INTRODUCTION

Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of terminal illness.1,2

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage.3

Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character.4,5 Also, vomiting, sweating, and lightheadedness may occur. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia.6

In an aortic dissection, blood penetrates the intima and enters the media layer. The high pressure rips the tissue of the media apart along the laminated plane splitting the inner two-thirds and the outer one-third of the media apart.7 This can propagate along the length of the aorta for a variable distance forward or backwards. Dissections that propagate towards the iliac bifurcation (with the flow of blood) are called anterograde dissections and those that propagate towards the aortic root (opposite of the flow of blood) are called retrograde dissections. The initial tear is usually within 100 mm of the aortic valve, so a retrograde dissection can easily compromise the pericardium leading to a hemopericardium.8 Aortic dissection can quickly lead to death from not enough blood flow to the heart or complete rupture of the aorta.9

*Corresponding author: Dr. Vedant Kulshrestha
Assistant Professor, Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College & Smt. S. K. Hospital, New Delhi

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage. Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia.6

In an aortic dissection, blood penetrates the intima and enters the media layer. The high pressure rips the tissue of the media apart along the laminated plane splitting the inner two-thirds and the outer one-third of the media apart. This can propagate along the length of the aorta for a variable distance forward or backwards. Dissections that propagate towards the iliac bifurcation (with the flow of blood) are called anterograde dissections and those that propagate towards the aortic root (opposite of the flow of blood) are called retrograde dissections. The initial tear is usually within 100 mm of the aortic valve, so a retrograde dissection can easily compromise the pericardium leading to a hemopericardium. Aortic dissection can quickly lead to death from not enough blood flow to the heart or complete rupture of the aorta.9

*Corresponding author: Dr. Vedant Kulshrestha
Assistant Professor, Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College & Smt. S. K. Hospital, New Delhi

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage.

Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia.

In an aortic dissection, blood penetrates the intima and enters the media layer. The high pressure rips the tissue of the media apart along the laminated plane splitting the inner two-thirds and the outer one-third of the media apart. This can propagate along the length of the aorta for a variable distance forward or backwards. Dissections that propagate towards the iliac bifurcation (with the flow of blood) are called anterograde dissections and those that propagate towards the aortic root (opposite of the flow of blood) are called retrograde dissections. The initial tear is usually within 100 mm of the aortic valve, so a retrograde dissection can easily compromise the pericardium leading to a hemopericardium. Aortic dissection can quickly lead to death from not enough blood flow to the heart or complete rupture of the aorta.

Sudden death due to aortic dissection – a case report

1Dr. Vedant Kulshrestha, 2Dr. Manav Sharma and 3Dr. G. V. Jain
1Assistant Professor, Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College & Smt. S. K. Hospital, New Delhi
2Senior Resident, Department of Forensic Medicine & Toxicology, All India Institute of Medical Sciences, Rishikesh
3Professor, Department of Forensic Medicine & Toxicology, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi

DOI: http://dx.doi.org/10.24327/IJRSR.2020.1107.5445

ABSTRACT

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage. Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia. Pericardial tamponade is the most common cause of death from aortic dissection. Aortic dissection is relatively rare, occurring at an estimated rate of three per 100,000 people per year. It is more common in men than women. The typical age at diagnosis is 63, with about 10% of cases occurring before the age of 40. Several different classification systems have been used to describe aortic dissections. Among them DeBakey and Stanford classification systems are commonly used in clinical practice.

In the present case, aortic dissection was found during autopsy in a 25 year old male who was an Under Trial Prisoner. It was DeBakey Type I or Stanford Type A aortic dissection, which led to sudden death due to cardiac tamponade.

INTRODUCTION

Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of terminal illness.1,2

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage.

Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character. Also, vomiting, sweating, and lightheadedness may occur. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia.

In an aortic dissection, blood penetrates the intima and enters the media layer. The high pressure rips the tissue of the media apart along the laminated plane splitting the inner two-thirds and the outer one-third of the media apart. This can propagate along the length of the aorta for a variable distance forward or backwards. Dissections that propagate towards the iliac bifurcation (with the flow of blood) are called anterograde dissections and those that propagate towards the aortic root (opposite of the flow of blood) are called retrograde dissections. The initial tear is usually within 100 mm of the aortic valve, so a retrograde dissection can easily compromise the pericardium leading to a hemopericardium. Aortic dissection can quickly lead to death from not enough blood flow to the heart or complete rupture of the aorta.

