

Research Article

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Aortic Dissection: Diagnostic, Therapeutic and Prognostic Aspects at the Regional Hospital Center of Saint-Louis, Senegal



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Abstract

Background: Aortic dissection (AD) is a life-threatening cardiovascular emergency with high mortality rates if not promptly diagnosed and treated. Data on AD in sub-Saharan Africa remains limited.

Objective: To describe the epidemiological, clinical, diagnostic, therapeutic, and prognostic characteristics of patients with AD at the Regional Hospital Center of Saint-Louis, Senegal.

Methods: This retrospective descriptive study included all confirmed AD cases from January 2020 to June 2024. Data collection encompassed demographic characteristics, risk factors, clinical presentation, diagnostic workup, treatment modalities, and outcomes.

Results: Six patients were included (3 males, 3 females) with a mean age of 54.16 ± 10.15 years. Hospital frequency was 0.48%. Hypertension was the most common risk factor (66.7%). Acute chest pain was present in all patients (100%), with sudden onset in 83.3%. Type A dissection predominated (83.3%). Diagnosis was confirmed by CT angiography in all cases. Medical management included beta-blockers in all patients. Three patients underwent surgical intervention (Bentall procedure). Overall mortality was 33.3%.

Conclusion: AD remains a rare but severe condition requiring urgent multidisciplinary management. Early diagnosis and appropriate treatment are crucial for improving outcomes.

Keywords: Aortic dissection; Diagnosis; Treatment; Senegal

Introduction

Aortic dissection (AD) represents one of the most catastrophic cardiovascular emergencies, characterized by a longitudinal tear in the aortic media, typically resulting from an intimal rupture and partial medial involvement [1,2]. Since its first anatomical description by Morgagni in 1761 and the first successful surgical repair by DeBakey in 1955, significant advances have been made in understanding and managing this complex pathology [3,4].

The natural history of untreated AD is grim, with mortality rates approaching 20% within the first 24 hours and 50% within 48 hours for type A dissections [5]. Despite therapeutic advances, AD continues to challenge clinicians worldwide due to its varied clinical presentations and the need for rapid intervention. The incidence of AD varies globally, with reported rates of 2.9-4.3

per 100,000 person-years in developed countries [6,7]. However, epidemiological data from sub-Saharan Africa remains scarce, highlighting the need for regional studies to better understand the disease burden and improve management strategies.

This study aims to analyze the diagnostic, therapeutic, and prognostic aspects of AD in a West African setting, providing insights into the clinical characteristics and outcomes of patients managed at a regional referral center in Senegal.

Methods

Study Design and Setting

This retrospective descriptive study was conducted at the Cardiology Department of the Regional Hospital Center of Saint-

Louis, Senegal, over a 4.5-year period (January 1, 2020, to June 28, 2024).

Study Population

All patients with confirmed AD diagnosis admitted to the cardiology department during the study period were included. Diagnosis confirmation required CT angiography evidence of aortic dissection. Patients with suspected but unconfirmed AD were excluded.

Data Collection

Data were extracted from medical records using a standardized form, including:

- Demographic characteristics and cardiovascular risk factors
- Clinical presentation and physical examination findings
- Diagnostic investigations (ECG, chest X-ray, echocardiography, CT angiography)
- Treatment modalities (medical and surgical)
- Outcomes and complications

Statistical Analysis

Descriptive statistics were used to summarize the data. Continuous variables were expressed as means $\pm$ standard deviation, and categorical variables as frequencies and percentages.

Results

Epidemiological Characteristics

Table 1: Demographic and risk factor profile of the study population.

Characteristics	n (%)	Mean $\pm$ SD
Age (years)		54.16 $\pm$ 10.15
Gender		
- Male	3 (50.0)	
- Female	3 (50.0)	
Cardiovascular risk factors		
- Hypertension	4 (66.7)	
- Diabetes mellitus	2 (33.3)	
- Smoking	2 (33.3)	
- Sedentary lifestyle	1 (33.3)	
- Family history of CVD	3 (50.0)	
- Age >50 years (M) or >60 years (F)	3 (50.0)	

The hospital frequency of AD was 0.48% among all cardiovascular admissions during the study period. The Table 1

summarizes the demographic and risk factor profile of the study population.

Clinical presentation

All patients presented with acute chest pain. The predominance of sudden onset pain (83.3%) aligns with the characteristic acute presentation. The Table 2 details the clinical characteristics and symptom profile of patients at presentation.

Table 2: Clinical presentation and physical examination findings.

