www.jcimcr.org

JCIMCR OPEN ACCESS Journal of Clinical Images and Medical Case Reports

ISSN 2766-7820

Research Article

Open Access, Volume 5

Endovascular repair of acute type B aortic dissection: Main complications during 30 postoperative days

Paulo Guilherme Bezerra Braga*; Mauro Barbosa Arruda Filho

Hospital Pronto-Socorro Cardiológico de Pernambuco (PROCAPE), Universidade de Pernambuco, Recife, PE, Brazil.

***Corresponding Author:**

Paulo Guilherme Bezerra Braga

Hospital Pronto-Socorro Cardiológico de Pernambuco (PROCAPE), Universidade de Pernambuco, Recife, PE, Brazil.

Tel: 55-81-998817920;

Email: paulodguilherme@gmail.com

Received: Mar 28, 2024

Accepted: Apr 23, 2024

Published: Apr 30, 2024

Archived: www.jcimcr.org

DOI: www.doi.org/10.52768/2766-7820/3018

Abstract

Introduction: Diseases of the aorta are moving towards less invasive approaches, with Thoracic Endovascular Repair (TEVAR) standing out. TEVAR is already a well-known intervention with clear benefits over conventional surgery. In addition to the benefits of this type of procedure, it is also necessary to recognize the main postoperative complications related to this approach. The aim of this study was to identify the main complications in the first 30 days after procedure in patients undergoing TEVAR, as well as to assess the main comorbidities that contribute to the development of complications.

Methods: We selected 75 medical records of adult patients who underwent TEVAR procedure between 2016 and 2021, using the database stored in our hospital and analyzed comorbidities and postoperative complications.

Results: Population was composed mainly by men 47 (69.2%), mean age of 62 years, with main comorbidities being: hypertension 70 (93.3%), smoking 38 (50.6%), dyslipidemia 15 (20%). Repair of acute type B thoracic aortic dissection was associated with a 30-day postoperative hospital mortality rate of 2.6% and a 1-year survival rate of 91.4%. The average length of stay in intensive care unit was 5 days and mean length of hospital stay was 13 days. The main complications were: Bleeding 11 (14.6%), endoleak 7 (9.3%) and acute myocardial infarction 7 (9.3%).

Conclusion: Surgical treatment of acute type B aortic dissections using TEVAR has shown satisfactory results for aortic diseases, making it the treatment of choice in some services.

Keywords: Endovascular repair; Acute aortic dissection; TEVAR; Aortic disease.

Introduction

Acute type B aortic dissection is a medical condition typically managed with anti hypertensive therapy [1]. However, up to 30% of patients with this type of dissection will develop complications such as poor perfusion, refractory pain, and impending aortic rupture. In these cases, Thoracic Endovascular Aortic Repair (TEVAR) becomes a surgical urgency requiring endovascular intervention to complement medical therapy [1,2]. TEVAR is an approach that can restore flow to the true lumen, stabilize the aneurysm, and prevent rupture [1-3]. Approximately one-third of patients with acute type B aortic dissection will develop complications requiring TEVAR [1]. TEVAR as an option for patients with type B aortic dissection is considered life-saving in the setting of complications such as con-

tained rupture or malperfusion syndrome, although its role in uncomplicated dissection is unknown [1-3]. Traditionally, stable patients are treated with medical management (annual survival ≥ 80%) [4,7]. Although TEVAR is generally a low risk procedure, complications can occur [1]. Internal leaks of types I and II are the most common after endovascular repair of thoracic and abdominal aneurysms. Early recognition and effective correction of these complications are crucial to optimizing clinical outcomes and minimizing potential additional complications [4-6]. Internal leaks (endoleaks) represent the most frequent complication after TEVAR. These endoleaks indicate persistent blood flow permeating the residual aneurysm sac, suggesting a failure in complete aneurysm exclusion. Despite the potential perioperative risks associated with TEVAR, evidence suggests that the benefits in terms of medium- to long-term survival may outweigh perioperative morbidity and mortality [8,9]. Therefore, the decision to opt for TEVAR in uncomplicated cases of type B aortic dissection involves careful assessment of the risks and benefits associated with the procedure. The aim of the present study was to identify the main complications in the first 30 days postoperatively in patients undergoing TEVAR for type B aortic dissection treatment, as well as to evaluate major comorbidities contributing to complication development.

