Femoral Thromboendarterectomy: Systematic Review with ☸SAIMSARA.

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Abstract: This paper aims to systematically review and synthesize current evidence regarding femoral thromboendarterectomy, focusing on its efficacy, safety, physiological impact, and associated clinical considerations, as extracted and structured by a multilayer AI research agent. The review utilises 7 studies with 273 total participants (naïve ΣN). Thromboendarterectomy (TEA) for common femoral artery (CFA) occlusive disease demonstrated a 1-year primary patency rate of 92.8%, significantly higher compared to stenting (84.6%, p=0.006). This suggests that femoral TEA is an effective revascularization strategy, particularly for CFA disease, with promising outcomes extending to complex aortoiliac lesions with minimally invasive approaches. However, the reliance on retrospective designs and small sample sizes in much of the current literature represents a significant limitation to the certainty and generalizability of these findings. Clinicians should prioritize femoral TEA for CFA occlusive disease, while future prospective comparative trials are needed to solidify long-term outcomes and optimize patient management strategies.

Keywords: Femoral thromboendarterectomy; Common femoral artery; Peripheral arterial disease

Review Stats

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- Source: Semantic Scholar
- Scope: All fields
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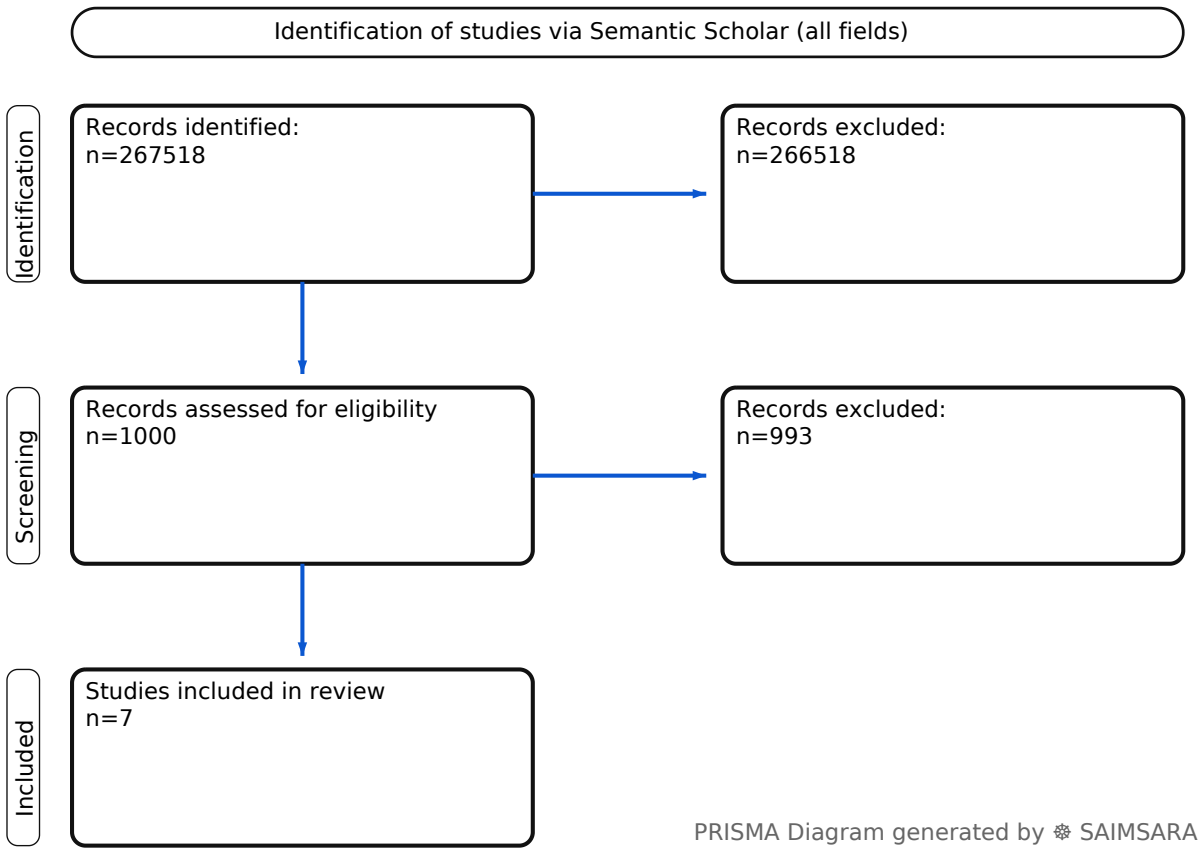
- Included original Abstracts/Papers: 7
- Total study participants (naïve ΣN): 273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Studies included in review
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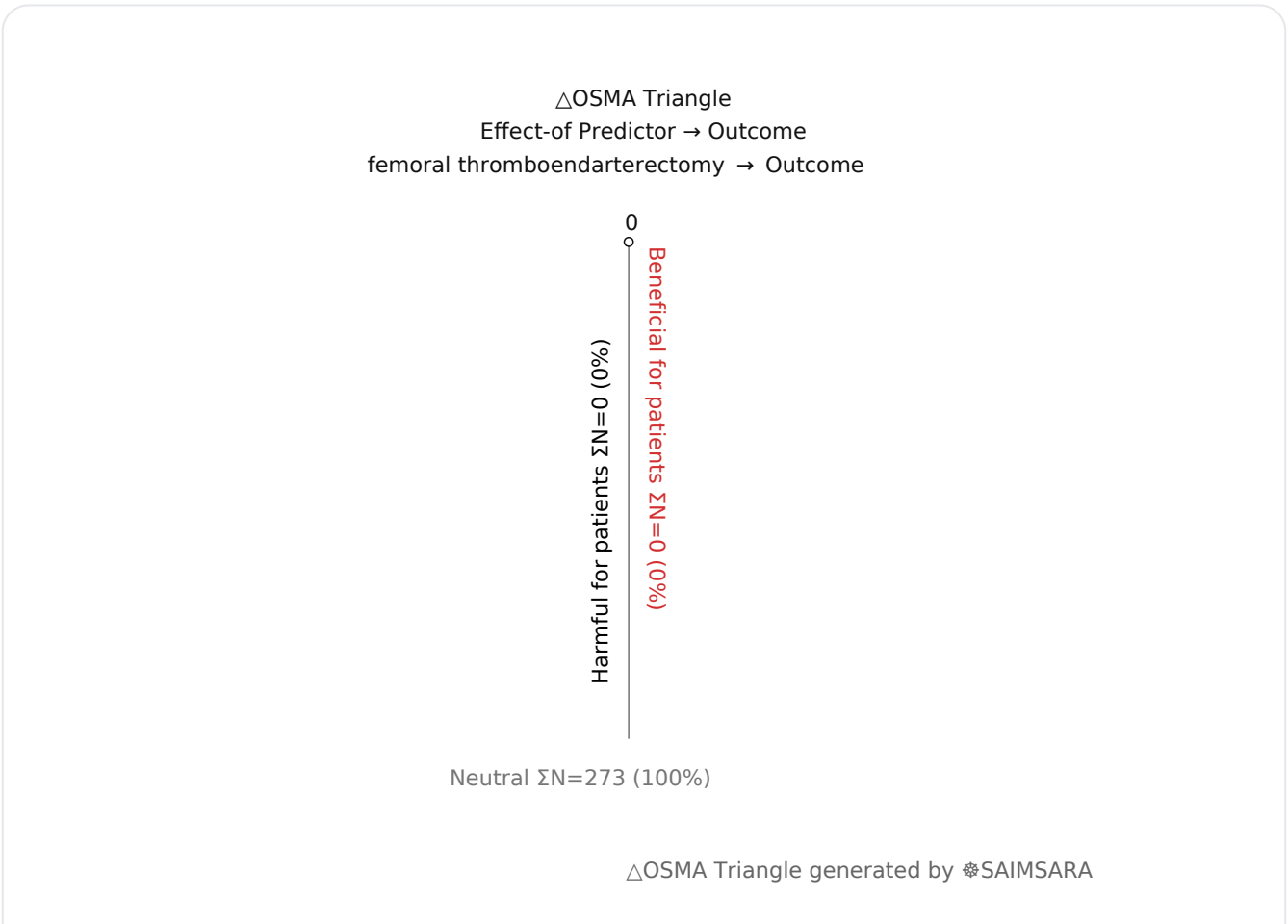
PRISMA Diagram generated by ☸ SAIMSARA


△OSMA Triangle
Effect-of Predictor → Outcome
femoral thromboendarterectomy → Outcome
0
Harmful for patients ΣN=0 (0%)
Beneficial for patients ΣN=0 (0%)
Neutral ΣN=273 (100%)
△OSMA Triangle generated by ☸SAIMSARA

Outcome-Sentiment Meta-Analysis (OSMA): *(LLM-only)*
Frame: Effect-of Predictor → Outcome • *Source*: Semantic Scholar
Outcome: Outcome Typical timepoints: 1-y, peri/post-op. Reported metrics: %, p.
Common endpoints: Common endpoints: complications, patency, mortality.
Predictor: femoral thromboendarterectomy — exposure/predictor.

