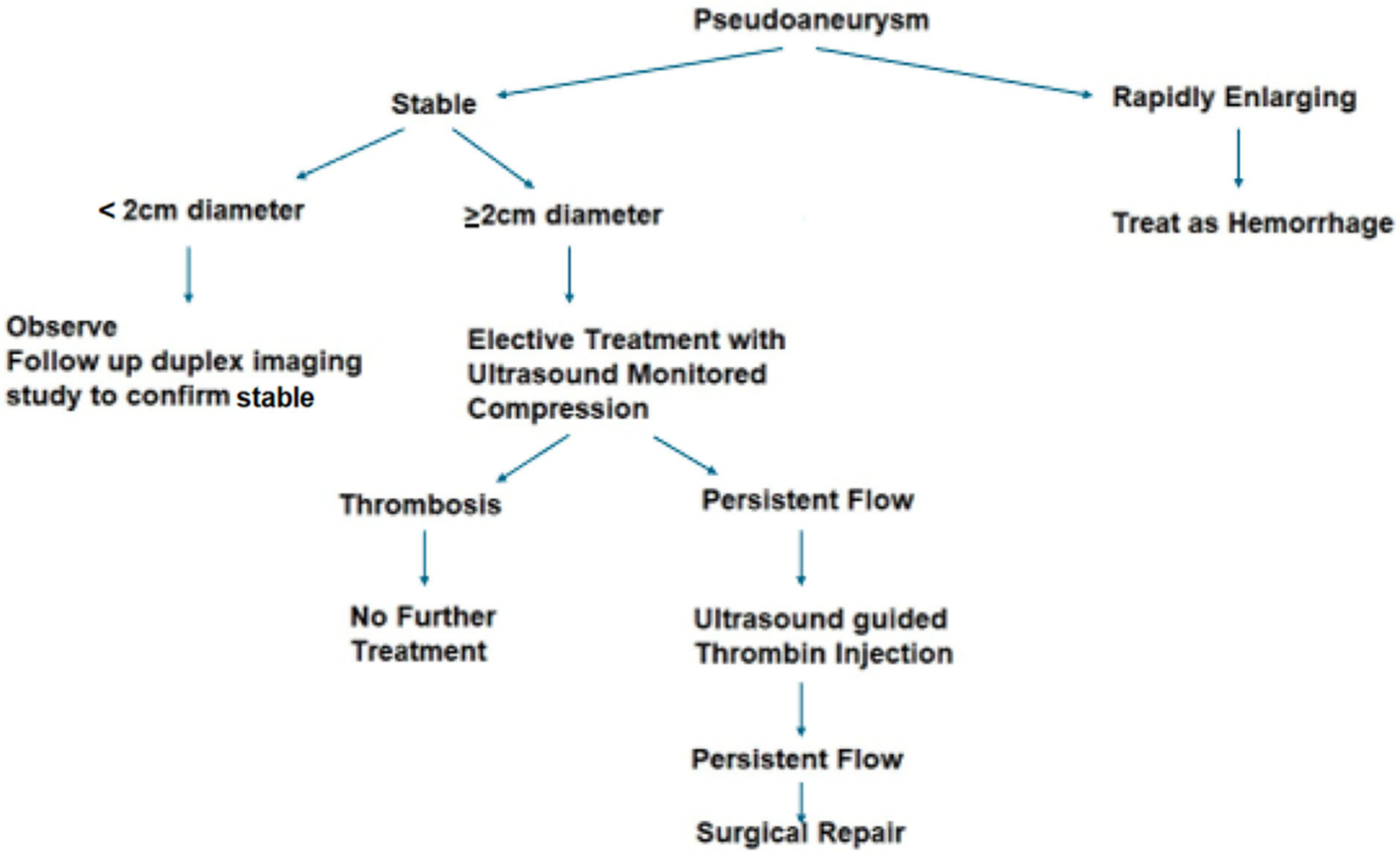



**Fig 4.** Strategy for the management of postcannulation iatrogenic pseudoaneurysm.

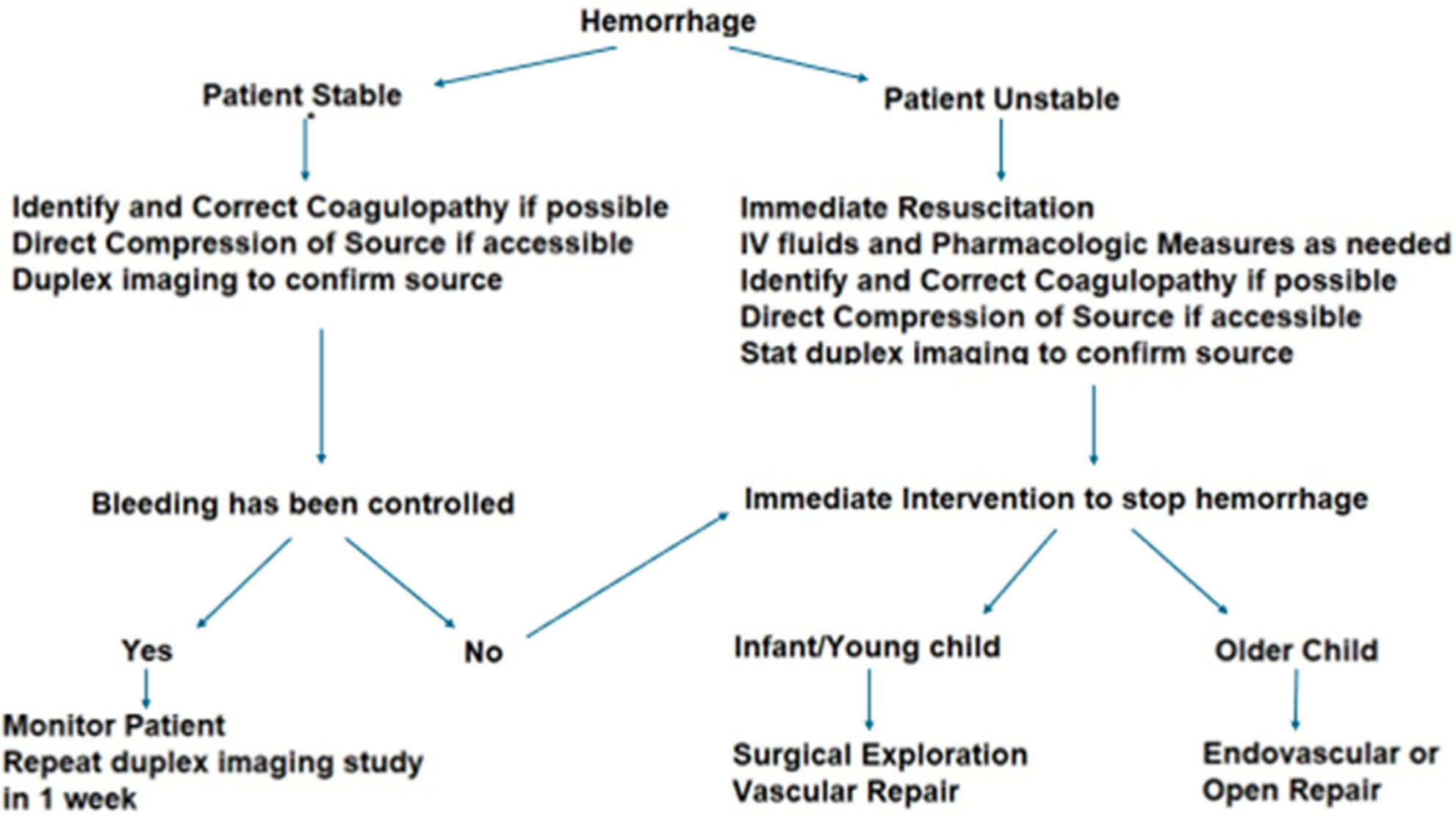



**Fig 5.** Strategy for the management of postcannulation hemorrhage.

# The obstetric experience among vascular surgery trainees


Ruojia Debbie Li, MD, MS,[a,b] Eric B. Pillado, MD, MS, MBA,[a,c] Margaret Reilly, MD, MS,[c] Lauren M. Janczewski, MD, Christina Cui, MD, MS,[d] Kathryn DiLosa, MD,[e] Joshua S. Eng, PhD,[a] Matthew C. Chia, MD, MS,[a] Malachi G. Sheahan III, MD,[f] Karl Y. Bilimoria, MD, MS,[a] Erika L. Rangel, MD,[g] Yue-Yung Hu, MD, MPH,[a,c] *and* Dawn M. Coleman, MD,[d] *Indianapolis, IN; Maywood and Chicago, IL; Durham, NC; Sacramento, CA; New Orleans, LA; and Boston, MA*

## ABSTRACT

**Background:** Vascular surgery training poses unique risks to pregnancy, including long hours, physically demanding work, and radiation exposure. Our objectives were to (1) understand pregnancy and parenthood experiences among vascular surgery trainees, (2) assess the rate of obstetric complications among vascular trainees, and (3) evaluate factors associated with trainee-parent wellness.

