

Two-year Clinical Outcomes Following Lower Limb Endovascular revascularization for Critical Limb Ischemia from an Asian Vascular Centre in Singapore

INTRODUCTION

- Peripheral arterial disease (PAD) is a chronic atherosclerotic disease that narrows peripheral arteries, especially in the lower limbs¹.
- The prevalence of PAD is 3 – 10%, increasing to 15 – 20% in people >70 years old².
- Critical limb ischemia (CLI) is the most severe manifestation of PAD and is associated with tissue loss or rest pain.
- Percutaneous transluminal angioplasty (PTA) has become an attractive treatment option for revascularizing patients with CLI because of its minimally-invasive technique as well as lower procedural-associated morbidity and mortality rates as compared to open bypass surgery.
- Numerous studies have evaluated the technical success of angioplasty, but few have commented on wound healing and functional outcomes of patients who have undergone PTA.

METHODS

- Patients with Rutherford category 4 – 6 who underwent endovascular revascularisation for CLI between January 2015 and March 2017 in the Vascular Unit at SGH were reviewed.
- Pre-morbid variables collected included patient demographics, comorbidities, pre-morbid functional status, Rutherford categorisation, Wound Ischemia and Foot Infection (WIFI) scores, pre-operative toe pressure and duration of wounds or symptoms.
- All patients were evaluated in the specialist vascular outpatient clinic at 1, 3 and 6 months after their procedure.
- The primary outcome measures were 30-day unplanned readmission, 2-year amputation, mortality at 1,6 and 12 months, as well as ambulation status at 6 and 12 months.
- Descriptive statistics of demographic and clinical variables were performed based on the procedure level and survival probability was computed based on individual, from date of the first operation.
- Association analysis was performed using logistic regression.

OBJECTIVES

The aim of this study was to examine the functional outcome status and limb salvage rate of CLI patients up to 2 years after undergoing lower limb endovascular revascularisation at a tertiary vascular centre in Singapore.

RESULTS and CONCLUSIONS

Table 1. Characteristics of patients in 221 lower limb angioplasty procedures

Characteristics	n (%)
Demographics	
Male sex	131 (59.3)
Age, mean (SD)	69.1 (11.1)
Ethnicity	
Chinese	147 (66.5)
Malay	34 (15.4)
Indian	35 (15.8)
Others	5 (2.3)
Employment Status	
Employed	63 (28.5)
Unemployed	69 (31.2)
Retired	89 (40.3)
Comorbidities	
Smoker	87 (39.4)
Body Mass Index, mean (SD)	24.7 (4.2)
Type 2 diabetes mellitus	198 (89.6)
Hypertension	209 (94.6)
Hyperlipidemia	187 (84.6)
Ischemic heart disease	128 (57.9)
Atrial fibrillation	35 (15.8)
Congestive cardiac failure	25 (11.3)
Previous stroke/ transient ischemic attack	43 (19.5)
Chronic kidney disease	121 (54.8)
End-stage renal failure	98 (44.3)
Previous contralateral major amputation	32 (14.5)
Mobility Status	
Pre-operative ambulant	154 (69.7)
Pre-operative ADL-independent	139 (69.2)
On examination	
Rutherford score	
4	36 (16.3)
5	113 (51.1)
6	72 (32.6)
WIFI score, median (IQR)	5 (3-6)
Duration of wound/ symptom (days), median (IQR)	30 (14-120)
Laboratory Values, mean (SD)	
Haemoglobin	10.9 (2.1)
Serum albumin	33.6 (6.5)
HbA1C	7.5 (1.6)
Toe pressure (mmHg), mean (SD)*	42.0 (21.4)

ADL: activities of daily living, IQR: Interquartile range, SD: standard deviation

*For 228 limbs operated on

- 228 limbs were intervened during 221 procedures in 207 patients.
- The mortality rate at 30 days, 6 months and 1 year post-procedure were 9.0%, 16.7% and 22.6%, respectively.
- 66% of patients had an amputation within 2 years post-procedure.
- 44.8% and 43.4% of patients were ambulant at 6 and 12 months post-procedure, respectively.
- Mortality, further amputation and post-op ambulation were predicted by certain pre-op functional and clinical factors, which may be used to identify patients who are likely to benefit or not benefit from PTA.

