Title: A retrospective cost analysis of angioplasty compared to bypass surgery for lower limb arterial disease in an Australian tertiary health service

Running title: Cost analysis of lower limb revascularisation

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A retrospective cost analysis of angioplasty compared to bypass surgery for lower limb arterial disease in an Australian tertiary health service

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ABSTRACT

Introduction

Percutaneous transluminal angioplasty (PTA) and surgical bypass (BYP) are treatment options for symptomatic peripheral arterial disease (PAD). PTA and BYP have different clinical outcomes and cost implications. This paper aims to compare hospital-related costs of PTA and BYP for PAD of the lower limbs in an Australian health service.

Methods

A retrospective cost analysis using clinical and financial data from an urban, tertiary hospital was performed. Patient cohorts were matched to existing published studies and 3-year findings were calculated. Outcomes measured were mean initial admission cost; mean bed stay; mean complication rate; mean cost of re-intervention at 12 months and extrapolated mean cost at 3 years.

Results

The mean total admission costs for PTA compared to BYP were \$8758 vs. \$27,849 ($p < 0.001$). Patients undergoing BYP were admitted for 10.25 vs. 3.77 nights ($p < 0.001$). The complication rate was greater in the BYP group for

infection only. Re-intervention was required by 13% of the PTA group and 16% of the BYP group, at a mean cost of \$11,798 and \$14,728 respectively ($p=0.453$). The extrapolated total mean cost at 3 years was higher in the BYP group for patients with both intermittent claudication (\$26,764 vs. \$11,402) and critical limb ischaemia (\$27,719 vs. \$12,655).

Conclusions

In this cohort PTA is a favourable alternative to BYP for PAD of the lower limbs as it is less costly, does not result in a greater reintervention rate at one year and has been previously demonstrated to have comparable clinical outcomes. Given the limitations of this retrospective analysis, a prospective cost-effectiveness analysis is recommended.

Key Words/MeSH Terms

Angioplasty, Balloon; Costs and Cost Analysis; Peripheral Arterial Disease; Radiology, Interventional; Vascular Grafting

MAIN TEXT

Introduction

Surgical revascularisation of peripheral vascular disease (PAD) is necessary when medical management has proven inadequate, resulting in debilitating pain and tissue loss¹. The current therapeutic options of surgical bypass (BYP) and percutaneous transluminal angioplasty (PTA) with or without stenting, have demonstrated similar outcomes with regards to quality of life² and overall survival³ for lower limb arterial disease. This study aims to assess the hospital-related costs associated with BYP and PTA for lower limb PAD in an Australian health service. To the authors' best knowledge this has not been previously examined.

PAD affects 10-25% of those over 55 years⁴ and the prevalence increases with age⁵. Other risk factors are similar to those for cardio- and cerebrovascular disease, including non-white race, male sex, smoking,

diabetes mellitus, hypertension, hypercoagulable state and dyslipidaemia^{6, 7}.

Age-adjusted prevalence of PAD is similar between high income and low-middle income countries⁸. PAD is estimated to affect more than 202 million individuals globally⁹.

Commonly involving the lower limbs, PAD is a manifestation of systemic atherosclerosis⁶ and potential consequences include chronic pain, ulceration, neuropathy and limb loss¹. Interventional procedures are recommended after failure of medical management⁶, which typically includes lipid-lowering therapy, antihypertensives, aspirin and smoking cessation¹⁰. The two major indications for re-vascularisation are claudication and critical limb ischaemia (CLI)¹¹, classified using the Rutherford Criteria into 7 grades of clinical severity¹² (*Table 1*). For the purposes of this retrospective review, we defined mild, moderate and severe claudication by exercise tolerance limited by claudication.

The Bypass versus Angioplasty in Severe Ischemia of the Leg (BASIL) trial demonstrated similar clinical outcomes between PTA and BYP in patients with Rutherford 4 to 6 disease³. Health-related quality of life (HRQOL) was not statistically different between patients following either procedure, however the mean in-hospital cost was 8469 United States dollars (USD) greater in the BYP group (95% CI, \$2417-\$14,522)¹³. This resulted in an incremental cost effectiveness ratio (ICER) of \$184,492 USD per quality-adjusted life year (QALY) gained, far greater than the widely used ICER threshold of 50,000 USD¹⁴. The significance of this finding however is unclear due to limitations in the use of ICER in health economics^{15, 16}.

