Case Report
Management of Acute Uncomplicated Stanford B Aortic Dissection in The Era of Endovascular Repair: A Case Report

Putri Annisa Kamilla1, Novi Kurnianingsih2, Sasmojo Widito2, Djanggan Sargowo2, Budi Satrijo2

1 Brawijaya Cardiovascular Research Center, Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia.
2 Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia.

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ABSTRACT

Background: Critical limb ischemia (CLI) is a terminal stage of peripheral arterial disease (PAD), in the absence of intervention, may lead to lower extremity amputation or death. In cases where medical management is not effective or severe cases of PAD, endovascular and surgical interventions are indicated. Endovascular interventions have become the first-line approach of CLI management and advanced considerably within the past decade.

Case Description: A 78 years old patient with hypertension was admitted to the hospital with persistent chest discomfort and cough for two weeks. The CT aortic angiogram showed type B dissection. Based on the recent guidelines, TEVAR should be considered in patients with uncomplicated type B aortic dissection. Thus we prepared the patient for TEVAR procedure. First, we established a multidisciplinary vascular team for the pre-procedural preparation of the patient. We perform careful measurement through detailed CT angiography reconstruction from carotid to femoral arteries. We found proximal diameter was 30-35mm, the distal diameter was 23mm, and the landing zone right after the left brachial ostium, suitable for stent-graft Valiant Captivia 36-32x150mm. The CT also showed that both the femoral artery were normal. We decided to use the right femoral artery as access. We proceed to the procedure two days later, under general anesthseia, digital subtraction angiography revealed dissection of the descending aorta, and the selected device was inserted. Total occlusion of the primary intimal tear was revealed due to the subsequent contrast injection. The patient was transferred to ICU for postprocedural care and extubated the day after. The hospital stay was uneventful, and a one-month follow-up CT shows no endoleak.

Conclusion: Management of uncomplicated Stanford B dissections is very challenging. TEVAR has emerged as an alternative with lower mortality and morbidity rates compared to surgery that might offer good long-term results.

1. Introduction

Dissection of the aorta is an uncommon yet devastating condition presented with a broad spectrum of clinical presentations. Population studies in the United States have estimated the incidence of aortic dissection to range from 2 to 3.5 cases per 100,000 persons per year.1 Aortic dissection is often associated with aging, obesity, collagen vascular disease, etc. Due to the wide range of initial symptoms and the physical examinations that were not specific, the use of CT, MRI, TEE, or occasionally, intrusive aortography is needed in diagnosing aortic dissection.

An aortic dissection occurred when blood flow in a false lumen between the medial and the intimal layers of the aortic wall resulted from an intimal tear.2 The two major classifications for the dissection of the aorta, which based on the dissection location are the DeBakey classification and the Stanford classification (Figure 1). Aorta distal to the left subclavian artery was involved in DeBakey III or also known as Stanford Type B dissection without any retrograde extension into the ascending aorta. Whereas in Stanford A and De Bakey I and II, there is the involvement of ascending aorta.3,4 Based on the onset, presentation occurs within 14 days is classified as acute, while chronic is more than two weeks.5,6 A recent publication from the IRAD study introduced a new classification for dissection, which stated that symptoms onset that lasts for more than 30 days is considered as chronic.7,8

Stanford Type B aortic dissections account for 25% to 40% of all dissections.9 The mortality rate is 11.7%, with most deaths occurring in the first 24 hours.10 Type B aortic dissections (TBAD) can be either complicated or uncomplicated. The following symptoms define complicated TBAD: malperfusion syndrome affecting visceral, renal,
or extremity, early aortic dilatation or signs of rupture or impending rupture (i.e., haemothorax, increasing periaortic and mediastinal hematoma), refractory pain and hypertension despite optimal medical treatment, or retrograde aortic dissection. When patients are asymptomatic without pain or malperfusion signs and hemodynamically stable, the dissection is defined as uncomplicated, constituting 75% of TBAD.\textsuperscript{11,12}

Uncomplicated type B aortic dissection (UTBAD) has been treated conservatively with optimal medical therapy to reduce blood pressure and heart rate. Despite the success of UTBAD optimal medical management in the early phase, aortic degeneration and aneurysmal development of the dissected aorta remain as a clinical problem with the morbidity, including the aneurysm degeneration of the affected segment, of 30% with 10% of 5-year mortality rate.\textsuperscript{13,14} Due to these results, endovascular repair (TEVAR) of TBAD has created a paradigm shift to both preventing and treating those complications, instead of only treating the complications of TBAD. We present the case of a 78-year-old gentleman who presented with acute UTBAD managed by TEVAR.

2. Case Illustrator

A 78 years-old hypertensive patient admitted to the hospital with persistent chest discomfort and cough for two weeks. Initially, he was admitted for suspicion of pneumonia and scheduled for a chest x-ray by a pulmonologist. The CXR result (Figure 2) showed widened mediastinum with the conclusion suspected aortic dissection and pleural effusion on his left lung. He was then scheduled for a thorax ultrasound the next day. His ultrasound result showed minimal pleural effusion on his left lung, and due to suspicion of dissection aorta in the CXR, the radiologist decided to evaluate the abdominal aorta and found an intraluminal intimal flap in aorta abdominals. Given these results, the patient was consulted to the cardiology department and underwent full echocardiography study, aortic duplex sonography examination, and CT aortic angiography the next day. Echocardiography showed mild aortic regurgitation, and the aortic duplex sonography revealed dilatation of the descending aorta with a size of 2.97 x 3.97 cm and intimal flap in the abdominal aorta at the TS level. CT aortic angiography showed TBAD from descending aorta until supra-aortic bifurcation, with the main entry tear is renal, renal, 20-22 mm from the left subclavian artery. The maximum diameter of the descending aorta was 6.52 cm, with a false patent lumen, and the size of the false lumen was 2.64 cm. It also showed another re-entry tear later at the distal part of the descending aorta (Figure 3). At the time of his clinical presentation, he complained of abdominal and back discomfort that persisted and rated with VAS 3-4 over 10. His was hemodynamically stable, and there was no sign of malperfusion syndrome, rupture, or impending rupture. Based on all of these findings patient was planned for TEVAR procedure for acute UTBAD.

