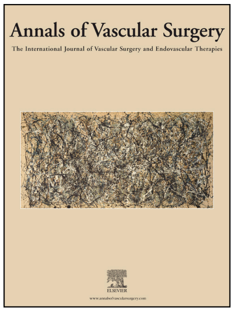

Iliac Artery Stenting Combined with Ipsilateral Open Femoro-Popliteal Revascularization and Its Effect on Bypass Patency

Michele Piazza, MD, Francesco Squizzato, MD, Sandro Lepidi, MD, Mirko Menegolo, MD, Franco Grego, MD, Michele Antonello, MD

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ILIAC ARTERY STENTING COMBINED WITH IPSILATERAL OPEN FEMORO-POPLITEAL REVASCULARIZATION AND ITS EFFECT ON BYPASS PATENCY

Michele Piazza MD*[1], Francesco Squizzato MD[1], Sandro Lepidi MD[1], Mirko Menegolo MD[1], Franco Grego MD[1], Michele Antonello MD[1]

[1]Vascular and Endovascular Surgery Clinic, Padova University – School of Medicine, Italy.

***CORRESPONDING AUTHOR**

MICHELE PIAZZA M.D.

VASCULAR AND ENDOVASCULAR SURGERY CLINIC

Padova University, School of Medicine

Via Giustiniani, 2 35100

Tel.049.8212636

Fax 049.8212637

e-mail: mikpia79@hotmail.com

ABSTRACT

Objectives: In cases of multilevel obstructive atherosclerotic disease, hybrid procedures of concomitant iliac artery stenting and femoro-popliteal bypass (IS-FPB) may represent a valid approach, but results are still unclear. The aim was to evaluate early and long-term outcomes of concurrent IS-FPB.

Methods: This retrospective study included 75 patients (76 limbs) treated with concomitant IS-FPB between January 2010 and June 2016. All patients were prospectively enrolled in a dedicated database. Long-term patency and limb salvage rates were reported using Kaplan-Meier curves. Clinical presentation, lesion sites and extension, distal run-off, type of stent and bypass were evaluated for their association with patency using univariate and multivariate analysis.

Results: Mean age was 72.2±9.4 years; the Society for Vascular Surgery comorbidity score was 1.14±0.61 A covered stent (CS) was implanted in 41 (54%) iliac arteries and a bare metal stent (BMS) in 35 (46%); a PTFE graft was used for by-pass in 44 limbs (58%) while 32 limbs (42%) had Great Saphenous Vein (GSV) bypass. Technical success was 99%; the 30-day cumulative surgical complications rate was 6%, mortality 2%, and morbidity 1%. At 42 months, primary patency of the entire ilio-femoral axis was 65.2% (95%CI 53%-86%). This finding was primarily related to femoro-popliteal bypass occlusion (primary patency, 69.5%), rather than iliac stent loss of patency (primary patency, 94.6%). Secondary patency was 77.6% and limb salvage 89.9%. Univariate analysis demonstrated that Rutherford Category 5/6 was a negative predictor of FPB patency (P=.04), whereas common femoral artery endarterectomy (P=.03) and the use of a CS (P=.02) were positive predictors. Multivariate analysis finally indicated that the use of CS to treat iliac obstructive disease was an independent predictor of patency (HR, 0.15; 95%CI 0.03-0.64; P=.01).

Conclusion: Concurrent iliac artery stenting and femoro-popliteal bypass have acceptable early and long-term results. Even if further studies are needed, the use of a CS for the iliac obstruction seem to provide better outcomes in the hybrid treatment of these cases of multilevel disease.

INTRODUCTION

Endovascular treatment of iliac obstructive disease has radically changed the management paradigms in vascular surgery during the last two decades. With continuous improvement in technology and results, the preferred treatment is now endovascular. This mini-invasive approach, based on percutaneous trans-luminal angioplasty (PTA) followed when necessary by stenting, was initially reserved for moderate obstructive lesions classified as TASC II A and B[1]; however the increased use of covered stents[2,3] led to treat also severe iliac obstructions with acceptable results. Similarly, the contemporary treatment of femoro-popliteal occlusive disease is primarily endovascular in cases of moderate and severe superficial femoral artery disease. In particular the use of percutaneous ePTFE/nitinol stents seems to exhibit similar primary patency rates at 4-year compared with conventional femoro-popliteal artery bypass grafting with prosthetic conduit[4]. However, in cases of advanced superficial femoral artery occlusive disease with long and severely calcified lesions, open surgery still carries a superior long-term clinical efficacy[5].