Clinical Feature	n (%)
Symptom Onset	
- Sudden	5 (83.3)
- Gradual	1 (16.7)
Pain characteristics	
- Chest pain	6 (100.0)
- Retrosternal	1 (16.7)
- Lower chest	2 (33.3)
- Precordial	1 (16.7)
- Epigastric	1 (16.7)
Pain radiation	
- Back	5 (83.3)
- Flanks	1 (16.7)
Associated symptoms	
- Dyspnea	2 (33.3)
- Vomiting	1 (16.7)
- Lower limb pain	1 (16.7)
Physical examination	
- Hypertension	4 (66.7)
- Aortic regurgitation murmur	4 (66.7)
- Pulse asymmetry	1 (16.7)
- Jugular venous distension	2 (33.3)
- Shock	1 (16.7)

Diagnostic investigations

The CT angiography demonstrated 100% diagnostic accuracy. The prevalence of type A dissection was 83.3%. The Table 3 summarizes the diagnostic findings across different imaging modalities.

The Figure 1 shows CT angiography images showing Type A aortic dissection with intimal flap and true/false lumens (axial and sagittal views).

Treatment and outcomes

All type A dissections received appropriate medical management with beta-blockers, and 60% of type A cases underwent surgical repair. The mortality rate was 33.3%. The Table 4 outlines the therapeutic approaches and clinical outcomes.

Table 3: Diagnostic investigation results.

Investigation	Performed n (%)	Abnormal Findings n (%)
Electrocardiography	6 (100.0)	5 (83.3)
- Left ventricular hypertrophy		3 (50.0)
- Right ventricular hypertrophy		1 (16.7)
- Conduction abnormalities		2 (33.3)
- Atrial fibrillation		1 (16.7)
Chest X-ray	2 (33.3)	2 (100.0)
- Cardiomegaly		2 (100.0)
- Mediastinal widening		1 (50.0)
Transthoracic Echocardiography	6 (100.0)	5 (83.3)
- Aortic dilatation		5 (83.3)
- Intimal flap		4 (66.7)
- True/false lumens		3 (50.0)
- Aortic regurgitation		5 (83.3)
- Pericardial effusion		2 (33.3)
CT Angiography	6 (100.0)	6 (100.0)
- Type A dissection		5 (83.3)
- Type B dissection		1 (16.7)
- Entry tear identified		6 (100.0)
- Pericardial effusion		3 (50.0)

Table 4: Treatment modalities and clinical outcomes.

Treatment/Outcome	n (%)
Medical Management	
- Beta-blockers	6 (100.0)
- Calcium channel blockers	3 (50.0)
- ACE inhibitors	2 (33.3)
- Analgesics	6 (100.0)
Surgical Intervention	3 (50.0)
- Bentall procedure	3 (100.0)
- Additional mitral valve replacement	1 (33.3)
Complications	
- Aortic regurgitation	5 (83.3)
- Pericardial effusion	3 (50.0)
- Renal impairment	2 (33.3)
- Pleural effusion	1 (16.7)
Clinical Outcomes	
- Favorable evolution	4 (66.7)
- Mortality	2 (33.3)

Discussion

This study represents one of the few reports on AD from West Africa, providing valuable insights into the clinical characteristics and outcomes of this life-threatening condition in a resource-limited setting.

Epidemiological considerations

The mean age of 54.16 years in our cohort is consistent with other African studies [8,9,10] but younger than typically reported in Western populations (mean age 63.1 years in IRAD) [11]. This age difference may reflect the earlier onset of cardiovascular risk factors, particularly hypertension, in African populations [12].

The equal gender distribution in our series contrasts with the typical male predominance reported in most studies [13]. This finding may be influenced by the small sample size and requires validation in larger cohorts.

Hypertension was the predominant risk factor (66.7%), aligning with its established role as the most important modifiable risk factor for AD [14,15]. The high prevalence of hypertension in sub-Saharan African populations, often inadequately controlled, likely contributes to the AD burden in this region [16].

Clinical presentation and diagnosis

The classic triad of sudden-onset chest pain (100%), pulse asymmetry (16.7%), and aortic regurgitation murmur (66.7%) was variably present, emphasizing the diagnostic challenge of AD [17]. The predominance of chest pain with back radiation (83.3%) is consistent with typical AD presentations [18,19].

CT angiography achieved 100% diagnostic accuracy in our series, confirming its role as the gold standard imaging modality for AD diagnosis [20,21]. The limited use of chest X-rays (33.3%) and their abnormal findings in all performed cases highlight the importance of having high clinical suspicion for AD.

Transthoracic echocardiography demonstrated good sensitivity (83.3%) for detecting AD signs, though its diagnostic accuracy varies significantly with operator experience and patient characteristics [22,23]. The combination of clinical assessment, basic imaging, and CT angiography provided a robust diagnostic approach in our setting.

Management and outcomes

All patients received appropriate initial medical management with beta-blockers, following current guidelines for AD management [24,25]. The use of additional antihypertensive agents in 83.3% of cases reflects the need for strict blood pressure control in AD patients.

The surgical management rate of 60% for type A dissections aligns with current recommendations for emergency surgical intervention [26,27]. The Bentall procedure was the surgical technique of choice, reflecting the need for comprehensive root replacement in these complex cases [28].