3. Pre-procedural Preparation

We prepared this patient with our multidisciplinary vascular team and performed detailed CT aortic angiography reconstruction to choose the landing zone and the most suitable device for the patient. We found proximal diameter was 30-35mm, the distal diameter was 23mm, and the landing zone based on the intimal tear location was at the descending part of the aorta, after the left subclavian artery branch, suitable for stent-graft Valiant Captivia 36-32x150mm. The CT also showed that both the femoral artery were normal. We decided to use the right femoral artery for access (Figure 5).

4. Procedure

The patient was taken to the catheterization lab and prepped and draped in the usual sterile manner from neck to knees. The patient undergoes general anaesthesia. Digital subtraction angiography was performed with access from the right common femoral artery. The digital subtraction angiography (DSA) revealed the ascending aorta in a proximal location still intact. The DSA showed intimal tear was on the descending part of the aorta with a landing zone distal to the left subclavian artery (Figure 6). Based on the measurement and the landing zone, the device graft was inserted and deployed. Subsequent contrast injection revealed total occlusion of a primary intimal tear (Figure 7). Extravasation of contrast outside the lumen was not found. The patient was transferred to the ICU for post-procedural care and extubated on the same day. The rest of the hospital stay was uneventful. The patient was discharged two days after the procedure, without any residual chest discomfort.
Figure 3. CT Results

Figure 4. 3D CT reconstruction showing proximal to the distal landing zone.
5. Follow up

The patient came for a routine controlled each month. CT aortic angiogram evaluation performed one month after the procedure shows patent graft and no endoleak (Figure 8). The false lumen diameter was reduced to 20 mm with thrombus in the false lumen. The patient was planned to undergo another serial follow-up CT aortic angiogram in the next three months, six months, and every year. The patient was also informed to continue anti-hypertensive drugs routinely. The patient no longer complained about the chest discomfort, and there was no abdominal discomfort or any related neurological symptoms.

6. Discussion

TEVAR is a safe, minimally invasive procedure, widely used as an alternative to surgery due to the lower morbidity and mortality rates in selected patient groups. The rationale for TEVAR for the management of TBAD is to promote primary closure in entry tear, which ultimately leads to false lumen thrombosis by decreasing pressure in the false lumen. It also prevents aortic events at the chronic phase, such as aneurysmal formation and rupture.6

TEVAR was initially used as an alternative to surgery for complicated Stanford B dissections, including signs of thoracic aorta rupture, organ malperfusion, or rapid expansion of the dissection in the distal aortic arch or the descending aorta. Later on, it has been shown that due to a better aortic remodelling process, TEVAR also improves long-term survival in patients with uncomplicated dissections.15 Based on the latest ESC guidelines on the diagnosis and treatment of aortic diseases, TEVAR should be considered in the setting of UTBAD.16

Patient selection who gain the advantage of UTBAD intervention remains as the key to maximize the benefits in aortic repair and reduce the complications. Certain high-risk features that should prompt repair of an acute, uncomplicated TBAD has been looked at by several authors. These high-risk factors are as follows: intramural hematoma with penetrating aortic ulcer in the proximal descending thoracic aorta, initial aortic diameter > 4 cm with a false patent lumen, initial false lumen diameter > 22 mm in the proximal descending thoracic aorta, and recurrent or refractory pain or uncontrolled hypertension with optimal medical therapy.11 Our patient's initial aortic diameter was 6.52 cm, and his initial false lumen was patent with a diameter of 2.64 cm, with an intimal tear in the proximal of descending aorta, which was a high-risk anatomic factor; the repair should have been considered at that time.

Better clinical outcome was found in Endovascular stenting of dissections rather than conservative treatment. The possible mechanism is likely due to the change in volume and remodelling process that occurred after a stent is deployed. Our patient's final DSA showed complete closure of intimal tear, thus reducing the false lumen's diameter and thrombosis. It was confirmed by a 1-month CT follow-up that showed a patent stent with reduced false lumen to diameter 20 mm.
and no endoleaks.

7. Conclusion

When managed medically, UTBAD, a highly complicated disease process, is correlated with poor late outcomes in a sub-group of patients who are at risk. Its management remains a challenge in medical practice. With improved skills and equipment, endovascular percutaneous treatment with TEVAR emerged as an alternative to surgery with lower morbidity and mortality rates. The first trials’ results are encouraging, suggesting that TEVAR ver effectively promotes a successful aortic remodelling in acute and subacute TBAD, which may be associated with reduced aorta-related complications and better survivals.

8. Declarations

8.1. Ethics Approval and Consent to participate
Patient has provided informed consent prior to involve in the study.

8.2. Consent for publication
Not applicable.

8.3. Availability of data and materials
Data used in our study were presented in the main text.

8.4. Competing interests
Not applicable.

8.5. Funding source
Not applicable.

8.6. Authors contributions
Idea/concept: PAK. Design: PAK. Control/supervision: PAK, NK,SW. Data collection/processing: PAK.Extraction/Analysis/interpretation: PAK, NK, SW. Literature review: PAK, NK, SW. Writing the article: PAK. Critical review: NK, SW. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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