In this scenario, today is not unusual to manage cases of severe multilevel obstructive disease of the iliac and femoro-popliteal district with a hybrid approach, based on iliac stenting in association to femoro-popliteal by-pass surgery.

Some studies[6] report an incidence varying from 5 to 20% of iliac lesions treated endovascularly associated to femoro-popliteal obstructions requiring open bypass. Even if the results of iliac stenting and femoro-popliteal bypass by themselves are well described, the overall outcomes in terms of effective limb revascularization in these cases undergoing hybrid treatment are not yet clear.

The purpose of this study was to evaluate early and mid-term outcomes of the treatment of multilevel obstructive disease with concurrent iliac artery stenting and femoro-popliteal bypass, and to identify the presence of any predictor of patency. The most current standards were used to define the different variables.

METHODS

In the last decade, with improvement in techniques and materials, endovascular treatment of iliac obstructive lesions has become the first choice in our institution, not only for focal lesions, but also in cases of more complex lesions (TASC II C and D) in patients at high-risk for open surgery or in cases of hostile abdomen. On the other side, even if the endovascular approach for femoro-popliteal obstructive disease is performed in most of cases, limb revascularization with surgical bypass has still a role in cases of:

1. Any type of superficial femoral artery (SFA) occlusion > 25 cm in length.
2. SFA long occlusion (15 cm) from its origin requiring associated common femoral and profunda femoral patch angioplasty.
3. TASC C and D femoro-popliteal lesions associated to large ischemic lesions at the foot (Rutherford class 6) requiring prolonged period of medications before healing or requiring foot minor amputation (vein by-pass considered first).
4. All those cases where SFA endovascular recanalization attempt were unsuccessful or recurrent in-stent restenosis.

Patients selection - Institutional review Board approval and informed consent requirements were waived for this study. A retrospective review of all patients admitted to our centre who underwent iliac artery stenting and concomitant femoro-popliteal bypass between January 2010 and January 2015 was carried out. Demographic information, preoperative characteristics, perioperative outcomes, and follow-up data including all medical records and diagnostic procedures were prospectively collected in a dedicated database. Those patients who had previous endovascular procedures of the iliac segment, those with associated aortic thrombosis or patients treated in an emergent setting were excluded from the study. Only patients receiving a femoro-popliteal bypass with at least one tibial vessel runoff were included in the study, while patients undergoing surgical bypass with distal anastomosis on the tibial arteries, as final attempt for limb salvage, were excluded.

Treatment and definitions - Operative comorbidity risk was evaluated using the Society for Vascular Surgery (SVS) comorbidity grading system[7] and the America Society of Anesthesiologist (ASA) score. Chronic limb ischemia was defined by symptoms at presentation, based on the SVS/American Association for Vascular Surgery reporting standards (AAVS)[8]. The Trans-Atlantic InterSociety Consensus II (TASC II) classification[1] was adopted to evaluate the extent of the iliac occlusive disease and the femoro-popliteal occlusive disease.

The diagnosis of peripheral artery disease was carried out after physical examination supported by duplex ultrasound and/or Ankle brachial index (ABI) measurements.

An abdominal and lower limbs angio-CT scan was performed for all patients; in cases of associated severely diseased tibial vessels, not clearly defined by the CT angiogram, a preoperative diagnostic angiography was required in addition. All patients included in this series had iliac artery stenosis > 70% and monophasic Doppler waveform in the ipsilateral CFA.

Associated common femoral artery (CFA) occlusive disease was classified as mild (< 50%), moderate (50-74% stenosis), or severe (75-99%) and occlusion; endarterectomy was performed when the CFA stenosis was > 50%. Tibial vessels runoff was evaluated in both groups using the current reporting standards[8].

The follow up evaluation of patency of the treated limb included symptoms assessment, physical examination, and regular color-flow Doppler ultrasonography and Ankle Brachial Index (ABI) at 3, 6, 12 months, and then yearly. Patients with loss of previously palpable pulses, symptoms recurrence, Doppler ultrasound findings of occlusion or restenosis (> 50% stenosis defined as > 100% increase in the peak systolic velocity relative to the adjacent segments), drop in the ABI > 0.15, or a combination of these findings underwent CT angiogram/angiography for further evaluation and confirmation of the diagnosis of stent restenosis/iliac stenosis or bypass occlusion, and to plan any eventual reintervention. Both primary and secondary patency as also limb salvage were defined in accordance with the SVS guidelines[8].