Historically, PTA has been thought to have a greater rate of restenosis¹⁷, however a more recent meta-analysis¹⁸ has shown it to be comparable to BYP for up to five years of follow up. New technology is increasing the duration of patency¹⁹, however the need for re-intervention significantly increases the total cost to both health system and patient.

Methods

A retrospective, single-institution study was conducted using local clinical and financial data over the financial years 2013-14 and 2014-15. Costings records

were searched for relevant Australian Classification of Health Interventions (ACHI) procedural codes²⁰ (*Table 2*) and correlated with inclusion and exclusion criteria.

The population was defined as adults (age >18 years) undergoing PTA or BYP for lower limb (infra-inguinal) PAD during the financial years 2013-14 and 2014-15. Patients who were admitted for reasons other than treatment of PAD and who presented with acute limb ischaemia were excluded. All patients meeting criteria in the specified years were included. The follow-up period was 12 months from the index procedure. Post-procedural intervention was classed as reintervention if performed on the same leg and as a new participant if on the contralateral leg.

The primary outcome was mean initial admission cost and secondary outcomes were mean bed stay; mean complication rate; mean cost of re-intervention at 12 months and extrapolated mean cost at 3 years.

At the study institution, interventional radiologists (IR) perform PTA and vascular surgeons perform both PTA and BYP. Straightforward cases are triaged directly by vascular surgery to either PTA or BYP. For complex patients, such as those with multiple co-morbidities or with complex disease on imaging, a joint decision is made at a multidisciplinary team meeting (MDT) involving both IR and vascular surgery. The decision is made considering multiple factors including patient factors, preliminary imaging findings and current literature.

Statistical Analysis

Nonparametric data are expressed as means with a 95% confidence interval. The one-way *t*-test was used for continuous variables and Pearson chi square test for categorical variables. Fisher's exact test was used for variables with a small sample size. Differences were considered significant if the estimated *p* value was less than 0.05. All costs are in Australian dollars. Statistical analysis was performed using JMP (version 13.0.0; SAS Institute Inc, Cary, NC, USA).

Costing

The total costing data for this health service includes both 'direct' and 'indirect' costs, divided into cost bucket areas (*Table 2*). Unit costs for procedures, anaesthetics, imaging, reintervention and outpatient follow-up was valued using the publicly-available Medicare Benefits Schedule (MBS) and Australian Public Hospitals Cost Report (ACHR)^{21, 22} (*Table 3*).

Extrapolation

A literature review was conducted to identify studies assessing reintervention with similar patient populations. Data from Siracuse et al²³ and Soga et al²⁴ were used to independently extrapolate the local mean costs of claudication and CLI groups to a 3-year follow up period using the following formula:

Extrapolated cost

$$= \{ \% \text{ with reintervention} \times (\text{mean admission cost} + \text{mean outpatient clinic cost} + \text{mean reintervention cost}) \} + \{ \% \text{ without reintervention} \times (\text{mean admission cost} + \text{mean outpatient clinic cost}) \}$$

Low-risk ethics approval was granted by The Alfred Ethics Committee. The STROBE²⁵ statement was applied for completeness.

Results

405 patients underwent PTA or BYP during the study period. 230 patients met inclusion criteria; 138 in the PTA group and 92 in the BYP group. Of the excluded patients 168 patients had PTA at supra-inguinal sites including the abdominal aorta, common and external iliac arteries and upper limb fistulae. 7 patients were admitted for a reason other than treatment of peripheral arterial disease.

As shown in *Table 4*, the PTA group was older (72.65 ± 11.74 vs. 69.95 ± 9.90 years, $p=0.061$). There were more patients in the BYP group with a Rutherford Score of 4 (5% vs. 21%, $p<0.001$) and more in the PTA group with a score of 5 (30% vs. 18%, $p=0.042$). There was no difference between groups with regards to scores 1-3 or 6. There was no significant difference in other characteristics including smoking status, ($p=0.089$), hypertension ($p=0.247$), diabetes mellitus ($p=0.550$), ischaemic heart disease ($p=0.288$),

cerebrovascular disease ($p=0.283$), use of a statin (0.227), ulcer/gangrene ($p=0.208$) or previous intervention on the contralateral leg ($p=0.086$). The BYP group had more participants with a history of previous intervention on the same leg (48% vs. 35%, $p=0.026$).