**Methods:** A survey was administered after the 2021 Vascular Surgery In-Training Examination. Residents and fellows who (or whose partners) experienced pregnancies during their clinical years of training were asked about their perceptions of the learning environment (work hours and mistreatment, including discrimination, bullying, and harassment), obstetric complications (miscarriage, pre-eclampsia, placental abruption, intrauterine growth restriction, cesarean section, and postpartum depression), and burnout. Multivariable logistic regression models identified factors associated with burnout.

**Results:** Among 510 trainees from 123 vascular surgery training programs (response rate 85.9%), 128 (25.1%) reported pregnancy during clinical training (12.7% female and 35.4% male; $P < .001$). Compared with male trainees, female trainees more frequently reported delaying having children owing to training (53.1% vs 30.0%; $P < .001$) and being advised against having children during residency (7.9% vs 0.4%; $P < .001$). Both female trainees and the partners of male trainees had high rates of obstetric complications (female 47.1% vs partners of male trainees 34.0%; $P = .3$). Compared with male trainees who had female partners, female trainees more frequently reported pregnancy/parenthood-related mistreatment (female 60.0% vs male 15.6%; $P = .002$) and duty-hour violations (female 47.4% vs male 12.0%; $P < .001$). Female gender was associated with increased risk for burnout (odds ratio, 4.8; 95% confidence interval,1.14-20.15); however, this difference was no longer significant after adjusting for mistreatment and duty-hour violations.

**Conclusions:** Vascular trainees experience high rates of obstetric complications. Senior-level trainees were more likely to experience obstetric complications, potentially owing to older age, longer and more complex surgical cases, and increased frequency of overnight calls. Women experienced more stigma related to pregnancy and childbearing, which may be associated with higher rates of burnout. Increased support for childbearing during training may help to maintain the wellness of a diverse workforce and better maternal-fetal health. (J Vasc Surg 2025;82:675-84.)

510 trainees responded to the survey

Vascular trainees experience high rates of obstetric complications. Senior-level trainees were more likely to experience obstetric complications, potentially owing to older age, longer and more complex surgical cases, and increased frequency of overnight calls. Women experienced more stigma related to pregnancy and childbearing, which may be associated with higher rates of burnout.

? Canadian vs US pregnancy support

# Long-term follow-up for the treatment of symptomatic pelvic venous insufficiency secondary to combined iliac vein stenosis and ovarian vein reflux treated with iliac vein stenting alone

Ania Trzesniowski,[a] Gaurav Lakhanpal, MD,[a] Levan Sulakvelidze, BS,[a] Richard Kennedy, PAC,[a] Sanjiv Lakhanpal, MD,[a] *and* Peter J. Pappas, MD,[a,b] *Glen Burnie and Greenbelt, MD*

