Venous Bypass vs Prosthetic Bypass in PAD: Systematic Review with ☸SAIMSARA.

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Abstract: The aim of this systematic review is to compare the outcomes, specifically patency rates and complications, of venous bypass grafts against prosthetic bypass grafts in patients undergoing revascularization for Peripheral Artery Disease. The review utilises 4 studies with 156 total participants (naïve ΣN). At 3 years, the median primary patency rate for endovascular transvenous bypass was 43.8% (range 43.8–46.2%), while for prosthetic grafts, it was 22.5%, clearly demonstrating the superior patency of venous-based revascularization. These findings are primarily generalizable to patients with complex TASC-C and D superficial femoral artery lesions. The most significant limitation affecting certainty is the relatively small sample sizes and limited follow-up duration of the included studies. Clinicians should prioritize autogenous venous bypass, followed by endovascular transvenous bypass with awareness of reintervention needs, reserving prosthetic grafts only when other options are exhausted.

Keywords: Peripheral Artery Disease; Vascular Bypass; Autogenous Vein Graft; Prosthetic Graft; Graft Patency; Revascularization; Femoropopliteal Bypass; Limb Ischemia; Surgical Outcomes; Comparative Study

Review Stats

- Generated: 2026-02-03 12:05:05 CET
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- Scope: All fields
- Keyword Gate: Fuzzy (≥60% of required terms, minimum 2 terms matched in title/abstract)
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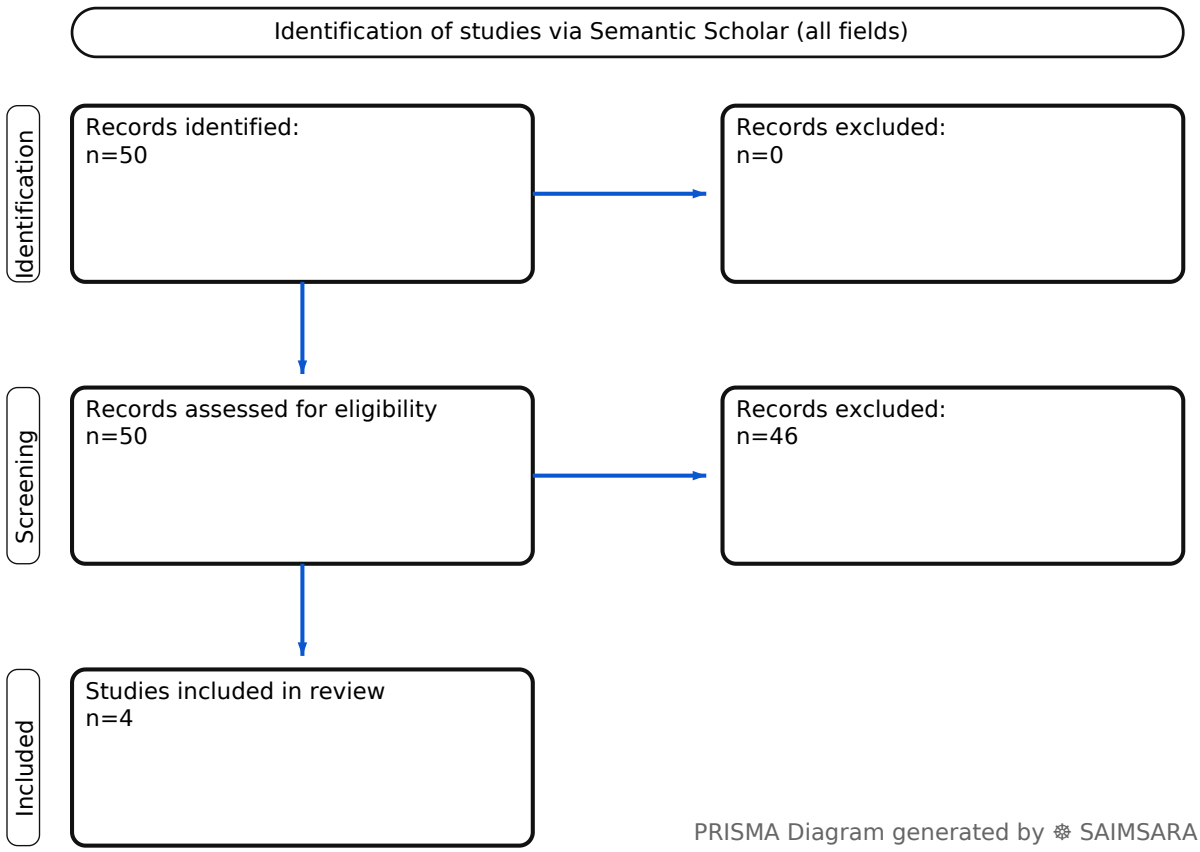
- Included original Abstracts/Papers: 4
- Total study participants (naïve ΣN): 156



