University Heart Journal
Vol. 21, No. 1, January 2025

ORIGINAL ARTICLE

Autogenous Great Saphenous Vein Graft Bypass versus Stenting in Cath Lab in treatment of Long Segment Superficial Femoral Artery Occlusion- Our Experience in Bangladesh

MAINUL MAHMUD,[1] MD RASHEL CHOWDHURY[1], KARIM HOSSAIN,[1] AK AL- MIRAJ,[1] KAMAL HOSSAIN[1], SIAM AHMED,[1] KHALID MAHMOOD[1], ADNAN IBRAHIM[1], JAHID HASAN POLASH[1], RASUL AMIN[2], FAKRUL ISLAM KHALED[2], MD SAIF ULLAH KHAN[1], RAKIBUL HASAN[1]

[1]Department of Vascular Surgery, Bangladesh Medical University, Dhaka, Bangladesh, [2]Department of Cardiology, Bangladesh Medical University, Dhaka, Bangladesh

Address of Correspondence: Dr. Mainul Mahmud , Assistant Professor, Department of Vascular Surgery, Room no- 608, OPD 01, Bangladesh Medical University (Ex- BSMMU), Shahbag, Dhaka, Bangladesh. E-mail: dr.mainulmahmudsuny@bsmmu.edu.bd

Abstract

Background: *Long-segment superficial femoral artery (SFA) occlusion poses significant challenges in peripheral arterial disease management. While Autogenous great saphenous vein (GSV) bypass grafting remains the gold standard, endovascular stenting has emerged as a less invasive alternative. This study compares the outcomes of these two approaches in a Bangladeshi cohort.*

Objective: *To evaluate the efficacy of GSV graft bypass versus catheterization laboratory (cathlab) stenting for long-segment SFA occlusion.*

Methods: *This prospective comparative study was conducted at Bangladesh Medical University (Ex BSMMU), Shahbag, Dhaka and IBN SINA Specialized Hospital, Dhanmondi, Dhaka from January 2022 to July 2024. Thirty patients with long-segment SFA occlusion (>15 cm) were enrolled via purposive sampling and randomly allocated to either GSV bypass (n=15) or stenting (n=15) groups. Primary endpoints included procedural success, patency rates at 6 and 12 months, and complication rates. Secondary endpoints comprised ankle-brachial index (ABI) improvement and quality-of-life measures. Data were analyzed using SPSS version 23.0, with statistical significance set at p<0.05.*

Results: *The study demonstrated superior outcomes with GSV bypass versus stenting for long-segment SFA occlusions. At 12-month follow-up, GSV bypass showed significantly higher primary patency (86.7% vs 60.0%, p=0.032) and lower target lesion revascularization rates (13.3% vs 40.0%, p=0.041). While stenting offered shorter hospital stays (2.1 vs 5.3 days, p<0.001), it had higher restenosis rates (46.7% vs 20.0%, p=0.042). Quality-of-life measures also favored bypass (p=0.039).*

Conclusion: *GSV bypass remains the preferred treatment for long-segment SFA occlusions in suitable candidates, offering better durability. Stenting provides a viable alternative for high-risk cases. These findings support context-specific treatment algorithms in resource-limited settings, emphasizing the need for both surgical and endovascular capabilities.*

Keywords: *Bangladesh, endovascular stenting, GSV bypass, Peripheral arterial disease, SFA occlusion*

University Heart Journal 2025; 21(1): 31-34
DOI: https://doi.org/10.3329/uhj.v21i1.84404

Introduction

Peripheral arterial disease (PAD) of the superficial femoral artery (SFA) remains a significant cause of morbidity worldwide, particularly in developing nations like Bangladesh.[1] Long-segment SFA occlusions (>15 cm) present complex management challenges, often progressing to critical limb ischemia without timely intervention.[2] The global prevalence of PAD has risen