- **1) Beneficial for patients** — Outcome with femoral thromboendarterectomy — — — ΣN=0
- **2) Harmful for patients** — Outcome with femoral thromboendarterectomy — — — ΣN=0
- **3) No clear effect** — Outcome with femoral thromboendarterectomy — [1], [2], [3], [4], [5], [6], [7] — ΣN=273

1) **Introduction**

Femoral thromboendarterectomy (TEA) is a foundational surgical technique for revascularizing occlusive disease in the common femoral artery (CFA) and associated segments, crucial for managing peripheral arterial disease (PAD). This procedure aims to remove atherosclerotic plaque, thereby restoring arterial patency and improving limb perfusion. Its application spans patients with intermittent claudication (IC) to those suffering from chronic limb-threatening ischemia (CLTI). The efficacy and safety of femoral TEA, alongside considerations for patient selection, perioperative monitoring, and adjunctive therapies, remain key areas of investigation in vascular surgery.

2) **Aim**

This paper aims to systematically review and synthesize current evidence regarding femoral thromboendarterectomy, focusing on its efficacy, safety, physiological impact, and associated clinical considerations, as extracted and structured by a multilayer AI research agent.

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 exhibit a predominance of retrospective designs [1, 3, 6], which inherently carry a higher risk of selection and information bias compared to prospective studies [2, 4]. Small sample sizes in several studies [1, 2, 5, 6] introduce potential for limited generalizability and statistical power. Heterogeneity in patient

populations and procedural scopes across studies further complicates direct comparisons and synthesis.

4) **Results**

4.1 **Study characteristics:** The included literature comprises mixed-design studies [1, 2, 6], cohort studies [3, 4], and a case series [5], with one entry providing general procedural information without specific study design [7]. Retrospective analyses were common [1, 3, 6], alongside prospective investigations [2, 4]. Patient populations varied, encompassing Japanese cohorts with CLTI and IC [1], patients with peripheral arterial disease undergoing revascularization [2], individuals with atherosclerotic CFA occlusive disease [3], and those undergoing various vascular surgeries including femoral TEA [4]. One study focused on aortoiliac occlusive disease [5], while others addressed focal CFA disease [6] or general indications for plaque removal [7]. Follow-up durations were often not specified [1, 2, 4, 6, 7], though some studies reported outcomes at 1 year [3] or up to 6 years [5].

4.2 **Main numerical result aligned to the query:**

Thromboendarterectomy (TEA) for common femoral artery (CFA) occlusive disease demonstrated a 1-year primary patency rate of 92.8%, which was significantly higher compared to stenting (84.6%, p=0.006) [3]. This superiority extended to freedom from reintervention, with TEA achieving a 94.0% rate versus 89.9% for stenting (p=0.030) over the same period [3]. For more extensive aortobiiliofemoral endarterectomy, a 6-year patency rate of 100% was reported [5].

4.3 **Topic synthesis:**

- **CFA TEA Efficacy & Patency:** Thromboendarterectomy (TEA) for common femoral artery (CFA) occlusive disease showed superior 1-year primary patency (92.8% vs 84.6%, p=0.006) and freedom from reintervention (94.0% vs 89.9%, p=0.030) compared to stenting [3].
- **Patient Prognosis by Ischemia Severity:** Patients with chronic limb-threatening ischemia (CLTI) undergoing TEA had significantly lower survival rates (P=0.037) and experienced 30-day mortality and complications, unlike those with intermittent claudication (IC) [1].
- **Perioperative Hemodynamic Monitoring:** Transcutaneous monitoring (TCM) of oxygen (tcpO2) and carbon dioxide (tcpCO2) detected significant changes during common femoral artery clamping, with tcpO2 decreasing by -2.1 kPa and tcpCO2 increasing by 0.9 kPa [2].
- **Antiplatelet Nonresponse:** A high incidence of perioperative acetylsalicylic acid (ASA) nonresponse was observed in vascular surgery patients, including those undergoing femoral TEA, increasing from 20% preoperatively to 35.7% postoperatively (p=0.005) [4].
- **Minimally Invasive Endarterectomy:** Minimally invasive aortobiiliofemoral endarterectomy achieved 100% patency at 6 years with 0% incidence of myocardial

infarction, stroke, death, amputation, intestinal ischemia, and sexual dysfunction for aortoiliac occlusive disease [5].