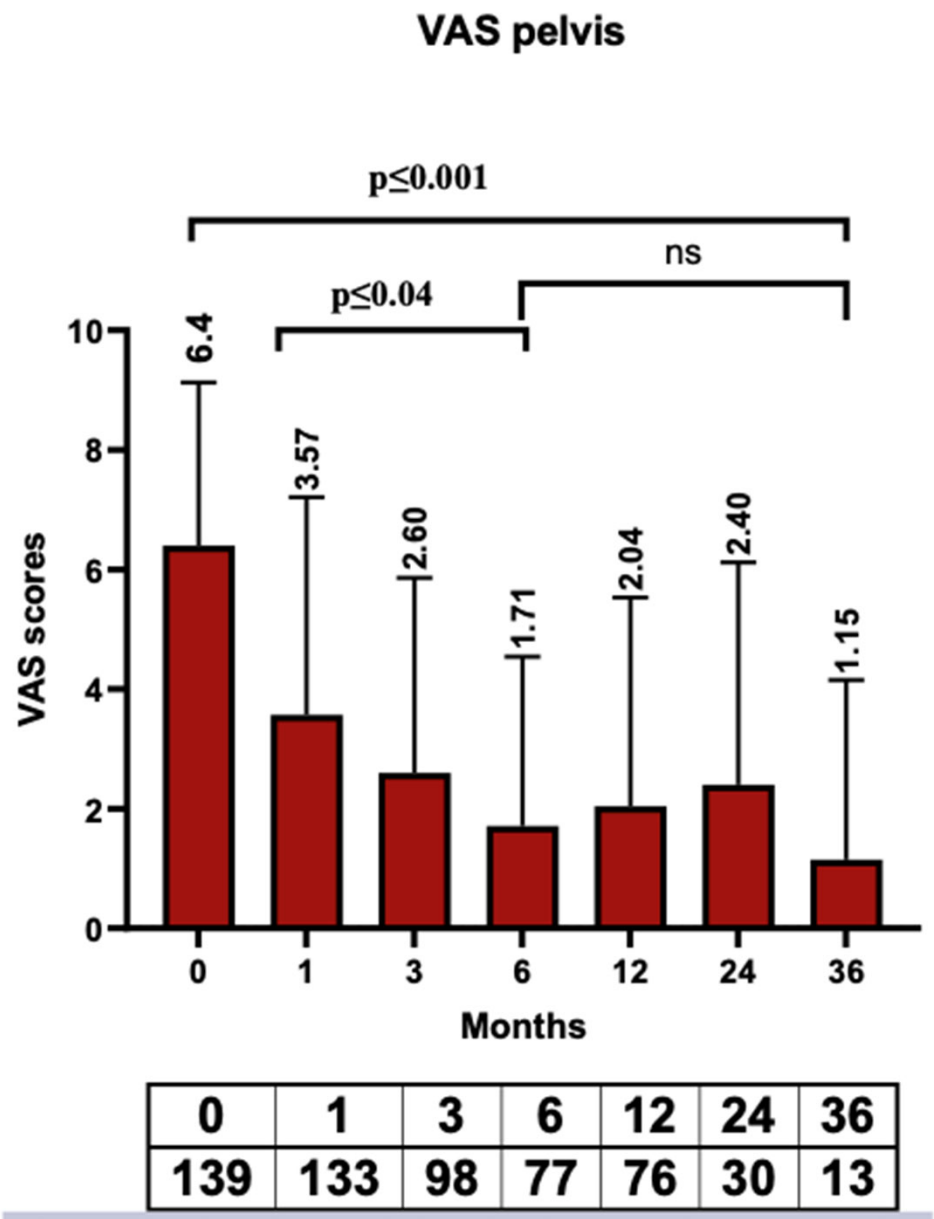
## ABSTRACT

**Background:** We previously reported that in women with symptomatic pelvic venous insufficiency secondary to combined iliac vein stenosis (IVS) and ovarian vein reflux (OVR), treated with iliac vein stenting alone that 78% reported complete symptom resolution up to 6 months. The purpose of this investigation was to determine the long-term effectiveness of this treatment strategy, the poststent reintervention rate and the incidence of poststent ovarian vein embolization (OVE) for residual symptoms.

**Methods:** A retrospective review of prospectively collected data at the Center for Vascular Medicine was performed. We investigated women with pelvic pain or dyspareunia secondary to combined IVS and OVR who were treated with stenting alone. Patients whose primary complaint was dysmenorrhea and/or leg symptoms were excluded from the analysis. Assessments and interventions consisted of an evaluation for other causes of pelvic venous disorder by a gynecologist, documentation of preintervention and 3-, 6-, 12-, 24-, and 36-month visual analog scale pain scores; transabdominal duplex ultrasound examination; stent type, diameter, and length; vein territory covered; and reintervention rates. All patients underwent diagnostic venography of their pelvic, left ovarian veins, and pelvic reservoirs, and intravascular ultrasound examination of their iliac veins.

**Results:** From February 2018 to January 2023, 141 women with a pelvic venous disorder secondary to IVS and OVR were identified. The average age was 44.7 ± 10.5 years with 3.18 ± 1.82 pregnancies. The average follow-up time for the entire cohort was 12.0 ± 12.1 months (median, 10.65 months). Types of stents were Venovo 48 (34%), Wallstent 14 (10%), and Abre 79 (56%). The most common diameter and stent lengths used were 14 and 16 mm and 140 and 150 mm, respectively. The most common vein territories covered were the inferior vena cava to the left external iliac vein in 83% and inferior vena cava to right external iliac vein in 13%. Pelvic and dyspareunia VAS scores before the intervention and at 3, 6, 12, 24, and 36 months after the intervention were as follows: 6.4 ± 73 (n = 141), 2.6 ± 3.3 (n = 98), 1.71 ± 2.83 (n = 77), 2.04 ± 3.5 (n = 76), 2.4 ± 3.7 (n = 30), and 1.15 ± 3 (n = 13) ($P \leq .001$). Of the entire cohort no patients required OVE and pelvic reservoir embolization. Pelvic reservoirs were present in 113 of 141 patients (83%). Stent reinterventions were required in 19 of 141 patients (13%).