The mean total admission costs were \$8758 (95% CI, 7314-10,203) for PTA and \$27,849 (24,631-31,067) for BYP ($p<0.001$). The average bed-stay (nights) was 3.77 (95%CI, 3.02-4.52) for PTA and 10.25 (95% CI, 8.61-11.89) for BYP ($p<0.001$) (*Table 5*).

The rate of peri-procedural complications was significantly greater in the BYP group for infection { $n=9$ (10%) vs. $n=1$ (1%), $p=0.001$ }, but not significant for bleeding/haematoma, thrombosis or acute kidney injury (AKI). The difference in bed stay amongst those with compared to those without infection was not statistically significant (14.20 vs. 6.00 days, $p=0.106$). During the index admission, 5 patients in the PTA group required re-intervention [PTA ($n=2$), graft revision ($n=1$), wound debridement ($n=2$). 4 patients in the BYP group required re-intervention {PTA ($n=1$), graft revision ($n=2$), wound debridement ($n=1$)}. The difference between groups was not significant.

In the PTA and BYP groups respectively, 56% and 53% were followed up in the public outpatient clinic with no difference in mean number of visits 1.72 (95% CI 1.29-1.16) vs. 2.12 (1.56-2.68) ($p=0.270$). At \$309 per clinic attendance²², the mean cost of all public outpatient follow-up is \$531.48 for PTA and \$655.08 for BYP ($p=0.007$). Of the 83 patients who were followed up in the private system, 34% were in the PTA group and 39% in the BYP group ($p=0.433$). The Medicare Benefits Schedule²¹ estimates \$43.00 for a subsequent attendance (although the patient out-of-pocket cost may be greater). This results in a mean cost of \$73.96 for the PTA and \$91.16 for the BYP groups ($p=0.433$). 14 and 8 patients in the PTA and BYP groups respectively did not have any documented follow-up.

Re-intervention during the follow-up period was required by 13% of the PTA group and 16% of the BYP group, at an average cost of \$11,798 and \$14,728

respectively ($p=0.453$). 2 PTA and 2 BYP patients required a second reintervention.

Baseline characteristics of local data, Siracuse et al and Soga et al are shown in *Table 6*.

Discussion

These findings demonstrate that the overall admission and post-discharge follow-up costs are significantly greater in the BYP group. This is associated with the shorter bed stay and reduced rate of periprocedural infection in the PTA cohort. Extrapolation of the data predicts that BYP would remain more costly at 3 years from the index admission despite reduced rates of reintervention. With regards to baseline characteristics, the few significant differences may have affected the decision as to which procedure to undertake and is a limitation of this study. This can be seen in the slightly older PTA group, for which the more invasive BYP procedure may have been deemed inappropriate due to factors such as anaesthetic risk. Patients with previous intervention on the same leg may have been more likely to undergo BYP for several reasons such as previous failed PTA, vascular disease more amenable to surgical intervention or to avoid iodinated contrast loading in the setting of renal impairment or allergy.

There were no differences in rates of complications other than infection or reintervention during the same admission. This is consistent with a study by Ah Chong et al²⁶, who found significantly greater wound complication rate in the BYP compared to PTA group (29% vs. 8%, $p<0.001$). Similarly, the median hospital stay was significantly longer in the BYP group (24 days vs. 4 days, $p<0.001$). A future prospective study with a larger sample size would more completely describe local complication rates.

While the BYP group had a higher rate of reintervention within the follow-up period, neither the 3% difference, nor the cost difference for this additional admission were statistically significant. Although our follow-up period was only

12 months, restenosis within the first 3 months after PTA has been observed in $\geq 50\%$ of patients with both femoropopliteal²⁷ and infrapopliteal disease¹⁷.

Similarly to the BASIL trial¹³, the cost difference decreased over the follow-up period and was no longer significant for reintervention. It is of note that all patients in the BASIL trial had a Rutherford score of 4-6²⁸ (more advanced disease), compared to 36% and 44% for the PTA and BYP groups in this paper.

Direct costs provide patient care services such as wards, medical staff, imaging, pathology and nursing. Indirect costs are those related to the hospital such as cleaning, water, engineering, information technology and human resources. Patients incur direct costs based on the clinical progress of their admission whilst indirect costs are distributed amongst cost bucket areas. Interpretation of costs is limited as interventional radiologists (IR) rather than surgeons often perform PTA, resulting in an underestimation of mean surgical staff costs¹. Similarly, 'other' theatre costs² do not include interventional angiography thus the mean is also unreasonably low.

