Long-Term Multicenter Outcomes Show That Prosthetic (PTFE) Bypasses To Tibial And Peroneal Arteries Are Worthwhile

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Infrapopliteal (tibial/peroneal) PTFE bypass

- First described by Veith et al in 1978
- Many centers could not duplicate these results and Randomized Control Trial showed worse outcomes than GSV bypass
- Variety of configurations reported (vein patches, precuffed, fistula…)
- Adoption of EV interventions led to decrease of their utilization

Veith FJ, Moss CM, Fell SC, et al: New approaches to limb salvage by extended extra-anatomic bypasses and prosthetic reconstructions to foot arteries. Surgery 1978;84:764-772.

Veith FJ, Gupta SK, Ascer E, White-Flores S, Samson RH, Scher LA, Towne JB, Bernhard VM, Bonier P, Flinn WR, et al. Six-year prospective multicenter randomized comparison of autologous saphenous vein and expanded polytetrafluoroethylene grafts in infrainguinal arterial reconstructions. J Vasc Surg. 1986;3:104-14.

Infrapopliteal (tibial/peroneal) PTFE bypass

- Global Vascular Guidelines recommends to avoid using a non-autologous conduit for bypass unless there is no endovascular option and no adequate autologous vein.
- Long term and ultra-long term outcomes not adequately reported for tibial bypass with PTFE; benefit remains questionable

Conte MS, Bradbury AW, Kolh P, White JV, Dick F, Fitridge R, Mills JL, Ricco JB, Suresh KR, Murad MH; GVG Writing Group. Global vascular guidelines on the management of chronic limb-threatening ischemia. J Vasc Surg. 2019;69(6S):3S-125S.e40.

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Goal

- Present patients who had long-term and ultra-long term patency from five centers using tibial PTFE bypasses over an 18 year period
- Present outcomes in all patients who had tibial/peroneal bypass with PTFE in two of these five centers with complete follow-up in an attempt to put this experience into perspective

Methods

- Five Centers :
  - MONTEFIORE – Veith
  - INOVA – Neville
  - NORTHWELL – Etkin, Landis
  - NYU – Cayne, Ascher, Adelman, Veith
  - BUFFALO – Dosluoglu
- 2001-2018
- CLTI (Rutherford 4-6)
- Remained patent at least 48 months
- No endovascular or autologous vein options

Methods

- Two Centers
- 2001-2021 (Buffalo);2014-2022 (Northwell Health)
- CLTI (Rutherford 4-6)
- All patients who had tibial level bypass with PTFE
- **Complete follow-up**
- Patency, Limb salvage, Survival

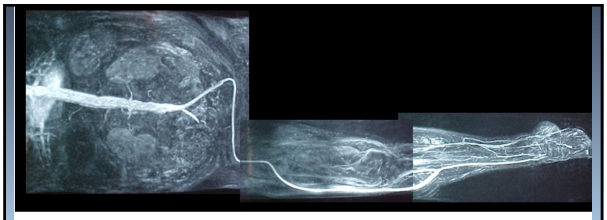
Results: Five Centers

- 35 patients
- Average age 73.1±9.5 (range 53-88).
- Inflow vessels
  - 27 (77%) common femoral
  - 7 (20%) iliac
  - 1 (3%) superficial femoral artery
- Outflow vessels
  - 15 (43%) peroneal
  - 12 (34%) posterior tibial or medial plantar,
  - 8 (23%) anterior tibial arteries

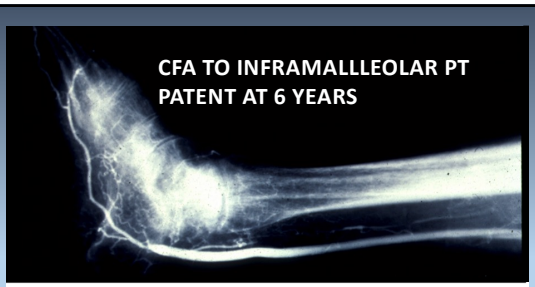
Case No.	Age	Inflow Vessel	Outflow Vessel	Vein Patch	Revised	Time to Patent
1	74	CFA	Peroneal	No	No	13
2	72	CIA	PT/MedialPlantar	No	No	11
3	62	EIA	Lateral plantar	No	No	11
4	64	EIA	Peroneal	Yes	No	10.5
5	85	CFA	Peroneal	No	Yes	9
6	68	CFA	PT	No	No	9
7	80	CFA	Peroneal	No	Yes	7
8	74	CFA	AT	No	No	6.4
9	70	CFA	PT	Yes	Yes	6.4
10	85	CFA	Peroneal	Yes	No	6
11	69	CFA	Peroneal	Yes	No	6
12	82	CFA	Peroneal	No	Yes	5.8
13	71	CIA	PT	Yes	Yes	5.5
14	68	EIA	AT	No	Yes	5.5
15	74	CFA	Peroneal	No	No	5
16	69	CFA	PT	No	No	5
17	66	CFA	Peroneal	Yes	No	5
18	74	CFA	AT	Yes	Yes	5
19	66	EIA	PT	Yes	Yes	5
20	57	SFA	AT	Yes	Yes	5
21	83	CFA	Peroneal	No	Yes	5
22	53	CFA	AT	Yes	No	4.8
23	68	CFA	Peroneal	Yes	No	4.5
24	82	CFA	PT	Yes	Yes	4.5
25	60	CFA	PT	No	No	4.5
26	76	CIA	Peroneal	No	No	4.5
27	72	CFA	AT	Yes	No	4.3
28	82	CFA	Peroneal	Yes	No	4.25
29	53	CFA	PT	Yes	No	4.25
30	77	CFA	Peroneal	Yes	No	4
31	87	CFA	Peroneal	Yes	Yes	4
32	88	CFA	AT	Yes	Yes	4
33	77	CFA	PT	No	No	4
34	87	CFA	AT	Yes	No	4
35	83	CFA	PT	Yes	Yes	4