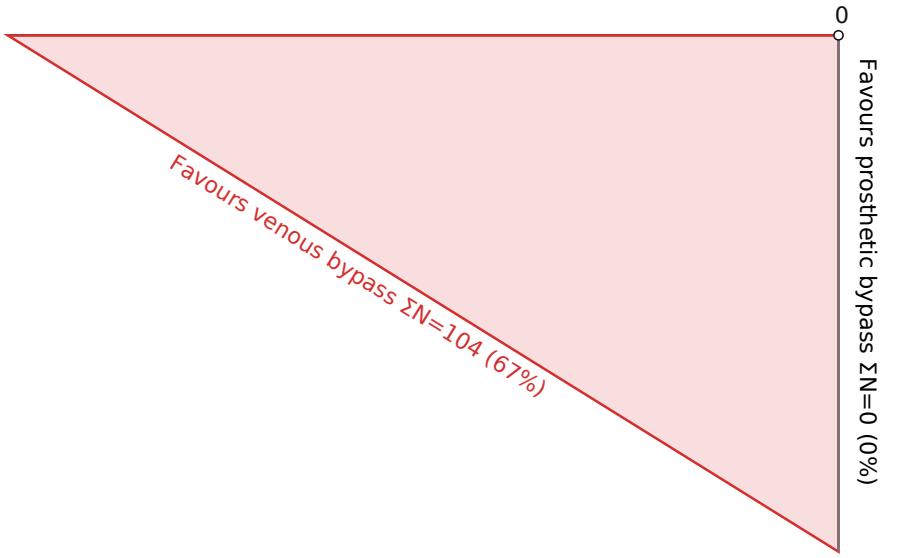
PRISMA Diagram generated by ☸ SAIMSARA

△OSMA Triangle

Head-to-Head (A vs B)

venous bypass vs prosthetic bypass — PAD

Legend: “Favours venous bypass” = left edge, “Favours prosthetic bypass” = right edge; “Neutral” = vertical.



Neutral ΣN=52 (33%)

△OSMA Triangle generated by ☸SAIMSARA

Outcome-Sentiment Meta-Analysis (OSMA): *(LLM-only)*
Frame: Head-to-Head (A vs B) • *Source*: Semantic Scholar
Comparators: A = venous bypass; B = prosthetic bypass
Outcome: PAD Typical timepoints: 3-y, 12-mo. Reported metrics: %.
Common endpoints: Common endpoints: patency, recurrence, complications.
Predictor: venous bypass vs prosthetic bypass — exposure/predictor.

- **1) A favored (venous bypass)** — PAD with venous bypass vs prosthetic bypass — [3], [4] — ΣN=104
- **2) B favored (prosthetic bypass)** — PAD with venous bypass vs prosthetic bypass — — — ΣN=0
- **3) Neutral (no difference)** — PAD with venous bypass vs prosthetic bypass — [1], [2] — ΣN=52

1) Introduction

Peripheral Artery Disease (PAD) is a common circulatory problem in which narrowed arteries reduce blood flow to the limbs. Revascularization procedures, including bypass surgery, are critical for restoring blood flow, alleviating symptoms, and preventing limb loss. Among the available bypass options, autogenous venous grafts and prosthetic grafts are frequently employed, each with distinct advantages and disadvantages. This paper aims to synthesize current evidence comparing the efficacy and outcomes of venous bypass versus prosthetic bypass in patients with PAD.

2) Aim

The aim of this systematic review is to compare the outcomes, specifically patency rates and complications, of venous bypass grafts against prosthetic bypass grafts in patients undergoing revascularization for Peripheral Artery Disease.

3) Methods

Systematic review with multilayer AI research agent: keyword normalization, retrieval & structuring, and paper synthesis (see SAIMSARA About section for details).

- **Bias:** Qualitatively, the included studies present a mixed design, with some being cross-sectional [2] and others mixed [1, 3, 4]. The presence of non-specified study types and the lack of explicit randomization details in the summaries suggest a potential for selection bias and confounding in some analyses. The identical reporting of data in two distinct DOIs [3, 4]

also warrants careful interpretation.