Operative technique – All procedures were performed by members of the Vascular and Endovascular Surgery Division expert in both iliac stenting and open surgical lower limb bypass. After surgical exposure of the CFA, a standard iliac stenting procedure was performed.

In case of iliac artery occlusion, either intraplaque or subintimal recanalization was obtained with the passage of a hydrophilic wire and catheter via antegrade or retrograde approach. When the disease extended into the CFA determining a stenosis >50%, open endarterectomy and patch angioplasty with ipsilateral great saphenous vein (GSV) was performed before iliac stenting. In case of extensive and severe external iliac artery (EIA) and CFA disease, the intimal flap of the remote endoarterectomy toward the EIA was usually gently crossed with an hydrophilic 0.035 guidewire under roadmapping in order to avoid dissections; the intimal flap was always covered with the stent landing distally just above the circumflex arteries.

The choice of the type of stent was operator-dependent, on a case-by case selection. Self-expanding covered nitinol stent were used primarily in case of calcified lesions or long lesions involving both CIA+EIA; balloon-expandable covered stents were used predominantly in cases of CIA orificial lesions at its origin. In all the other cases BMSs were preferred.

The femoro-popliteal bypass was performed after completion of the endovascular procedure and adequate inflow restoring. The infrainguinal revascularization was performed using the GSV as preferred conduit. In case of non-adequate (<3mm diameter) or absent GSV, a 7 or 8 mm PTFE Propaten graft (W.L Gore & Associates, Inc., Flagstaff, AZ - USA) was used as conduit. A Linton vein patch was routinely performed in the below-the-knee popliteal artery if a prosthetic bypass graft was used.

Heparin was routinely administered to elevate the activated clotting time above 250 seconds before the intervention, and the dose was repeated as needed throughout the course of the procedure.

All patients were prescribed aspirin after the procedure at a dose ranging from 81 to 325 mg, to be continued *sine die*. Clopidogrel, at 75 mg daily, was associated for at least 8 weeks.

Statistical analysis – Continuous data are expressed as mean ± standard deviation; categorical data as number and percentage. Kaplan-Meier survival curves for primary patency, secondary patency, limb salvage and death were estimated. Univariate analysis was conducted using Kaplan Meier curves with the log-rank test. Cox proportional hazards models were used to determine the association of relevant clinical, anatomical and procedural factors with femoro-popliteal bypass primary patency. Variables with univariate significance ($P<.05$) were entered into the multivariate model in combination with important clinical variables and confounders in order to identify independent predictors of patency. All analyses were carried out with R 3.1.2 software (R Foundation for Statistical Computing, Vienna, Austria) and a P-value of <0.05 (two-tailed) was considered statistically significant.

RESULTS

Overall, the mean patient age was 72.2±9.4 years and 4% (n=3) were <60 years old; the mean SVS comorbidity score was 1.14±0.61. Other risk factors and comorbidities are shown in **Table 1**.

All patients presented with critical limb ischemia, and most of them were categorized as Rutherford 5/6 (n=65, 86%). Preoperative clinical and anatomical data are shown in **Table 2**. At the iliac level, a broad spectrum of lesions ranging from TASC B to TASC D were treated. Recanalization of an occluded iliac artery was required in 13 cases (17%). Associated CFA stenosis >50% was present in 17 cases (22%), and CFA complete occlusion was present in 9 (12%) of the treated limbs.

Operative and procedural data are summarized in **Table 3**. In particular a CS was implanted in 41 (54%) iliac arteries and a bare metal stent BMS in 35 cases (46%). A PTFE graft was used as bypass conduit in 44 limbs (58%), while GSV was used in 32 limbs (42%). Additional CFA endarteretomy was performed in 17 limbs (22%) and associated tibial vessels PTA was required in 4 (5%).

Within 30 days after surgery there were no cases of acute thrombosis. Early amputation was necessary in 1 case despite a successful revascularization due to an extensive gangrene. Groin hematoma requiring reintervention occurred in 2 cases. One case of wound infection, and 1 case of lymph leak were treated conservatively (**Table 4**). The 30-days mortality was 2%.

Average length of follow-up was 29±19 months (range, 30 days – 60 months).