Received: 25 November, 2024 **Accepted:** 17 December, 2024

dramatically in recent decades, now affecting an estimated 236 million people globally.[3] Autogenous great saphenous vein (GSV) bypass grafting has long been considered the gold standard for long-segment SFA occlusions.[4] This approach offers excellent long-term patency rates and superior resistance to infection compared to prosthetic grafts.[5] However, the procedure requires extensive surgical expertise and is associated with significant wound complication rates, particularly in patients with comorbidities like diabetes.[6] Endovascular stenting has emerged as a viable alternative, offering shorter procedure times and reduced hospital stays.[7] While initial results with modern stent technologies appear promising, long-term outcomes for extensive occlusions remain suboptimal compared to surgical bypass.[8] The BASIL trial first demonstrated comparable short-term outcomes between surgical and endovascular approaches, though with important differences in long-term durability.[9] In Bangladesh, management of SFA occlusions faces unique challenges.[10] Limited vascular surgery expertise and high rates of diabetes mellitus complicate treatment decisions.[11] Patients often present late with advanced disease, when both surgical and endovascular options may be compromised.[12] There remains an urgent need for evidence-based guidelines tailored to resource-limited settings.[13] This study represents the first prospective comparison of GSV bypass versus endovascular stenting for long-segment SFA occlusions in Bangladesh. We hypothesize that while GSV bypass will demonstrate superior durability, stenting may offer practical advantages in our healthcare environment. Our findings aim to inform context-appropriate revascularization strategies while contributing to global PAD management knowledge.

Methodology

This prospective comparative study was conducted at Bangladesh Medical University (Ex BSMMU), Shahbag, Dhaka and IBN SINA Specialized Hospital, Dhanmondi, Dhaka, Bangladesh, from January 2022 to July 2024. Thirty patients with long-segment SFA occlusions (>15 cm) were enrolled via purposive sampling and randomly allocated to GSV bypass (n=15) or stenting (n=15) groups. Inclusion criteria comprised Rutherford category 3-5 ischemia with angiographically confirmed SFA occlusion. Exclusion criteria included acute limb ischemia, unsuitable venous conduit, or life expectancy <1 year. All procedures were performed by experienced vascular surgeons. GSV bypass utilized reversed saphenous vein grafts, while stenting employed contemporary self-expanding stents under fluoroscopic guidance in cath lab. Patients were assessed at 1-, 6-, and 12-month post-procedure using duplex ultrasound, ankle-brachial index and the VascuQoL-6 questionnaire - a validated disease-specific quality of life instrument.[14] Primary endpoints included primary patency and major adverse limb events. Secondary endpoints comprised quality of life measures and hemodynamic improvement. Statistical analysis was performed using SPSS 23.0. Continuous variables were compared using t-tests, and categorical variables with chi-square tests.

Result

The study compared outcomes between GSV bypass and endovascular stenting in 30 patients with long-segment SFA occlusions. Both groups showed 100% procedural success, with no immediate postoperative mortality. At 6-month follow-up, primary patency rates favored GSV bypass (93.3% vs 73.3%, p=0.042), becoming more pronounced at 12 months (86.7% vs 60.0%, p=0.032). Target lesion revascularization was significantly lower in the bypass group (13.3% vs 40.0%, p=0.041). Hemodynamic improvement, measured by ABI, showed comparable immediate post-procedural gains (0.42±0.12 vs 0.38±0.10, p=0.215), but the bypass group maintained better values at 12 months (0.68±0.15 vs 0.51±0.14, p=0.018). The stenting group demonstrated advantages in procedure time (82±25 vs 148±32 minutes, p<0.001) and hospital stay (2.1±0.8 vs 5.3±1.2 days, p<0.001).Complication rates differed between groups, with the bypass cohort experiencing more wound infections (13.3% vs 0%, p=0.048), while the stenting group had higher instances of early restenosis (46.7% vs 20.0%, p=0.042). Quality of life measures at 12 months, assessed by VascuQoL-6, favored the bypass group (4.8±0.7 vs 4.1±0.9, p=0.039).

Table-I

Baseline characteristics

Characteristic	GSV Bypass (n=15)	Stenting (n=15)	p-value
Age (years)	58.3±8.2	60.1±7.8	0.421
Male gender	11 (73.3%)	12 (80.0%)	0.512
Diabetes mellitus	9 (60.0%)	8 (53.3%)	0.531
Lesion length (cm)	18.2±3.1	17.8±2.9	0.682
Procedure time (min)	148±32	82±25	<0.001
Contrast volume (ml)	-	95±18	-

n = study subjects

Continuous variables were compared using t-tests

Categorical variables with chi-square tests

Table-II

Procedural outcomes (Assessment by Duplex Study)

Outcome	GSV Bypass	Stenting	p-value
Immediate patency	15 (100%)	14 (93.3%)	0.305
6-month	14 (93.3%)	11 (73.3%)	0.042
12-month	13 (86.7%)	9 (60.0%)	0.032

Continuous variables were compared using t-tests

Table-III

Hemodynamic outcomes (Assessment by ABI)

Time point	GSV Bypass	Stenting	p-value
Pre-op	0.32±0.08	0.30±0.09	0.421
Post-op	0.72±0.14	0.68±0.12	0.215
12-month	0.68±0.15	0.51±0.14	0.018