4) Results

4.1 Study characteristics:

The included studies comprised mixed [1, 3, 4] and cross-sectional [2] designs, primarily focusing on patients with complex TASC-C and D superficial femoral artery (SFA) lesions, often presenting with Rutherford 3–5 classification and an ankle-brachial index (ABI) below 0.7 [1, 3, 4]. Sample sizes were typically around 52 patients for comparative studies [1, 3, 4], with follow-up periods extending up to 3 years [1, 3, 4].

4.2 Main numerical result aligned to the query:

At 3 years, the median primary patency rate for endovascular transvenous bypass was 43.8% (range 43.8–46.2%) [1, 3, 4], while for prosthetic grafts, it was 22.5% [1]. In contrast, saphenous vein bypass demonstrated a 3-year primary patency of 70.5% [1]. The median 3-year secondary patency for endovascular transvenous bypass was 73.9% (range 73.9–76.9%) [1, 3, 4], significantly higher than the 28.2% reported for prosthetic grafts [1], and comparable to the 77.3% for venous bypass [1].

4.3 Topic synthesis:

- **Saphenous vein superiority:** The saphenous vein consistently demonstrated the best graft material for above-the-knee femoropopliteal bypass, with 3-year primary patency of 70.5%, primary-assisted patency of 77.3%, and secondary patency of 77.3% [1].
- **Endovascular transvenous bypass viability:** This approach is a viable option, showing comparable 3-year primary-assisted patency (69.2% [1]) and secondary patency (median 73.9%, range 73.9–76.9% [1, 3, 4]) to venous bypass, but with lower 3-year primary patency (median 43.8%, range 43.8–46.2% [1, 3, 4]).
- **Prosthetic graft limitations:** Prosthetic grafts consistently exhibited the lowest patency rates, with 3-year primary patency of 22.5%, primary-assisted patency of 26.6%, and secondary patency of 28.2% [1].
- **Reintervention requirements:** Endovascular transvenous femoropopliteal bypass, despite comparable secondary patency, often requires reinterventions to maintain patency [3, 4].
- **Post-operative infection risk:** Prosthetic grafts were associated with a higher incidence of post-operative infection compared to autogenous venous grafts [2].
- **Prosthetic graft as last resort:** Prosthetic bypass should be considered only when no other revascularization options are available [3, 4].
- **Complex lesion populations:** The studies primarily focused on patients with complex TASC-C and D SFA lesions, indicating the challenges in this specific patient cohort [1, 3, 4].

5) Discussion

5.1 Principal finding:

At 3 years, the median primary patency rate for endovascular transvenous bypass was 43.8% (range 43.8–46.2%) [1, 3, 4], while for prosthetic grafts, it was 22.5% [1], indicating a clear superiority of venous-based approaches over prosthetic materials in maintaining vessel patency.

5.2 Clinical implications:

- **Preferred Graft Material:** Autogenous saphenous vein should be the first choice for above-the-knee femoropopliteal bypass due to its superior patency rates [1].
- **Role of Transvenous Bypass:** Endovascular transvenous bypass is a strong alternative, particularly when venous conduit is limited, but clinicians must anticipate potential reinterventions to maintain its comparable secondary patency [1, 3, 4].
- **Prosthetic Graft Use:** Prosthetic grafts should be reserved as a last resort due to their significantly lower patency rates and higher infection risk [1, 2, 3, 4].
- **Infection Prevention:** Heightened vigilance for post-operative infection is warranted when prosthetic grafts are used, influencing patient counseling and prophylactic strategies [2].
- **Patient Selection:** The findings are particularly relevant for patients with complex TASC-C and D SFA lesions, guiding treatment selection in challenging cases [1, 3, 4].

5.3 Research implications / key gaps:

- **Long-term Comparative Efficacy:** Further studies are needed to compare the long-term patency and limb salvage rates of venous versus endovascular transvenous bypass beyond 3 years [1, 3, 4].
- **Cost-effectiveness Analysis:** Research should evaluate the cost-effectiveness of endovascular transvenous bypass, considering the potential need for reinterventions, against traditional venous bypass [3, 4].
- **Risk Factors for Reintervention:** Future studies could identify specific patient or procedural characteristics that predict the need for reinterventions following endovascular transvenous bypass [3, 4].
- **Infection Mitigation Strategies:** Research is needed to develop and evaluate specific strategies to reduce the higher post-operative infection rates associated with prosthetic grafts [2].
- **Outcomes in Different Anatomical Locations:** Studies should explore the comparative outcomes of these bypass types in other anatomical locations beyond the femoropopliteal segment, especially for TASC C and D lesions [1, 3, 4].