**Conclusions:** The majority of women with pelvic pain secondary to combined IVS and OVR achieved near complete symptom resolution with iliac vein stenting alone, despite the presence of a pelvic reservoir in 83% of patients. Although most women complained of some minimal residual pelvic pain or dyspareunia, the majority were satisfied with their outcomes and did not require further intervention. In this patient population, iliac vein stenting should be considered the primary treatment modality. OVE should be reserved for patients with persistent or recurrent pelvic pain unresolved with stenting. (J Vasc Surg Venous Lymphat Disord 2025;13:101990.)




| 0 | 1 | 3 | 6 | 12 | 24 | 36 |
|---|---|---|---|---|---|---|
| 139 | 133 | 98 | 77 | 76 | 30 | 13 |

**Fig 3.** Visual analog scale (*VAS*) pain scores in women with iliac vein stenoses, treated with iliac vein stenting before intervention, 3, 6, 12, 24, and 36 months after intervention. All VAS scores are significantly improved compared to preintervention scores. Scores improve up to 6 months. No significant differences are noted after 6 months.


**IMPORTANCE** Vascular injuries require urgent repair to minimize loss of limb and life. Standard revascularization relies on autologous vein or synthetic grafts, but alternative options are needed when adequate vein is not feasible and when clinical conditions preclude safe use of synthetic materials.

**OBJECTIVE** To evaluate the performance of the acellular tissue engineered vessel (ATEV) in the repair of extremity arterial injuries.

**DESIGN, SETTING, AND PARTICIPANTS** Two open-label, single-arm, nonrandomized clinical trials, including 1 prospective civilian study (CLN-PRO-V005 [V005]) and 1 retrospective observational study in a war zone (CLN-PRO-V017 [V017]), were conducted from September 2018 to January 2024 (follow-up ongoing) at 19 level 1 trauma centers in the US and Israel and 5 frontline hospitals in Ukraine. Patients had vascular injury, no autologous vein available for emergent revascularization, and risk factors for wound infection. Data include the subset of patients with extremity injuries and were analyzed from September 2023 to January 2024.

**INTERVENTION** The ATEV is a bioengineered vascular conduit grown from human vascular cells, available off the shelf, and implantable without immunosuppression.

**MAIN OUTCOMES AND MEASURES** Primary patency at day 30 was the primary outcome. Secondary outcomes included limb salvage, graft infection, and patient survival. A systematic literature review identified synthetic graft benchmarks in the treatment of arterial trauma for the same end points.

**RESULTS** The arterial extremity injury subset included 51 of 69 participants in V005 and 16 of 17 participants in V017. The majority were male (V005, 38 [74.5%]; V017, 16 [100%]), the mean (SD) ages were similar (V005, 33.5 [13.6] years; V017, 34.2 [9.0] years), and the mean (SD) Injury Severity Scores were similar (V005, 20.8 [10.5]; V017, 20.1 [18.9]). Penetrating injuries dominated (V005, 29 patients [56.9%]; V017, 14 patients [87.5%]). At day 30 for the V005 and V017 trials, respectively, ATEV primary patency was 84.3% (95% CI, 72.0%-91.8%) and 93.8% (95% CI, 71.7%-98.9%); secondary patency was 90.2% (95% CI, 79.0%-95.7%) and 93.8% (95% CI, 71.7%-98.9%); amputation rate was 9.8% (95% CI, 4.3%-21.0%) and 0% (95% CI, 0.0%-19.4%); ATEV infection rate was 2.0% (95% CI, 0.4%-10.3%) and 0% (95% CI, 0.0%-19.4%); and death rate was 5.9% (95% CI, 2.0%-15.9%) and 0% (95% CI, 0.0%-19.4%) (no deaths attributed to the ATEV at day 30). Day 30 synthetic graft benchmarks were as follows: secondary patency, 78.9%; amputation, 24.3%; infection, 8.4%; and death, 3.4%.