*Corresponding author: Dr. Vedant Kulshrestha
Assistant Professor, Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College & Smt. S. K. Hospital, New Delhi

Aortic dissection or dissecting hematoma is a catastrophic illness characterized by dissection of blood between and along the laminar planes of the media, with the formation of a blood-filled channel within the aortic wall, which often ruptures outward, causing massive hemorrhage.

Aortic dissection (AD) occurs when an injury to the innermost layer of the aorta allows blood to flow between the layers of the aortic wall, forcing the layers apart. In most cases, this is associated with a sudden onset of severe chest or back pain, often described as “tearing” in character. Other symptoms may result from decreased blood supply to other organs, such as stroke or mesenteric ischemia.

In an aortic dissection, blood penetrates the intima and enters the media layer. The high pressure rips the tissue of the media apart along the laminated plane splitting the inner two-thirds and the outer one-third of the media apart. This can propagate along the length of the aorta for a variable distance forward or backwards. Dissections that propagate towards the iliac bifurcation (with the flow of blood) are called anterograde dissections and those that propagate towards the aortic root (opposite of the flow of blood) are called retrograde dissections. The initial tear is usually within 100 mm of the aortic valve, so a retrograde dissection can easily compromise the pericardium leading to a hemopericardium. Aortic dissection can quickly lead to death from not enough blood flow to the heart or complete rupture of the aorta.

*Corresponding author: Dr. Vedant Kulshrestha
Assistant Professor, Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College & Smt. S. K. Hospital, New Delhi
Pericardial tamponade is the most common cause of death from AD.9

Aortic dissection is relatively rare, occurring at an estimated rate of three per 100,000 people per year. It is more common in men than women. The typical age at diagnosis is 63, with about 10% of cases occurring before the age of 40.  

Aortic dissection is more common in those with a history of high blood pressure, a number of connective tissue diseases that affect blood vessel wall strength including Marfan syndrome and Ehlers Danlos syndrome, a bicuspid aortic valve, and previous heart surgery. Major trauma, smoking, cocaine use, pregnancy, a thoracic aortic aneurysm, inflammation of arteries, and abnormal lipid levels are also associated with an increased risk. Several different classification systems have been used to describe aortic dissections. One such classification is based on chronicity and labels aortic dissections as hyperacute (<24 hours duration), acute (2–7 days), subacute (8–30 days), and chronic (>30 days).10

DeBakey system categorizes the dissection based on where the original intimal tear is located and the extent of the dissection (localized to either the ascending aorta or descending aorta or involves both the ascending and descending aorta).

- **Type I** – originates in ascending aorta, and propagates at least to the aortic arch and often beyond it distally. It is most often seen in patients less than 65 years of age and is the most lethal form of the disease.
- **Type II** – originates in the ascending aorta and is confined to it.
- **Type III** – originates in the descending aorta and rarely extends proximally, but will extend distally. It most often occurs in elderly patients with atherosclerosis and hypertension.

The Stanford classification is divided into two groups, A and B, depending on whether the ascending aorta is involved.12

- **A** – involves the ascending aorta and/or aortic arch, and possibly the descending aorta. The tear can originate in the ascending aorta, the aortic arch, or more rarely, in the descending aorta. It includes DeBakey types I and II.
- **B** – involves the descending aorta or the arch (distal to the left subclavian artery), without the involvement of the ascending aorta. It includes DeBakey type III.