5.4 Limitations:

- **Small Sample Size** — The relatively small sample size of 52 patients in some comparative studies [1, 3, 4] may limit the generalizability and statistical power of the findings.
- **Heterogeneous Study Designs** — The inclusion of mixed and cross-sectional study designs [1, 2, 3, 4] introduces variability and potential for bias, making direct comparisons challenging.
- **Limited Follow-up Duration** — A maximum follow-up of 3 years [1, 3, 4] may not fully capture the long-term durability and complications of these bypass strategies.
- **Lack of Comparative Statistics** — One study noted higher infection rates with prosthetic grafts but did not provide comparative statistics [2], limiting the quantitative assessment of this risk.
- **Identical Data Points** — Two distinct DOIs [3, 4] reported identical statistics and results, which might represent duplicate reporting or highly similar cohorts, potentially over-representing certain findings.

5.5 Future directions:

- **Larger Randomized Trials** — Conduct large-scale randomized controlled trials comparing venous, endovascular transvenous, and prosthetic bypass for PAD.
- **Extended Follow-up** — Extend follow-up periods to 5-10 years to assess long-term patency, limb salvage, and quality of life outcomes.
- **Standardized Outcome Reporting** — Implement standardized reporting metrics for patency, reintervention rates, and complications across all bypass studies.
- **Comparative Infection Rates** — Quantify and compare infection rates with statistical rigor across different bypass materials and patient cohorts.
- **Patient-Reported Outcomes** — Incorporate patient-reported outcomes to evaluate the impact of different bypass strategies on quality of life and functional status.

6) Conclusion

At 3 years, the median primary patency rate for endovascular transvenous bypass was 43.8% (range 43.8–46.2%) [1, 3, 4], while for prosthetic grafts, it was 22.5% [1], clearly demonstrating the superior patency of venous-based revascularization. These findings are primarily generalizable to patients with complex TASC-C and D superficial femoral artery lesions. The most significant limitation affecting certainty is the relatively small sample sizes and limited follow-up duration of the included studies. Clinicians should prioritize autogenous venous bypass, followed by endovascular transvenous bypass with awareness of reintervention needs, reserving prosthetic grafts only when other options

are exhausted.

