Accidental Finding of Atherosclerosis with 90% Stenosis of the Coronary Artery In a 17-Year-Old White Male

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ABSTRACT

Atherosclerotic cardiovascular disease is the leading cause of death in the United States, though no case reports of teenage deaths due to the disease were found after extensive literary research. A case is presented of a 17-year-old male driver involved in a motor vehicle collision.

Autopsy examination revealed multiple blunt force injuries. Approximately 3 mm of the middle portion of the left anterior descending coronary artery displayed about 90% atherosclerotic stenosis. It was determined that the cause of death was ventricular fibrillation due to atherosclerotic cardiovascular disease. The consultation with the parents and possible finding of hypercholesterolemia are discussed in the report. *Acad Forensic Pathol.* 2018 8(4): 947-951

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INFORMATION

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INTRODUCTION

Heart disease is the leading cause of death in the United States. The most prevalent type of heart disease is atherosclerotic cardiovascular disease (1, 2). Atherosclerosis begins in childhood as deposits of cholesterol and its esters in the intima of large muscular arteries. At certain arterial sites, more lipid accumulates and is covered by a fibromuscular cap to form a fibrous plaque. Further changes in fibrous plaques render them vulnerable to rupture, an event that precipitates occlusive thrombosis and clinical disease (e.g., sudden cardiac death, myocardial infarction, stroke, or peripheral arterial disease) (3). Teenage atherosclerotic cardiovascular disease is extremely rare. No case reports of teenage deaths due to the disease were found after extensive literary research.

CASE REPORT

A 17-year-old male driver was involved in a motor vehicle collision. The incident report from the police department indicated that he crossed the midline of the road and collided head-on with an oncoming motor vehicle. There was no evidence of distracted or fatigued driving; he was driving on a familiar route from home to a local restaurant on a sunny day. He was pronounced dead at the scene.

Autopsy examination revealed multiple blunt force injuries. There was complete transection of the spine under T3, with approximately 200 mL of clotted blood in the right pleural cavity. Multiple lacerations involved the liver, spleen, and left kidney, with 300 mL of clotted blood in the abdominal cavity. Additionally, open fractures of the left forearm and closed fractures of the bilateral femurs were identified.

Approximately 3 mm of the middle portion of the left anterior descending coronary artery displayed about 90% atherosclerotic stenosis—the stenosis was eccentric, yellow, soft, and without calcification (**Images 1 and 2**). The right coronary artery and the rest of the left anterior descending coronary artery were of the usual caliber and completely normal. There was no evidence of any abnormality of the myocardium.

No other macroscopic diseases were identified. He weighed 179 pounds at a length of 65 inches. Toxicology tests were negative for any drugs or chemicals in the body.

It was determined that the cause of death was ventricular fibrillation due to atherosclerotic cardiovascular disease with multiple blunt force injuries as contributing factors. The manner of death was deemed natural.

An interview with the victim's parents revealed that he never had chest pain, shortness of breath, cardiac arrhythmia, or any other symptoms. He was very active and took part in wrestling, baseball, and football in high school. However, the maternal side of the family has a history of high cholesterol, although no family members have died of coronary artery disease at an early age. Based on recommendations from the forensic pathologist, the 14-year-old brother was tested, and results indicate that he already has high cholesterol. He is now being treated by a local cardiologist.

DISCUSSION

There are multiple potential causes for accelerated atherosclerosis in young people. These include the common risk factors of obesity, hypertension, dyslipidemia, diabetes, and smoking, as well as autoimmune diseases such as lupus erythematosus (4, 5). The presence of significant hyperlipidemia in the absence of other risk factors in the decedent's brother suggests familial hypercholesterolemia. Familial hypercholesterolemia (FH) is a well-documented cause of premature coronary heart disease (CHD) in the young (6). In studies of young adults (age less than 50 years) with myocardial infarction, FH was found in more than 9%. Heterozygous familial hypercholesterolemia is relatively common, with one in every 500 births being heterozygous, though homozygous disease is rare, found in one in every one million births (7, 8). The blood samples and cardiac tissues from this case have been preserved for possible future study.

Regarding death certification, the determination of cause and manner of death in this case was based on the principle of the "chain of events." More likely than

not, fatal ventricular fibrillation due to atherosclerotic cardiovascular disease caused him to cross the mid-line of the road and collide head-on with an oncoming motor vehicle. The belief that multiple blunt force injuries were contributing factors is based on the notion that if this ventricular fibrillation had occurred in a witnessed setting without trauma, he could have been saved.

It is understood that the manner of death in this case could have been ruled as accident by other medical examiners or coroners because blunt force injuries

were listed as contributing factors. It is our opinion that the initial event of the “chain of events” in this particular case was atherosclerotic cardiovascular disease, which resulted in a motor vehicle accident, and then blunt force injuries. Although blunt force injuries contributed to the terminal event—death—it is our opinion that the manner of death should be governed by the initial event.

In another possible scenario of a motor vehicle driver hit by another motor vehicle, triggering his or her cardiac death due to severe atherosclerotic cardiovas-

Image 1: Macroscopic examination of the coronary artery with 90% stenosis.

cular disease, and with minimal blunt force injuries, it is our opinion that the manner of death is accident because the initial event was a motor vehicle accident. The cause of death in this scenario would still be atherosclerotic cardiovascular disease.

CONCLUSION

A common problem in forensic pathology is deciding whether a death involving a motor vehicle crash represents a true traumatic death or the consequence of a sudden cardiac death while driving. In cases where this is not certain, most offices will perform a full autopsy. This case illustrates that this uncertainty is not

limited to older drivers, but should be a consideration in younger decedents as well. In such cases, consultation with the family is appropriate prior to autopsy to obtain medical history. If FH is suspected, clinical follow-up for family members would be appropriate, including evaluation of more traditional risk factors for atherosclerotic heart disease with FH (4). These actions are justified by the public health role of the forensic pathologist.

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Image 2: Microscopic examination of the coronary artery with 90% stenosis (H&E, x40).

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