Is TEVAR an effective approach to prevent complications related to residual false lumen after surgery for aortic dissection type A? A systematic review.

Nikolaos Schizas, Georgia Nazou, Ilias Samiotis, Constantine N Antonopoulos, Dimitrios C. Angouras

Abstract

Introduction: Residual false lumen after treatment for Aortic Dissection type A (AD) has been associated with early complications, such as malperfusion or rupture and mid-term or delayed complications, such as aneurysm formation or dissection expansion. Thoracic Endovascular Aortic Repair (TEVAR) is considered an effective solution by several surgical teams to prevent future complications. In this systematic review, all published data regarding the implementation of TEVAR after previous treatment for AD were collected in order to investigate indications, methods, clinical outcomes and aortic remodeling in these patients.

Methods: The aim of this study was to investigate the indications, the methods and the efficacy of TEVAR usage after surgical treatment of AD. Data for this study were collected from four widely used medical databases (MEDLINE, SCIENCE DIRECT, GOOGLE SCHOLAR, OVID). All the results for each database were recorded and were analyzed with systematic method. Techniques and clinical outcomes were investigated. Aortic remodeling was evaluated based on the following parameters in these studies: aortic diameter, true lumen diameter, false lumen diameter, false lumen thrombosis and false lumen patency

Results: The results obtained from search among all databases were 1,410 articles and the articles included in the review were 9. The majority of the studies were retrospective (7/9 studies), while no study was randomized. The total number of patients were 157 and 133 of them (84.7% of patients) were treated with TEVAR in zone 3 without extension below diaphragm intraoperatively. Among 142 patients the calculated mortality rate was 12.7% (18 of 142 patients) and 2.8% (4 of 142 patients) presenting stroke. **The percentage of patients with total or partial thrombosis combined was 65,9% (62 patients in a population of 92). Re-intervention rate was 18,7%**

Conclusions: **TEVAR after AD surgery is an approach usually chosen in clinical practice, but the criteria of its usage are uncertain. This method is safe, enhances aortic remodeling with acceptable reintervention rate**. Definite guidelines on this field should be created in order to delineate whether TEVAR after AD surgery is beneficial as preventive measure to aorta related complications and under which criteria this approach should be chosen.

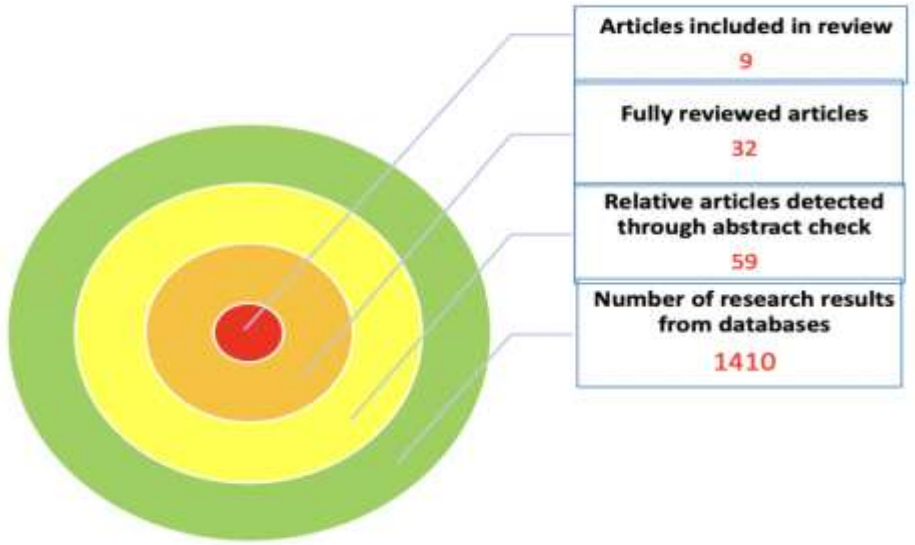

Figure 1: Flow diagram of the article selection process.

Table 4: Information regarding follow-up, aortic remodeling parameters and reinterventions.