**Case report**

A 25 years old male who was an Under Trial Prisoner in Neemka Jail, Faridabad, suddenly fell down in lock up and had chest pain. He was initially admitted in Civil Hospital, Faridabad. Then he was referred to Safdarjung Hospital, Delhi on the same day where he expired within few hours. Inquest was conducted by Metropolitan Magistrate. Deceased was an alcoholic, chronic smoker and a known case of Chronic obstructive pulmonary disease. There was no history of any drug abuse. There was no history of diabetes mellitus, hypertension or any cardiac disease. There was no family history of diabetes, hypertension or any congenital heart disease. Autopsy was conducted at the mortuary of Vardhman Mahavir Medical College & Safdarjung hospital, New Delhi. On external examination the dead body was wrapped in white body bag and blue hospital sheet, wearing red colored half sleeve T-shirt, grey colored lower pant, white, black and blue colored underwear. The dead body measured 172 cm in length, moderately built and nourished. Rigor mortis was present all over the body. Post mortem staining was seen over the back of the body, which was fixed. Cornea of both sides was opaque. Conjunctiva and natural orifices were normal. Injection marks were present over front of right elbow and right forearm. Defibrillator marks were present over front and left side of chest. Reddish abrasion of size 0.5 cm x 0.5 cm was present over inner aspect of left elbow. Reddish abrasion of size 0.5 cm x 0.5 cm was present over outer aspect of left elbow. Reddish abrasion of size 2 cm x 2 cm was present over outer aspect of left hip. Reddish abrasion of size 1.5 cm x 1 cm was present over lower and inner aspect of right knee. Reddish abrasions, in number, of sizes 1 cm x 1 cm, 0.5 cm x 0.5 cm and 0.3 cm x 0.2 cm respectively, were present over inner aspect of left knee. On internal examination, Scalp on reflection showed blood extravasation over left parieto-temporal region over an area of 5 cm x 2 cm. Skull was intact. Brain was edematous. Patchy subdural and subarachnoid haemorrhage present over both cerebral hemispheres and cerebellum, more over left side. Spinal Column was NAD (No abnormality detected). Neck structures on dissection showed blood extravasation present around blood vessels of neck on left side at posterior aspect. Hyoid bone, thyroid and cricoid cartilages were intact. Trachea and oesophagus were NAD. Collar Bone, Sternum and Ribs were intact. Pleural Cavity: NAD. Both lungs were congested and edematous. Pericardium contained about 200 ml of blood. Heart was enlarged weighing 400 gms. Left ventricular wall thickness measures 2 cm. Right ventricular wall thickness measures 0.6 cm. Interventricular septum thickness measured 1.8 cm. Left anterior descending artery was thickened, atherosclerosed and narrowed by 40%. Left circumflex artery was thickened, atherosclerosed and narrowed by 80%. Right coronary artery was thickened, atherosclerosed and narrowed by 60%. Proximal part of ascending aorta was dilated and thinned out at places. Proximal part of descending aorta showed tears in intima and media layer, and blood extravasation was present in ascending aorta, arch of aorta and thoracic part of descending aorta underneath the adventitia layer. Heart valves were normal. Peritoneal Cavity: NAD. Stomach contained about 100 ml of grey colored fluid with no unusual smell. Stomach mucosa was congested. Intestines contained gases and faecal matter.

Liver was congested. Spleen was slightly enlarged. Kidneys were congested. Pelvic cavity, pelvic bones, urinary bladder and genitals were normal. Viscera was sent for chemical analysis, report of which came as negative later on. Heart along with attached ascending aorta, aortic arch and proximal part of descending aorta was sent for histopathological examination which confirmed the diagnosis of aortic dissection. The final cause of death in this case was cardiac tamponade as a result of aortic dissection. Though the post mortem findings in head and neck might create some confusion about possibility of assault to inexperienced doctors, but the history and meticulous autopsy clinches the diagnosis.

**DISCUSSION**

The acute aortic dissection (AD) is the most common cause of sudden death in the aorta’s diseases and it is associated with high mortality; despite the advances in diagnosis and treatment
Monzo Blasco A et al, studied thirty-four cases of sudden death due to aortic dissection in the histopathology laboratory of the Legal Medicine Institute in Spain (1998-2015). Forensic autopsy was performed with complementary histological and toxicological studies. They found 73% corresponded to men with a lower average age than women (42 vs. 49 years). The cardiac weight was increased (88%), regardless of age, with a mean of 534 g, and was higher when presenting dilated aortic root (74%) or high blood pressure (53%). Cystic medial degeneration (57%) was associated to aortic dilation and bicuspid aortic valve, and both with younger age, but not related to high blood pressure and left ventricular hypertrophy in older ages. Horizontal line was more frequent (66%) and Type II DeBakey predominated. Most of them died suddenly at home (66%); 61% from previously known symptoms (51% of the total) was associated with chest pain (mainly precordial). 40% had sought medical attention the day before and were erroneously diagnosed.14

