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Factors influencing patency after autogenous arteriovenous fistula post-PTA: a meta-analysis and systematic review

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ADMINISTRATIVE INFORMATION

Support - No funding was received for this study.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 September 2025 and was last updated on 7 September 2025.

INTRODUCTION

Review question / Objective What are the factors influencing the patency of autogenous arteriovenous fistulas (AVFs) after percutaneous transluminal angioplasty (PTA) based on a meta-analysis and systematic review?

Condition being studied This study focuses on autogenous arteriovenous fistulas (AVFs), which are surgically created vascular access points used for hemodialysis in patients with end-stage renal disease (ESRD). AVFs are typically formed by connecting an artery to a vein, allowing for a high blood flow to support dialysis treatments. However, AVFs are prone to complications such as thrombosis and stenosis, leading to the need for interventions like percutaneous transluminal angioplasty (PTA) to maintain patency. The effectiveness of PTA in preventing AVF thrombosis and maintaining long-term access is crucial for the management of dialysis patients. This study aims to evaluate the factors influencing the patency of AVFs after PTA procedures, with a particular focus on patient characteristics and procedural variables.

METHODS

Participant or population The review will focus on adult patients (age ≥ 18) with ESRD who have undergone AVF creation. Specifically, the study will include patients who have received PTA to maintain AVF patency. Participants will come from various demographic backgrounds, including different age groups and sexes.

Intervention This review evaluates the impact of PTA as an intervention to maintain patency in AVFs in patients with ESRD. The analysis includes various factors related to the PTA procedure, such as the technique and patient characteristics, that may influence the long-term success of the intervention.

Comparator As this is a systematic review and meta-analysis of factors influencing AVF patency

after PTA, there is no direct comparative intervention group. The review compares the impact of different variables (e.g., patient characteristics, procedural factors) on the outcomes of PTA, rather than comparing PTA with an alternative intervention.

Study designs to be included This review will include observational studies, such as cohort studies, case-control studies, and cross-sectional studies, as well as randomized controlled trials (RCTs) if available. Studies that examine the impact of various factors (e.g., patient characteristics, procedural factors, post-operative management) on the patency of AVFs after PTA will be included.

Eligibility criteria Studies that include adult patients (age ≥ 18) with ESRD who have undergone AVF creation.Studies that assess the effects of PTA on the patency of AVFs in patients with ESRD. Studies reporting relevant outcome measures, such as AVF patency rates or any other complication rates post-PTA.

Information sources We will search electronic databases such as PubMed, Embase, Cochrane Library, and Web of Science for relevant studies. Additionally, we will review trial registers (e.g., ClinicalTrials.gov), and contact authors of relevant studies for unpublished data or clarification if necessary. Grey literature, including government reports or institutional repositories, may also be considered to ensure comprehensive data inclusion.

Main outcome(s) The main outcomes of this review are the patency indicators of AVF after PTA, including primary patency, secondary patency, assisted primary patency, and restenosis. Effect measures will include odds ratios (ORs) or hazard ratios (HRs) to compare the factors influencing AVF patency, with subgroup analyses based on patient characteristics and procedural details.

Quality assessment / Risk of bias analysis The quality of the included studies will be assessed using the Cochrane Collaboration's Risk of Bias (RoB) tool for randomized controlled trials (RCTs) and the Newcastle-Ottawa Scale (NOS) for observational studies.The Cochrane RoB tool evaluates the risk of bias across several domains, including selection bias, performance bias, detection bias, attrition bias, reporting bias, and other potential sources of bias. For observational studies, the NOS will be used to assess the quality of studies based on three main criteria: selection, comparability, and exposure/outcome assessment. Any studies with high risk of bias or unclear methodological quality will be excluded or analyzed with caution.

Strategy of data synthesis Data synthesis will include a meta-analysis of the extracted data, with effect measures for the primary and secondary outcomes including ORs and HRs. A random-effects model or fixed-effects model will be used to account for heterogeneity between studies. Subgroup analyses will be performed based on patient characteristics, procedural details, and different types of PTA interventions. If the data are too heterogeneous, a narrative synthesis will be conducted. Sensitivity analyses will also be performed to assess the robustness of the results based on the risk of bias in the included studies.

Subgroup analysis Subgroup analysis will be based on patient characteristics (e.g., age, sex, comorbidities such as diabetes) and procedural factors (e.g., balloon diameter, balloon type, number of balloon dilations). This analysis aims to explore the differences in AVF patency outcomes after PTA across different subgroups. The impact of these factors on primary patency, secondary patency, and other complications will be assessed separately within the subgroups to provide more specific insights into the factors influencing the success of PTA.

Sensitivity analysis Sensitivity analysis will assess the robustness of the results by examining the impact of study quality and risk of bias. This analysis will exclude studies with a high risk of bias or unclear methodology to evaluate whether the overall conclusions change.

Country(ies) involved The study is being carried out in China, with authors and affiliations from the third hospital of Mianyang.

Keywords Autogenous arteriovenous fistula; percutaneous transluminal angioplasty; patency; restenosis; end-stage renal disease.

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