Table 2. Multivariate analysis for post-procedure outcomes

Predictors	Odds Ratio (95% CI)						
	Unplanned 30 day readmission	30 day mortality	6 month mortality	1 year mortality	Amputation at 2 years	Ambulatory at 6 months	Ambulatory at 1 year
Employment status							
Retired			12.278 (2.126 – 237.270)				
Unemployed			18.299 (3.240 – 349.754)				
Body mass index	0.824 (0.729 – 0.921)						1.082 (0.985 – 1.193)
Smoker		0.308 (0.066 – 1.048)					
Pre-operative ambulant		0.363 (0.120 – 1.040)					0.455 (0.178 – 1.136)
Pre-operative impaired functional status				3.668 (1.701 – 8.107)			
Stroke/ Transient ischemic attack					2.732 (1.150 – 6.773)		2.440 (0.947 – 6.515)
Atrial fibrillation				2.337 (0.915 – 5.956)			
Chronic kidney disease					1.605 (0.858 – 3.046)	4.601 (2.339 – 9.362)	
End stage renal failure	5.751 (2.569 – 13.869)	6.457 (1.667 – 42.696)	2.885 (1.165 – 7.721)	2.239 (1.005 – 5.147)			5.639 (2.596 – 12.909)
Previous contralateral major amputation	4.120 (1.558 – 11.052)				3.353 (1.220 – 10.116)		3.277 (0.992 – 11.710)
Wifi score					1.161 (0.997 – 1.361)	1.324 (1.116 – 1.591)	1.344 (1.110 – 1.653)
Haemoglobin					0.890 (0.753 – 1.040)		
Albumin		0.909 (0.825 – 0.992)	0.874 (0.808 – 0.938)	0.877 (0.816 – 0.936)			

CI: confidence interval

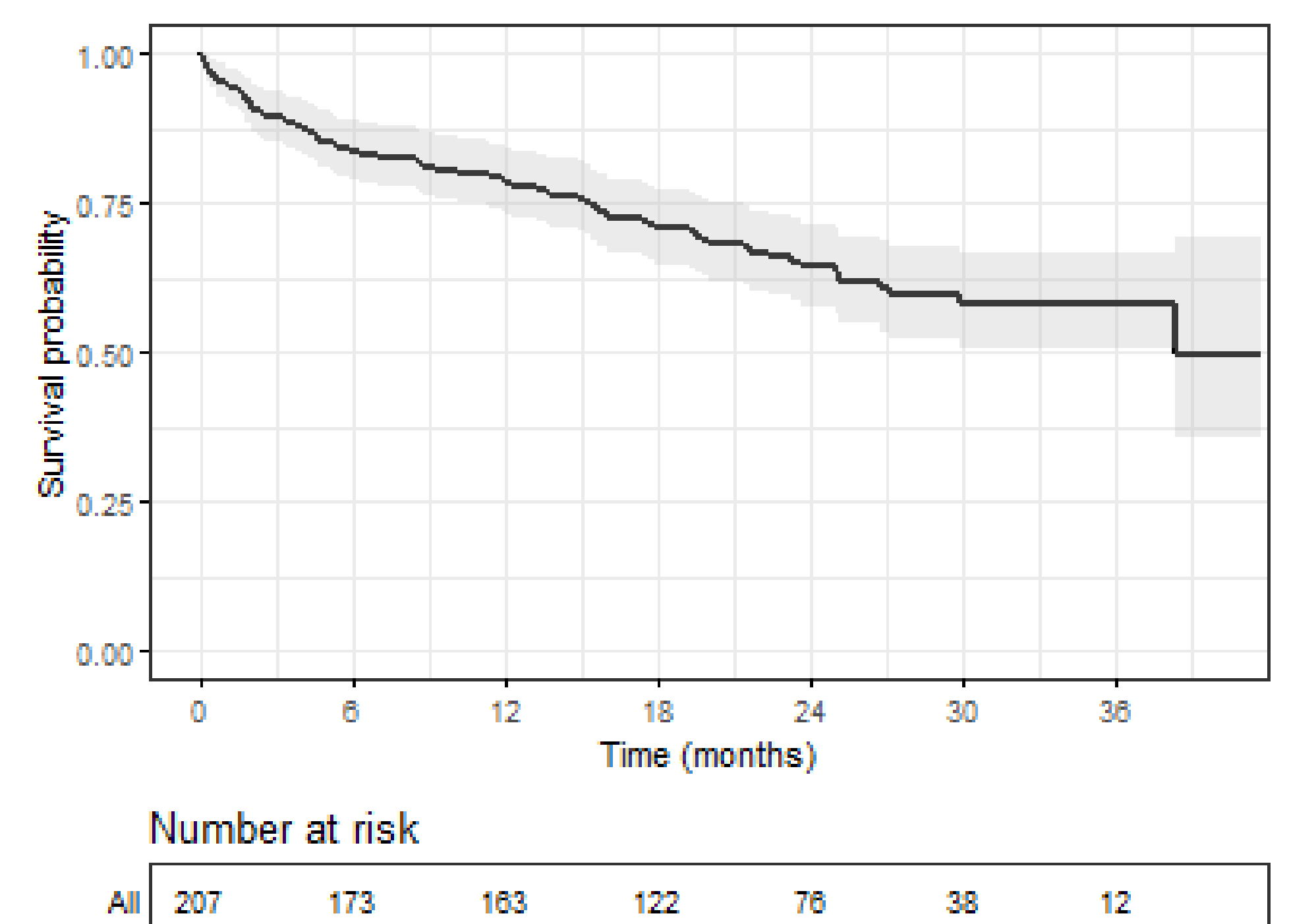


Figure 1. Overall survival of patients undergoing lower limb endovascular revascularization

References

- Kullo, I.J. and T.W. Rooke, *Peripheral Artery Disease*. 2016. **374**(9): p. 861-871.
- Fowkes, F.G., et al., *Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis*. *Lancet*, 2013. **382**(9901): p. 1329-40.