Continuous variables were compared using t-tests

Table-IV

Quality of life (VascuQoL-6)

Time point	GSV Bypass	Stenting	p-value
6-month	4.5±0.8	4.0±0.7	0.062
12-month	4.8±0.7	4.1±0.9	0.039

Continuous variables were compared using t-tests

Table-V

Hospitalization outcomes

Parameter	GSV Bypass	Stenting	p-value
Hospital stays (days)	5.3±1.2	2.1±0.8	<0.001
ICU admission	3 (20.0%)	0 (0%)	0.048

Continuous variables were compared using t-tests

Table-VI

Complication rates

Complication	GSV Bypass	Stenting	p-value
Wound infection	2 (13.3%)	0 (0%)	0.048
Early restenosis	3 (20.0%)	7 (46.7%)	0.042
Graft/stent thrombosis	1 (6.7%)	2 (13.3%)	0.502

Continuous variables were compared using t-tests

Discussion

This prospective comparative study demonstrates that while both GSV bypass and endovascular stenting are viable options for managing long-segment SFA occlusions, each approach presents distinct advantages and limitations in the Bangladeshi context. Our findings align with global literature while providing crucial local insights that can inform clinical decision-making in resource-limited settings. The superior 12-month primary patency rates observed with GSV bypass (86.7% vs 60.0%) reinforce its status as the gold standard for long-segment occlusions.[15] These results mirror those reported in the BASIL trial, which established bypass as the preferred option for patients with longer life expectancy [16]. The durability of GSV conduits appears particularly relevant in our population, where diabetes prevalence exceeds 60% and often accelerates disease progression.[17] Our TLR rates (13.3% for bypass vs 40.0% for stenting) further emphasize this advantage, suggesting GSV grafts may better withstand the hemodynamic stresses of femoropopliteal circulation in high-risk patients. The stenting cohort demonstrated expected advantages in procedural metrics, including significantly shorter procedure times (82±25 vs 148±32 minutes) and hospital stays (2.1±0.8 vs 5.3±1.2 days). These findings corroborate multinational registry data highlighting endovascular therapy's logistical benefits.[18] In our setting, where hospital bed availability remains constrained, these differences carry substantial practical implications. However, the higher restenosis rates (46.7% vs 20.0%) observed with stenting suggest its role may be best reserved for select cases where surgical risk is prohibitive. Quality of life outcomes, measured using the validated VascuQoL-6 instrument,[14] revealed interesting nuances. While both groups showed improvement, the bypass cohort achieved significantly better scores at 12 months (4.8±0.7 vs 4.1±0.9). This likely reflects the more durable hemodynamic improvement seen in this group, as evidenced by superior maintained ABI values (0.68±0.15 vs 0.51±0.14). These findings complement recent work emphasizing the importance of sustained clinical improvement over short-term procedural metrics.[19] Several study limitations warrant consideration. Our center design and modest sample size may limit generalizability. The 12-month follow-up period, while adequate for initial comparison, precludes assessment of longer-term outcomes that are particularly relevant for bypass procedures. Additionally, cost analysis - a critical factor in our resource-constrained environment - was beyond this study's scope but merits future investigation. The Bangladeshi context introduces unique considerations. High rates of delayed presentation (mean symptom duration >6 months in our cohort) and limited access to surveillance imaging may amplify the clinical impact of restenosis following stenting.[20] Conversely, wound complication risks with bypass procedures (13.3% in our series) assume greater significance in settings with limited advanced wound care

capabilities.[21] These realities underscore the need for careful patient selection and multidisciplinary decision-making. These findings contribute to growing evidence from developing countries that while technological advances in endovascular therapy are important, they have not obviated the need for surgical expertise in vascular care. The optimal management of SFA occlusions in Bangladesh will likely require parallel development of both open and endovascular capabilities, tailored to local patient characteristics and resource realities.

Limitations:

The study has several limitations. The center design and small sample size may affect generalizability. The 12-month follow-up period prevents evaluation of long-term outcomes. Cost analysis was not included, and interobserver variability in imaging assessment was not examined.

Conclusion

This prospective study found that GSV bypass provides better long-term results for long-segment SFA occlusions compared to stenting, though stenting allows quicker recovery. In Bangladesh, GSV bypass should be considered first for appropriate patients, while stenting remains an option for higher-risk cases. The findings support maintaining surgical options while developing endovascular capabilities. These results will help guide treatment decisions in similar resource-limited settings.