The overall primary patency of the revascularized ilio-femoral axis (including both iliac stent and femoro-popliteal bypass) was 65.2% (95%CI, 54-87) at 42 months. This primary patency was mostly influenced by femoro-popliteal bypass failure rather than iliac stent (**Fig 1**). In fact, there were only two cases of iliac stent occlusion (13%); iliac stent restenosis without bypass occlusion was reported in 1 case (6%) and concurrent iliac stent and FPB occlusion occurred in 1 case (6%). All the other cases of loss of patency (n=13; 86%) were caused by bypass occlusion in the setting of a regularly patent stented iliac axis. More in details, iliac stent primary patency by itself was 93.5% (95%CI, 81-100) and bypass patency was 69.5% (95%CI, 56-86).

The cause of bypass occlusion was identified only in 5 cases (38%), and was related to progression of the arterial occlusive disease below the knee, with worsened runoff (n=3; 23%).

At the univariate analysis (**Supplementary table**), Rutherford category 5/6 resulted to be negatively associated to patency (P=.04), while CFA endarterectomy (P=.03) and the use of a CS (P=.02) were associated to improved patency not only at 24 months, but also at 36 months of follow-up.

Overall secondary patency was 77.6% (95%CI 63-95), limb salvage 89.9% (95%CI 52-80) and survival 81.6% (95%CI 72-91). To note that all reinterventions during the follow-up period were infra-inguinal revascularizations.

The Cox multivariate regression (**Figure 2**), indicated that the use of a CS into the iliac segment was the only independent predictor of patency HR, 0.15; 95%CI 0.03-0.64; P=.04).

DISCUSSION

The simultaneous hybrid treatment with IS-FPB is a well established approach from more than two decades[9,10,11,12]. Lau et al. reported preliminary results in 1998[12]; however this study was limited by the small number of cases (n=12) and by the short follow-up (1 year). Furthermore, the advances in endovascular techniques for iliac revascularization in the last two decades completely changed the outcomes of these patients and extended indications to endovascular treatment.

In fact iliac stenting today represents a well established procedure, but its primary patency depends on multiple factors. The COBEST trial recently demonstrated[13] a five year primary patency in favour of CS compared to BMS for TASC C and D iliac lesions (74.7% vs 62.5%; p=.01), while no differences were described in freedom from binary restenosis for TASC B lesions (HR, 0.74; 95% CI, 0.23-2.38)[14].

On the other hand, as far as it concerns the femoro-popliteal axis, it is still debated which is the preferred approach (between open or endovascular) for TASC C and D lesions, especially in cases of long occlusion (> 20 cm in length) of the SFA. An autologous saphenous vein bypass, even if more invasive, still represents the gold standard of care; one of the last literature review[15] reports a primary patency of 72% and 51% at 5 years and more than 10 years respectively. Obviously, an adequate great saphenous vein for bypass creation is not always available. Karen et al.[4] reported a comparable 4 year primary patency between covered stent endograft and expanded politretrafluoroethylene (ePTFE) bypass graft (59% vs 58%; p=.807) for the treatment of SFA obstructive lesions > 25 cm in length. More recently, Samson[16] reported a primary patency of 74.5% at 5 years for new generation heparin-bonded ePTFE bypass, increasing to 85% when above the knee bypass was performed.

In this scenario, iliac stenting + femoro-popliteal bypass, when indicated, can be considered a valid strategy to treat patients with limited invasiveness and to guarantee effective clinical success and acceptable long term outcomes.

In patients with multilevel obstructive disease, proximal revascularization of the iliac segment alone is usually the initial approach, but in some cases it may result in unsatisfactory relief of symptoms because of concomitant, untreated severe femoro-popliteal lesions. When necessary, associated CFA endoarterectomy and vein patch has been demonstrated[6] to guarantee adequate mid-term patency (91% at 3 years); however, major tissue loss at presentation was considered a negative predictor of patency (p=.02). For these reasons, especially in cases with Rutherford class V and VI, concurrent femoro-popliteal bypass may improve the chance of ulcer healing and avoid multiple interventions.

Another situation is represented by patients who need infrainguinal bypass surgery, in presence of ispilateral moderate to severe iliac stenosis. In this case iliac obstructive disease causes a poor inflow and iliac stenting becomes mandatory in order to guarantee an adequate inflow to the femoro-popliteal bypass, allowing good midterm results.