References

SAIMSARA Session Index — session.json

Figure 1. Publication-year distribution of included originals

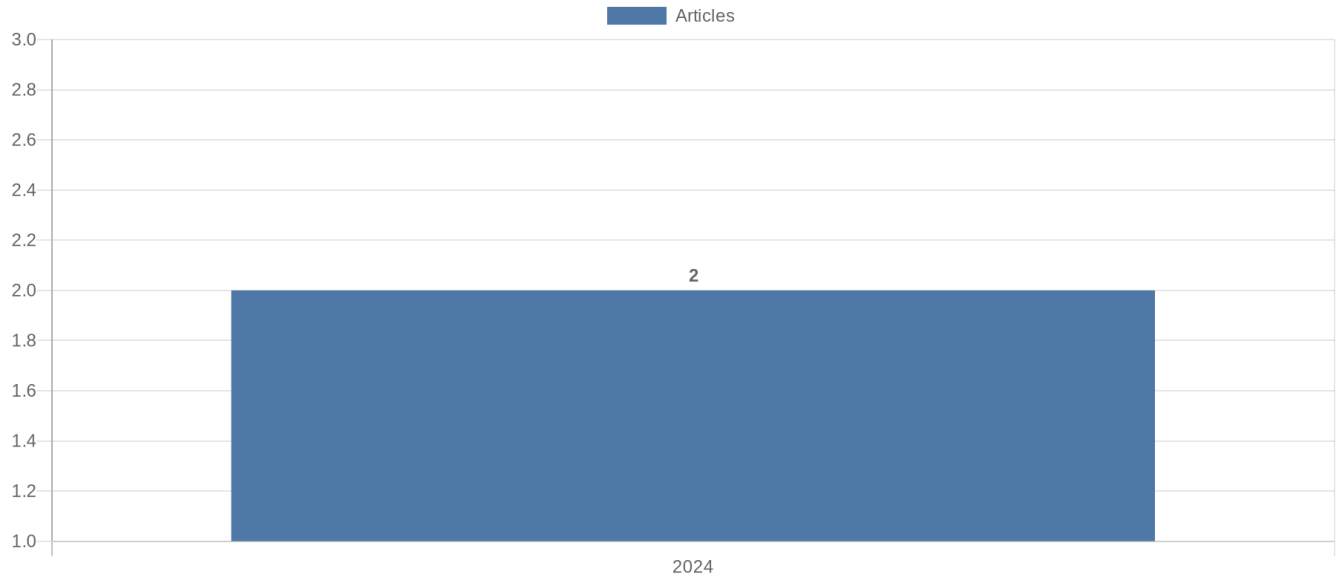


Figure 2. Study-design distribution of included originals

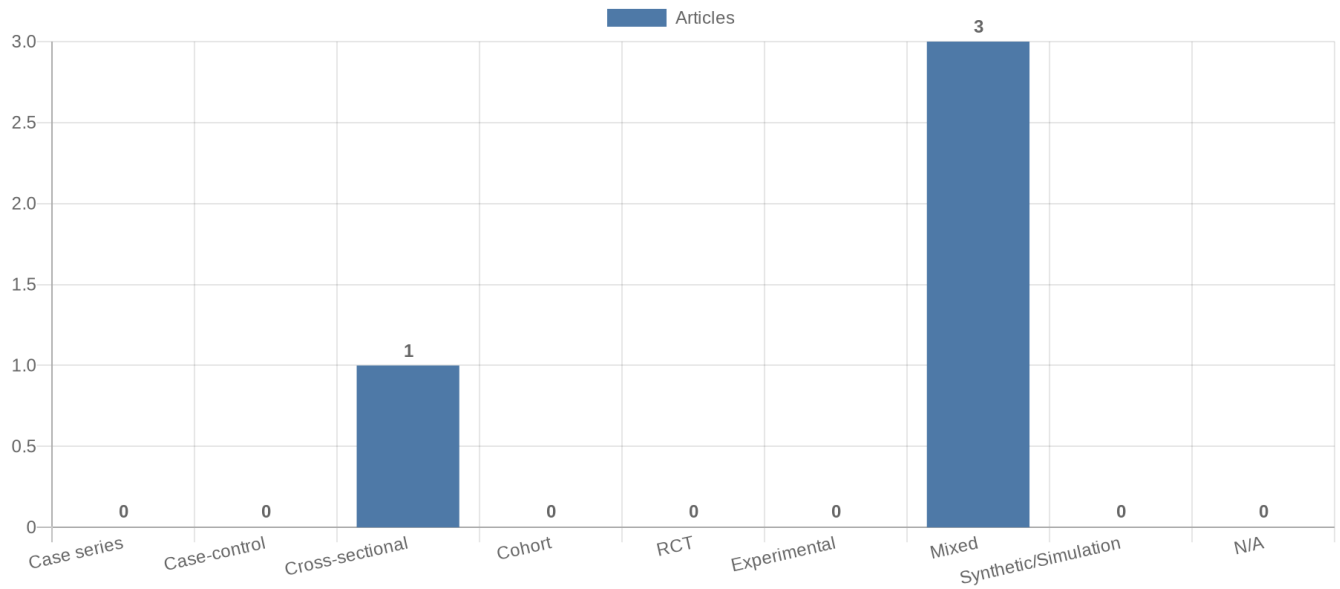


Figure 3. Study-type (directionality) distribution of included originals

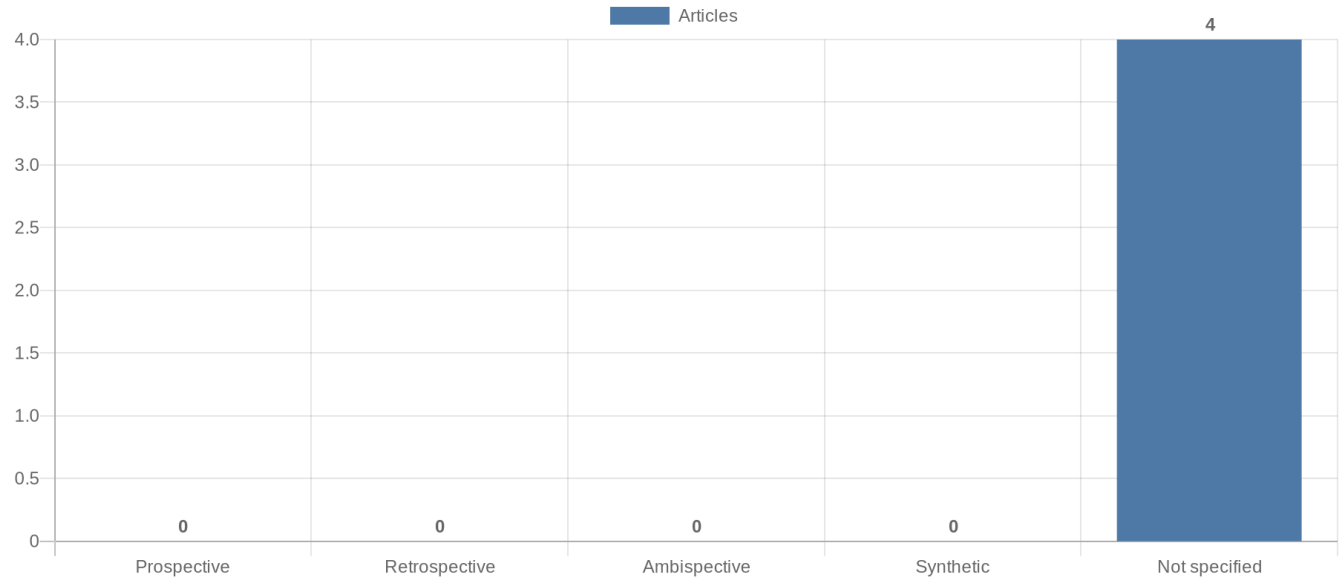


