When and Why is ALI best treated with Open Surgery: When are endovascular treatments best?

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No Disclosures

Basics

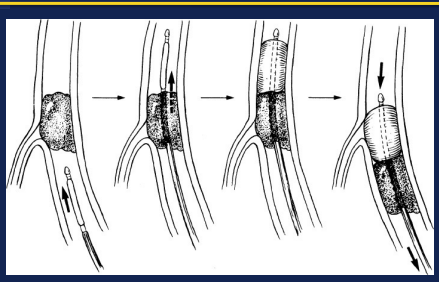
- Guidelines and data
- Case examples
- Recommendations

Basics: ALI

Category	Description	Neuromuscular Findings	Doppler	Intervention
I	Viable	No sensory or muscle weakness	Audible arterial and venous	Elective
IIa	Threatened (marginally)	Minimal	Often inaudible arterial, audible venous	Urgent
IIb	Threatened (immediately)	Mild to moderate, associated with pain	Usually inaudible arterial, audible venous	Emergent
III	Irreversible	Profound deficit	No signals	Emergent

Adapted from Rutherford R, Baker JD, Ernst C, et al. Recommended standards for reports dealing with lower extremity ischemia: revised version. *J Vasc Surg*. 1997;26(3):517-538. Copyright © 1997 Society for Vascular Surgery and International Society for Cardiovascular Surgery, North American Chapter. With permission.

Tried and True



Editor's Choice – European Society for Vascular Surgery (ESVS) 2020 Clinical Practice Guidelines on the Management of Acute Limb Ischaemia

Recommendation 14

It is recommended that patients with acute limb ischaemia should have access to treatment in a hybrid theatre, or operating theatre with C arm equipment, and by a clinical team able to offer a full range of open or endovascular interventions during a single procedure.

Class	Level	References
I	C	Consensus

Recommendation 15

For patients requiring surgical thrombo-embolectomy for acute limb ischaemia, regional or local anaesthesia may be considered, but always with an anaesthetist present.

Class	Level	References
IIb	C	Morris-Stiff *et al.* (2009)[99]

Recommendation 21

After open revascularisation for acute limb ischaemia, simultaneous endovascular treatment addressing inflow or outflow stenosis should be considered.

Class	Level	References
IIa	C	de Donato *et al.* (2014),[72] Balaz *et al.* (2013),[94] Argyriou *et al.* (2014),[95] Davis *et al.* (2018)[96]

Eur J Vasc Endovasc Surg (2020) 59, 173–218

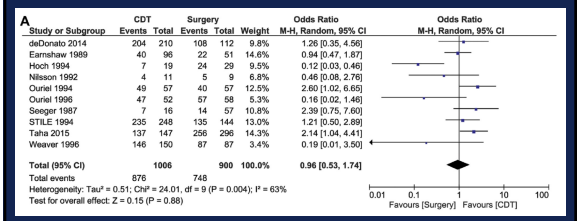
Open surgical or endovascular revascularization for acute limb ischemia

John C. Wang, MD, FACS, Ann H. Kim, MD, and Vikram S. Kashyap, MD, FACS, *Cleveland, Ohio*

Acute limb ischemia (ALI) is one of the most common vascular emergencies, with high risk for limb loss if it is not treated expediently. Endovascular therapy is less invasive and used increasingly because of patient factors that disfavor open surgery despite limited quality data to support its safety and efficacy. This evidence summary reviews literature from 1990 to 2014, comparing contemporary surgical and endovascular revascularization. Systematic review was performed with emphasis on acuity of presentation, study design, revascularization techniques, limb salvage and mortality rates, and complications. There were 2999 articles identified and 563 abstracts reviewed; 68 articles were reviewed fully and 26 critically appraised. Limb salvage, amputation-free survival, overall survival and mortality, and treatment complications were elucidated, including Medicare outcomes data. Risk factors for amputation and mortality were identified. Surgical or endovascular revascularization for ALI is achievable with acceptable limb salvage and amputation rates, which are not markedly different between the two modalities in the short term. Endovascular therapy and surgery are complementary rather than competing strategies for ALI. Further good-quality clinical trial data are needed to define longer term outcomes. (J Vasc Surg 2016;63:270-8.)

Endovascular therapy and surgery are complementary rather than competing strategies for ALI

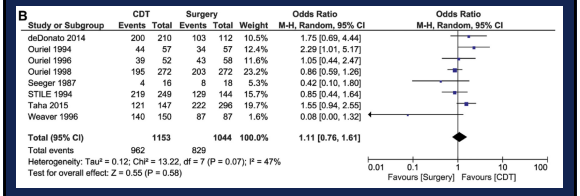
A systematic review and meta-analysis of endovascular and surgical revascularization techniques in acute limb ischemia



30 day amputation rate

(J Vasc Surg 2020;71:654-68.)

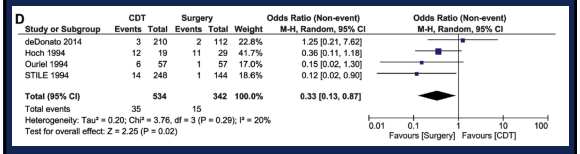
A systematic review and meta-analysis of endovascular and surgical revascularization techniques in acute limb ischemia



6 month limb salvage

(J Vasc Surg 2020;71:654-68.)

A systematic review and meta-analysis of endovascular and surgical revascularization techniques in acute limb ischemia



One year Major Vascular Event rate

(J Vasc Surg 2020;71:654-68.)