Our study confirms that this type of hybrid procedure has excellent early and long term outcomes. An interesting finding is that the overall primary patency, considering the results of the entire iliac + femoro-popliteal revascularization, is primarily related to bypass occlusion rather than iliac stent restenosis or occlusion. In fact, if analysed separately, bypass primary patency was 65% at 42 months, while stent patency was 93%. Similar outcomes were already preliminarily observed in 1998 in a small study by Hung Lau[12], as they reported a primary patency of 100% for stent and 85% for bypass at 1 year. In our experience, the cause of bypass occlusion was identified only in 5 cases (35%), while in all the other cases (n=8, 62%) occlusion occurred without the presence of technical error or distal disease evolution.

These results led us to analyse the presence of factors affecting bypass patency. It is not surprisingly that in the univarate analysis, the presence of tissue loss (Rutherford category 5/6) was a negative predictor of patency (P=.04). On the other hand, it is interesting to note that CFA endarterectomy was positively associated to patency (P=.03). This means that in these cases of multilevel revascolarization, the treatment also of moderate CFA stenosis (>50%) may improve patency, providing both an improved outflow for the iliac stent and a better inflow for the femoro-popliteal bypass.

Another important result of this study is the evidence of improved patency in those cases with iliac lesions treated with a covered stent. This result of the univariate analysis (P=.02) was then confirmed at the multivariate analysis, showing that the use of a covered stent was the only independent predictor of femoro-popliteal bypass patency (HR, 0.15; 95%CI 0.03-0.64; P=.01). It is not surprising that the type of iliac stent may affect femoro-popliteal bypass patency in a hybrid procedure, but this finding could be related to several factors. First, the use of covered stents allow a more aggressive dilatation even of calcified vessels without the risk of arterial rupture; this decreases the risk of leaving untreated iliac residual stenosis that, even if not haemodynamically significant, may produce a moderate flow-limiting effect influencing bypass mid-term patency. Similarly, a second hypothesis is that even if an iliac artery segment has been treated with successful angioplasty and stenting, it may present diffuse parietal calcification above and below the stented segment or develop minimal in-stent hyperplasia. Covered stents in fact guarantee a mechanical barrier to intimal hyperplasia, that may be the cause of blood flow modifications at the femoral level thus reducing long term by-pass patency. Third, the use of a covered stent may have a protective role from distal embolization. Unfortunately, we do not have any instrumental information to support these hypothesis, that should be confirmed by haemodynamic and/or imaging data. Anyway this result is in line with the current trend of use of stent grafts in severe iliac occlusive disease, that has increased progressively from the late 1990[17].

Usually, the infrainguinal characteristics, as the type of material used for by-pass creation and the severity of associated obstructive disease of the femoral and tibial vessels, have a fundamental role to determine long term patency. However in this case, the multivariate analysis evaluating major aspects as associated CFA endarterectomy, site of distal anastomosis, type of graft used and distal runoff, failed to identify any significant predictor. In particular, even if there was a trend in favour of the use of GSV (P=.06), the material of the bypass failed to be an independent predictor of patency. This could be obviously related to and the low number of events and to the limited follow-up.

Our study has some limitations that are worthy of mention. This was a retrospective, non-randomized study; thus, the choice of type of stent to be used or bypass technical aspects were left to the surgeon treating the patient, leading to inherent biases. On the other side, prospective data collection allowed to obtain reliable information regarding follow-up outcomes. Moreover, this is the first study that focus on outcomes of simultaneous treatment of iliac stenting in association to femoro-popliteal bypass in terms of early outcomes and long-term patency; furthermore, no previous study analysed the effect of a stented iliac artery on femoro-popliteal bypass patency.

CONCLUSIONS

Concurrent iliac artery stenting and femoro-popliteal by-pass have acceptable early and long-term results. Overall primary patency of the entire revascularization is more related to bypass patency rather than iliac stent patency. The classification as Rutherford category 5/6 seems to reduce mid-term patency, while CFA endarterectomy and the use of a CS are associated to an improved patency. Even if further studies are needed, the use of a CS for the iliac obstruction seem to provide better outcomes in the hybrid treatment of these cases with multilevel disease.

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LEGENDS

Table 1. Demographics, cardiovascular risk factors, and perioperative risk assessment in the 75 patients undergoing iliac stenting+femoro-popliteal bypass.

Table 2. Clinical data and anatomical data for the 76 limbs treated with iliac stenting + femoro-popliteal bypass.

Table 3. General operative and procedural information in the 76 limbs treated with iliac stenting + femoro-popliteal bypass.