**CONCLUSIONS AND RELEVANCE** Results of analysis in the subset of patients with vascular extremity injuries in 2 single-arm trials in civilian and real-world military settings suggest that the ATEV provides benefits in terms of patency, limb salvage, and infection resistance. Comparing ATEV outcomes with synthetic graft benchmarks demonstrated improved outcomes in the treatment of acute vascular injuries of the extremities. The analyses reported herein are limited to the subset of 67 patients with vascular extremity injuries out of 86 patients enrolled in 2 trials and excluded 19 patients with iatrogenic and torso injuries. Had these 19 patients been included in these analyses, the efficacy and safety findings could have been attenuated.

JAMA Surgery | Original Investigation

# Bioengineered Human Arteries for the Repair of Vascular Injuries in an Extremity Injury Subset of Trial Participants

Ernest E. Moore, MD; Michael Curi, MD; Nicholas Namias, MD; Rishi Kundi, MD; Ying Wei Lum, MD; Charles J. Fox, MD; Ravi R. Rajani, MD; Todd E. Rasmussen, MD; Oleksandr Sokolov, MD; Laura E. Niklason, MD, PhD; Zakaria Khondker, PhD; Shamik J. Parikh, MD; for the CLN-PRO-V005 Investigators and the CLN-PRO-V017 Investigators

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**Group Information:** The members of the CLN-PRO-V005 Investigators and the CLN-PRO-V017 Investigators

From: **Bioengineered Human Arteries for the Repair of Vascular Injuries in an Extremity Injury Subset of Trial Participants**

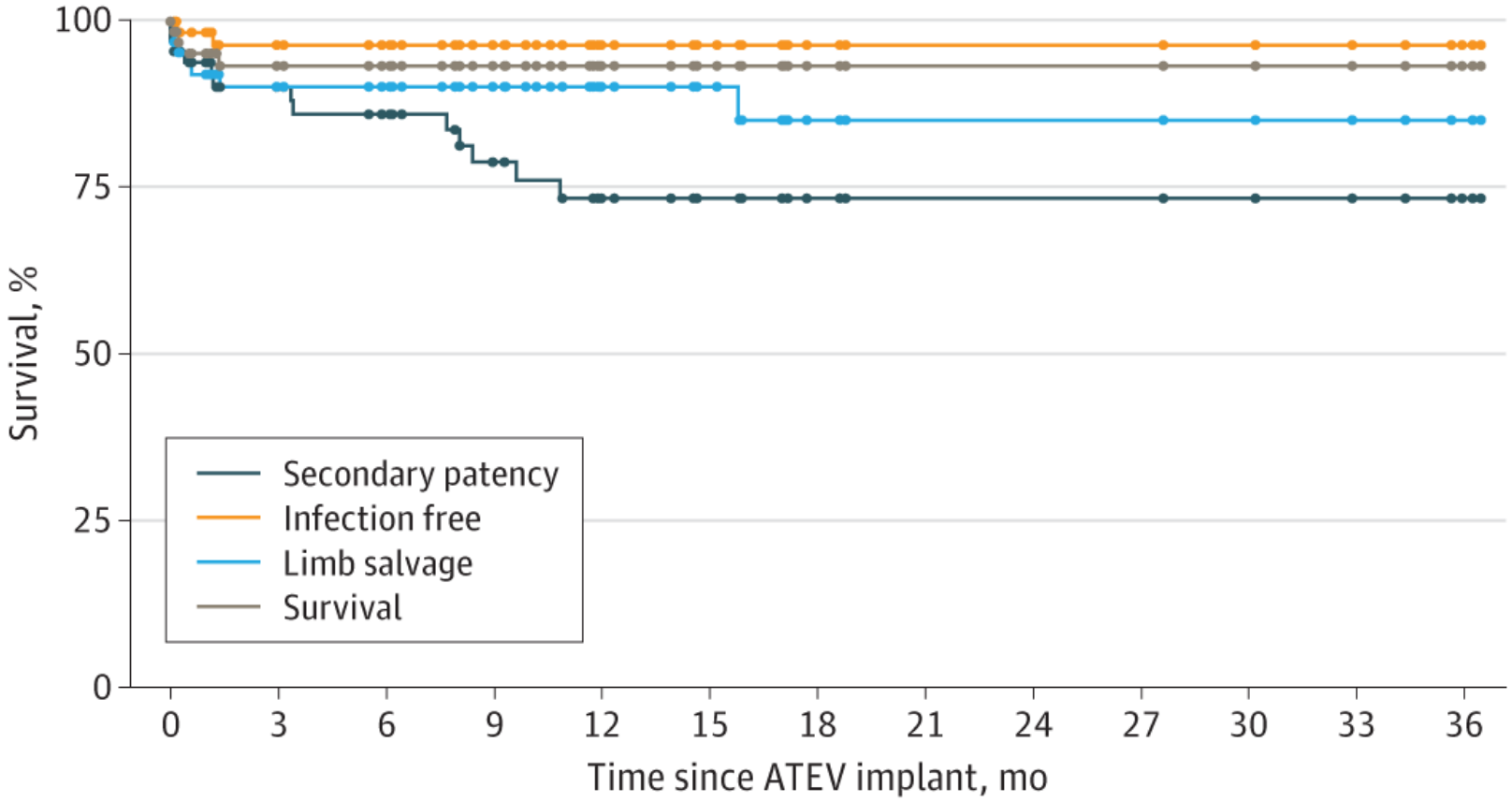
JAMA Surg. 2025;160(2):181-189. doi:10.1001/jamasurg.2024.4893