Material and methods

Study design: This is a retrospective study with a quantitative approach. Medical records of adult patients with type B aortic dissection who underwent TEVAR from January 2016 to January 2021 were selected using the database stored in the Electronic Patient Record Service (PEP), Cardiological Emergency Hospital of Pernambuco (PROCAPE) in Recife-PE. Patients undergoing TEVAR indicated after the diagnosis of type B aortic dissection during the period 2016-2021 were included. Patients with other concurrent surgeries or reoperations were excluded. The study was conducted following the Helsinki Declaration and approved by the Research Ethics Committee of HUOC/PROCAPE Complex, according to the resolution of the National Health Council.

All 75 patients with isolated type B aortic dissection underwent TEVAR procedures. Diagnosis and therapeutic planning were based on CT angiography in all cases, with preoperative arteriography being an optional diagnostic method.

Data collection and definition: Data collection identified specific clinical information necessary for the research in electronic medical records. This process guided data selection and the definition of inclusion and exclusion criteria. For data analysis, a database was constructed in Microsoft Excel Office 2019 spreadsheet, which was exported to SPSS software (Statistical Package for the Social Sciences), version 18, for analysis. To characterize the personal and clinical profile of the evaluated patients, percentage frequencies were calculated, and respective frequency distributions were constructed.

Results

Most patients were male (62.7%) and mean sample age was 62 ± 12.4 years. Systemic Arterial Hypertension (SAH) was the most prevalent comorbidity (93.3%), followed by smoking (50.6%), dyslipidemia (20%), and Coronary Artery Disease (CAD) (10.6%). Table 1 summarize demographic and clinical characteristics finding.

Table 1: Demographic and clinical characteristics of patients undergoing TEVAR.

Characteristics	N	%
Male	47	62.7
Age	62 ± 12.4	
Systemic arterial hypertension	70	93.3
Diabetes mellitus	06	8.0
Smoking	38	50.6
Alcoholic consumption	06	8.0
Cronic Kidney Disease	06	8.0
Dyslipidemia	15	20.0
Coronary Artery Disease	08	10.6

Regarding anatomic sites, we found that 33.3% of patients had concomitant dissection of supra-aortic trunks and 23 (30.6%) required coverage of left subclavian artery during TEVAR procedure. Fortunately, during planning for operation, all patients at risk for left subclavian artery coverage were identified and a left carotid - left subclavian artery bypass could be safely performed previously to TEVAR procedure.

Table 2: Anatomical features and associated procedures.

Clinic characteristics and procedures	N	%
Dissection of supra-aortic trunks	25	33.3
Organic ischemia	04	5.3
Left subclavian artery coverage	23	30.6
Left subclavia artery revascularization	23	30.6

Table 3: Clinical outcomes and associated complications.

Clinic characteristics and procedures	N	%
ICU stay (days)	5.2 ± 5.9	-
Hospital stay (days)	19.6 ± 13.6	-
MI	07	9.3
Stroke	02	2.6
Bleeding	11	14.6
Bleeding from surgical site	09	12.0
Retroperitoneal bleeding	01	1.3
Aorto-gastric fistula	01	1.3
Endoleak	07	9.3
Type 1B	6	8.0
Type 3	1	1.3
Retrograde Dissection	4	5.3
Prosthesis infection	1	1.3
Death	02	2.6

Table 3 provides information on clinical outcomes and complications. Mean ICU stay and mean hospital stay was 5.2 and 19.6 days, respectively. Main complication was bleeding from surgical site, most due to endoleaks (9.3%). Only 1 patient had retroperitoneal bleeding and 1 patient developed aorto-gastric fistula. MI happened in 7 patients (9.3%). Stroke occurred in 2 patients. Seven patients developed endoleak, most commonly type 1B. Four patients evolved with retrograde dissection and 1 patient had prosthesis infection. Overall 30-day mortality was 2.6%.