Table 4. Early outcomes (<30 days from surgery) in the 76 limbs treated with iliac stenting + femoro-popliteal bypass.

Supplementary table. Univariate analysis for primary patency of the femoro-popliteal bypass in the 76 limbs treated with iliac stenting + femoro-popliteal bypass.

Figure 1. Primary patency of the overall revascularization (iliac stent + femoro-popliteal bypass, black line), the iliac stent alone (green line), and the femoro-popliteal bypass alone (red line). SE<10%.

Figure 2. Bar plot of multivariate analysis (Cox proportional hazards) for primary patency of the femoro-popliteal bypass in the 76 limbs treated with iliac stenting + femoro-popliteal bypass.

Table 1.

Variable	*M±SD/N(%)*
Demographics	
Age, years	72.2 ± 9.4
Age < 60 years	3 (3.9)
Male gender	59 (77.6)
Cardiovascular risk factors	
Hypertension	66 (86.1)
Diabetes	35 (46.1)
Smoking[a]	49 (64.5)
Coronary artery disease	42 (55.3)
Renal insufficiency	22 (28.9)
Dialysis	1 (1.3)
COPD	10 (13.1)
Medical therapy	
None	7 (9.2)
Antiplatelet	40 (52.6)
Dual antiplatelet	7 (9.2)
Anticoagulant	13 (17.1)
Antiplatelet + anticoagulant	9 (11.8)
Perioperative assessement	
ASA score	2.7 ± 0.5
SVS cardiac score	1.34 ± 1.01
SVS pulmunary score	0.22 ± 0.54
SVS renal score	0.54 ± 0.98
SVS sum score	1.14 ± 0.61

[a] Include current and former smokers.

Variable	*M±SD/N(%)*
Clinical data	
Rutherford category	
3	2 (2.6)
4	9 (11.8)
5-6	65 (85.5)
Anatomical data	
Aortoiliac TASC classification	
B	25 (32.9)
C	24 (31.6)
D	27 (35.5)
Stenosis length > 10 cm	15 (19.7)
Iliac occlusion[c]	13 (17.1)
Aortic bifurcation disease	8 (10.5)
CFA grade of stenosis	
Minimal (<50%)	59 (77.6)
Moderate/high (50-74%)	3 (3.9)
High (75-99%)	5 (6.5)
Occlusion	9 (11.8)
Femoropopliteal TASC classification	
C	38 (50.0)
D	38 (50.0)

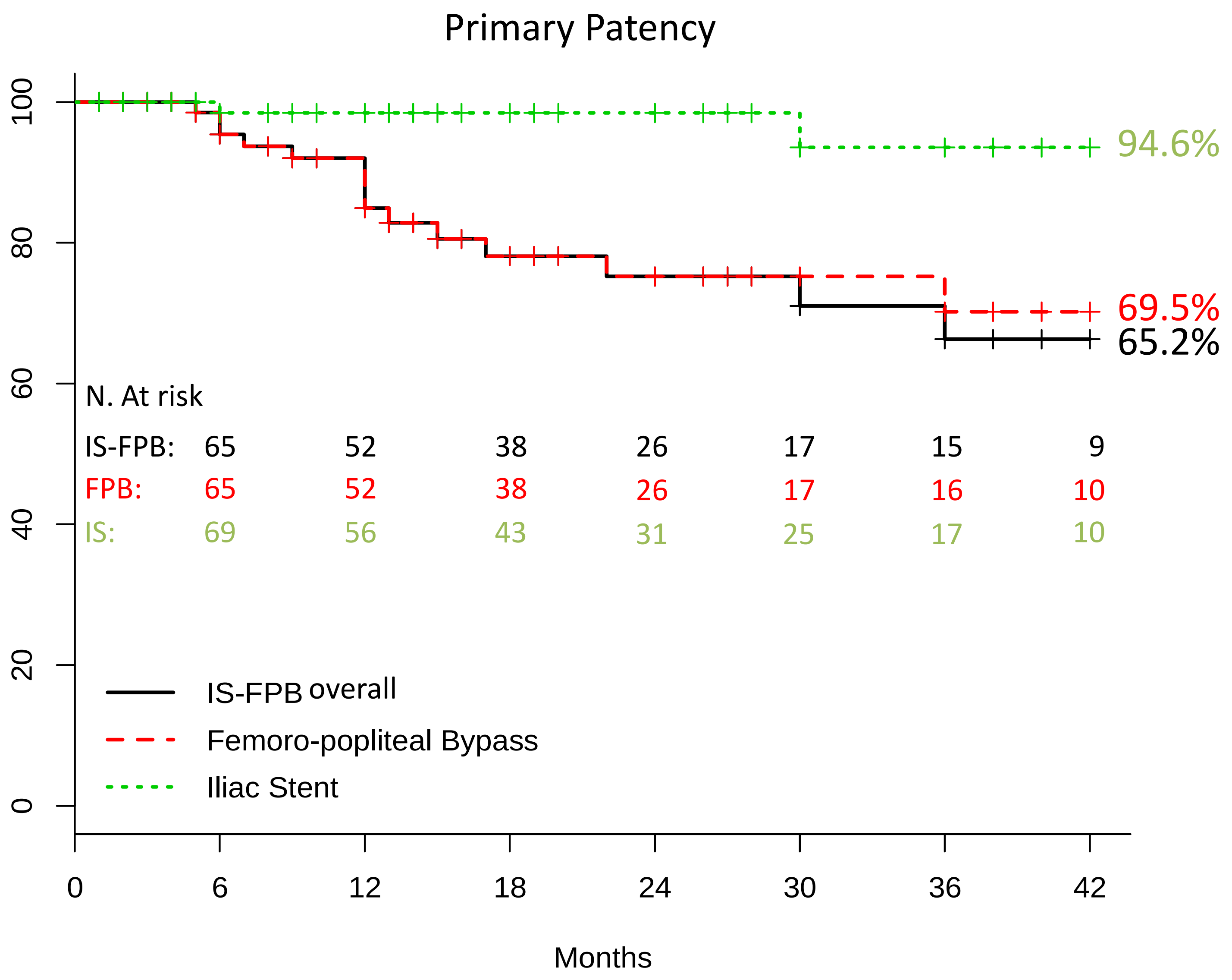
Table 3.