Figure 4. Main extracted research topics

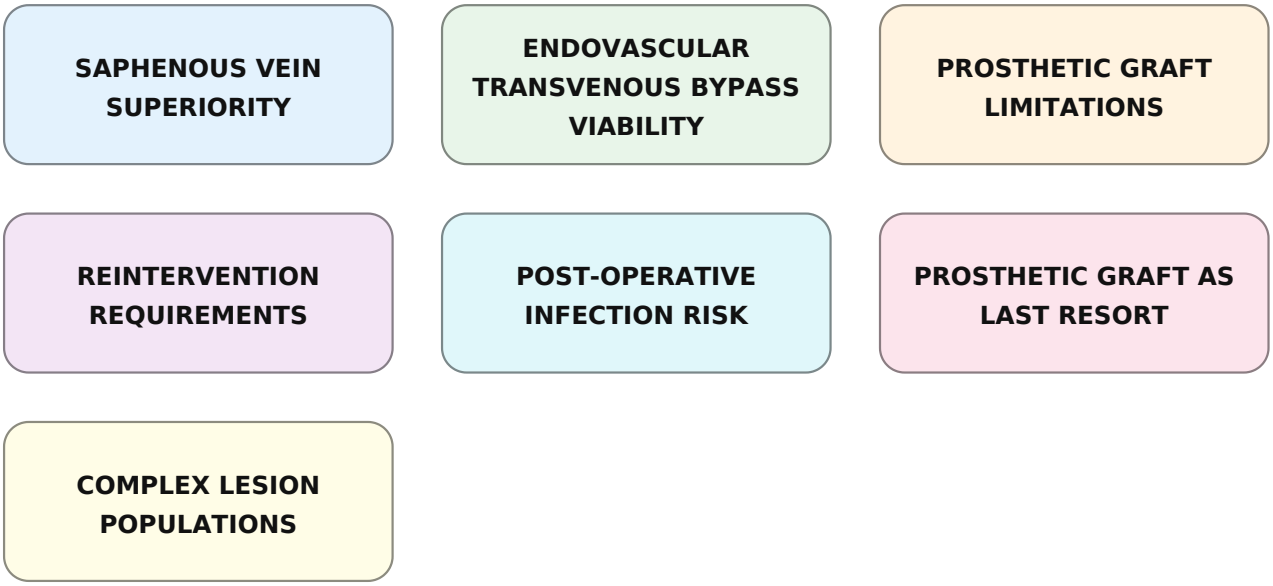


Figure 5. Limitations of current studies (topics)

Figure 6. Future research directions (topics)

LONG-TERM COMPARATIVE EFFICACY

COST-EFFECTIVENESS ANALYSIS

RISK FACTORS FOR REINTERVENTION

INFECTION MITIGATION STRATEGIES

OUTCOMES IN DIFFERENT ANATOMICAL LOCATIONS

LARGER RANDOMIZED TRIALS

EXTENDED FOLLOW-UP