

INPLASY PROTOCOL

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Prevalence and Prognostic Associations of Early Postoperative Stroke and Death among Patients Undergoing Inner Branched Thoracic Endovascular Repair of Aortic Arch Pathologies: A systematic Review and Meta-analysis

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Review question / Objective: To assess the prevalence and associations of early postoperative stroke and death among patients undergoing inner branched thoracic endovascular aortic repair (TEVAR) of arch pathologies.

Eligibility criteria: Our including criteria are as follows: 1) Patients with aortic arch pathologies, who were judged unfit for open surgery in a multidisciplinary path; 2) using inner branched TEVAR for the endovascular repair. 3) report the prevalence of 30-day postoperative stroke or death as result. Excluding criteria: 1) combined with fenestration or chimney in TEVAR; 2) full-text unavailable; 2) case reports with fewer than three cases; 3) studies with an only reconstruction of the left subclavian artery (LSA) rather than innominate artery or left common carotid artery (LCCA).

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 03 August 2022 and was last updated on 03 August 2022 (registration number INPLASY202280010).

INTRODUCTION

Review question / Objective: To assess the prevalence and associations of early postoperative stroke and death among patients undergoing inner branched thoracic endovascular aortic repair (TEVAR) of arch pathologies.

Condition being studied: To this day, perioperative stroke and death in the clinical treatment of aortic arch diseases were still a major concern for vascular surgeons and patients. It was reported that traditional open surgery and hybrid approach remained associated with a significant risk of perioperative stroke and

death for arch pathologies. With the promotion of fenestrated and branched thoracic endovascular aortic repair (TEVAR), more and more people tend to choose endovascular surgery for aneurysm or dissection involving the proximal aortic arch, especially for patients with a high risk of anesthesia, poor general condition, advanced age, or more serious comorbidities. As the fenestrated TEVAR seems to be associated with higher mortality and narrower anatomic suitability, inner branched TEVAR is more commonly used in Ishimaru zone 0 and 1. Currently, a variety of custom-made or "off-the-shelf" inner branched devices have been developed to treat the arch disease. However, for the lack of high-quality evidence, the role of endovascular techniques has been highlighted only in few guidelines based on expert opinion. Many factors were thought to be associated with postoperative stroke or mortality in endovascular repair of arch disease, such as learning curve, air embolism, surgical approaches, et al. But so far, what has the real influence over the postoperative stroke and death of inner branched TEVAR in the treatment of aortic arch disease has not been identified. This review aimed at examining the pooled prevalence and possible vulnerability factors of 30-day postoperative stroke and death among patients undergoing inner branched TEVAR in the treatment of aortic arch pathologies.

METHODS

Participant or population: Patients with aortic arch pathologies, who were judged unfit for open surgery in a multidisciplinary path.

Intervention: Inner branched TEVAR.

Comparator: Non-applicable. Because all included studies were observational studies.

Study designs to be included: Observational studies.

Eligibility criteria: Our including criteria are as follows: 1) Patients with aortic arch pathologies, who were judged unfit for open surgery in a multidisciplinary path; 2) using inner branched TEVAR for the endovascular repair. 3) report the prevalence of 30-day postoperative stroke or death as result. Excluding criteria: 1) combined with fenestration or chimney in TEVAR; 2) full-text unavailable; 2) case reports with fewer than three cases; 3) studies with an only reconstruction of the left subclavian artery (LSA) rather than innominate artery or left common carotid artery (LCCA).

Information sources: We identified the following electronic databases for literature retrieval: PUBMED, EMBASE, and Cochran Central Register of Controlled Trials (CENTRAL). No time range or language restrictions was set for the retrieval, and the last search was on February 4, 2022.

Main outcome(s): The prevalence of 30-day (early) postoperative stroke, death, and combined stroke/death was considered the primary outcome measure.

Additional outcome(s): The secondary outcomes were the rates of technical success and late aorta-related death.

Quality assessment / Risk of bias analysis: Two authors independently assessed the methodological quality and risk of bias of included articles based on the JBI Critical Appraisal Checklist for Case Series. (All included studies were case series.)

Strategy of data synthesis: Meta-analysis software, Meta (R package) by Schwarzer using R software package version 4.0.5, was used in this study. Two trained investigators respectively extracted data from included studies and any disparities between them will be solved in a discussion with the third one. Extracted information includes: (1) study-related data; (2) information related to the risk of bias assessment; (3) demographics and clinical characteristics of the study populations; and (4) outcome data.

Subgroup analysis: A subgroup analysis (R software package version 4.0.5) was taken in an indirect way which grouped the possible risk factors by the mean of their percentages. The Odd Ratios (ORs) were also calculated to indicate the correlation strength (IBM SPSS Statistics 26.0). Subgroup analyses were done according to the following variables which might differ or matter in the influence of early postoperative stroke rate or mortality: (1) study location: individual country or multiple countries; (2) device-related: brand; (3) demography: age, sex; (4) comorbidities: smoking, diabetes mellitus (DM), coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), cerebrovascular disease (CVD), chronic kidney disease (CKD); (5) aortic arch pathologies: non-dissection related; (6) surgical strategy: with carbon dioxide flushing; staged left subclavian artery revascularization; emergency.

Sensitivity analysis: Post-hoc sensitivity analysis including leave-one-out analysis and Baujat diagnostics were also done.

Language restriction: Only studies written in English will be included in this study.

Country(ies) involved: China.

Keywords: Thoracic endovascular aortic repair; TEVAR; branch; Aortic arch; Meta-analysis; Systematic review.

Contributions of each author:

Author 1 - Jiang-Ping Gao - Author 1 proposed this idea, collected the data, drafted the manuscript and perform statistical analysis.

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Author 3 - Hong-Peng Zhang - The author proposed this idea, collected the data, perform statistical analysis, and revise the article.

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