**Table 2. Efficacy and Safety Outcomes for Acellular Tissue Engineered Vessel Compared With Synthetic Graft Benchmarks in a Subset of Patients With Vascular Extremity Injuries at Day 30**

| | No. (%; 95% CI) | | | |
|---|---|---|---|---|
| Outcome at day 30 | V005 (n = 51) | V017 (n = 16) | Meta-analytically combined,[19] V005 + V017 (n = 67) | Meta-analytic synthetic grafts benchmark, % |
| Primary patency[a] | 43 (84.3; 72.0-91.8) | 15 (93.8; 71.7-98.9) | 58 (87.1; 77.6-94.6) | 78.9 |
| Secondary patency | 46 (90.2; 79.0-95.7) | 15 (93.8; 71.7-98.9) | 61 (91.5; 83.0-97.5) | 78.9 |
| Conduit infection rate | 1 (2.0; 0.4-10.3) | 0 (0; 0.0-19.4) | 1 (0.9; 0.0-5.8) | 8.4 |
| Amputation rate | 5 (9.8; 4.3-21.0) | 0 (0; 0.0-19.4) | 5 (4.5; 0.0-17.7) | 24.3 |
| Death from all causes | 3 (5.9; 2.0-15.9) | 0 (0; 0.0-19.4) | 3 (3.5; 0.03-10.1) | 3.4 |

From: **Bioengineered Human Arteries for the Repair of Vascular Injuries in an Extremity Injury Subset of Trial Participants**

JAMA Surg. 2025;160(2):181-189. doi:10.1001/jamasurg.2024.4893




No. at risk

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Secondary patency | 67 | 45 | 40 | 32 | 24 | 17 | 12 | 10 | 10 | 10 | 9 | 7 | 4 |
| Infection free | 67 | 48 | 45 | 38 | 26 | 19 | 12 | 10 | 10 | 10 | 9 | 7 | 4 |
| Limb salvage | 67 | 48 | 45 | 38 | 26 | 19 | 11 | 9 | 9 | 9 | 8 | 6 | 4 |
| Survival | 67 | 48 | 45 | 38 | 26 | 19 | 12 | 10 | 10 | 10 | 9 | 7 | 4 |