Morentin Campillo B et al, did a multicenter population-based study based on forensic autopsies conducted in the provinces of Biscay (1991-2016), Valencia (2000-2016), and Seville (2004-2016) in people aged 1 to 35 years. They identified 35 individuals with sudden death due to thoracic aortic dissection (80% males), with a mean age of 29±5 years. The incidence was 0.09/100 000 inhabitants/y. Eighteen persons had at least 1 risk factor for thoracic aortic dissection (TAD), and this figure increased to 29 when post mortem findings were included. Thirty-five cases of sudden death due to AAD were autopsied (87.1%). Of the 31 cases, 26 (83.9%) patients were not recognized clinically and were misdiagnosed with acute myocardial infarction, coronary artery disease, cholecystitis, acute gastroenteritis, renal/urinary lithiasis, or acute pancreatitis.15

In the present case, aortic dissection was found during autopsy in a 25 year old male who was an Under Trial Prisoner. It was DeBakey Type I or Stanford Type A aortic dissection. Proximal part of ascending aorta was dilated and thinned out at places. Proximal part of descending aorta showed tears in intima and media layer, and blood extravasation was present in ascending aorta, arch of aorta and thoracic part of descending aorta underneath the adventitia layer. Associated atherosclerotic coronary artery disease was also present. The cause of death in this case was cardiac tamponade as a result of aortic dissection, which led to sudden death. Deceased was an alcoholic, chronic smoker and a known case of Chronic obstructive pulmonary disease. There was no history of any drug abuse. There was no history of diabetes mellitus, hypertension or any cardiac disease. There was no family history of diabetes, hypertension or any congenital heart disease.

CONCLUSION
In this case report a young male who was an Under Trial Prisoner, suddenly fell down in lock up and had chest pain. He was admitted in the hospital where he expired within few hours. Inquest was conducted by Metropolitan Magistrate. Deceased was an alcoholic, chronic smoker and a known case of Chronic obstructive pulmonary disease. There was no history of any drug abuse. There was no history of diabetes mellitus, hypertension or any cardiac disease. There was no family history of diabetes, hypertension or any congenital heart disease. During autopsy few abrasions were present on the body at places. Scalp on reflection showed blood extravasation over left parieto-temporal region. Skull was intact. Brain was edematous. Patchy subdural and subarachnoid haemorrhage present over both cerebral hemispheres and cerebellum, more over left side. Neck structures on dissection showed blood extravasation present around blood vessels of neck on left side at posterior aspect. Hyoid bone, thyroid and cricoid cartilages were intact. Pericardium contained about 200 ml of blood. Proximal part of ascending aorta was dilated and thinned out at places. Proximal part of descending aorta showed tears in intima and media layer, and blood extravasation was present in ascending aorta, arch of aorta and thoracic part of descending aorta underneath the adventitia layer. Associated atherosclerotic coronary artery disease was also present. On histopathological examination the diagnosis of aortic dissection was confirmed. Though the post mortem findings in head and neck might create some confusion about possibility of assault, but the history and meticulous autopsy clinches the diagnosis. This case emphasises the requirement of essential investigations to diagnose aortic dissection early and start treatment to prevent sudden death in young individuals. It also highlights the role of meticulous autopsy and histopathological examination to detect this condition.

Acknowledgements: None.
Conflict of Interest: None.
Financial Assistance: None.
References


How to cite this article:
Dr. Vedant Kulshrestha, Dr. Manav Sharma and Dr. G. V. Jain.2020, Sudden Death Due to Aortic Dissection – A Case Report. Int J Recent Sci Res. 11(07), pp. 39121-39124. DOI: http://dx.doi.org/10.24327/ijrsr.2020.1107.5445

*******