

# Catastrophic aortic dissection in a patient of end stage renal disease

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## ABSTRACT

**Introduction:** Aortic dissection is a catastrophic condition characterized by a tear in the intimal layer of the aorta leading to splitting of the intima and media forming a false lumen within the aorta. It is a calamitous condition as the blood flow to most of the major branches of the aorta gets compromised. It has a varying presentation and it is described as a great masquerader. Acute aortic dissection is rare, and most cases are discovered during autopsies. The association of aortic dissection with renal failure is high as most patients have coexisting comorbid conditions especially hypertension which is a major risk

factor for aortic dissection. **Case Report:** We describe a patient on maintenance hemodialysis (MHD) who developed an acute aortic dissection and underwent surgery with a successful outcome which is very rare, even in patients with normal renal function. **Conclusion:** Prompt recognition and appropriate intervention is crucial for the survival of the patient. The mortality is very high in thoracic aortic dissection and is estimated to be in hours if emergency surgery is not done.

**Keywords:** Aortic dissection, Catastrophic condition, End stage renal disease (ESRD), Maintenance hemodialysis

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## INTRODUCTION

Aortic dissection is a catastrophic condition associated with a tear in the intima of the aorta which further progresses to form a false lumen within the aorta, and hence compromising the blood flow to the branches of the aorta. Acute aortic dissection may be rapidly fatal and one must have a high index of suspicion [1]. The

association with end stage renal disease (ESRD) is high due to the presence of comorbid conditions especially hypertension which is major risk factor for aortic dissection. Most diagnoses of aortic dissection are made during post mortem studies, as the index of suspicion is low. Operative mortality is in the range of 15–40% rising with increasing stage of chronic kidney disease, maximum being on dialysis. Surgical management is difficult due to extensive fluid, electrolyte, and intravascular volume fluctuations. Prompt diagnosis and emergency treatment are critical especially in diseases of the ascending aorta. Involvement of the arch of the aorta requires urgent surgery as the coronary blood flow is compromised besides compromised blood supply to the great vessels arising from the arch [2]. We describe a case of acute aortic dissection who presented with features of acute coronary syndrome, hypertensive urgency and hemiparesis. A high degree of suspicion and a meticulous clinical examination, along with timely intervention lead to a successful outcome.

## CASE REPORT

Our patient was a 40-year-old male, non-smoker and a case of presumed chronic interstitial nephritis and ESRD on maintenance hemodialysis since one year. He presented with sudden onset retrosternal chest pain which was severe, radiating to the scapula and back. This was associated with diaphoresis and weakness of the right upper and lower limb and diffuse pain abdomen. There was no history of weakness in any other limb or any facial involvement. There was no history of any bowel or bladder involvement, any loss of consciousness, seizure or altered sensorium.

Clinically, he was averagely built with a height 179 cm, weight 67 kg and BMI 20.91 kg/m<sup>2</sup>. On examination his pulse was 68/min regular, pulses were asymmetrical and were not felt in right upper and right lower limb. He had raised blood pressure 200/110 mmHg with the blood pressure in the right upper limb and right lower limb not recordable. He had tachypnea and hypoxia with a SpO<sub>2</sub> of 88% at room air. Jugular venous pressure (JVP) was not raised and there was no papilledema. The right upper and lower limbs were cold with absent pulses. Cardiovascular examination revealed an early diastolic murmur suggestive of aortic regurgitation. Abdomen was soft, non-tender and bowel sounds were heard. Neurological examination revealed no localizing signs. Laboratory investigations done revealed hemoglobin 7.8 g/dl, total leukocyte count 5100/mm<sup>3</sup>, blood urea 193 mg/dl, Serum creatinine 7.8 mg/dl, serum sodium 133 mEq/dl, serum potassium 3.6 mEq/dl, serum calcium 10.4 mg/dl, serum phosphate 3.9 mg/dl. Electrocardiogram (ECG) revealed left ventricular hypertrophy with strain pattern. Doppler of the right upper and lower limb revealed no flow in the right subclavian and right iliac artery. 2D echo showed normal left ventricular function, dilated left

atrium, left ventricular ejection fraction (LVEF) 65% with aortic regurgitation and a dissection flap of the ascending aorta. Computed tomography angiography (CTA), done subsequently, showed a Stanford type A aortic dissection beginning from the ascending aorta and extending up to the bifurcation of iliac arteries. There was no flow in the right subclavian and right common iliac artery. Coronary and renal perfusion was adequate and the flow in the great vessels of the arch was intact (Figure 1). Patient was taken up for emergency thoracic surgery with the blood pressure controlled with nitroglycerine infusion at 1.8 µg/min. The patient was operated with cardiopulmonary bypass, hypothermia (25°C) and cardioplegic arrest with antegrade selective cerebral perfusion. The aorta was opened and the dissection flap of the arch excised and replaced with a Dacron graft (Figure 2A–B) which covered the entire arch of the aorta only, the rest of the aorta was left untouched. The patient was on intraoperative continuous venovenous hemodialysis during the surgery. Twelve units of packed red blood cells were transfused during the surgery. Postoperatively, he had hypotension requiring inotropic support along with continuous veno-venous hemodialysis (CVVHD). He was weaned of inotropes by the third day. Thereafter he was supported with intermittent hemodialysis. A repeat CTA revealed that the flow to the coronaries and great vessels of the neck was normal. The right subclavian and iliac artery had good flow, though the dissection in the abdominal aorta was present, as only the entry point of the dissection in the arch of the aorta was repaired (Figure 3).