Discussion

TEVAR is rapidly surpassing traditional open surgical intervention as the preferred procedure for patients undergoing descending thoracic aorta intervention [12]. Type IA Endoleaks immediately after TEVAR in patients with type B aortic dissection are relatively common, and their immediate appearance may indicate worsening clinical condition. However, in our research, type IB endoleaks were the most common, found in 6 patients (8%), with 1 case of type 3 endoleak (1.3%). The prevalence of endoleak in this study was 7 cases (9.3%), similar to other studies showing a prevalence of 10-12%, aligning with current literature [3].

The ADSORB trial, a prospective randomized study of acute type B aortic dissection where no mortality at 30 days was observed in the conservative treatment group or in the TEVAR group for uncomplicated acute type B aortic dissection. Short-term results were favorable compared to conservative treatment alone, showing lower all-cause mortality rates at one year (91.6 vs. 85.5%) for cases undergoing endoprosthesis treatment [12]. Comparatively, our study presented a one-year survival rate of 91.4%, showing favorable and consistent data with international literature.

The goal of initial treatment for uncomplicated acute type B aortic dissection is to prevent aortic events in the acute phase. However, after conservative treatment in the acute phase, numerous patients progress to aortic dissection during follow-up, requiring surgical treatment in the chronic phase. TEVAR for uncomplicated acute type B aortic dissection is performed from the perspective of preventing aortic events such as aneurysm formation and rupture during the chronic phase. Some cases cause aneurysm enlargement, contributing to the risk of aortic rupture, which is widely related to determining the TEVAR indication criteria for uncomplicated acute type B aortic dissection. Residual blood flow to the false lumen through peripheral re-entry after TEVAR is an important factor related to aneurysm enlargement of the aorta in the chronic phase and remains a significant problem [13].

For cases of type B aortic dissection, TEVAR is referred to as class I recommendation and listed as class IIa for uncomplicated type B aortic dissection [19]. Stroke is a feared complication in open aortic repair; TEVAR has shown a combined stroke prevalence of 4.1%, with an incidence of 7.2% marking the upper limit of reported stroke occurrences. The use of TEVAR has demonstrated an intra-hospital mortality rate as low as 7.3%, a hospital stroke rate of 1.9 to 6.4%, and a 30-day mortality rate of 8% [14]. Our study found 2 cases of stroke (2.6%) within 30 days, with no deaths.

The INSTEAD-XL trial indicated lower overall and specific aortic mortality with TEVAR compared to medical management: 7 versus 19% and 11 versus 19%, respectively[16]. The management of acute type B aortic dissection by open surgery represents a significant challenge in medical practice, presenting an in-hospital mortality rate of 22.4%, and it was also evidenced that the majority of patients developed at least one postoperative complication, emphasizing the complexity of this condition [17]. Despite improvements over time in organ and spinal cord protection strategies during surgical procedures, open repair is still associated with considerable rates of mortality and morbidity, even when performed in specialized and excellent centers [18].

Conclusion

In this study, we presented survival rates and complication rates within those observed in other institutions, demonstrating satisfactory results. Despite advancements, it remains important to identify the main evident complications of the procedure and formulate the best therapeutic approach for the long-term prognosis of patients.

Declarations

Data availability: Under reasonable request, specific data can be shared after ethical committee analysis.

Funding: The authors received no financial support for the research, authorship, and/or publication of this article.