Honourable Mention


# Milli-spinner thrombectomy

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Check for updates

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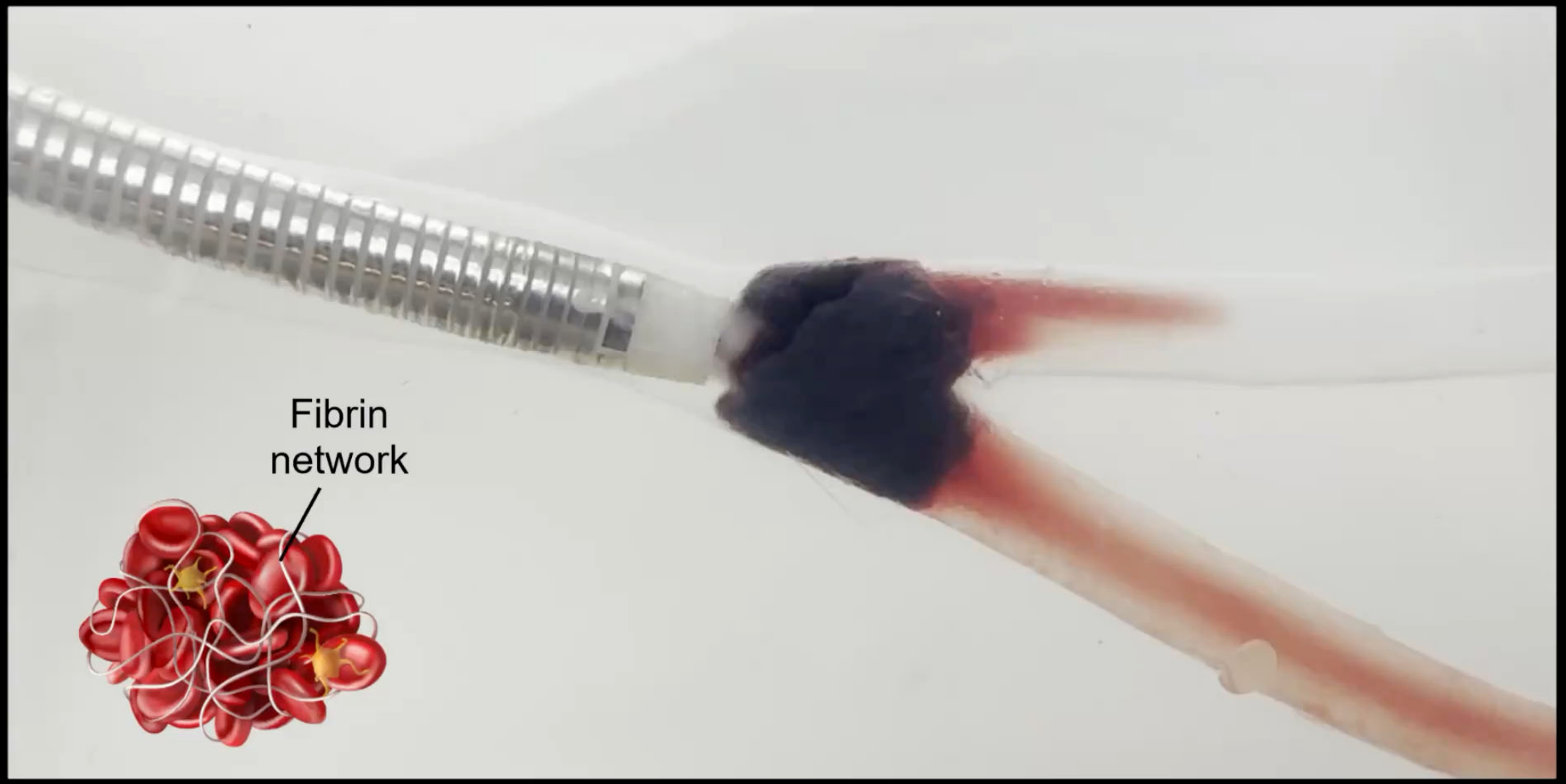
Clot-induced blockage in arteries or veins can cause severe medical conditions[1]. Mechanical thrombectomy is a minimally invasive technique used to treat ischaemic stroke, myocardial infarction, pulmonary embolism and peripheral vascular disease[2–4] by removing clots through aspiration[5], stent retriever[6] or cutting mechanisms[7]. However, current mechanical thrombectomy methods fail to remove clots in 10–30% of patients[8–10], especially in the case of large, fibrin-rich clots[11]. These methods can also rupture and fragment clots[12], causing distal emboli and poor outcomes[13]. To overcome these challenges, we develop the milli-spinner thrombectomy, which uses a simple yet innovative mechanics concept to modify the clot's microstructure, facilitating its removal. The milli-spinner works by mechanically densifying the clot's fibrin network and releasing red blood cells through spinning-induced compression and shear forces. It can shrink the clot volume by 95% for easy and fast removal. In vitro tests in pulmonary and cerebral artery flow models and in vivo experiments in swine models demonstrate that the milli-spinner achieves ultrafast clot debulking and high-fidelity revascularization, outperforming aspiration thrombectomy. The milli-spinner thrombectomy directly modifies the clot microstructure to facilitate clot removal, improving mechanical thrombectomy success rates compared with current methods that rely on clot rupture or cutting. This approach offers a promising new direction for mechanical thrombectomy devices, especially for treating ischaemic stroke, pulmonary embolism and peripheral thrombosis.

# Milli-spinner modifies clot microstructure for volume reduction



- Updated claudication and mesenteric/renal guidelines


- Controversial papers paclitaxel-coated devices, asymptomatic carotid disease, pelvic venous disease management

- Keep on top of paediatric iatrogenic trauma, opiod use,  intensive care for vascular patients, bioengineered human arteries, trainee obstetrical experience