- **Indications for Endarterectomy:** Endarterectomy is recommended for short lesions and for TransAtlantic Inter-Society Consensus (TASC) C and D lesions, indicating its role in complex occlusive disease [7].
- **Focal CFA Disease Management:** Thromboendarterectomy is a viable procedure for focal occlusive disease of the common femoral artery [6].

5) **Discussion**

5.1 **Principal finding:** Thromboendarterectomy (TEA) for common femoral artery (CFA) occlusive disease demonstrated a 1-year primary patency rate of 92.8%, significantly higher compared to stenting (84.6%, p=0.006) [3]. This highlights TEA's robust efficacy in maintaining arterial patency for a critical vascular segment.

5.2 **Clinical implications:**

- Femoral TEA appears superior to stenting for CFA occlusive disease, suggesting it should be considered the preferred revascularization strategy in this anatomical location based on patency and reintervention rates [3].
- Patient selection is critical, as individuals with chronic limb-threatening ischemia (CLTI) face significantly worse survival outcomes and higher complication rates post-TEA compared to those with intermittent claudication (IC) [1].
- Transcutaneous monitoring of oxygen (tcpO2) and carbon dioxide (tcpCO2) can provide real-time feedback on tissue perfusion changes during femoral artery clamping, offering a potential tool for intraoperative decision-making [2].
- The high incidence of perioperative acetylsalicylic acid (ASA) nonresponse suggests a need for personalized antiplatelet strategies to optimize thrombotic protection in patients undergoing femoral TEA and other vascular surgeries [4].
- Minimally invasive endarterectomy techniques may offer excellent long-term patency and low complication rates for more extensive aortoiliac occlusive disease, potentially expanding surgical options [5].

5.3 **Research implications / key gaps:**

- **Long-term Comparative Effectiveness:** Further prospective studies are needed to compare the long-term patency and clinical outcomes of femoral TEA versus stenting

beyond 1 year for common femoral artery occlusive disease [3].

- **Risk Stratification for CLTI:** Research should focus on identifying specific biomarkers or clinical factors that predict poor survival and complications in CLTI patients undergoing femoral TEA to refine patient selection and optimize perioperative management [1].
- **Impact of ASA Nonresponse:** Future studies should investigate the clinical consequences of perioperative acetylsalicylic acid (ASA) nonresponse on outcomes following femoral TEA and evaluate the effectiveness of alternative antiplatelet regimens [4].
- **Utility of Transcutaneous Monitoring:** Prospective trials are warranted to determine if real-time transcutaneous oxygen and carbon dioxide monitoring during femoral TEA can guide surgical technique or predict postoperative complications, thereby improving patient outcomes [2].
- **Minimally Invasive TEA Expansion:** Comparative studies are needed to assess the generalizability and long-term efficacy of minimally invasive endarterectomy techniques for focal common femoral artery disease or other peripheral arterial segments [5, 6].

5.4 **Limitations:**

- **Retrospective Study Designs** — Many studies relied on retrospective data collection [1, 3, 6], limiting causal inference and increasing potential for selection bias.
- **Small Sample Sizes** — Several studies had small cohorts (N=10 to N=63) [1, 2, 5, 6], which may limit the generalizability and statistical power of their findings.
- **Heterogeneous Patient Populations** — The included studies covered diverse patient groups (IC, CLTI, aortoiliac disease) and varying procedural scopes, making direct comparisons challenging [1, 5].
- **Limited Follow-up Duration** — Outcomes were often reported for short-to-mid-term periods (e.g., 1 year) [3], with long-term data scarce for many aspects of femoral TEA [1, 2, 4, 6].
- **Incomplete Outcome Reporting** — Specific numerical data for critical outcomes like survival rates were not consistently provided across studies [1].

5.5 **Future directions:**

- **Prospective Comparative Trials** — To robustly compare femoral TEA against alternative revascularization strategies like stenting for common femoral artery disease.
- **Long-term Patency Evaluation** — To assess the durability of femoral TEA outcomes beyond 1-6 years across diverse patient cohorts.