Conflict of interest: The authors have declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

1. Tolenaar JL, et al. Predicting in-hospital mortality in acute type B aortic dissection: Evidence from International Registry of Acute Aortic Dissection. Circulation 2014; 130: S45-50.
2. Evangelista A, et al. Insights from the International Registry of Acute Aortic Dissection: A 20-Year Experience of Collaborative Clinical Research. Circulation 2018; 137: 1846-60.
3. Lombardi JV, et al. Society for Vascular Surgery (SVS) and Society of Thoracic Surgeons (STS) reporting standards for type B aortic dissections. J Vasc Surg. 2020; 71: 723-47.
4. Svensson LG, et al. Expert consensus document on the treatment of descending thoracic aortic disease using endovascular stent-grafts.Ann Thorac Surg. 2008; 85(1 suppl): S1-41.
5. Fattori R, et al. Optimal management of traumatic aortic injury. Eur J Vasc Endovasc Surg 2009; 37: 8-14.
6. Nienaber CA, et al. TEVAR in complicated type B aortic dissection. J Vasc Surg. 2011; 340: 1529-1533.
7. Golledge J, Eagle KA. Acute aortic dissection. Lancet. 2008; 372: 55-66.
8. Day D, Walker TG. Complications of endovascular aneurysm repair of the thoracic and abdominal aorta: Evaluation and management. Cardiovasc Diagn Ther. 2018; 8(Suppl 1): S138-S156.
9. Okabe R, Morioka N, Katayama H, Nakamatsu S, Shirota K, et al. Type II endoleak repair after endovascular abdominal aortic repair using a computed tomography-guided percutaneous transabdominal approach. J Vasc Surg Cases. 2015; 1(4): 236-238.
10. Katsargyris A, et al. Incomplete expansion of chimney stent graft during chimney-thoracic endovascular aneurysm repair. Ann Vasc Surg. 2017; 39: 293.e1-5.
11. Tjaden BL Jr, et al. Outcomes from the Gore Global Registry for endovascular aortic treatment in patients undergoing thoracic endovascular aortic repair for type B dissection. J Vasc Surg. 2018; 68: 1314-23.
12. Brunkwall J, et al. Endovascular Repair of Acute Uncomplicated Aortic Type B Dissection Promotes Aortic Remodelling: 1 Year Results of the ADSORB Trial. European Journal of Vascular and Endovascular Surgery. 2014; 48(3): 285-291.
13. Uchida T, Sadahiro M. Thoracic Endovascular Aortic Repair for Acute Aortic Dissection. Annals of Vascular Diseases. 2018; 11(4): 464-472.

14. Bavaria JE, Brinkman WT, Hughes GC, Shah AS, Charlton-Ouw KM, et al. Five-year outcomes of endovascular repair of complicated acute type B aortic dissections, The Journal of Thoracic and Cardiovascular Surgery. 2020. doi: ttps://doi.org/10.1016/j.jtcvs.2020.03.162.

15. De Beaufort, H W, et al. Four-dimensional flow cardiovascular magnetic resonance in aortic dissection: Assessment in an ex vivo model and preliminary clinical experience. J Thorac Cardiovasc Surg. 2019; 157: 467-76.

16. Debus ES, Grundmann RT. Descending Thoracic Aortic Aneurysms (DTAA) and Thoracoabdominal Aortic Aneurysms (TAAA). Evid-based Ther Vasc Surg. 2024; 9(1): 69-99.

17. Bozinovski J, Coselli JS. Outcomes and survival in surgical treatment of descending thoracic aorta with acute dissection. Ann Thorac Surg. 2008; 85: 965-71.

18. Jonathan CH, Joseph SC. Open repair for thoracoabdominal aortic aneurysms precipitated by chronic aortic dissection. Vessel. Plus. 2022.

19. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases. European Heart Journal. 2014; 35(41): 2873-2926. doi:10.1093/eurheartj/ehu281.