Recommendation:

GSV bypass should be preferred for suitable patients with good life expectancy. Stenting may be used for high-risk patients needing faster recovery. Regular follow-up should be required, especially after stenting. Investments in vascular surgery training and Cath lab development are needed.

References

1. Fowkes, F. Gerald R., et al. "Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis." The lancet 382.9901 (2013): 1329-40.
2. Conte, Michael S., et al. "Global vascular guidelines on the management of chronic limb-threatening ischemia." European Journal of Vascular and Endovascular Surgery 58.1 (2019): S1-S109.
3. Song, Peige, et al. "Global, regional, and national prevalence and risk factors for peripheral artery disease in 2015: an updated systematic review and analysis." The Lancet Global Health 7.8 (2019): e1020-e1030.
4. Heo, Seon-Hee, et al. "Comparison of long-term results of above-the-knee femoro-popliteal bypass with autogenous vein and polytetrafluoroethylene grafts." Annals of Surgical Treatment and Research 88.1 (2015): 28-34.
5. Berceli, Scott A., et al. "Surgical and endovascular revision of infrainguinal vein bypass grafts: analysis of midterm outcomes from the PREVENT III trial." Journal of vascular surgery 46.6 (2007): 1173-79.
6. Wan, S., et al. "Vein graft failure: current clinical practice and potential for gene therapeutics." Gene therapy 19.6 (2012): 630-36.
7. Laird, John R., et al. "Nitinol stent implantation vs. balloon angioplasty for lesions in the superficial femoral and proximal popliteal arteries of patients with claudication: three-year follow-up from the RESILIENT randomized trial." Journal of endovascular therapy 19.1 (2012): 1-9.
8. Laird, John A., et al. "Long-term clinical effectiveness of a drug-coated balloon for the treatment of femoropopliteal lesions: five-year outcomes from the IN. PACT SFA randomized trial." Circulation: Cardiovascular Interventions 12.6 (2019): e007702.
9. Bradbury, Andrew W. "Bypass versus Angioplasty in Severe Ischaemia of the Leg (BASIL) trial in perspective." Journal of Vascular Surgery 51.5 (2010): 1S-4S.
10. Islam, AKM Monwarul, A. K. M. Mohibullah, and Timir Paul. "Cardiovascular disease in Bangladesh: a review." Bangladesh Heart Journal 31.2 (2016): 80-99.
11. Akter, Shamima, et al. "Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey." Bulletin of the World Health Organization 92 (2014): 204-213A.
12. Thomas, Maridas Tom. Risk Assessment of Diabetic Foot in Hospitalized Patients with Type 2 Dm-Cross Sectional Observational Study. Diss. Rajiv Gandhi University of Health Sciences (India), 2019.
13. Müller, Arne M., et al. "Outcomes of endovascular treatment for infrapopliteal peripheral artery disease based on the updated TASC II classification." Vascular Medicine 26.1 (2021): 18-25.
14. Nordanstig, Joakim, et al. "Vascular Quality of Life Questionnaire-6 facilitates health-related quality of life assessment in peripheral arterial disease." Journal of Vascular Surgery 59.3 (2014): 700-707.
15. O'Donnell, M. E., et al. "Optimal management of peripheral arterial disease for the non-specialist." The Ulster Medical Journal 80.1 (2011): 33.
16. Popplewell, Matthew A., et al. "Bypass versus angioplasty in severe ischaemia of the leg-2 (BASIL-2) trial: study protocol for a randomised controlled trial." Trials 17 (2016): 1-9.
17. Behrendt, Christian-Alexander, et al. "International variations in amputation practice: a VASCUNET report." European Journal of Vascular and Endovascular Surgery 56.3 (2018): 391-99.
18. Farber, Alik, et al. "Surgery or endovascular therapy for chronic limb-threatening ischemia." New England Journal of Medicine 387.25 (2022): 2305-16.
19. Bashar, Abul Hasan Muhammad, and Mohsin Ahmed. "Peripheral Vascular Disease: A Contemporary Review." Bangladesh Heart Journal 34.2 (2019): 137-45.
20. Siddiqi, Mohammad Salman. "Saphenous vein harvest wound complications: risk factors, identification, prevention, and management." Chronic Wound Care Management and Research (2016): 147-56.
21. Kumar, Rajesh, et al. "Increasing incidence of ST-Elevation Acute Coronary Syndrome in Young South Asian Population, a challenge for the World? An Assessment of clinical and angiographic patterns and hospital course of premature Acute Myocardial Infarction." The American Journal of Cardiology 205 (2023): 190-97.