Variable	*M±SD/N(%)*
Operative data	*Pts=76*
General anesthesia	69 (90.6)
Length of stay, days	9.1 ± 9.3
Procedural data	*Limbs=76*
IS endovascular target	
CIA	27 (35.5)
EIA	16 (21.0)
CIA + EIA	33 (43.4)
Mean number of stents	1.5 ± 1.3
Mean length of coverage, cm	8.0 ± 4.3
Type of stent	
Covered stent	41 (53.9)
Bare metal stent	35 (46.1)
Femoropopliteal bypass	
Supragenicular	38 (50.0)
Vein	10 (13.1)
Prosthetic	28 (36.8)
Infragenicular	38 (50.0)
Vein	22 (28.9)
Prosthetic	16 (21.1)
Vein	32 (42.1)
Prosthetic	44 (57.9)
Mean tibial runoff	4.9 ± 2.3
Associated procedures	
CFA endoarterectomy	17 (22.3)
Tibial vessels PTA	4 (5.2)

Table 4.

Variable	*M±SD/N(%)*
Medical outcomes	*Pts=75*
Major cardiac	1 (1.3)
Respiratory failure	0 (-)
Dialysis	0 (-)
Death[a]	2 (2.6)
Surgical outcomes	*Limbs=76*
Technical success	75 (98.6)
Ankle-brachial index	
Before	0.44 ± 0.38
After	0.93 ± 0.22
Increase	0.43 ± 0.37
Limb ischemia/thrombosis[b]	0 (-)
Hematoma	2 (2.6)
Wound infection	1 (1.3)
Lymph leak	1 (1.3)
Iliac rupture	0 (-)
Early amputation	1 (1.3)

[a]Including 1 case of major cardiac complication
[b]Requiring surgery


Primary Patency
100
80
60
40
20
0
94.6%
69.5%
65.2%
N. At risk
IS-FPB: 65 52 38 26 17 15 9
FPB: 65 52 38 26 17 16 10
IS: 69 56 43 31 25 17 10
IS-FPB overall
Femoro-popliteal Bypass
Iliac Stent
0 6 12 18 24 30 36 42
Months

Variable	95% CI	HR	P
Rutherford 5/6	0.28–7.73	1.48	0.64
Covered stent	0.03–0.64	0.15	0.01
CFA endarterectomy	0.09–2.33	0.48	0.36
Below the knee	0.84–9.38	2.81	0.09
GSV bypass	0.08–1.04	0.34	0.06
Tibial runoff ≥ 6	0.37–6.50	1.46	0.55