There was also good flow in bilateral renal arteries. Subsequently, the histopathological report of the resected segment of aorta also confirmed aortic dissection (Figure 4). Nearly six months postoperatively, the patient is on maintenance hemodialysis and the blood pressure is well controlled on two antihypertensive drugs. There is no residual neurological deficit. Over a period of time the remaining dissection of the abdominal aorta will settle down as the entry point of the dissection has been sealed.

## DISCUSSION

Acute aortic dissection is a catastrophic condition which has a varied presentation depending upon the segment of the aorta involved. It is one of the few conditions where the risk of mortality is directly proportional to time in hours. A dissection occurs due to a tear in the intima secondary to high shearing forces on the wall of the aorta which then progresses causing a false lumen. Dissection of the ascending aorta and the arch of the aorta is an emergency due to the involvement of the coronaries and the great vessels arising from the arch. Our patient was a case of ESRD on maintenance hemodialysis (MHD) with uncontrolled hypertension who presented with chest and abdominal pain, right hemiparesis and a hypertensive emergency, masquerading an acute coronary event which may have lead to a stroke. Presence



Figure 1: Sagittal reformatted post-contrast computed tomography scan showing a Type A intramural aortic dissection involving the ascending aorta, arch of aorta (marked by red arrow) and extending through the descending aorta till the bifurcation of common iliac arteries.

of unequal pulses increased the suspicion of aortic dissection. The hypertensive emergency was most likely due to compromised flow in the renal vessels. Stanford type A dissection requires emergency surgery and there is no role for conservative treatment.

Thoracic surgery in these patients carries a high risk of mortality as these patient have underlying atherosclerosis and calcification, they are fluid overloaded



Figure 2: (A) Peroperative picture showing the dissection flaps in arch of aorta (marked by arrows), (B) Peroperative picture showing the placement of Dacron graft within aortic arch.



Figure 3: (A, B) Coronal reformatted computed tomography angiography showing normal contrast enhancement of arch of aorta with flow seen in right iliac artery.



Figure 4: Thoracic aorta showing a classical dissection in the media (indicated by arrow) (H&E stain, x40).

and have electrolyte imbalances, coagulation disorders requiring massive blood transfusions, underlying cardiac dysfunction which may lead to pulmonary edema [3]. Post surgery, there is a risk of neurological deficits due to prolonged cardiopulmonary bypass and hypothermia. There is a requirement of intraoperative and post operative continuous renal replacement therapy to manage the crucial fluid and electrolyte balance along with guarded anticoagulation [4, 5]. Our patient recovered completely post surgery with no residual neurological deficit. The entry point of the dissection was closed thus securing the blood supply to the coronaries. Since there was no entry point for the dissection the false lumen would gradually resolve. The aim of presenting this case is the varied presentation of aortic dissection and a high index of suspicion is warranted along with prompt intervention required to save these patients. A positive outcome of aortic dissection in a patient with ESRD on MHD is very rare. Advances in medicine have increased the life expectancy of patients on hemodialysis [6]. Most of these patients have hypertension, diabetes, advanced atherosclerosis, vascular calcification and are prone for diseases of the aorta. Death from dissection is usually diagnosed at autopsy due to poor clinical suspicion or else the high risk of morbidity and mortality of surgery [7]. There is a paucity of data on diseases of the aorta in these patients and awareness needs to be created to promptly and courageously treat these patients when necessary rather than contemplating the risks. Hence a rare successful outcome of ascending aortic dissection without any morbidity will provide an impetus to clinicians to offer these patients an option of surgery rather than live in fear of impending complications.

## CONCLUSION

The aim of presenting this case is the successful outcome of surgery in aortic dissection in a patient of end stage renal disease due to timely intervention. Since life expectancy of patients with end stage renal disease (ESRD) is increasing with advances in medicine, and a majority of them prone to diseases of the aorta secondary to hypertension and atherosclerosis, and paucity of data on aortic diseases in these patients, awareness for the treatment is required.

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## Author Contributions

Satish Mendonca – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

ANM Chengappa – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

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## Guarantor

The corresponding author is the guarantor of submission.

## Conflict of Interest

Authors declare no conflict of interest.

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