Siracuse et al²³ retrospectively reviewed patients undergoing PTA (n=105) and BYP (n=113) for intermittent claudication due to superficial femoral artery occlusive disease. The study found no difference in freedom from reintervention at 3 years (66% vs. 77%, not significant) (*Table 7*). Soga et al²⁴ conducted a larger study of patients with CLI undergoing endovascular therapy (EVT) (n=823) and BYP (n=230). A significantly higher rate of freedom from reintervention was found in the BYP group at 3 years (69.2% vs. 56.6%, p=0.02) (*Table 7*). Baseline characteristics between the local population and that of both Siracuse et al and Soga et al are similar, however Soga et al had a larger cohort for both PTA and BYP (*Table 6*). When rates of reintervention within 3 years from the index admission in the two published studies were extrapolated to our local costings results (*Table 7*), a higher mean total admission cost was found for BYP in both claudication and CLI groups.

272 Limitations

273 The study examines in-hospital costs and does not take into account
 274 community healthcare costs or health-related quality of life. Additional costs
 275 such as time off from work, carer's burden and travel expenses were not in
 276 the scope of this study; although since the average age of the population was
 277 greater than 70 years, a loss of economic productivity is likely to be limited.
 278 The allocation of the total admission cost into 'cost buckets' results in
 279 underestimation of surgical staff costs and overestimation of imaging costs for
 280 patients undergoing PTA, however the overall admission cost is not affected.
 281 The extrapolation to 3 years from index admission uses data from Siracuse
 282 and Soga, however as demonstrated in Table 6, there are differences
 283 between the populations.. These limitations could be addressed by
 284 conducting a future, longitudinal, prospective study, with participants reporting
 285 external healthcare appointments and with the use of standardised
 286 instruments such as the Vascular Quality of Life Questionnaire (VascuQoL)²⁹.

287
 288 PTA is a favourable alternative to BYP for PAD of the lower limbs as it is less
 289 costly and is associated with shorter bed stay, fewer infections, lower public
 290 post-discharge follow-up costs and no significant difference in re-intervention
 291 at twelve months. This difference in admission cost is projected to remain at
 292 three years, despite a higher rate of reintervention. Given the limitations of
 293 this retrospective analysis, a prospective cost-effectiveness analysis is
 294 recommended.

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TABLES

Table 1. Rutherford Criteria¹²

CLI Critical limb ischaemia

Grade	Category	Clinical Description	Exercise Tolerance
0	No clinical disease	Asymptomatic	
1	Claudication	Mild claudication	>100m
2		Moderate claudication	50-100m
3		Severe claudication	<50m

4	CLI	Ischaemic rest pain
5		Minor tissue loss: non-healing ulcer, focal gangrene, diffuse pedal ischaemia
6		Major tissue loss: extending above transmetatarsal level, non-salvageable foot

Table 2. Health Service Cost Buckets & Mean Cost

MBS Medicare Benefits Schedule, AHCR Australian Public Hospitals Cost Report, DSA Digital subtraction angiography (fluoroscopy, plain films and contrast injection)

Area	Inclusions	PTA	BYP	p-value*
Allied Health	Dietetics, interpreters, occupational therapy, physiotherapy, podiatry, social work	\$178 (124-233)	\$493 (349-638)	<0.001
Imaging	Radiology, ultrasound, interventional radiologists, radiology nursing	\$3625 (3232-4018)	\$1779 (1333-2225)	<0.001
Medical Staff (Surgical)	Anaesthetists, consultants, hospital medical officers, registrars	\$163 (0-337)	\$5089 (4527-5651)	<0.001
Medical Staff (Non-Surgical)	Consultants, hospital medical officers, registrars	\$1159 (833-1485)	\$3596 (3001-4191)	<0.001
Nursing	Nursing & consumables (outpatient/ward), patient transport & transit lounge, ward catering	\$3106 (1908-2954)	\$6098 (5131-7066)	<0.001
Pathology	Biochemistry, haematology, microbiology, serology,	\$242 (179-305)	\$808 (623-993)	<0.001

	immunology, blood bank, pathologists			
Pharmacy	Imprest, scripted, pharmacists	\$310 (225-396)	\$922 (735-1110)	<0.001
Theatre (Operating Room)	Anaesthetics & drugs, clinical sterile supply, pre-operative/lounge nursing, theatre consumables, theatre/recovery nursing, theatre technicians	\$502 (71-933)	\$7165 (6430-7900)	<0.001
Theatre (Other)	Angiography, electrocardiography	\$61 (0-126)	\$104 (0-229)	0.549

