# Claudication Outcomes for Femoropopliteal Graft Entrapment with the Sartorius Muscle

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## Introduction

Femoropopliteal bypass surgery is currently one of the most common surgeries done to relieve claudication in the setting of peripheral vascular disease (PVD)[1]. During this surgery, a prosthetic or autologous vein graft is tunneled between the anastomoses either subcutaneously or through the anatomic position, located under the sartorius muscle and next to the superficial femoral and popliteal arteries.[2,3] This tunneling is done blindly, which can result in entrapment of the graft within the sartorius muscle instead of passing freely under it[4]. Previous studies have shown that popliteal artery entrapment within the gastrocnemius muscle can lead to compression and thrombosis of the artery because contraction of the muscle can disrupt its patency[4–6]. However, there is currently insufficient data to suggest whether entrapment within the sartorius muscle results in similar outcomes. The objective of the current study was to correlate graft patency for femoropopliteal bypass with potential graft entrapment by the sartorius muscle by retrospective cohort analysis of patients with prior bypass who subsequently underwent CT imaging for any reason. **The hypothesis to be tested was that intramuscular passage of a femoropopliteal bypass is associated with inferior primary patency at five years due to external compression of the graft by the muscle.**

## Methods

- Medical records from patients treated with a femoropopliteal bypass surgery were reviewed for demographic and health-related factors, indication for intervention, and graft patency including revision and above ankle amputation
- Patients were grouped by general graft location based on that recorded within the operative notes
- Patients with subfascial grafts were then grouped based on whether their graft was completely enveloped within the sartorius or surrounding musculature as determined by relevant postoperative CT imaging

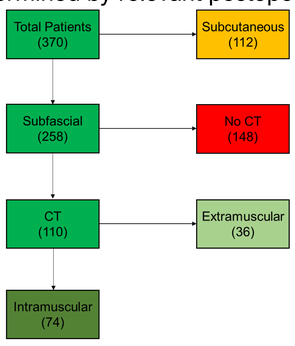


**Figure 1.** Distribution of femoropopliteal bypass patients used in this study, based on graft location and the availability of postoperative CT imaging.

- Regarding the outcome of primary patency, demographic and risk factors were compared with a chi-square analysis. Clinical significance was determined by log-rank test P<0.10
- Selected variables were then analyzed via a multivariate Cox regression. Clinical significance was determined by a two-tailed t-test P<0.05.
- Graft primary patency was analyzed with a Kaplan-Meyer life table analysis using the log rank test

## Results

| Variable | Hazard Ratio | 95% CI | P |
|---|---|---|---|
| **Vein Graft** | **0.47** | **.028-0.77** | **.003*** |
| **Active Smoking** | **2.02** | **1.19-3.42** | **.009*** |
| **Hypertension** | **1.75** | **0.92-3.33** | **.088*** |
| **Urgent/Emergent** | **1.55** | **0.93-2.58** | **.090*** |
| Below knee target | 1.44 | 0.90-2.30 | .13 |
| COPD | 1.64 | 0.74-3.63 | .22 |
| Age | 1.12 | 0.99-1.04 | .24 |
| Caucasian race | 0.84 | 0.53-1.34 | .46 |
| Male sex | 0.87 | 0.46-1.66 | .67 |
| Renal insufficiency | 1.21 | 0.30-4.94 | .80 |
| Diabetes mellitus | 1.03 | 0.63-1.66 | .92 |
| *Intramuscular* | *1.02* | *0.63-1.65* | *.94* |

**Table 1.** Results of the univariate chi-square analysis of selected variables, including surgical factors and comorbidities. Variables are listed in order of significance, and those that met the previously determined threshold for clinical significance are bolded.

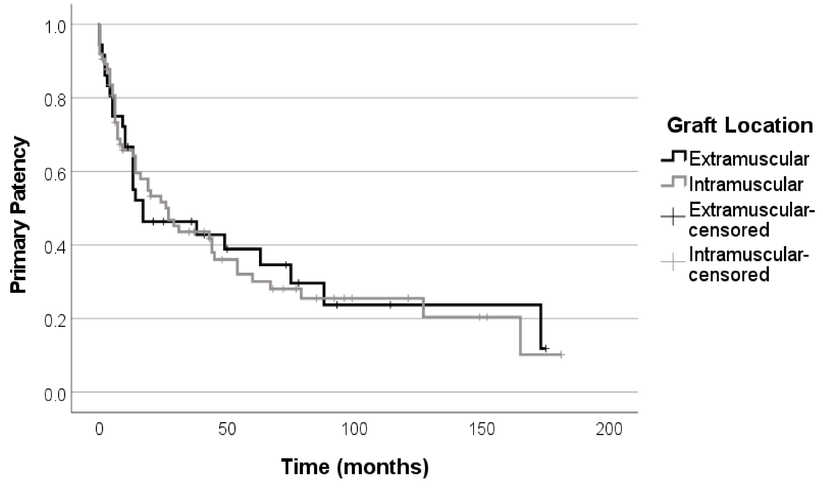


**Figure 2.** Kaplan-Meyer survival analysis for primary patency of extramuscular and intramuscular subfascial femoropopliteal bypass grafts.

| Variable | Hazard Ratio | 95% CI | P |
|---|---|---|---|
| **Active Smoking** | **2.83** | **1.55-5.19** | **<.001*** |
| **Vein Graft** | **0.51** | **0.30-0.87** | **.013*** |
| **Hypertension** | **2.00** | **1.03-3.89** | **.041*** |
| Below knee target | 1.51 | 0.89-2.59 | .13 |
| *Intramuscular* | *1.33* | *0.77-2.28* | *.31* |
| Urgent/Emergent | 1.00 | 0.57-1.75 | .99 |

**Table 2.** Results of the multivariate Cox regression analysis of selected variables. Variables are listed in order of significance, and those variables that met the previously determined threshold for clinical significance are bolded.

## Conclusions

- This study limited to 110 patients with subfascial grafts **fails to demonstrate significant differences in primary patency according to whether subfascial femoropopliteal grafts pass through the sartorius muscle**
- Other factors that have been previously known to affected overall graft primary patency, including smoking status, diagnosed hypertension, and the use of a vein versus a prosthetic graft were confirmed

## Future Directions

Larger and, ideally, multi-institutional studies would be required to adequately detect any differences in patency by muscular entrapment, especially for prosthetic grafts to the below knee popliteal artery. This further analysis can then be used to provide more specific guidelines regarding the femoropopliteal bypass graft for peripheral artery occlusion, including any potential benefit in intraoperative imaging with the purpose of detecting graft tunneling location.

## References

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