Endovascular Versus Surgical Revascularization for Acute Limb Ischemia

NIS data set
2010-14
ICD9 codes

Elective and urgent/emergent

Problem – very apples and oranges

Matched Cohort

Outcome	Endovascular Revascularization (n=3873)	Surgical Revascularization (n=3873)	OR (95% CI)	*P* Value
Primary				
Death	108 (2.8)	156 (4.0)	0.68 (0.53 to 0.88)	0.003
Secondary				
MI	74 (1.9)	104 (2.7)	0.71 (0.52 to 0.95)	0.023
Stroke	56 (1.4)	73 (1.9)	0.76 (0.54 to 1.09)	0.13
Death/MI/stroke	202 (5.2)	292 (7.5)	0.67 (0.56 to 0.81)	<0.001
Any amputation	182 (4.7)	197 (5.1)	0.92 (0.75 to 1.13)	0.43
Fasciotomy	74 (1.9)	315 (8.9)	0.22 (0.17 to 0.28)	<0.001
Acute kidney injury	406 (10.5)	462 (11.9)	0.86 (0.75 to 1.00)	0.044
Major bleeding	648 (16.7)	812 (21.0)	0.76 (0.68 to 0.85)	<0.001
ICH	27 (0.7)	13 (0.3)	2.08 (1.07 to 4.05)	0.030
Transfusion	400 (10.3)	716 (18.5)	0.51 (0.45 to 0.58)	<0.001
Vascular complications	53 (1.4)	26 (0.7)	2.05 (1.28 to 3.29)	0.003
Discharge to SNF*	711 (18.9)	986 (26.5)	0.64 (0.58 to 0.72)	<0.001
Length of stay, d	4.0 (2.0 to 7.0)	5.0 (3.0 to 8.0)	−1.23 (−1.49 to −0.97)†	<0.001
Hospital costs, US$	23 269 (15 873 to 33 752)	15 695 (10 661 to 24 307)	6265 (5325 to 7205)†	<0.001

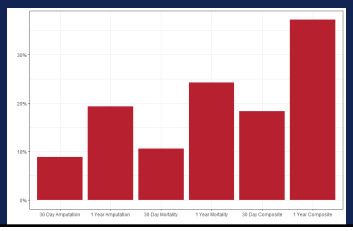
Circ Cardiovasc Interv. 2020;13:e008150.

BMC2 Registry Data

- Retrospective review of open thrombectomy procedures
- N = 954 unique patients with complete discharge information.
- Discharge dates range from 2018 - 2021.

BMC2 Registry Data

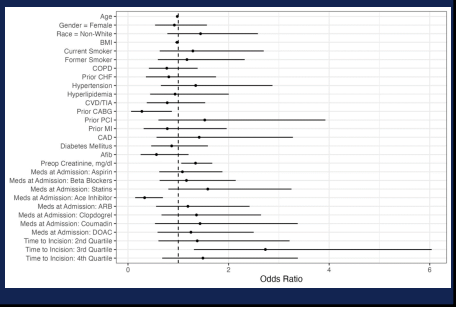
Variable	N (Non-Missing at Follow-Up)	Statistics
30 Day Amputation	766	68 (8.88%)
1 Year Amputation	503	97 (19.28%)
30 Day Mortality	846	90 (10.64%)
1 Year Mortality	607	147 (24.22%)
30 Day Composite (Amputation or Mortality)	840	154 (18.33%)
1 Year Composite (Amputation or Mortality)	627	233 (37.16%)



BMC2 Registry Data

30 Day Amputation Logistic Regression

Timing to intervention quartiles: Median 7.5 hrs



BMC2 Registry Data

One year Amputation Logistic Regression

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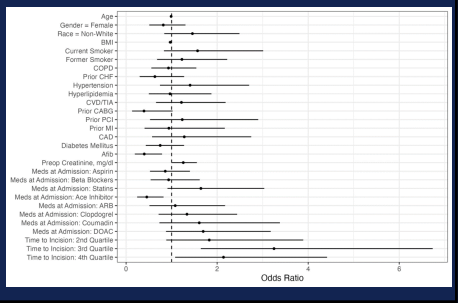
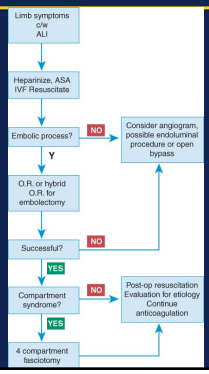


ALI Algorithm



Cases Illustration

60 yo man with known Afib, taken off DOAC for colonoscopy.
Presents to ER with 4 hours of painful, numb RLE
On exam, non palp fem pulse
Has SVS grade IIB ischemia
Heparinized, aspirin, and IV hydration
Taken to the hybrid OR

What would you do?

75 yo woman with known PAD, prior ABI = R 0.9 / L 0.5 with R femoral to AK popliteal ePTFE graft
Presents with SVS IIA/B ischemia
Heparinized, IVF hydration
Taken to the hybrid OR

What would you do?

Summary

- Recognition is key!
- Prompt anticoagulation and hydration
- Consider patient's underlying illnesses
- Optimal therapy is rendered in Hybrid suite

- If clearly embolic, would proceed with open thrombectomy

- If **not** clearly embolic, prior PAD, prior graft, peripheral AA, would proceed with endoluminal therapy

- Evidence is insufficient to recommend endo or thrombectomy in all cases of ALI

- Caveot – ALI is often less acute than one may think!