Table 3. Itemised costs

MBS Medicare Benefits Schedule, *AHCR* Australian Public Hospitals Cost Report, *DSA* Digital subtraction angiography (including fluoroscopy, plain films and contrast injection), † Private specialist consulting rooms, ‡ Medical consultation identification number

Category	Item	Description	Item Cost	Source
PTA	35300 (35306)	Single artery (+ stent)	\$515.35 (\$609.90)	MBS ²¹
	35303 (35309)	Multiple arteries (+ stent)	\$660.80 (\$762.35)	
BYP	32739 /32742	Femoral artery using vein, above/below knee anastomosis	\$1293.40/ \$1481.50	
	32751	Femoral artery using synthetic graft	\$1188.20	
	32754	Femoral artery using composite graft	\$1481.50	
	32763	Other arterial bypass	\$1188.20	
Anaesthetics	17610	Pre-anaesthesia consultation	\$43.00	
	21270	Procedures on arteries of upper	\$158.40	

	/2144 0 /2150 0	leg/knee/lower leg		
Imaging	55220	Duplex scanning of arteries or bypass grafts, or pre-procedure mapping	\$84.75	
	11610	Measurement of ankle:brachial indices and arterial waveform analysis	\$63.75	
	60048	DSA lower limbs, 1-3 data acquisition runs	\$564.00	
	60051	DSA lower limbs, 4-6 data acquisition runs	\$827.10	
	60054	DSA lower limbs, 7-9 data acquisition runs	\$1,176.10	
	60057	DSA lower limbs, ≥10 data acquisition runs	\$1,376.30	
Other	33848	Re-operation for bleeding/thrombosis after vascular procedure	\$639.20	
	35202	Re-operation on major arteries of extremities	\$817.10	
	34175	Excision of infected bypass graft of extremities	\$1188.20	
	35103 /3510 0	Debridement of necrotic superficial/deep tissue from ischaemic limb	\$234.55 /\$368.55	
Outpatient	104/1 05	Initial/subsequent attendance [†]	\$85.55 /\$43.00	
	20.24 [‡]	Non-admitted patient attendance – Vascular Surgery	\$309.00	AHCR ² 2

Table 4. Baseline characteristics

425 * *t*-Test, ** Pearson chi square ^Fisher's Exact Test ' *n* number, *SD* Standard
 426 deviation, *IDDM* Insulin-dependent diabetes mellitus, *NIDDM* Non-insulin
 427 dependent diabetes mellitus
 428

Characteristic, n (%)		PTA	BYP	p-value
n		138	92	
Age (mean±SD)		72.65±11.74	69.95±9.90	0.061*
Male sex n (%)		92 (67)	67 (73)	0.322**
Smoking status² n (%)	Current	30 (22)	22 (24)	0.089**
	Ex-smoker	74 (54)	59 (64)	
	Never smoker	31 (22)	11 (12)	
	Missing data, n	3 (2)	0 (0)	
Hypertension n (%)		107 (78)	72 (78)	0.247**
Diabetes Mellitus³ n (%)	IDDM	27 (20)	17 (18)	0.550**
	NIDDM	29 (21)	20 (22)	
	Missing data	3 (2)	0 (0)	
Ischaemic heart disease n (%)		55 (41)	42 (46)	0.288**
Cerebrovascular disease n (%)		27 (20)	15 (16)	0.283**
Statin use n (%)		113 (82)	82 (89)	0.227**
Rutherford Score n, (%)	Claudication	89 (64)	51 (56)	0.199**
	CLI	49 (36)	40 (44)	
	1	6 (4)	4 (4)	0.635^
	2	17 (12)	7 (8)	0.252**
	3	64 (46)	40 (43)	0.665**
	4	7 (5)	19 (21)	<0.001**
	5	42 (30)	17 (18)	0.042**
	6	1 (1)	4 (4)	0.085^
Ulcer/gangrene		47 (34)	28 (31)	0.208**
Previous intervention same leg		47 (35)	44 (48)	0.026**

Previous intervention contralateral leg	29 (22)	21 (23)	0.086**
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Table 5. Resource Utilisation

n number, *CI* Confidence interval, *AKI* Acute kidney injury, * *t*-Test, ** Pearson chi square