Results: Five Centers

- A distal anastomotic vein patch 20 (57%)
- Direct anastomosis 15 (43%).
- Bypass patency 4 to 13 years (mean 5.9±2.4 years)
- 40% of bypasses required revisions for failing or failed bypass grafts during follow up



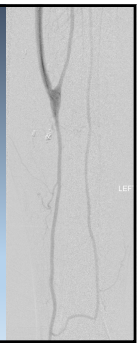
68 Year old man with EIA to contralateral tibial bypass with PTFE, with 5.5 year patency



Angiogram of patent bypass to an isolated segment of posterior tibial below the ankle

Two Centers(N=110)
Buffalo: 61 Northport: 49

- Mean Age: 72.2±10.9
- 61% DM, 60% CAD, 20% COPD
- 77% Tissue loss, 23% ischemic rest pain
- 41% (45/110) had previous revascularizations

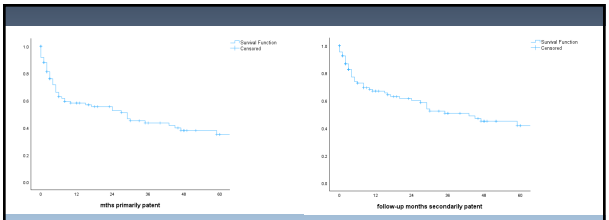


PTFE tibial bypass (N=110)

- Distal targets
  - peroneal in 44 (40%)
  - posterior tibial 42 (38%)
  - anterior tibial 24 (22%)
- Standard PTFE graft 39 (24 precuffed, one Linton patch)
- Heparin-bonded PTFE graft 71 patients (42 Linton patch)

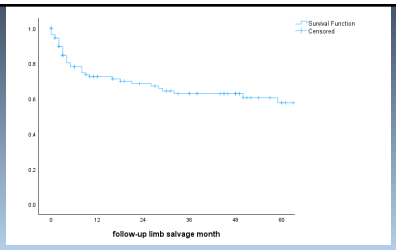
PTFE tibial bypass group: Follow-up

- Mean follow-up 48.5±48.5 (0-259) months

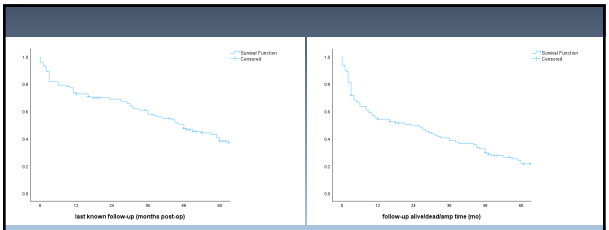


	12 mo	24 mo	36 mo	48 mo	60 mo
	58±5%	53±5%	44±6%	38±6%	35±6%
110	48	38	26	19	11

	12 mo	24 mo	36 mo	48 mo	60 mo
	67±5%	60±5%	51±6%	45±6%	42±6%
110	54	42	30	22	12



	12 mo	24 mo	36 mo	48 mo	60 mo
	73±5%	69±5%	63±5%	63±5%	58±6%
110	60	50	41	33	20



	12 mo	24 mo	36 mo	48 mo	60 mo
	73±4%	69±4%	58±5%	48±5%	38±5%
110	81	69	60	49	34

	12 mo	24 mo	36 mo	48 mo	60 mo
	54±5%	50±5%	39±5%	30±5%	22±4%
110	60	50	41	33	20

Patency (absolute numbers)

	12mo	24mo	36mo	48mo	60mo
Alive	81	69	60	49	34
Patent	54 (67%)	42 (61%)	30 (50%)	22 (45%)	12 (35%)
Limb salvage	60 (74%)	50 (72%)	41 (68%)	33 (67%)	20 (59%)

Long Term Outcomes: Tibial bypass with PTFE

	PP 4 year	5 year	SP 4 year	5 year	LS 4 year	5 year	Survival 4 year	5 year
Neville '12 (270)	51%				68%			
Hingorani '05 (176)		24%				74%		40%
Loh '13 (49)		22%				56%		
Hamdan '02 (45)		36%		39%		63%		
Guntani '18 (444)	36%		51%		71%		56%	
Lautenbach '05 (105)	64%				74%		38%	
Current '24 (110)	38%	32%	45%	42%	63%	58%	48%	38%

Systematic literature review comparing clinical utility of heparin-bonded expanded polytetrafluoroethylene graft with autologous saphenous vein graft for the management of below-the-knee peripheral arterial disease

David J. Dexter, MD,[1] Frank O'Neill, PhD,[2] and Richard F. Neville, MD.[1] *Norfolk and Falls Church, VA, and Flagstaff, AZ*

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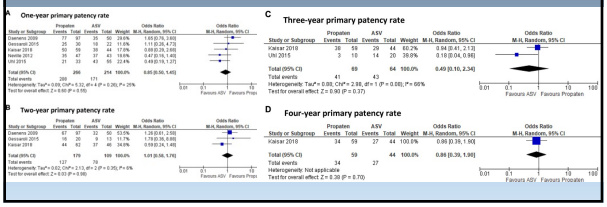
For tibial level bypasses



Conclusions:

- PTFE remains a worthwhile bypass conduit for patients with CLTI to avoid major amputation
- Reasonable long-term patency and limb salvage rates, some patients acquiring benefit for even extended periods of time.
- These conduits should continue to remain in every vascular surgeon's therapeutic armamentarium and should be strongly considered in their limb salvage treatment algorithms.

Thank you