- **Personalized Antiplatelet Strategies** — To investigate the clinical impact and optimal management of perioperative ASA nonresponse in vascular surgery patients.
- **Advanced Hemodynamic Monitoring** — To determine if transcutaneous monitoring during TEA can predict or prevent adverse outcomes and guide intraoperative management.
- **Minimally Invasive Technique Evaluation** — To further evaluate the applicability and long-term efficacy of minimally invasive endarterectomy for broader indications.

6) **Conclusion**

Thromboendarterectomy (TEA) for common femoral artery (CFA) occlusive disease demonstrated a 1-year primary patency rate of 92.8%, significantly higher compared to stenting (84.6%, p=0.006) [3]. This suggests that femoral TEA is an effective revascularization strategy, particularly for CFA disease, with promising outcomes extending to complex aortoiliac lesions with minimally invasive approaches. However, the reliance on retrospective designs and small sample sizes in much of the current literature represents a significant limitation to the certainty and generalizability of these findings. Clinicians should prioritize femoral TEA for CFA occlusive disease, while future prospective comparative trials are needed to solidify long-term outcomes and optimize patient management strategies.

References

SAIMSARA Session Index — session.json

Figure 1. Publication-year distribution of included originals

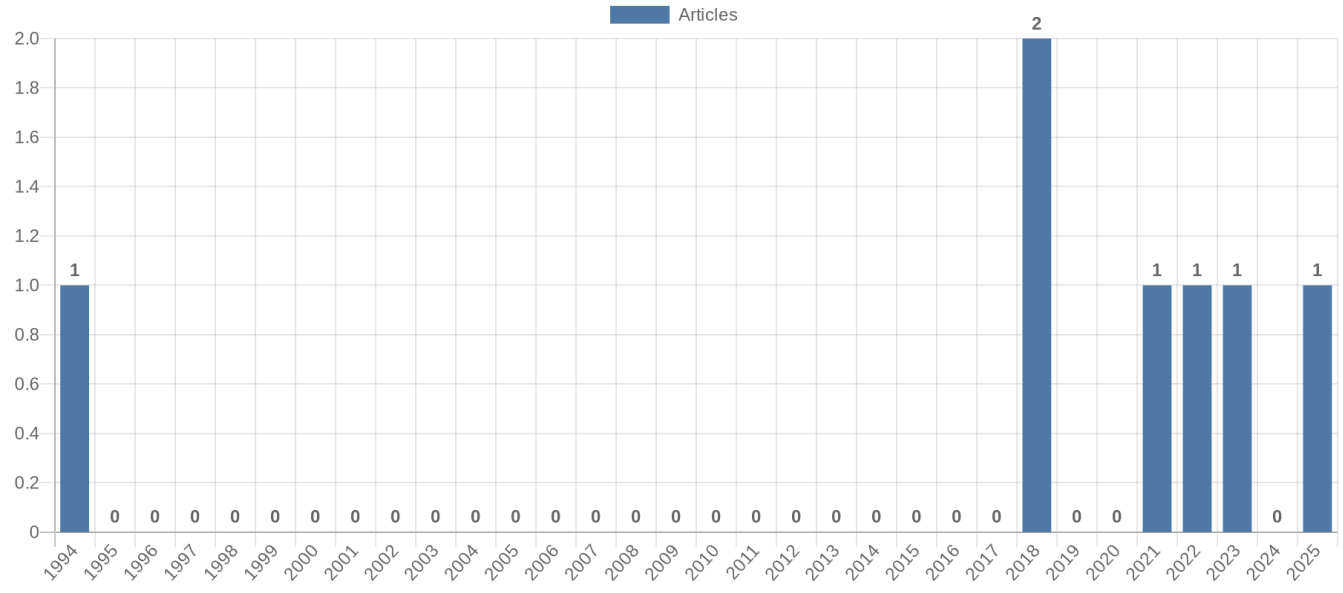


Figure 2. Study-design distribution of included originals

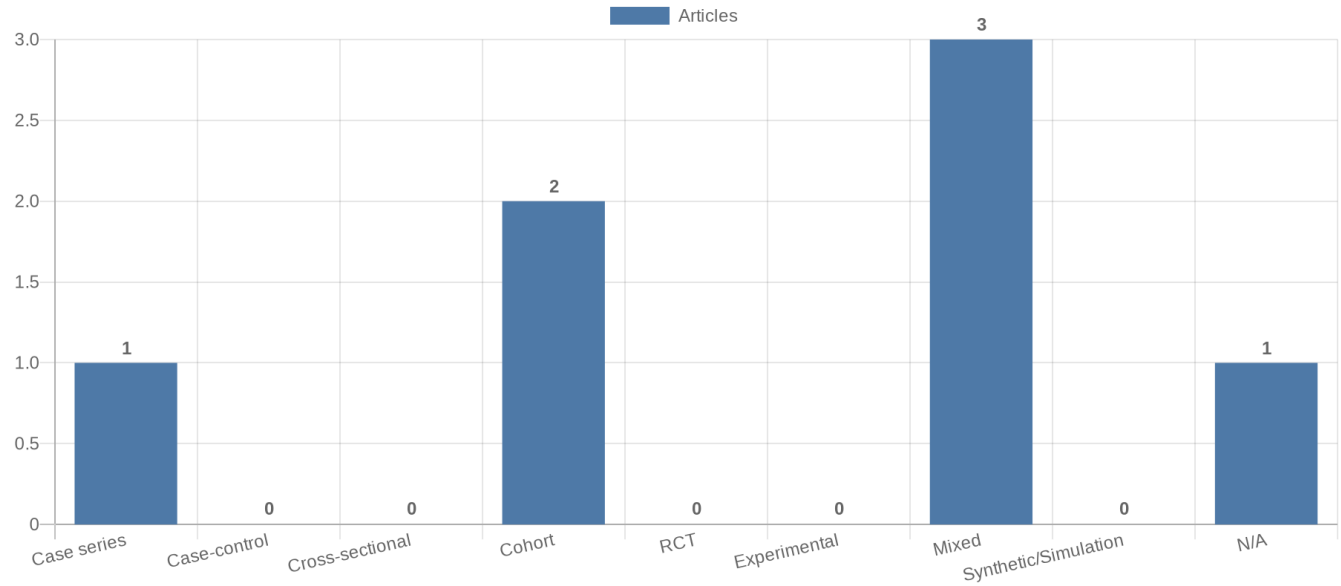


Figure 3. Study-type (directionality) distribution of included originals

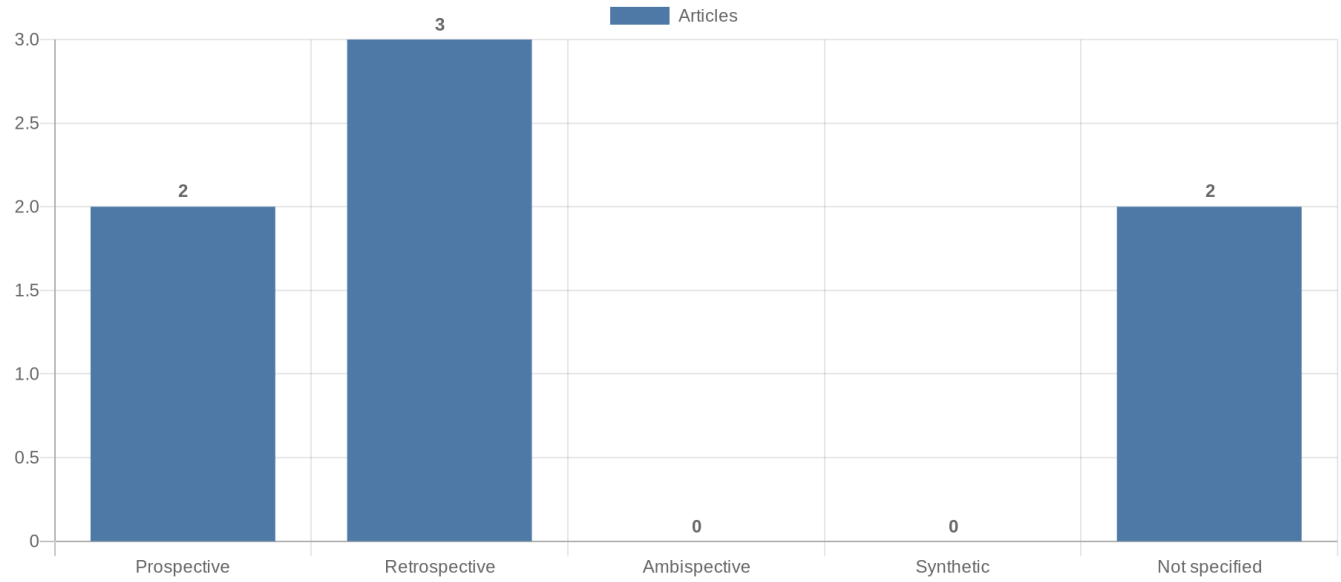


Figure 4. Main extracted research topics

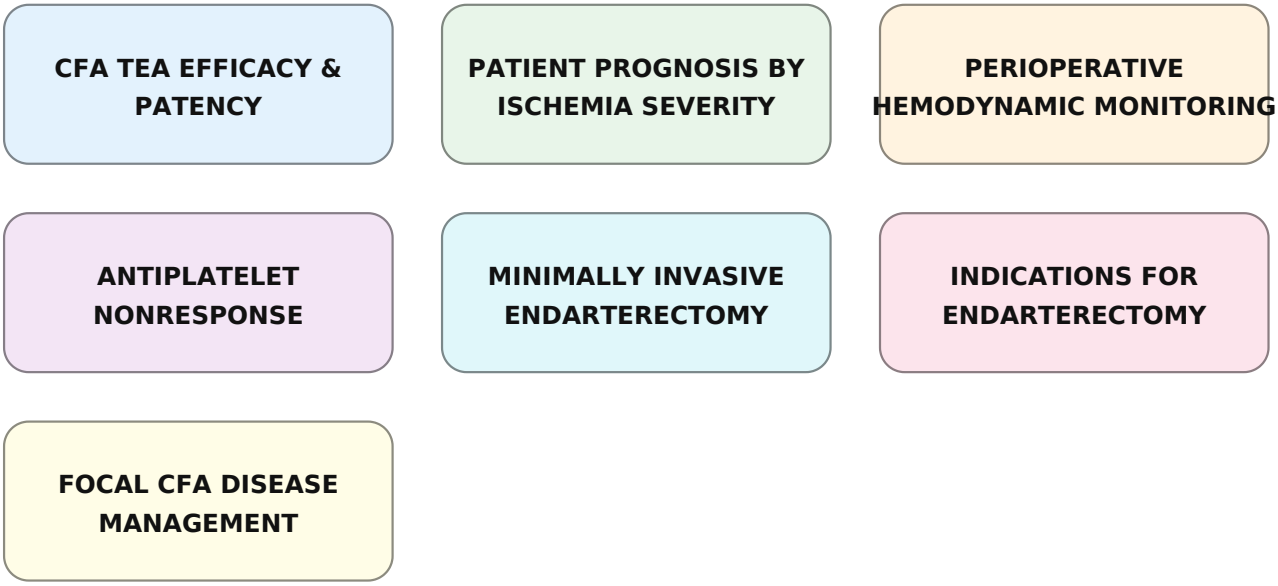


Figure 5. Limitations of current studies (topics)

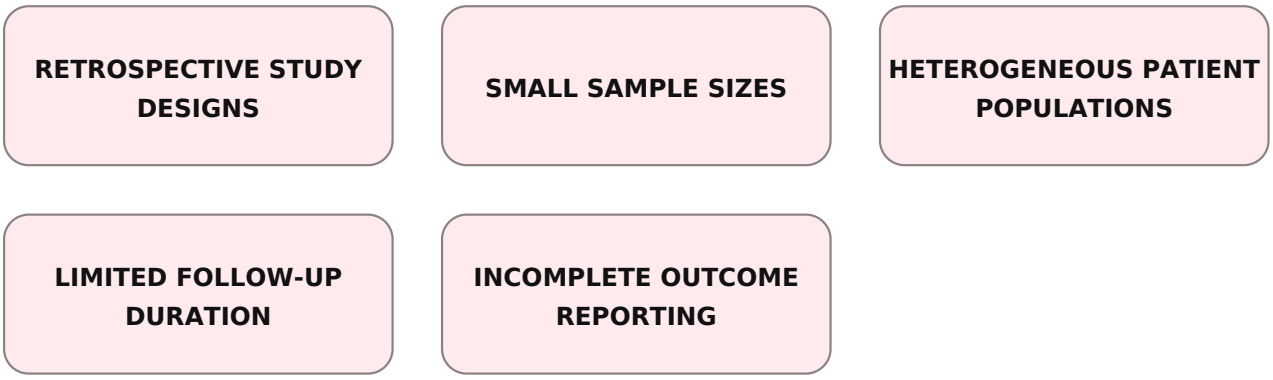


Figure 6. Future research directions (topics)