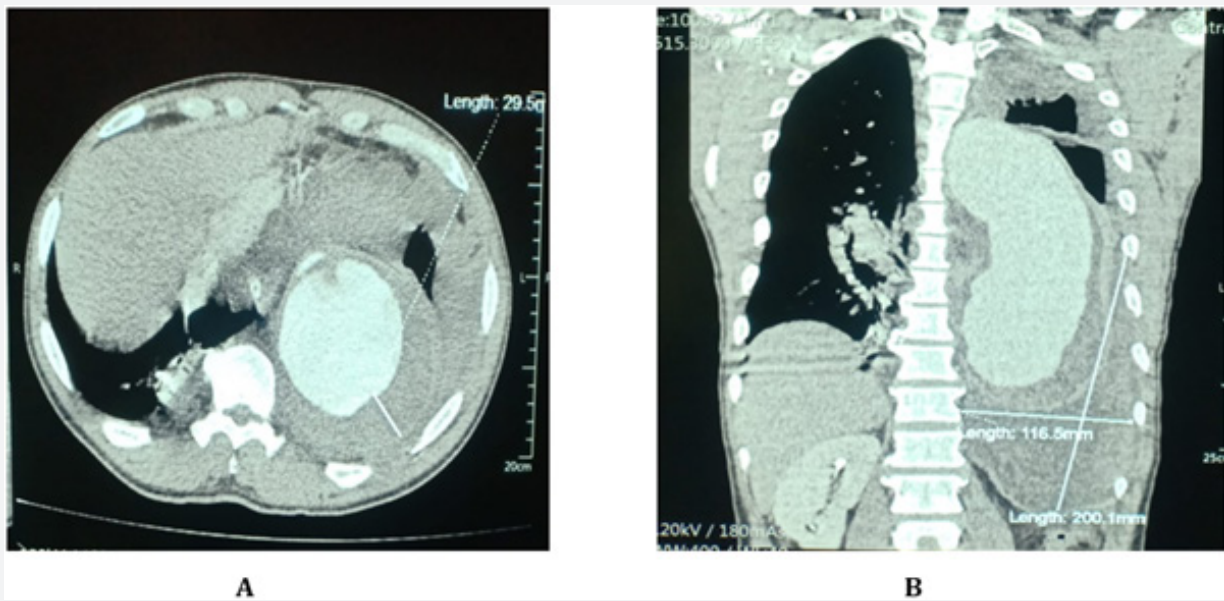


Figure 1: CT angiography images showing Type A aortic dissection with intimal flap and true/false lumens (A: axial and B: sagittal views).

The overall mortality rate of 33.3% is concerning but falls within expected ranges for AD, particularly in settings with limited immediate surgical capabilities [29,30]. The short mean hospital stay (48.5 hours) may reflect either rapid stabilization or early mortality, highlighting the acute nature of this condition [31-37].

Limitations

This study has several limitations inherent to its retrospective design and small sample size. The single-center experience may not be representative of the broader regional picture. Additionally, the lack of long-term follow-up data limits assessment of chronic outcomes and late complications.

The limited availability of certain diagnostic modalities, such as transesophageal echocardiography and cardiac MRI, may have influenced diagnostic accuracy and treatment planning. However, this reflects the real-world constraints of practicing medicine in resource-limited settings.

Implications for clinical practice

This study highlights several important considerations for AD management in West Africa:

- **Enhanced awareness:** The rarity of AD (0.48% hospital frequency) necessitates increased clinical suspicion and awareness among healthcare providers.
- **Diagnostic protocols:** CT angiography should be the first-line imaging modality when AD is suspected, given its high diagnostic accuracy.

- **Treatment standardization:** All AD patients should receive immediate medical management with beta-blockers, regardless of subsequent surgical plans.

- **Referral systems:** Robust referral networks to centers with cardiac surgical capabilities are essential for optimal type A dissection management.

- **Risk factor modification:** Given the high prevalence of hypertension, comprehensive cardiovascular risk reduction programs are crucial for AD prevention.

Future research directions

Future multicenter studies with larger sample sizes are needed to better characterize AD in West African populations. Prospective registries could provide valuable insights into long-term outcomes and guide the development of region-specific management protocols.

Investigation of genetic factors predisposing to AD in African populations may reveal important ethnic differences in disease susceptibility. Additionally, cost-effectiveness analyses of different diagnostic and therapeutic strategies could inform resource allocation decisions in low- and middle-income countries.

Conclusion

Aortic dissection remains a rare but life-threatening cardiovascular emergency in West Africa. Our study demonstrates that despite resource limitations, appropriate diagnosis and management can be achieved with good outcomes in selected

patients. The predominance of hypertension as a risk factor emphasizes the importance of cardiovascular disease prevention programs in this region.

Early recognition, prompt diagnosis with CT angiography, immediate medical stabilization, and timely surgical intervention when indicated are the cornerstones of successful AD management. Continued efforts to improve diagnostic capabilities, treatment protocols, and referral systems will be essential for reducing the morbidity and mortality associated with this devastating condition.

Conflicts of Interest: The authors declare no conflicts of interest.

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