Publication	Year	Type of study	Study period	Number of patients	Time of intervention	Criteria of TEVAR	Technical parameters
Jakob et al	2008	Retrospective observational comparative	2001-2007	4	Intraoperative	De Bakey 1 dissection and findings from CTA that were considered eligible from antegrade TEVAR according to surgeons' aspects	Talent stent graft
Shimamura et al	2008	Retrospective observational	1994-2004	29	Intraoperative	Presence of entry tear in distal arch or descending thoracic aorta that couldn't be treated with hemiarch replacement	Custom made from Gianturco stent and WSL graft
Pochettino et al	2009	Retrospective observational	2005-2008	24	Intraoperative	Presence of entry tear in distal arch or descending thoracic aorta	GORE TAG graft
Preventza et al	2014	Prospective invasive - Comparative study (surgical approach changed in 2009)	2005-2012	25	Intraoperative	Malperfusion. Aneurysmal dilation of proximal descending aorta. Extend of dissection to the diagram (Criteria are not specific but defined by the surgeon's aspect)	GORE TAG graft till October 2011 Conformable TAG device after November 2011
Sultan et al	2017	Retrospective observational comparative	2006-2014	21	Intraoperative	All patients surviving at least 1 year in whom CT Angiography of 1 month and 1 year could be obtained.	GORE TAG graft
Di Tommaso et al	2018	Retrospective observational	2009-2015	11	4.7 +/- 2.3 years	Aortic diameter >45mm Aortic growth >5mm/year Impenting rupture	Bare stent 5 patients Djumbodies Dissection System 6 patients Jotec E-XL
Morishita et al.	2019	Prospective non-randomized trial (Observational on new management strategy)	2015-2016	11	122 (50-197) days	1) Age<60 years, 2) Patent false lumen 3) Aortic diameter >46mm	Bare metal stent (Zenith dissection endovascular system) 4 cases required left subclavian artery revascularization
Gaudry et al.	2021	Prospective observational	2017-2019	2	Not defined	Aortic diameter >55mm Rapid aortic growth (>10mm/year). Malperfusion syndrome Aortic rupture	Bare stent STABILISE technique
Li et al	2022	Retrospective observational comparative	2016-2019	30	Intraoperative	True lumen collapse less than 50%	20 Conform TAG, 5 GORE TAG,2 Navion,2 Zenith Diss,1 Zenith TX2

Table 2: All studies regarding TEVAR usage after surgically treated aortic dissection type A. Information regarding the type of study, study period, number of patients, time of intervention, criteria of TEVAR and technical parameters.

Publication	Year	Number of patients	Preoperative False lumen diameter	Preoperative Patent false lumen	Organ malperfusion (preoperatively)	Mortality	Stroke
Jakob et al	2008	4	Not mentioned	Not mentioned	Not mentioned	Not certain due to combined group (Change of treatment during study period)	Not certain due to combined group (Change of treatment during study period)
Shimamura et al	2008	29	Not mentioned	Not mentioned	7 cases malperfusion of lower extremity	2 deaths in-hospital	0
Pochettino et al	2009	24	Not mentioned	Not mentioned	3/36 transcient paraparesis	5 deaths in-hospital deaths	1
Preventza et al	2014	25	Not mentioned	Not mentioned	19	3	3
Sultan et al	2017	21	Not mentioned	Not mentioned	0	0	0
Di Tommaso	2018	11	44.1 +/- 2.3	All patent	0	1	0
Morishita et al.	2019	11	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Gaudry et al.	2021	2	55.7mm	Not mentioned	0	0	0
Li et al	2022	30	Not mentioned	Not mentioned	0	4 deaths in-hospital and 3 deaths in follow-up period	0

Table 3: Data regarding preoperative findings regarding pre-TEVAR false lumen characteristics and clinical status. Additionally, the clinical outcomes (mortality, stroke) after TEVAR are presented.

Is TEVAR an Effective Approach to Prevent Complications after Surgery for Aortic Dissection Type A? A Systematic Review

by Nikolaos Schizas [1,2,*], Georgia Nazou [3], Ilias Samiotis [4], Constantine N. Antonopoulos [5] and Dimitrios C. Angouras [2]

[1] 4th Cardiac Surgery Department, Hygeia Hospital, 151 23 Marousi, Greece

[2] Department of Cardiac Surgery, Medical School, National and Kapodistrian University, 157 72 Athens, Greece

[3] Anesthesiology Department, Evangelismos General Hospital, 106 76 Athens, Greece

[4] Cardiovascular and Thoracic Surgery Department, Evangelismos General Hospital, 106 76 Athens, Greece

[5] Department of Vascular Surgery, Medical School, National and Kapodistrian University, 157 72 Athens, Greece

[*] Author to whom correspondence should be addressed.

Healthcare **2024**, *12*(13), 1263; **https://doi.org/10.3390/healthcare12131263**