		PTA	BYP	p-value
n		138	92	
Mean total admission cost (95% CI)		\$8758 (7314-10203)	\$27,849 (24,631-31,067)	<0.001*
Mean bed stay in nights (95% CI)		3.77 (3.02-4.52)	10.25 (8.61-11.89)	<0.001*
Complications n (%)	Infection	1 (1)	9 (10)	0.001**
	Bleeding /haematoma	9 (7)	7 (8)	0.751**
	Thrombosis	4 (3)	3 (3)	0.876**
	AKI	6 (4)	7 (8)	0.294**
Re-Intervention during admission n(%)	PTA	2 (1)	1 (1)	0.813**
	Graft revision	1 (1)	2 (2)	0.343**
	Wound debridement	2 (1)	1 (1)	0.813**
Post-Discharge Follow Up	Mean attendance n(95% CI)	1.72 (1.29-2.16)	2.12 (1.56-2.68)	0.270*
	Public Clinic n(%)	77 (56)	48 (53)	0.589**
	Mean cost	\$531.48	\$655.08	0.007*
	Private n(%)	47 (34)	36 (39)	0.433**
	Mean cost	\$73.96	\$91.16	
	None n(%)	14 (10)	8 (9)	0.714**
1st Re- Intervention	n(%)	16 (13)	15 (16)	0.521**
	Cost	\$11,798 (5534-	\$14,728 (9387-	0.453*

		18,062)	20,069)	
2nd Re-	n	2 (1)	2 (2)	
Intervention	Cost	\$5152±800	\$7341±2295	0.391*

Table 6. Comparison of studies for extrapolation^{23, 24}

n number, SD Standard deviation, NA Not available.

	PTA			BYP		
	Local	Siracuse	Soga	Local	Siracuse	Soga
n	138	105	823	92	113	230
Age mean±SD	72.65±11.74	69±11.3	71.4±10.3	69.95±9.90	63±11.2	71.9±9.3
Male sex n(%)	92 (67)	66 (63)	549 (67)	67 (73)	77 (68)	162 (70)
Smoking Status	Current	30 (22)	23 (22)	360 (32)	22 (24)	33 (29)
	Ex-smoker	74 (54)	46 (44)	334 (41)	59 (64)	41 (36)
Hypertension n(%)	107 (78)	82 (78)	645 (78)	72 (78)	75 (66)	182 (79)
Diabetes mellitus n(%)	56 (41)	37 (35)	561 (68)	37 (40)	41 (36)	141 (61)
Ischaemic heart disease n(%)	55 (41)	43 (41)	468 (57)	42 (46)	44 (39)	103 (45)
Cerebrovascular disease n(%)	27 (20)	9 (9)	166 (20)	15 (16)	9 (8)	88 (38)
Statin use n(%)	113 (82)	9 (9)	NA	82 (89)	62%	NA
Ulcer n(%)	47 (34)	NA	594 (72)	28 (31)	NA	179 (78)

Table 7. Extrapolation of data from Siracuse et al²² (Claudication) and Soga et al²⁴ (Critical limb ischaemia)

	Siracuse			Soga		
	PTA	BYP	p-value	PTA	BYP	p-value
Freedom from reintervention at 3 years	66%	77%	NS	56.60%	69.20%	0.02

Requiring reintervention at 3 years	34%	23%	NS	44.40 %	39.80%	0.02
Extrapolated mean total cost at 3 years	\$11,402	\$26,764	-	\$12,655	\$27,719	-

Figures

Case 1: Patient who underwent angiography for assessment of lower limb PAD. The patient was subsequently referred for BYP.

Figure 1: Stump of superficial femoral artery is seen with adequate filling of profunda femoris.

Figure 2: Demonstrates reconstitution of superficial femoral artery via collaterals from profunda femoris.

Case 2: Patient who underwent PTA for in-stent restenosis

Figure 3: Demonstrates superficial femoral artery with multiple stents in-situ and in-stent restenosis.

Figure 4: Good result demonstrated following PTA with two 5x60mm drug coated balloons.

Case 3: Patient who underwent PTA for popliteal artery stenosis

Figure 5: High-grade stenosis demonstrated in popliteal artery

Figure 6: Good result demonstrated following PTA with a single 5x60mm drug coated balloon.

Case 4: Patient who underwent PTA and stenting for short superficial femoral artery occlusion

Figure 7: Short distance occlusion of mid-superficial femoral artery

Figure 8: Residual stenosis seen following PTA with 5x60mm balloon

Figure 9: Good result demonstrated following implantation of a 5x60mm drug-eluting stent

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